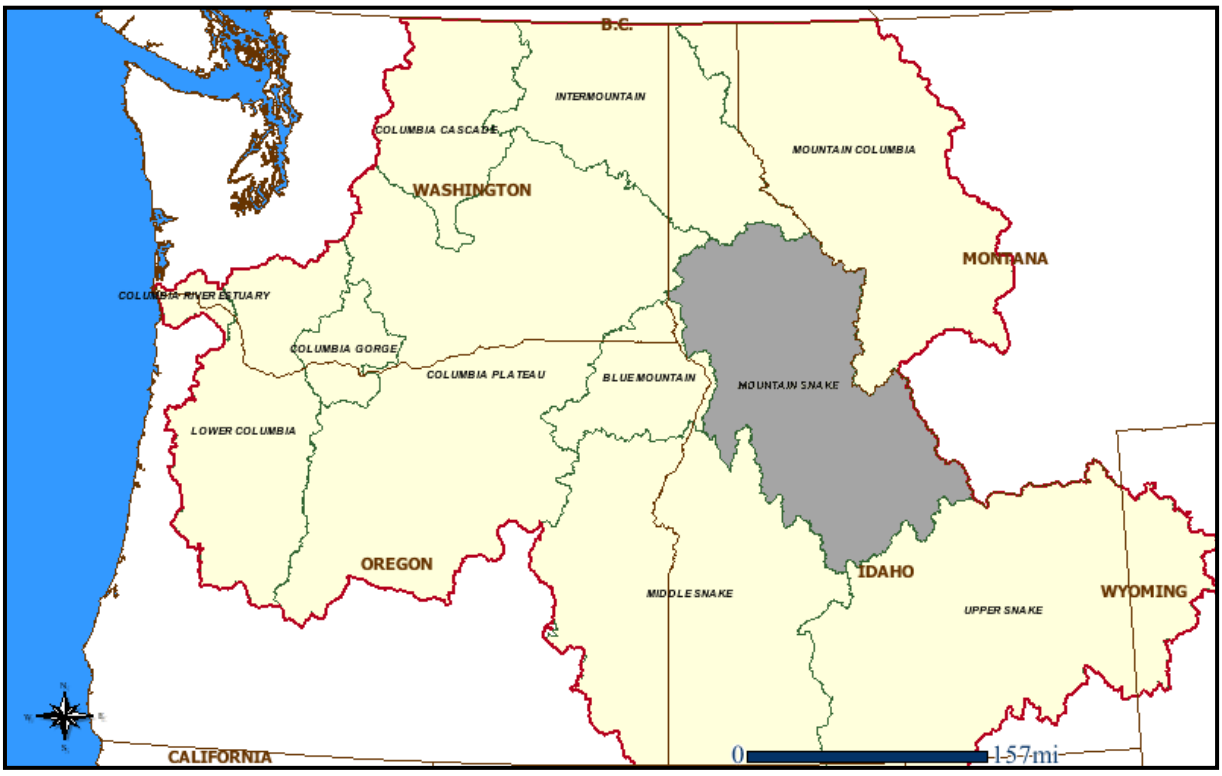
U.S. Fish and Wildlife Service Pacific Region

Columbia River Basin Hatchery Review Team

Columbia River Basin, Mountain Snake Province

Salmon and Clearwater River Watersheds



Idaho Lower Snake River Compensation Plan State Operated Hatcheries

Clearwater, Magic Valley, McCall, and Sawtooth Fish Hatcheries

Assessments and Recommendations

Final Report, Appendix B:

Briefing Document; Summary of Background Information

March 2011

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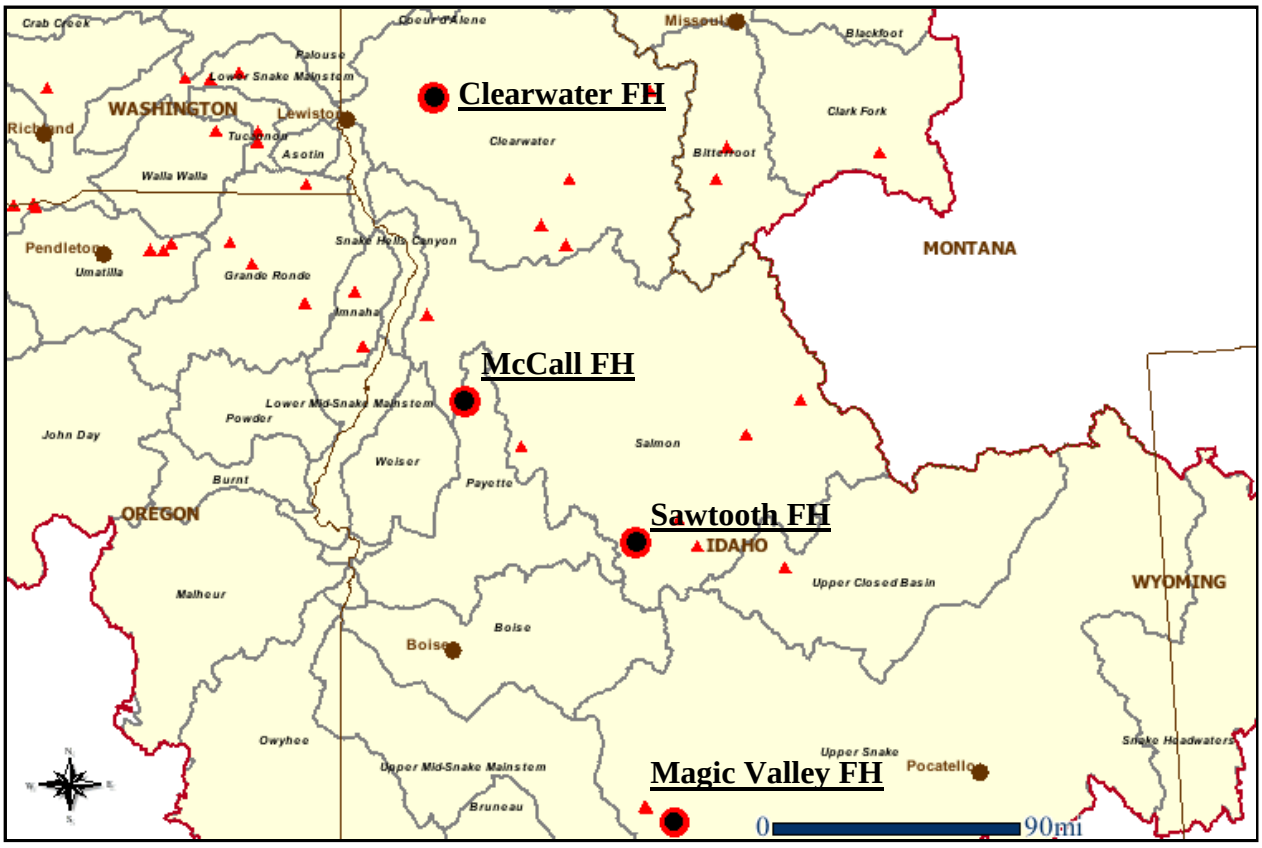

Figure 1. LSRCP Fish Hatcheries in Idaho[1]

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

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I. Introduction to the Lower Snake Region

For an overview of the Lower Snake Region, please refer to Appendix B of the Hatchery Review Team's Lower Snake National Fish Hatcheries Assessments and Recommendations Report. The document is available at http://www.fws.gov/Pacific/fisheries/Hatcheryreview/reports.html

II. Clearwater Fish Hatchery

A. Description of hatchery[2]

Site Overview - The main hatchery consists of two separate incubation facilities, 24 outdoor raceways for steelhead rearing, 11 outdoor raceways for Chinook rearing, an adult holding and spawning area, residences for seven permanent employees, and an administration building and dormitory.

There are structures for adult trapping, holding and spawning at Red River, Crooked River and Powell satellite faculties. Each of these also have rearing and acclimation ponds for Chinook salmon and steelhead (IDFG 2008a).

- The Clearwater Fish Hatchery and its four satellite facilities comprise the largest hatchery complex constructed by the Army Corp of Engineers under the Lower Snake River Compensation Plan. Construction began in 1986 with the Red River satellite facility and ended in 1991 with the completion of the main Clearwater Hatchery in Ahsahka, Idaho.

- The main Clearwater Hatchery is located at Ahsahka, Idaho approximately 45 miles east of Lewiston, Idaho on highway 12. When you arrive at Orofino on highway 12, turn left across the bridge entering town, immediately turn left on highway 7 and travel approximately 4.5 miles, cross the bridge over the North fork of the Clearwater River and take an immediate left across the railroad tracks and into the entry of the Clearwater Hatchery.

- The Red River facility is located near the Red River Ranger station approximately 15 miles east of Elk City, Idaho.

- The Crooked River facility is located approximately 44 miles east of Grangeville, Idaho on highway 14. Crooked River fish trap is located approximately ¼ mile upstream of the mouth of Crooked River.

- The Powell facility may be seen by driving on state highway 12 to approximately milepost 163.5 and then turning south on the Elk Summit road and travel two miles to the entryway sign of the Powell fish trap. The Lower Snake River Compensation Plan is a federal mitigation program created to provide mitigation for fish losses caused by the construction of the four lower Snake River dams. The Idaho Department of Fish and Game operates the hatchery with funding provided through the U.S. Fish and Wildlife and Lower Snake River Compensation Plan office.

Clearwater Hatchery - Clearwater Fish Hatchery is the final facility built by the U.S. Army Corps of Engineers under the LSRCP. This facility is also the largest of the LSRCP hatcheries built. The hatchery office building consists of two parts. The dormitory section includes four bunkrooms with maximum capacity of 15 people, a living room, dining room, kitchen, shower rooms, and laundry room. The administration portion consists of office space with a visitor center and entry lobby.

[2] *IDFG July 2006 p.4-7.*

The shop area includes a vehicle maintenance shop, a smaller mechanical repair shop, wood shop, and locker room. The hatchery building also houses an incubation room and walk-in freezer. A screen and equipment storage building is on the west end of the hatchery. There are seven residences on the hatchery grounds. Each residence also has a storage building. Isolation incubation building is for receiving eggs with unknown disease status and a chemical storage building for storing barrels of formalin and chlorine.

Two 1.8-mile long pipelines run upstream to the Dworshak Dam. The pipelines go up the face of the dam to an elevation of 1,357 feet, then through the dam into the reservoir. The 18-inch pipe (secondary supply) is stationary at an elevation of 1,357 feet with a screened inlet to keep out debris. This pipe supplies cool water to the hatchery. The 48-inch flexible plastic pipe (primary supply) is suspended from a floating platform with a winch attached to the platform. A winch raises and lowers the intake of the pipe to the level of desired water temperature. This pipe supplies warm water (50 to 58o

Approximately 200 yards upstream from the hatchery is a distribution structure designed to reduce the 286-psi of the high-pressure supply lines to the gravity flow of 7 psi to the hatchery. The structure consists of a primary and secondary chamber. The primary and secondary pipelines have each been outfitted with a hydroelectric generator and put into operation June 2000. The two generators will produce approximately 2400 KW of electricity.

A 73,600 cubic foot cleaning sedimentation pond is used to settle out the solids produced by the hatchery. A 414,000 cubic foot final sedimentation pond settles waste from the total flow of hatchery operation and the out flow of the cleaning sediment.

In 2000, a new 2,040 square foot structure was constructed. The sides of the new building are four military transport containers, two on each side, welded end to end. They support a roof spanning a 51 x 40 foot area creating a new covered storage area.

The steelhead raceways consist of 300 ft x 10 ft x 6-ft deep raceways supplied by a center head raceway with an east and west bank of 12 raceways each. A total rearing space of 24 raceways is 216,000 cubic feet. This area will rear a maximum capacity of 2.4 million steelhead smolts with 0.3-density index (DI) (Piper 1986). A flow of approximately 1.67 cubic feet per second (cfs) is available for each raceway, but this flow will only allow 1.7 million steelhead to be reared in these raceways without exceeding the flow index (FI) of 1.2 (Piper). All water for these raceways flow through degassing towers and then into the head raceway. These raceways are supplied with water from both intakes.

Chinook raceways are 200 ft x 10 ft x 3 ft deep. Eleven raceways have a total rearing space of 66,000 cubic feet. The raceways are supplied with water from both primary and secondary intakes and a mixing chamber, which allows for the control of water temperature to rear Chinook. The designed rearing capacity of these raceways is 1.5 million smolts at a 0.3 DI (Piper). The estimated flow per raceway is 2.4 cfs.

The adult holding facility consists of two ponds with a combined capacity of 8,000 cubic feet and a maximum holding capacity of 800 adult salmon. There is also a covered spawning area with two live wells for on-site egg taking. This facility is supplied with water from the tailrace of the juvenile Chinook raceways. Estimated flow per pond is 3.5 cfs.

The incubation room contains 48 double stack Heath incubators with a total of 768 trays available for egg incubation. The maximum capacity of this facility is five million green eggs. The incubation room is supplied with both water sources to provide the desired temperature for incubation with a flow of 5 to 6 gpm per stack.

Isolation incubation consists of 15 double stack Heath Incubators with a total of 240 trays available for egg incubation. The maximum capacity of this facility is 1.5 million green eggs. The isolation incubation room is supplied with both water sources to provide the desired temperature for incubation with a flow of 5 to 6 gpm per stack.

Early rearing consists of sixty concrete vats. Each measures 40-ft x 4-ft x 3 ft deep and contains 480 cubic feet of rearing space. This part of the facility can rear 5.9 million fish to 287 fish/lb. at a 0.3 DI. The vats are supplied with water from each intake and have a flow of approximately 120 gpm per vat when all vats are in use. An incubation jar is plumbed directly into them. The 60 incubator jars have a total capacity of 2.6 million eggs with a flow of 15 gpm per jar. Each vat is equipped with automatic feeders controlled by adjustable time clocks.

Crooked River - There are two separate sites to this facility. The first is the adult trap and a support cabin located one-half mile upstream of the mouth of Crooked River. The weir at this location consists of removable posts and panels supported by an iron bridge across Crooked River. There are no holding ponds at the site, and all fish are either released directly from the trap or transported to Red River holding ponds. Ten miles upstream from the adult trap are two raceways for summer rearing and spring acclimation of smolts. There is a cleaning waste pond and final settling pond to meet EPA water quality standards. Additional facilities include a garage, shop, walk-in freezer, and a support cabin.

The Crooked River acclimation facility has two raceways, measuring 145 ft x 20 ft x 4 ft deep, for a total of 23,200 cubic feet. These raceways have a capacity of 700,000 juvenile Chinook with a DI of 0.29. Water flow per raceway is 6 cfs. Each raceway is outfitted with three automatic Nielson feeders. The adult trapping facility measures 10 ft x 12 ft x 4 ft deep with a total of 480 cubic feet. Water flow for the adult facility is 10 cfs. This facility has no provision for adult holding.

Powell - The Powell facility is at the confluence of Crooked Fork Creek and Colt Killed Creek (White Sands), which form the Lochsa River. There is one rearing pond for summer rearing and spring acclimation of smolts. A water supply diversion and intake screen structure are on Walton Creek, and a pump house is on Colt Killed Creek. A weir diverts fish that come up into Walton Creek into the fish ladder and fish trap. The fish trap is connected to two adult holding ponds and a covered spawning area. A floating weir that spans across the Lochsa River is stored at the facility for use when needed. Also on site are a formalin storage building and a support cabin with a walk-in freezer.

The rearing pond measures 165 ft x 65 ft x 5 ft deep and has 53,625 cubic feet of rearing space. The maximum design capacity is 500,000 fish with a DI of 0.092. Water flow through this pond is 6.24 cfs. A catwalk across the length of the pond supports eight automated Nielson feeders.

The two adult ponds, measuring 100 ft x 20 ft x 4 ft 8 in. deep, have a volume of 9,500 cubic feet and a holding capacity of 960 adult Chinook. The adult trap measures 12 ft x 6 ft x 4 ft deep and is supplied with 6.24 cfs of water.

Red River - The Red River facility consists of four structures: freezer/storage building, a work shop/garage area, a formalin storage building, and a support cabin. The adult holding facility consists of two raceways with a holding capacity of 350 adult fish. A removable tripod and panel weir blocks fish passage across Red River and diverts them into the fish ladder. There is one rearing pond for summer rearing and spring acclimation of smolts.

The adult holding facility consists of two ponds, measuring 10 ft x 45 ft x 4 ft deep, with a total of 3,400 cubic feet of holding space and a trap area 8 ft x 16 ft x 4 ft deep. These ponds have a holding capacity of 350 fish. A removable tripod and panel weir blocks fish passage and diverts them into the fish ladder. One half of the weir consists of floating panels and the other half is removable tripods and panels. Water flow through the ponds is 4.09 cfs.

The rearing pond measures 170 ft x 70 ft x 4 ft 6 in. deep and has 53,550 cubic feet of rearing space. The maximum design capacity is 500,000 fish with a DI of 0.092. This pond has a hypalon plastic liner with eight to ten inch diameter cobblestones on the inclined banks. The bottom of the pond is a bare liner, which aids in pond vacuuming. A catwalk runs the entire length of the rearing pond and holds eight automatic Nielson feeders.

B. Hatchery water sources[3]

Clearwater Fish Hatchery – Clearwater Fish Hatchery receives water through two supply pipelines from Dworshak Reservoir. The warm water intake is attached to a floating platform and can be adjusted from five feet to fifty feet below the surface. The cool water intake is stationary at 245 feet below the top of the dam. An estimated 9 cfs of water is provided by the cool water supply and 70 cfs of water from the warm water supply. The cool water supply has remained fairly constant between 38° and 45°F. The warm water can reach 80°F but is adjusted regularly to maintain 56°F for as long as possible throughout the year. When water temperatures drop in the fall, the intake will be moved to the warmest water available until water temperatures rise in the spring. All water is gravity flow to the hatchery.

Red River - Red River is supplied by gravity flow from an intake at the bottom of the South Fork of Red River, 225 yards upstream from the facility. The water right for the facility is 8.18 cfs. During low flow in the summer, about 5 cfs is available to the hatchery. Temperatures ranged from 50° to 68°F.

Crooked River - Crooked River rearing raceways are supplied by an intake 200 yards upstream of the raceways. The water rights stipulate 10 cfs from April 1 to June 30 and 6 cfs from July 1 to Oct. 1 at the rearing facility. Temperatures ranged from 48° to 68°F (Appendix B1). All temperatures were taken at the adult trap. All water supplied to both facilities is gravity flow.

Powell – The intake is 100 yards upstream from the facility. Powell's water rights for the gravity intake are 6.24 cfs from gravity flow system on Walton Creek and 2.5 cfs from a supply pumped out of Colt Killed Creek. Two 7.5 horsepower pumps can be used to supply Walton Creek with water from Colt Killed Creek during periods of low water. Water temperatures ranged from 44° to 57°F from Walton Creek.

[3] *IDFG July 2006 p.4-7.*

C. Adult broodstock collection facilities[4]

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 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 (Bowles and Leitzinger 1991). Carson National Fish Hatchery fingerlings were released in 1981. From 1982 through 1985, only adults returning to the Red River satellite were used to source eggs for broodstocks. However, Dworshak National Fish Hatchery (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 National Fish hatcheries 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 hatchery and at Dworshak NFH were released at this location in 1989. Juvenile Chinook salmon were released from Kooskia NFH in 1990 and 1991 (Bowles and Leitzinger 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.

D. Broodstock holding and spawning facilities[5]

Clearwater Fish Hatchery – The main Clearwater Hatchery is not a collection facility, but it does have an adult holding facility. This consists of two ponds with a combined capacity of 8,000 ft3 and a maximum holding capacity of 800 adult salmon. Each pond measures 10 ft x 1000 ft and an average depth of four ft deep. There is a covered spawning area with live tanks at the head of each holding pond.

Red River - The Red River Satellite facility has an adult trapping and holding facility. The two adult holding ponds measure 10 x 45 ft with an average depth of 4 ft. Total holding space is 3,400 ft3 and total holding capacity is 350 adult fish. This facility also has a covered spawning area with live tanks at the head of each holding pond.

Crooked River – The Crooked River facility has no broodstock holding or spawning capability.

[4] *CFH Spring Chinook HGMP, Sept. 30, 2002.*
[5] *CFH Spring Chinook HGMP, Sept. 30, 2002, p. 24-26 and 31-32.*

Crooked/Red River - Adult spring Chinook salmon trapped at Crooked River are transported daily to the Red River satellite holding facility. Fish may also be transferred to the main Clearwater Fish Hatchery. At the time of transfer, fish are anesthetized, measured, injected with Erythromycin (20 mg/kg), inspected for injuries, and scanned for CWT, PIT, and radio tags. Fish are transferred using adult transport vehicles.

Powell - The Powell facility also has two adult ponds measuring each 100 ft x 20 ft x 4 ft 8 inches. The volume of the two ponds is 9,500 ft3 with a holding capacity of 960 adult Chinook. It is supplied with 6.24 cfs of water. There is a covered spawning area with live tanks at the head of each holding pond.

Adult spring Chinook trapped at Powell facility are held and spawned at the Powell facility and then transported to Clearwater FH after water hardening.

E. Incubation facilities[6]

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

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

- Eyed-eggs are typically loaded in Heath tray baskets at densities not to exceed 8,000 eggs per basket.

- Water flow to each incubator stack is checked periodically to insure that desired flows are maintained. Incubator water temperatures are tracked with recording thermographs and hand thermometers.

F. Indoor rearing facilities[7]

At the swim-up stage of development, unfed fry are moved to inside vats and distributed as evenly as possible (typically 15,000 to 44,000 fish per vat at ponding). Fry are typically ponded in hatchery vats when 80% of each incubation tray has completed yolk absorption. Temperature units are tracked throughout incubation to assist with the process of tracking incubation development. Spring Chinook salmon are typically ponded from December through the end of January. Flow and density indices are held to not exceed 1.3 and 0.3, respectively

[6] *CFH Spring Chinook HGMP, Sept. 30, 2002, p.34-35.*
[7] *CFH Spring Chinook HGMP, Sept. 30, 2002, p.35-36.*

G. Outdoor rearing facilities[8]

- **Clearwater Fish Hatchery -** Chinook raceways are 200 ft x 10 ft x 3 ft deep. Eleven raceways have a total rearing space of 66,000 cubic feet. The raceways are supplied with water from both primary and secondary intakes and a mixing chamber, which allows for the control of water temperature to rear Chinook. The designed rearing capacity of these raceways is 1.5 million smolts at a 0.3 DI. The estimated flow per raceway is 2.4 cfs.

- **Clearwater Fish Hatchery -** Early rearing space consists of sixty concrete vats. Each measures 40 ft x 4 ft x 3 ft deep and contains 480 cubic feet of rearing space. This part of the facility can rear 5.9 million fish to 287 fish/lb. at a 0.3 DI. The vats are supplied with water from each intake and have a flow of approximately 120 gallons per minute per vat when all vats are in use. An incubation jar is plumbed directly into each vat. The 60 incubator jars have a total capacity of 2.6 million eggs with a flow of 15 gpm per jar.

- **Clearwater Fish Hatchery** - During early rearing, vats are cleaned daily and dead fish removed. During final rearing, outside raceways are cleaned every other day but dead fish are removed daily.

- Hatchery and satellite water temperatures are monitored constantly with recording thermographs and checked routinely with hand held thermometers. Early rearing water temperatures (vat room) typically range from 4.4ºC to 13.3ºC. Dissolved oxygen and total dissolved gas are monitored monthly using hand held meters. Dissolved oxygen typically remains at 8.0 ppm or greater. Total dissolved gas typically averages 100%.

H. Release locations and facilities[9]

- **Crooked River** - The Crooked River facility has two raceways, measuring 145 ft x 20 ft x 4 ft deep, for a total of 23,200 cubic feet. These raceways have a capacity of 700,000 juvenile Chinook with a DI of 0.29. Water flow per raceway is 6 cfs. Each raceway is outfitted with three automatic Nielson feeders. The adult trapping facility measures 10 ft x 12 ft x 4 ft deep with a total of 480 cubic feet. Water flow for the adult facility is 10 cfs. This facility has no provision for adult holding.

- **Powell** - The rearing pond measures 165 ft x 65 ft x 5 ft deep and has 53,625 cubic feet of rearing space. The normal loading of 320,000 fish produces the best looking smolts and a DI significantly less than 0.3. The maximum design capacity is 500,000 fish with a DI of 0.092. Water flow through this pond is 6.24 cfs. A catwalk across the length of the pond supports eight automated Nielson feeders.

- **Red River** - A 170-ft x 70 ft x 4 ft 6 in. deep rearing pond will rear a maximum of 320,000 Chinook smolts. The maximum design capacity is 500,000 fish with a DI of 0.092. Water flow through this pond is 6.24 cfs. This pond has a hypalon plastic liner with eight to ten inch diameter cobblestones on the inclined banks. The bottom of the pond is a bare liner, which aids in pond vacuuming. A catwalk runs the entire length of the rearing pond and holds eight automatic Nielson feeders. Water flow through the pond is 4.09 cfs.

[8] *CFH Spring Chinook HGMP, Sept. 30, 2002, p.36-37.*
[9] *CFH Spring Chinook HGMP, Sept. 30, 2002, p.36-37.*

I. Outmigrant monitoring facilities

Historically, Chinook releases from Clearwater have ranged up to approximately 1.98 million smolts, 1.65million presmolts and 1.0 million parr. All production Chinook are Ad clipped. During the first week of April (dates) the NPT will transport approximately 262,500 smolts to the Selway River for release near the mouth of Meadow Creek. Planned releases of BY06 spring Chinook smolts are for 1,858400 fish at an expected 16-20 fish per pound (103,245 pounds of fish). PIT tags (45,500) will be used in spring Chinook releases in 2008 to assess, juvenile survival, escapement back to the project area, and harvest management. (USFWS, Feb. 2008, p.9, Table 5)

J. Additional or special facilities

Clearwater FH has an isolation incubation building on site.

K. Outreach and public education facilities/programs[10]

- 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.
- 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.
- The facility has hands-on interactive education on-site and self-guided tour signage. Tours are often provided.
- Clearwater FH host the Clearwater Youth Program, introducing youth to hatcheries and fish culture.

L. Special issues or problems (e.g. water and property rights issues, law suits, etc.)

None identified.

[10] *Pers. comm. IDFG staff, 2008.*

IIA. Clearwater FH Spring Chinook

A. General information

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 were to be trapped at Dworshak NFH or the three satellite facilities in the Clearwater River Basin (Red River, Crooked River, and Powell). Each satellite facility includes adult trapping/holding facilities and rearing/acclimation ponds. The adult return goal for the program is 11,915 salmon back to the project area (above Lower Granite Dam). (USFWS May 1990, p.21-22)

B. Stock/Habitat/Harvest Program Goals and Purpose

1. Purpose and justification of program

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. (USFWS May 1990, p.21-22)

2. Goals of program

The goal of this program is to return 11,915 spring Chinook salmon above Lower Granite Dam to mitigate for survival reductions resulting from construction and operation of the four lower Snake River dams. (CFH Spring Chinook HGMP, Sept. 30, 2002, p.3)

3. Objectives of program

- Approximately 1,860 Chinook are needed for broodstock for the Clearwater Fish Hatchery spring Chinook salmon program. This number includes 1,020 for Powell, 840 for the SF program and also accounts for pre-spawning mortality.
- Original design memorandum shows the production goal may be as high as three million Chinook smolts. Historically, Chinook releases from Clearwater have ranged up to approximately 1.98 million smolts, 1.65million presmolts and 1.0 million parr.
- Adult return goal for the program is 12,000 adult Chinook over Lower Granite Dam.

(USFWS, Feb. 2008, p.9, Table 5)

4. Type of program (Integrated or Segregated)

Clearwater Fish Hatchery was designed as an *Isolated Harvest Program*. However, some broodstock management, rearing, and juvenile releases supported Idaho Supplementation Studies (ISS) activities conducted by the IDFG and Nez Perce Tribal supplementation programs. (CFH Spring Chinook HGMP, Sept. 30, 2002, p.3)

5. Alignment of program with ESU-wide plans

There is currently no ESU-wide hatchery plan for spring Chinook salmon. Spring Chinook salmon are not listed in the Clearwater River Basin.

6. Habitat description and status where fish are released.

Very little habitat within the Clearwater 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 AUs. 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, and Upper and Lower Selway AUs. While poor habitat conditions for spring Chinook are typically associated with lower mainstem reaches of major tributaries (Lolo Creek, Lochsa, Selway and South Fork Clearwater Rivers) and the mainstem Clearwater River, it does provide an excellent migration corridor (NWPPC Nov. 2003, p.279).

7. Size of program and production goals (No. of spawners and smolt release goals)

Approximately 1,007 females and 1,007 males are needed for Clearwater Hatchery allocations at a 1:1 male to female ratio. (USFWS, Feb. 2008, p.16-17, Table 5)

Stock	Brood Year	Release location	Program Goal
South Fork	2006	Red River Pond	400,000
South Fork	2006	Crooked River pond	140,000
South Fork	2006	Crooked River trap	560,000
Powell	2006	Powell pond	400,000
South Fork/ Rapid River	2007	Selway R. - upper	300,000
South Fork	2006	Selway R. - lower	300,000
Powell	2007	Trans to NPTH for 09 rel.	125,000
Total			**2,225,000**

C. Description of program and operations

1. Broodstock goal and source[11]

- Founding hatchery stocks used for spring Chinook salmon re-introductions were primarily obtained from the Rapid River Hatchery. Initially however, spring Chinook stocks imported for restoration came from Carson, Big White, Little White or other spring Chinook captured at Bonneville dam. Genetic analyses confirm that existing natural spring Chinook salmon in the Clearwater River subbasin are derived from reintroduced Snake River stocks.

- **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 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 National Fish Hatchery fingerlings were released in 1981. From 1982 through 1985, only adults returning to the Red River satellite were used to source eggs 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 National Fish hatcheries 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 hatchery 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.

2. Adult collection procedures and holding[12]

Spring Chinook will be trapped at the Crooked River and Red River weirs, which will be installed approximately the third week of March, prior to high water. Trapping operations will

[11] *CFH Spring Chinook HGMP, Sept. 30, 2002, p.27-28.*
[12] *CFH Spring Chinook HGMP, Sept. 30, 2002, p.16-17.*

continue until after September 1 and five consecutive days of zero fish are trapped. Proposed adult needs will be approximately 1,007 females and 1,007 males for Clearwater Hatchery allocations. NPT requested adult spring Chinook in excess of Clearwater broodstock requirements be available for broodstock at NPTH. A minimum of 200 females and 200 males will be requested to fill broodstock needs at NPTH. If CFH manager predicts elevated prespawning mortality in holding adults, hatchery manager will compensate for loss by taking and holding additional adult fish. If by commencement of spawning too many adults have been taken, then adult outplants will be implemented at locations and priorities identified in the 2008 Clearwater R. AOP.

The outplanting protocol [for excess hatchery broodstock] provides for distribution for natural spawning and subsistence use. If adult Chinook, available for release into natural spawning areas, exceed the numbers agreed to, further consultation will occur. The general procedure for providing fish for subsistence will be first to tribal programs, then to charitable organizations. Jack Chinook may go to subsistence programs directly.

Table 8a. Sites, release numbers, and marks for adult Spring Chinook Salmon, when all Clearwater basin production programs are above broodstock needs.*

Release Location	Hatchery Source	Number Limit
Selway Basin		
McGruder	RR, NPTH, Clear, DNFH, KNFH	800 - 1,000
O'Hara Creek	RR, NPTH, Clear, DNFH	200
Lower Selway	RR, NPTH, Clear, DNFH, KNFH	0 - 2,000
SF Clearwater R.		
Mill Creek	RR, NPTH, Clear, DNFH	150
Meadow Creek	RR, NPTH, Clear, DNFH	150 - 300
SF Clearwater R.	RR, NPTH, Clear, DNFH	0 - 500*
Lochsa River		
Colt Killed Creek	RR, NPTH, Clear, DNFH	500
	Subtotal	**1,800 - 4,650**

*Release Locations are not prioritized
If adult Chinook available for outplant exceed the numbers agreed upon above the NPT will consult with co-managers on additional outplant sites or numbers.

3. Adult spawning

a) Spawning protocols[13]

Spawning ratios of 1:1 will be used unless the brood stock population is less than 100 females. If the spawning population is less than 100 females, then eggs from each female will be split into two equal groups. A different male will fertilize each group. One cup of well water will be added to each bucket and set aside for 30 seconds to one minute. The two buckets will be poured together and continued through the spawning process. When brood stock population is 50 to 25 females, the eggs from each female will be split into three equal groups and each group fertilized by a different male. One cup of well water

[13] *CFH Spring Chinook HGMP, Sept. 30, 2002, p.17.*

will be added to each bucket and set aside for 30 seconds to one minute; then all three buckets will be poured together. When brood stock population is 25 females or less, the eggs from each female will be divided into four equal groups, each fertilized by a separate male. The process will be completed as previously mentioned to finish the spawning process. During the entire spawning year, at least five to ten percent of the jacks will be used during the spawning process. An effort will be made to use all returning fish for spawning. If presented with an excess number of one sex, gametes from individual parents may be subdivided and each part fertilized with gametes with different parents. The first sort will occur between August 5 and 10. All females will be sorted twice per week, and all ripe females will be spawned each time. Spawning will continue until all females are spawned. NPT assistance will be provided when spawning Chinook for NPTH. If too many eggs are taken for the hatchery program, these eggs can be used to backfill appropriate IDFG programs, other agency programs. If not needed, surplus eggs will be disposed.

b) No. of males and females spawned each year over past 10 years (table)[14]

Brood year	Females	Males
2007		
Powell	526	545
Red/Crooked R.	142	334
2006		
Powell	242	246
Red/Crooked R.	607	463
2005		
Powell	81	119
Red/Crooked R.	126	143
2004		
Powell	460	410
Red/Crooked R.	436	232
2003		
Powell	351	383
Red/Crooked R.	398	499
2002		
Powell	554	371
Red/Crooked R.	485	391
2001		
Powell	795	482
Red/Crooked R.	676	483
2000		
Powell	551	335
Red/Crooked R.	376	397

[14] *Compiled table from IDFG Sept. 2007, July 2006, Sept. 2005a, July 2004, Oct. 2003a, July 2002.*

4. Fertilization

a) Protocols[15]

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

- When the broodstock population contains 50 females to 25 females, the eggs from each female are split into three equal sub-families. Each sub-family is fertilized by a different male. One cup of well water is added to each bucket and set aside for 30 seconds to one minute. All three sub-families are then combined.

- When the broodstock population contains 25 females or less, the eggs from each female are divided into four equal sub-families. Each sub-family is fertilized by a separate male. The process is completed as previously mentioned to finish the spawning process. During the entire spawning year, at least five to ten percent of the jacks will be used for spawning. An effort is made to use all returning fish for spawning.

b) Number of eggs collected and fertilized each year over past 10 years (table)[16]

Brood year	Green Eggs	Eyed Eggs	% Eye UP
2007			
Powell	2,000,753	1,870,377	93.5
Red/Crooked R.	542,180	517,118	95.4
(Trans.) Rapid River	625,573	578,457	92.5
2006			
Powell	824,580	760,924	92.3
Red/Crooked R.	1,983,316	1,928,925	97.3
2005			
Powell	310,039	290,201	93.6
Red/Crooked R.	485,624	471,872	97.2
(Trans.) Rapid River		155,423	
(Trans.) Dworshak		801,353	
2004			
Powell	1,309,624	1,270,750	97.0
Red/Crooked R.	1,605,432	1,468,683	91.5
2003			
Powell	1,255,390	1,142,247	91.0
Red/Crooked R.	1,588,998	1,514,901	95.3
(Trans.) Dworshak	310,167	294,213	94.9
2002			
Powell	1,930,703	1,824,108	94.5

[15] *CFH Spring Chinook HGMP, Sept. 30, 2002, p.33.*
[16] *Compiled table from IDFG Sept. 2007, July 2006, Sept. 2005a, July 2004, Oct. 2003a, July 2002.*

Red/Crooked R.	1,726,885	1,678,849	97.2
2001			
Powell	2,737,281	2,510,087	91.7
Red/Crooked R.	1,840,509	1,779,772	96.7
2000			
Powell	2,035,086	1,791,464	88.0
Red/Crooked R.	715,014	588,217	82.3

5. Incubation[17]

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

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

- Eyed-eggs are typically loaded in Heath tray baskets at densities not to exceed 8,000 eggs per basket.

- Water flow to each incubator stack is checked periodically to insure that desired flows are maintained. Incubator water temperatures are tracked with recording thermographs and hand thermometers.

6. Ponding

a) Protocols[18]

Fry are typically ponded in hatchery vats when 80% of each incubation tray has completed yolk absorption. Temperature units are tracked throughout incubation to assist with the process of tracking incubation development. Spring Chinook salmon are typically ponded from December through the end of January. Flow and density indices are held to not exceed 1.3 and 0.3, respectively.

b) Number of fry ponded each year, including % hatch each year

Spawn Year	Green Eggs Taken	Eyed-eggs	Survival to Eyed Stage (%)
1988	391,743	N/A	N/A
1989	N/A	N/A	N/A

[17] *CFH Spring Chinook HGMP, Sept. 30, 2002, p.34-35*
[18] *CFH Spring Chinook HGMP, Sept. 30, 2002, p.35.*

1990	24,000	N/A	N/A
1991	24,200	16,051	66.3
1992	543,878	495,045	91.0
1993	1,651,269	1,382,719	83.7
1994	327,085	303,464	92.8
1995	9,635	7,130	74.0
1996	590,371	537,828	91.1
1997	2,759,300	2,457,191	89.1
1998	1,228,047	1,006,067	82.0
1999	907,614	855,384	94.2

Eyed-egg to smolt survival for spawn years 1998 and 1999 are presented below:

Spawn Year	Eyed-eggs	Number of Smolts Released	Survival from Eyed Stage to Release (%)
1998	1,006,067	829,000	82.0
1999	855,384	781,823	91.0

(CFH Spring Chinook HGMP, Sept. 30, 2002, p.33)

Brood Year	Fry to fingerling	Fingerling to smolt
1988	N/A	N/A
1989	N/A	N/A
1990	N/A	N/A
1991	N/A	N/A
1992	99.2	95.9
1993	94.2	91.5
1994	92.9	98.0
1995	98.6	99.7
1996	96.4	96.1
1997	97.7	96.0
1998	99.7	99.9
1999	89.8	99.5

(CFH Spring Chinook HGMP, Sept. 30, 2002, p.35-36)

Brood year	Green Eggs	Eyed Eggs	% Eye UP
2007			
Powell	2,000,753	1,870,377	93.5
Red/Crooked R.	542,180	517,118	95.4
(Trans.) Rapid River	625,573	578,457	92.5
2006			
Powell	824,580	760,924	92.3
Red/Crooked R.	1,983,316	1,928,925	97.3
2005			
Powell	310,039	290,201	93.6
Red/Crooked R.	485,624	471,872	97.2
(Trans.) Rapid River		155,423	

(Trans.) Dworshak		801,353	
2004			
Powell	1,309,624	1,270,750	97.0
Red/Crooked R.	1,605,432	1,468,683	91.5
2003			
Powell	1,255,390	1,142,247	91.0
Red/Crooked R.	1,588,998	1,514,901	95.3
(Trans.) Dworshak	310,167	294,213	94.9
2002			
Powell	1,930,703	1,824,108	94.5
Red/Crooked R.	1,726,885	1,678,849	97.2
2001			
Powell	2,737,281	2,510,087	91.7
Red/Crooked R.	1,840,509	1,779,772	96.7
2000			
Powell	2,035,086	1,791,464	88.0
Red/Crooked R.	715,014	588,217	82.3

(IDFG Sept. 2007, July 2006, Sept. 200a5, July 2004, Oct. 2003a, July 2002)

7. Rearing/feeding protocols[19]

At the swim-up stage of development, unfed fry are moved to inside vats and distributed as evenly as possible (typically 15,000 to 44,000 fish per vat at ponding). Density (DI) and flow (FI) indices are maintained to not exceed 0.30 and 1.3, respectively (Piper et al. 1982).

Clearwater Fish Hatchery - Chinook raceways are 200 ft x 10 ft x 3 ft deep. Eleven raceways have a total rearing space of 66,000 cubic feet. The raceways are supplied with water from both primary and secondary intakes and a mixing chamber, which allows for the control of water temperature to rear Chinook. The designed rearing capacity of these raceways is 1.5 million smolts at a 0.3 DI. The estimated flow per raceway is 2.4 cfs.

Early rearing space consists of sixty concrete vats. Each measures 40 ft x 4 ft x 3 ft deep and contains 480 cubic feet of rearing space. This part of the facility can rear 5.9 million fish to 287 fish/lb. at a 0.3 DI. The vats are supplied with water from each intake and have a flow of approximately 120 gallons per minute per vat when all vats are in use. An incubation jar is plumbed directly into each vat. The 60 incubator jars have a total capacity of 2.6 million eggs with a flow of 15 gpm per jar.

Crooked River - The Crooked River facility has two raceways, measuring 145 ft x 20 ft x 4 ft deep, for a total of 23,200 cubic feet. These raceways have a capacity of 700,000 juvenile Chinook with a DI of 0.29. Water flow per raceway is 6 cfs. Each raceway is outfitted with three automatic Nielson feeders. The adult trapping facility measures 10 ft x 12 ft x 4 ft deep with a total of 480 cubic feet. Water flow for the adult facility is 10 cfs. This facility has no provision for adult holding.

Powell - The rearing pond measures 165 ft x 65 ft x 5 ft deep and has 53,625 cubic feet of rearing space. The normal loading of 320,000 fish produces the best looking smolts and a DI significantly less than 0.3. The maximum design capacity is 500,000 fish with a DI of 0.092.

[19] *CFH Spring Chinook HGMP, Sept. 30, 2002, p.36-38.*

Water flow through this pond is 6.24 cfs. A catwalk across the length of the pond supports eight automated Nielson feeders.

Red River - A 170-ft x 70 ft x 4 ft 6 in. deep rearing pond will rear a maximum of 320,000 Chinook smolts. The maximum design capacity is 500,000 fish with a DI of 0.092. Water flow through this pond is 6.24 cfs. This pond has a hypalon plastic liner with eight to ten inch diameter cobblestones on the inclined banks. The bottom of the pond is a bare liner, which aids in pond vacuuming. A catwalk runs the entire length of the rearing pond and holds eight automatic Nielson feeders. Water flow through the pond is 4.09 cfs.

Hatchery and satellite water temperatures are monitored constantly with recording thermographs and checked routinely with hand held thermometers. Early rearing water temperatures (vat room) typically range from 4.4ºC to 13.3ºC. Dissolved oxygen and total dissolved gas are monitored monthly using hand held meters. Dissolved oxygen typically remains at 8.0 ppm or greater. Total dissolved gas typically averages 100%.

During early rearing, vats are cleaned daily and dead fish removed. During final rearing, outside raceways are cleaned every other day but dead fish are removed daily.

During early rearing, spring Chinook fry are fed a starter and grower diets produced by BioOregon. Fish are fed every hour during this stage of development using automatic feeders. Feeding rates range from 5.0% to 1.8% body weight per day. The average feed conversion rate during the early rearing period is 1.31 pounds of feed for every pound of weight gain.

During final rearing in outside raceways, spring Chinook salmon are fed BioOregon's grower diet. Fish are fed every hour during this stage of development using pneumatic system. Feeding rates range from 2.0 to 1.8% body weight per day. The average feed conversion rate during this stage of development is 1.2 pounds of feed for every pound of weight gain.

8. Fish growth profiles[20]

First year growth information (monthly length increase) for spring Chinook salmon reared at the Clearwater Fish Hatchery are presented below.

Month in Culture	Growth Increase Per Month (cm)
January	0.36
February	0.45
March	0.58
April	0.50
May	0.76
June	0.53
July	1.77
August	1.82
September	1.27
October	1.17
November	0.71
December	0.61

[20] *CFH Spring Chinook HGMP, Sept. 30, 2002, p.37-38.*

9. Fish health protocols and issues

- All females will be tested by ELISA for Bacterial Kidney Disease (BKD). All eggs from females that are identified at a level of 0.25 OD or higher will be culled. A 60 fish sample (ovarian fluids) and at least 30 kidney/spleen (tissue) samples will be taken for viral replicating agents. A 20 fish sample (head wedge) will be taken for *Myxobolus cerebralis* analysis. Juveniles will be inspected on a quarterly basis. Diagnostics on demand. Pre-liberation samples prior to release at satellites (20 fish sample). (USFWS, Feb. 2008, p.7.)

- 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. (pers. comm. D. Munson, IDFG, 2008)

- 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. (pers. comm. D. Munson, IDFG, 2008)

- 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(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)

10. Chemotherapeutant use[21]

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

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

- 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.

[21] *Pers. comm. D. Munson, IDFG, 2008.*

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

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

11. Tagging and marking of juveniles[22]

Stock	Brood Year	Release location	Expected Release	# AD	# CWT	# PIT
South Fork	2006	Red River Pond	424,700	424,700	40,000	12,000
South Fork	2006	Crooked River pond	141,700	141,700	0	1,000
South Fork	2006	Crooked River trap	566,800	566,800	40,000	12,000
Powell	2006	Powell pond	415,900	415,900	80,000	12,000
South Fork/ Rapid River	2007	Selway R. - upper	300,000	0	0	0 Oxy-tet
South Fork	2006	Selway R. - lower	309,300	203,000	309,000	8,500
Powell	2007	Trans to NPTH for 09 rel.	unknown	33%	100%	0
Total			2,158,400	1,752,100	469,000	45,500

12. Fish Release

a) Protocols [23]

All fish reared at the Clearwater Hatchery are transported off station for release in the upper basin of the Clearwater drainage. Fish are loaded into transport trucks using a Magic Valley Heliarc fish pump. The loading density guideline for transport vehicles is ½ pound 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.

b) Number of fish released each year (subyearlings?; yearlings?; other?)[24]

Stock	Brood Year	Release location	Program Goal
South Fork	2006	Red River Pond	400,000

[22] *USFWS, Feb. 2008, Table 5.*
[23] *CFH Spring Chinook HGMP, Sept. 30, 2002, p.42.*
[24] *USFWS, Feb. 2008, Table 5.*

South Fork	2006	Crooked River pond	140,000
South Fork	2006	Crooked River trap	560,000
Powell	2006	Powell pond	400,000
South Fork/ Rapid River	2007	Selway R. - upper	300,000
South Fork	2006	Selway R. - lower	300,000
Powell	2007	Trans to NPTH for 09 rel.	125,000
Total			**2,225,000**

D. Program benefits and performance[25]

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

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

3.1.2 Standard: Program contributes to mitigation requirements.

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

3.1.3 Standard: Program addresses ESA responsibilities.

Indicator 1: ESA Section 7 Consultation completed.

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

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

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

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

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

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

[25] *CFH Spring Chinook HGMP, Sept. 30, 2002, p.42.*

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

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

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

1.10.2) "Performance Indicators" addressing risks.

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

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

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

Indicator 1: Number of spawners of natural origin removed for broodstock managed.
Indicator 2: Number and origin of spawners migrating to natural spawning areas managed.
Indicator 3: Number of eggs or juveniles placed in natural rearing areas managed.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1. Adult returns

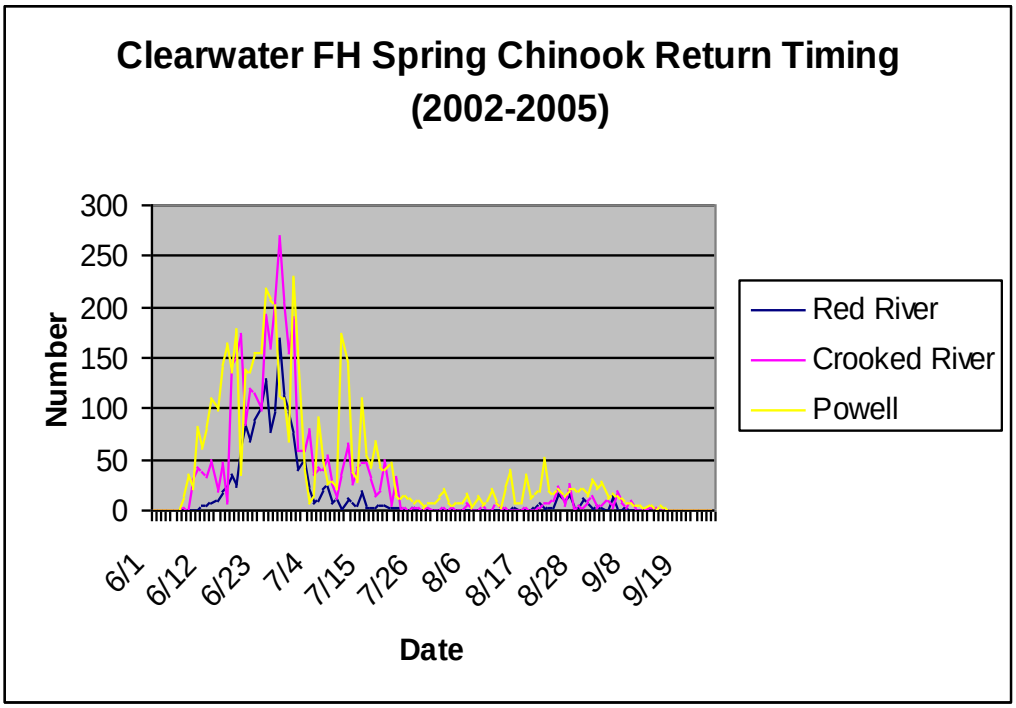
a) Numbers of adult returns (need data for the past 10-20 years)

Year	Females	Males/Unk.	Jacks
1988	209	182	3
1989	93	133	32
1990	86	142	4
1991	17	44	10
1992	243	270	24
1993	525	498	16
1994	86	56	2
1995	2	7	15
1996	178	223	146
1997	1,011	913	8
1998	388	379	3
1999	41	39	264
2000	1,352	705/ 118	959
2001	2,476	1,795/ 1,328	91
2002	1,876	1,386/ 19	72

(CFH Spring Chinook HGMP, Sept. 30, 2002, p.30-31)

Year	Facility	Females	Males/Unk.	Jacks
2007	Red/ Crooked R.	304	228/29	350
	Powell	559	403/11	277
2006	Red/ Crooked R.	670	453/13	35
	Powell	276	192/8	77
2005	Red/ Crooked R.	148	116/2	55
	Powell	96	115/3	27
2004	Red/ Crooked R.	703	472/0	57
	Powell	955	119/0	45
2003	Red/ Crooked R.	783	683/0	192
	Powell	730	719/3	126
2002	Red/ Crooked R.	1,091	818/11	39
	Powell	784	568/8	33

b) Return timing and age-class structure of adults



Return Year	Facility	I Ocean Male	I Ocean Female	II Ocean Male/Unk.	II Ocean Female	III Ocean Male/Unk.	III Ocean Female
2007	Red/ Crooked R.	357	0	136/15	242	92/7	62
	Powell	277	2	311/6	498	92/5	59
2006	Red/ Crooked R.	35	15	434/10	649	19/3	6
	Powell	77	2	181/8	267	11/0	7
2005	Red/ Crooked R.	55	2	99/1	126	17/1	20
	Powell	27	2	83/2	76	32/1	18
2004	Red/ Crooked R.	57	9	440/0	690	32/0	4
	Powell	45	9	581/0	905	198/0	41
2003	Red/ Crooked R.	192	0	93/0	281	590/0	502
	Powell	126	3	324/1	463	395/2	264
2002	Red/ Crooked R.	39	5	585/10	922	233/1	164
	Powell	33	3	404/6	746	164/2	36

c) Smolt-to-adult return rates

POWELL SATELLITE

			Return Age From BY				
Brood Year	Number Released	Year Released	1-ocean	2-ocean	3-ocean	Total	SAR (%)
1986	200,100	Spr. 1988	27	157	10	194	0.097
1987	200,639	Spr. 1989	2	16	15	33	0.016
1988	314,500	Fall 1989	7	249	288	544	0.173
1989	307,100 180,764	Fall 1990 Spr. 1991	6	204	57	267	0.054
1990	358,400 204,300	Fall 1991 Spr. 1992	8	28	1	37	0.007
1991	500	Fall 1992	1	1	0	2	0.400
1992	261,628	Spr. 1994	12	141	129	268	0.102
1993	311,690 290,417	Fall 1994 Spr. 1995	45	587	310	942	0.156
1994	232,731	Spr. 1996	2	177	53	232	0.099
1995	3,549	Spr. 1996	1	8	88	97	2.73
1996	244,847	Spr. 1998	119	877	56*	1,052	0.430
1997	330,555 334,482	Fall 1998 Spr. 1999	300	2,210*	202*	2,712	0.410
1998	293,522	Spr. 2000	78*	1,156*	661*	1,895*	0.650
1999	212,648	Spr. 2001	36*	788*	215*	1,039*	0.489
2000	559,630 349,890	Fall 2001 Spr. 2002	129*	1,364*	42*	1,535*	0.169
2001	526,733 350,665	Fall 2002 Spr.2003	48*	131*	14*	193*	0.022
2002	385,292 376,797	Fall 203 Spr. 2004	27*	422*			
2003	343,967 403,917	Fall 2004 Spr.2005	78*				

* Does not include fish caught in fisheries or left in river.

(IDFG Sept. 2007, p.36)

RED RIVER SATELLITE

			Return Age From BY				
Brood Year	Number Released	Year Released	1-ocean	2-ocean	3-ocean	Total	SAR (%)
1982	260,000 40,000	Fall 1983 Spr. 1984	2	-	107	109	0.036
1983	80,000	Spr. 1985		377	259	636	0.795
1984	136,800	Spr. 1986	35	132	74	214	0.176
1985	96,400 96,800	Fall 1986 Spr. 1987	3	25	13	41	0.021
1986	233,100	Fall 1987	5	38	8	51	0.022

1987	291,200	Fall 1988	2	9	3	14	0.005
1988	240,500	Fall 1989	1	31	39	71	0.029
1989	273,800 187,000	Fall 1990 Spr. 1991	5	99	13	117	0.025
1990	354,700 207,500	Fall 1991 Spr. 1992	1	18	1	20	0.004
1991	6,000	Fall 1992	0	0	0	0	0.000
1992	22,246	Fall 1993	3	4	45	52	0.234
1993	320,755	Fall 1994	5	191	42	238	0.074
1994	24,002	Spr. 1996	2	25	2	29	0.121
1995	2,983	Spr. 1997	1	6	22	29	0.972
1996	51,208	Spr. 1998	15	81	66*	162	0.316
1997	66,114 360,983	Fall 1998 Spr. 1999	179*	1,244*	122*	1,545*	0.360
1998	74,981 159,051 234,032	Fall 1999 Spr.2000	23*	494*	222*	739*	0.316
1999	68,684	Fall 2000	7*	40*	0*	47*	0.068
2000	84,238 350,318	Fall 2001 Spr.2002	36*	527*	18*	581*	0.134
2001	85,064 351,066	Fall 2002 Spr. 2003	18*	102*	14*	134*	0.031
2002	108,323 354,868	Fall 2003 Spr. 2004	22*	644*			
2003	401,362	Spr. 2005	21*				

* Does not include fish caught in fisheries or left in river.

(IDFG Sept. 2007, p.32)

CROOKED RIVER SATELLITE

			Return Age From BY				
Brood Year	Number Released	Year Released	1-ocean	2-ocean	3-ocean	Total	SAR (%)
1987	199,700	Spr. 1989	2	13	7	22	0.011
1988	300,407	Spr. 1990	2	208	276	486	0.162
1989	339,087	Fall 1990	13	119	10	142	0.042
1990	320,400	Fall 1991	7	15	0	22	0.002
1991	-	-	1	0	1	1	0.000
1992	273,766	Spr. 1994	6	241	59	306	0.112
1993	415,535 537,908	Fall 1994 Spr. 1995	94	935	213	1,274	0.134
1994	37,071	Spr. 1996	2	22	3	27	0.073
1995	0	Spr. 1997	0	0	0	0	0.000
1996	205,906	Spr. 1998	122	637	101	860*	0.417
1997	162,119 600,981	Fall 1998 Spr. 1999	454	1,878*	276*	2,608*	0.340
1998	89,299 399,060	Fall 1999 Spr. 2000	34*	1,023*	870*	1,927*	0.395

1999	105,507 84,649	Fall 2000 Spr. 2001	37*	334*	27*	398*	0.209
2000	155,887 726,489	Fall 2001 Spr. 2002	156*	479*	14*	649*	0.074
2001	169,768 629,687	Fall 2002 Spr. 2003	35*	98*	8*	141*	0.018
2002	234,317 750,317	Fall 2003 Spr. 2004	28*	405*			
2003	64,263 700,387	Fall 2004 Spr. 2005	28*				

* Does not include fish caught in fisheries or left in river.

(IDFG Sept. 2007, p.31)

d) Stock productivity (e.g. recruits per spawner)[26]

- Lochsa-Selway River Spring Chinook - 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.

- South Fork Clearwater River Spring Chinook - 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.

2. Contributions to harvest and utilization (e.g. food banks)

- *Table: Estimated harvest based on CWT recoveries of Clearwater FH Chinook salmon in the Clearwater River, 1997-2005. (Derived by Joe Krakker, USFWS, from: IDFG Dec. 2006, Sept. 2005, Dec. 2004, Oct. 2003)*

Year	Total Est. Clear. R. Catch	Total Est. Clear. R. Harvest	Total Est. Clear. R. Hrs. Fished	Est. CFH Harvest
1997	874	738	12,909	0

[26] *See Hatchery Review Team's Lower Snake NFH's report and HSRG 2008.*

1998	135	99	7,227	2
2000	4,867	4,384	78,940	307- Powell
2001	29,307	21,833	307,713	2,100 – Powell 5,031 – S.F. Cl.
2002	9,408	6,986	157,630	488 – Powell 1,411 S.F. Cl.
2003	5,137	3,010	105,968	175 – Powell 181 S.F. Cl.
2004	11,913	7,704	153,405	835 – Powell 1,066 S.F. Cl.
2005	1,748	1,085	32,458	420

- **1997** - A spring Chinook salmon sport fishing season was held from May 17 through June 15, 1997 on portions of the North Fork, South Fork, and mainstem Clearwater Rivers, and from July 16 through August 3 on the Lochsa River, North Fork and South Fork Clearwater Rivers, Idaho. During the early (May 17-June 15) season, we estimated anglers spent 12,909 hours to catch 874 Chinook, of which 738 hatchery Chinook were harvested. We estimated 87 non-adipose fin-clipped Chinook, which were naturally produced, were caught and released. The season average catch rate was 16 hours per fish. During the late (July 16-Aug. 3) season, we estimated anglers fished 1585 hours and caught no fish. The majority (94%) of CWTs recovered were from spring Chinook released from DNFH into the North Fork Clearwater River, with the other 6% coming from KNFH fish released into Clear Creek. (IDFG 1997, p.1,5)

- **1998** - A series of weekend spring Chinook salmon sport fishing seasons were held from May 29 through June 19, 1998 on portions of the North Fork and mainstem Clearwater rivers. A total of 1,332 anglers spent 7,227 hours to catch 135 Chinook of which 99 were harvested. Of the 36 Chinook released, 17 were naturally produced as determined by the presence of an adipose fin. Average catch rate for the season was 54 hours per fish. Forty five CWT's were recovered, of these, 42 CWTs (93.3%) were from DNFH-origin fish released at DNFH and one (2.2%) was from a fish reared at Clearwater Anadromous Fish Hatchery and released at Powell Pond. The origin of the other two CWTs (4.4%) could not be determined. (IDFG Jan. 2000, p.1,5)

- **2000** - A spring Chinook salmon sport-fishing season was held from May 5 through July 4, 2000, on portions of the Clearwater River and selected tributaries in north central Idaho. During the season, we estimated anglers spent 78,940 hours to catch 4,867 Chinook, of which 4,384 were harvested. Of the 483 Chinook released, 247 were non-adipose fin clipped. Over 80% of the fish harvested were caught in the Dworshak Dam tailrace. The season average catch rate was 16.2 hours per fish. Of all CWT recovered, 93% were of Dworshak National Fish Hatchery origin while the remaining 7% were from the Clearwater Fish Hatchery's (CFH) Powell satellite facility. (IDFG July 2005, p.1,5)

- **2001** - A spring Chinook salmon sport-fishing season was held from April 21 through August 5, 2001, on portions of the mainstem Snake River and the Clearwater River drainage, and April 21 through June 10 on the mainstem Salmon River in north central Idaho. In the Clearwater drainage, we estimated anglers spent 307,713 hours to catch 29,307 Chinook, of which 21,883 were harvested. The season average catch rate was 10.5

hours per fish caught. Of the 7,424 Chinook released 5,389 were non-adipose fin clipped. We estimated that of the 21,883 fish harvested in the drainage, 8,355 were Dworshak NFH origin, 6,397 were Kooskia NFH origin, 2,100 were Clearwater Fish Hatchery Powell origin, and 5,031 were Clearwater Fish Hatchery South Fork origin. (IDFG 2001, p.1)

- **2002** - A spring Chinook salmon sport-fishing season was held from April 20 through August 4, 2002, on portions of the mainstem Snake River and the Clearwater River drainage, and April 25 through June 16 on the mainstem Salmon River in north central Idaho. In the Clearwater drainage, we estimated anglers spent 157,630 hours to catch 9,408 Chinook, of which 6,986 were harvested. The season average catch rate was 17 hours per fish caught. Of the 2,422 Chinook released, 1,846 were non-adipose fin clipped. We estimated that of the 6,986 fish harvested in the drainage, 3,542 were Dworshak NFH origin, 1,545 were Kooskia NFH origin, 488 were Clearwater Fish Hatchery Powell origin, and 1,411 were Clearwater Fish Hatchery South Fork origin. (IDFG 2002, p.1)

- **2003** - A spring Chinook salmon sport-fishing season was held during portions of April through August, 2003, on portions of the Clearwater River drainage, and April 26 through June 22, 2003 on portions of the mainstem Salmon River in north central Idaho. In the Clearwater drainage, we estimated anglers fished 105,968 hours to catch 5,137 spring Chinook, of which 3,010 were harvested. Age three males (jacks) accounted for 106 of the fish harvested. Of the estimated 2,125 fish released, 1,630 were non-adipose clipped adults and 257 were adipose clipped adults. The average catch rate for all fish harvested during the season was 35 hours/fish and for all fish caught was 21 hours/fish. We estimated that of the 3,010 fish harvested in the drainage, 2,228 were DNFH origin, 426 were KNFH origin, 175 were CFH Powell origin, and 181 were CFH South Fork origin. (IDFG 2003, p.1)

- **2004** - Spring Chinook salmon sport-fishing seasons were held on 231 river miles of the Clearwater River drainage, 50 miles of the Snake River from Dug Bar upstream to Hells Canyon Dam, and 59.5 river miles of the mainstem Salmon River in north central Idaho during portions of April through August, 2004. In the Clearwater drainage, we estimated anglers fished 153,405, hours to catch 11,913 spring Chinook, of which 7,704 were harvested. Jacks accounted for 120 of the fish harvested. Of the estimated 4,209 fish released, 3,700 were non-adipose clipped adults and 300 were adipose clipped adults. The average catch rate for all fish harvested during the season was 20 hours/fish and for all fish caught was 13 hours/fish. We estimated that of the 7,704 Chinook harvested in the drainage, 3,608 were DNFH origin, 2,195 were KNFH origin, 835 were CLWFH Powell origin, and 1,066 were CLWFH South Fork origin. (IDFG 2004, p.2)

- **2005** - A spring Chinook salmon recreational fishery was held on 208 river miles of the Clearwater River drainage, 50 miles of the Snake River from Dug Bar upstream to Hells Canyon Dam, and 34 river miles of the mainstem Salmon River in north central Idaho during portions of April through June, 2005. In the Clearwater drainage, we estimated anglers fished 32,458 hours to catch 1,748 spring Chinook, of which 1,085 were harvested. Jacks accounted for 6 of the fish harvested. Of the estimated 663 fish released, 393 were non-adipose clipped adults and 213 were adipose clipped adults. The average catch rate for all fish caught and harvested during the season was 19 and 30 hours/fish, respectively. We estimated that of the 1,079 adult Chinook harvested in the drainage, 606 were DNFH origin, 53 were KNFH origin, and 420 were CFH origin. (IDFG 2005, p.2)

3. Contributions to conservation

The outplanting protocol [for excess hatchery broodstock] provides for distribution for natural spawning and subsistence use. If adult Chinook, available for release into natural spawning areas, exceed the numbers agreed to, further consultation will occur. The general procedure for providing fish for subsistence will be first to tribal programs, then to charitable organizations. (USFWS, Feb. 2008, p.16-17)

4. Other benefits

NPT requested adult spring Chinook in excess of Clearwater broodstock requirements be available for broodstock at NPTH. (CFH Spring Chinook HGMP, Sept. 30, 2002, p.16)

E. Research, monitoring, and evaluation programs[27]

- Document LSRCP fish rearing and release practices.

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

- Document the contribution LSRCP-reared spring Chinook salmon make toward meeting mitigation and management objectives. Document juvenile out-migration and adult returns.

- Estimate the number of wild/natural and hatchery-produced Chinook salmon escaping to project waters above Lower Granite Dam using dam counts, harvest information, spawner surveys, and trap information (e.g., presence/absence of identifying marks and tags, number, species, size, age, length). Conduct creel surveys and angler phone or mail surveys to collect harvest information. Assess juvenile outmigration success at traps and dams using direct counts, marks, and tags. Reconstruct runs by brood year. Summarize annual mark and tag information (e.g., juvenile out-migration survival, juvenile and adult run timing, adult return timing and survival). Develop estimates of smolt-to-adult survival for wild/natural and hatchery-produced Chinook salmon. Use identifying marks and tags and age structure analysis to determine the composition of adult Chinook salmon. Identify factors that are potentially limiting program success and recommend operational modifications, based on the outcome applied studies, to improve overall performance and success. Evaluate potential relationships between rearing and release history and juvenile and adult survival information. Develop hypotheses and experimental designs to investigate practices that may be limiting program success. Implement study recommendations and monitor and evaluate outcomes.

[27] *CFH Spring Chinook HGMP, Sept. 30, 2002, p.45-46.*

F. Program conflicts

1. Biological conflicts (e.g. propagated stock maladapted to hatchery water source)

Both the Powell and South Fork Salmon programs (Red river and Crooked River) are back filled with Rapid River and Dworshak spring Chinook salmon (as available) when broodstock needs at the two sites are not met. (pers. comm. Joe Krakker, USFWS 2008)

2. Harvest conflicts (e.g. mixed stock fishery on hatchery and wild fish limits harvest opportunities on hatchery fish)

- Spring Chinook salmon are not listed in the Clearwater Basin.

3. Conservation conflicts and risks

a) Genetic conflicts associated with straying and natural spawning of hatchery fish (Stray rates, proportion of hatchery-origin fish on natural spawning grounds, etc. Provide tables or figures where appropriate)

- Spring Chinook salmon are not listed in the Clearwater Basin.

b) Ecological conflicts (e.g. competition between hatchery fish and wild fish, predation,)[28]

- The possibility of collecting ESA-listed salmon or steelhead during broodstock collection in upper Clearwater River tributaries is remote. Fall Chinook and sockeye salmon adults are temporally and spatially separated from broodstock collection at the Clearwater Fish Hatchery satellite weirs. Several studies have shown a high degree of fidelity to natal stream or release site for Chinook (Bowles and Leitzinger 1991). The satellite weirs are over 100 miles from the mouth of the Clearwater River. We cannot differentiate spring Chinook naturally produced in the upper Clearwater drainage from listed spring/summer Chinook. We have no indication that marked hatchery fish from even the same geographic area as listed Chinook salmon (such as McCall summer Chinook) are being collected in the upper Clearwater River. We conclude there would is no effect to listed salmon from our adult spring Chinook broodstock collection at the Clearwater Fish Hatchery satellite weirs.

- In addition to broodstock collection, adults may be out-planted from a satellite weir site to spawning areas upstream for research or supplementation. Adult out-plants will not exceed estimated carrying capacity of rearing habitat for their progeny, so we conclude there would be no effect to listed salmon from this action.

[28] *CFH Spring Chinook HGMP, Sept. 30, 2002, p.21-23.*

- The LSRCP "Hatchery Evaluation Study Program" in the Clearwater River will continue studies initiated to determine hatchery rearing and release strategies that will help meet the mitigation requirements of the LSRCP program and the management goals of the IDFG. Within this goal, the hatchery program will attempt to improve the survival of hatchery fish while avoiding negative effects to natural populations. Two primary objectives are central to achieving this goal: 1) Evaluate the success of the LSRCP program in meeting specified goals and 2) Identify factors limiting hatchery success and recommend possible improvements based on existing knowledge and experimentation. Hatchery operation studies have focused on the monitoring and evaluation of hatchery loading and size variables, timing of release studies, location of release studies, and natural rearing studies.

- The physical operation of the Clearwater Fish Hatchery and its satellites is expected to have no affect on listed salmon or steelhead. All effluents must meet existing water quality standards. Water sources are properly screened and maintained so as to not affect listed salmon or steelhead.

- Hatchery spring Chinook salmon fish from the Clearwater Fish Hatchery program essentially enter the Snake River emigration corridor at Lower Granite Reservoir. Their presence in the reservoir overlaps to some degree with listed sockeye, spring/summer Chinook salmon, and steelhead. We believe Chinook from the program are temporally separated from listed fall Chinook salmon in the reservoir based on different migration periods. The National Marine Fisheries Service has identified potential competition for food and space and behavioral interactions in the migration corridor as a concern.

- Our current hatchery practices include measures to control pathogens. Bacterial Kidney Disease (BKD) continues to persist in hatcheries, but it is also endemic in naturally spawning populations. Efforts to minimize BKD incidence in hatcheries, such as adult disease testing, culling, and single family incubation, will continue. There is no evidence that horizontal transmission of disease from the Clearwater Fish Hatchery program to listed species occurs or has a measurable effect on listed species survival and recovery.

- There is no effect from the Clearwater Fish Hatchery program to listed spring/summer Chinook salmon in their production area. We believe that even with low abundance of listed Chinook salmon, the potential of affecting them with the Clearwater Fish Hatchery program by straying of adults, disease transmission, or competitive effects in the migration corridor, is remote.

- Fall Chinook salmon are temporally and spatially separated from the LSRCP spring Chinook salmon release and should not be adversely affected.

- Sockeye are spatially separated from the LSRCP spring Chinook salmon release until they enter Lower Granite Reservoir. It appears that there is also some temporal separation of migration timing. Most of the hatchery fish have probably passed through Lower Granite Reservoir by the time sockeye arrive, in years of normal water conditions.

4. Other conflicts between the hatchery program, or fish produced by the program, and other non-hatchery issues

None identified here.

IIB. Clearwater FH B-run Steelhead

A. General information

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 350,000 pounds (1,750,000 smolts) of steelhead (8 fpp) for release off station. All adults for the program were to be trapped at Dworshak NFH or the three satellite facilities in the Clearwater River Basin (Red River, Crooked River, and Powell). Each satellite facility includes adult trapping/holding facilities and rearing/acclimation ponds. The adult return goal for the program is 14,000 salmon back to the project area (above Lower Granite Dam). (USFWS May 1990, p.32)

B. Stock/Habitat/Harvest Program Goals and Purpose

1. Purpose and justification of program

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 350,000 pounds (1,750,000 smolts) of steelhead (8 fpp) for release off station. (USFWS May 1990, p.21-22)

2. Goals of program

The goal of this program is to return 14,000 steelhead above Lower Granite Dam to mitigate for survival reductions resulting from construction and operation of the four lower Snake River dams. (CFH North Fork Clearwater R. B-run Steelhead HGMP, Sept. 30, 2002, p.3)

3. Objectives of program

- 1,252,900 Dworshak B green eggs are requested from Dworshak NFH to provide for a release of 843,000 Dworshak B smolts into the Clearwater River Basin (67.3% green egg to smolt survival). (USFWS, Feb. 2008, Table 3 & 4)
- Adult return goal for the program is14,000 adult steelhead over Lower Granite Dam.
- The objectives of Idaho Fish and Game Department for the Clearwater Fish Hatchery are to reestablish historic fish runs into the upper Clearwater River tributaries, enhance the wild spawning population, and increase sport and tribal fishery opportunities. (IDFG Feb. 21, 2008, p.1)

4. Type of program (Integrated or Segregated)

Clearwater Fish Hatchery was designed as an *Isolated Harvest Program*. However, some broodstock management, rearing, and juvenile releases have supported Idaho Supplementation Studies (ISS) activities conducted by the IDFG and Nez Perce Tribal supplementation programs. (CFH North Fork Clearwater R. B-run Steelhead HGMP, Sept. 30, 2002, p.3)

5. Alignment of program with ESU-wide plans

There is currently no ESU wide hatchery plan or recovery for steelhead in the Snake River.

6. Habitat description and status where fish are released.

Prior to blockage by Dworshak Dam, habitat in the North Fork Clearwater provided excellent steelhead spawning and rearing habitat that supported 60% of the spawning activity in the Clearwater subbasin. Of the remaining habitat in the subbasin, excellent steelhead trout habitat characterizes the vast majority of the available habitat in the Upper Selway AU, and the majority of tributary habitats within the Lower Selway and Lochsa Aus. The mainstem Lochsa River and mainstem Selway River above the wilderness boundary provide 'good' steelhead trout habitat, as do most of the tributary systems within the South Fork AU. Within the South Fork AU, 'excellent' steelhead trout habitat is associated with drainages originating within the Gospel Hump Wilderness Area: Johns Creek, Tenmile Creek, and the uppermost reaches of Crooked River. The Lower Clearwater and Lolo/Middle Fork Aus are most typically characterized by fair to poor steelhead habitat throughout. Notable exceptions are Big Canyon Creek and portions of Lolo Creek which are characterized as "good" steelhead trout habitat. (NWPPC Nov. 2003, p.279)

7. Size of program and production goals (No. of spawners and smolt release goals)

Approximately 187 females and 187 males are needed for Clearwater Hatchery allocations at a 1:1 male to female ratio. (USFWS, Feb. 2008, p.9, Table 3)

Stock	Brood Year	Release location	Program Goal
Dworshak B	2008	Crooked River	150,000
Dworshak B	2008	Crooked River	83,000
Dworshak B	2008	Red River	100,000
Dworshak B	2008	Red River	150,000
Dworshak B	2008	SF CLWR, Red House	260,000
Dworshak B	2008	Meadow Creek	25,000
Dworshak B	2008	Mill Creek	25,000
Dworshak B	2008	Lolo Creek	50,000

(USFWS, Feb. 2008, p.9, Table 4)

C. Description of program and operations

1. Broodstock goal and source

Broodstock for the Dworshak NFH B-run steelhead program was originally obtained by collecting wild/natural fish returning to the North Fork Clearwater River. Broodstock collection was initiated in 1969, several years before Dworshak Dam was completely closed. This is the only source of broodstock that has ever been used. (DNFH B-run Steelhead HGMP Oct. 1, 2002, p.29)

2. Adult collection procedures and holding

All broodstock are collected and spawned at Dworshak NFH

3. Adult spawning

a) Spawning protocols

All spawning will occur at Dworshak NFH. Our expected first spawn date for Clearwater Hatchery egg collection is March 6. Spawning occurs on every Tuesday. When possible 1:1 male:female spawning will be used. On spawning days, eggs taken for Clearwater FH and Magic Valley will be from fresh fish that have entered Dworshak NFH trap since the last spawning day or fish that were green (not ripe) on previous spawning days and returned to the holding pond. Incubation to eyed stage of eggs destined for CFH production will occur at Dworshak NFH. All eggs from positive IHNV parentage will be culled at this point. At Dworshak NFH, the eggs will be shocked and then transferred to Clearwater Hatchery where they will be disinfected and placed in Heath egg trays. (USFWS, Feb. 2008, p.6)

b) No. of males and females spawned each year over past 10 years (table)

Not Applicable

4. Fertilization

a) Protocols

Not Applicable

b) Number of eggs collected and fertilized each year over past 10 years (table)

Not Applicable

5. Incubation[29]

- Incubation to eyed stage of eggs destined for CFH production will occur at Dworshak NFH. All eggs from positive IHNV parentage will be culled at this point. At Dworshak NFH, the eggs will be shocked and then transferred to Clearwater Hatchery where they will be disinfected and placed in Heath egg trays. They will be picked and enumerated the next day. The eggs will then be placed in Heath egg trays for the remaining incubation period.

- **Option 1**: Eggs are placed into Heath egg trays with approximately 5,000 eggs per basket. Water flowing through each stack is set at six gallons per minute. The eggs are treated every other day during incubation with 1,667 ppm Formalin for fifteen minutes. A pump dispenses Formalin through pressurized system that is operated by a time clock. This system dispenses Formalin directly into the top tray of each incubator stack. Formalin treatment begins when eggs are 48 hours old and continues until prior to hatching. They will remain in trays until 900 TU's have accumulated and approximately 80% of the fish are completely buttoned-up.

- **Option 2**: The eggs may be placed into incubation jars at the head of each indoor rearing vat. They swim up and out of the incubation jars directly into vats. Incubators are loaded at 30,000 eggs per jar and flow is set at 15 gallons per minute.

6. Ponding

a) Protocols

The fry remain in the indoor vats until they are approximately 35 fish per pound (density index 0.30). Vats are loaded at approximately 20K per vat. Fingerlings are now moved to outside rearing raceways. When they are moved outside, they are ad-clipped and test groups receive Coded Wire Tags (CWT). They will remain here until they are full smolt size and age, approximately 5.5 to 7.0 fish per pound. Raceways are loaded with approximately 60K each. (IDFG Feb. 21, 2008, p.6)

b) Number of fry ponded each year, including % hatch each year

Clearwater Fish Hatchery survival information is presented below.

Brood Year	Fry to fingerling percent survival	Fingerling to smolt percent survival
1992	95.0%	97.9%
1993	94.6%	97.0%
1994	98.0%	98.4%
1995	94.7%	93.0%
1996	96.3%	98.4%
1997	94.9%	96.5%
1998	94.3%	96.8%

[29] *USFWS, Feb. 2008, p. 5-6.*

1999	97.4%	87.6%
2000	97.5%	89.3%
2001	56.0%	99.1%

(CFH North Fork Clearwater R. B-run Steelhead HGMP, Sept. 30, 2002, p.31)

Brood year	**Green Eggs**	**Eyed Eggs**	**% Eye UP**
2007			
2006	1,191,536	1,138,372	95.5
2005	1,257,201	979,864	77.9
2004	1,249,961	1,161,957	93.0
2003	1,545,221	1,481,444	95.9
2002	Eyed at DNFH	1,065,391	
2001	Eyed at DNFH	1,039,672	
2000			

(IDFG Sept. 2007, July 2006, Sept. 2005a, July 2004, Oct. 2003a, July 2002)

7. Rearing/feeding protocols[30]

- At the swim-up stage of development, unfed fry are moved to inside vats and distributed as evenly as possible (typically 28,000 to 39,000 fish per vat at ponding). Initial density (DI) and flow (FI) indices average 0.07 and 0.36, respectively (Piper et al. 1982). Fish are typically held in the vat room from late July through early August in any year. At the end of their term in this location, they are fin clipped, possibly tagged (PIT and CWT) and moved to 12 outside steelhead raceways. The average length and weight of fish at tagging is approximately 82 mm and 5.9 g., respectively. Outside raceway density and flow indices range from 0.22 to 0.33 (DI) and 0.44 to 0.99 (FI). Density and flow indices are maintained to not exceed 0.33 (DI) and 1.5 (FI).

- Hatchery and satellite water temperatures are monitored constantly with recording thermographs and checked routinely with hand held thermometers. Steelhead incubation temperatures (March through May) range from a low of approximately 8.9 ºC to a maximum of approximately 13.8 ºC. Incubation water temperature averages approximately 11.0 ºC. Early steelhead rearing temperatures (June through October) range from a low of approximately 10.0 ºC to a maximum of 14.0 ºC. Early incubation temperatures average approximately 11.6 ºC. Late rearing through release temperatures (October through April) range from a minimum of 4.4 ºC to a maximum of 12.1 ºC. Late rearing temperatures average approximately 7.8 ºC.

- Dissolved oxygen and total dissolved gas are monitored monthly using hand held meters. Dissolved oxygen typically remains at 8.0 ppm or greater. Total dissolved gas typically averages 100%.

- During early rearing, vats are cleaned daily and dead fish removed. During final rearing, outside raceways are cleaned every other day but dead fish are removed daily.

[30] *CFH North Fork Clearwater R. B-run Steelhead HGMP, Sept. 30, 2002, p.31-32.*

- *Clearwater Hatchery Chinook Salmon Feed Schedule. Bio-Diet Feed*

#1 Starter	Mix for three days with #2
#2 Starter	Swim-up – 950 per pound
Mix #2 and #3	950 per pound – 600 per pound
#3 Starter	600 per pound – 494 per pound
Mix #3 and 1.0	494 per pound – 410 per pound
1.0mm Grower	410 per pound – 350 per pound
Mix 1.0 and 1.3	350 per pound – 300 per pound
1.3 Grower	300 per pound – 250 per pound
1.3 and 1.5 Mix	250 per pound – 200 per pound
1.5 Grower	200 per pound – 110 per pound
Mix 1.5 and 2.5	110 per pound – 75 per pound
2.5 Grower	75 per pound - Release

(IDFG Feb. 21, 2008, Appendix B)

8. Fish growth profiles

Monthly growth (fish weight expressed in fish per pound, and length) information for the Clearwater Fish Hatchery is presented below for brood years 1995 through 2001.

Monthly steelhead weight history (fish per pound)

Brood year and month in culture	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**Avg.**
April								
May		1,321.7		1,025.8	1,350.0	601.3	2,026.7	1,265.1
June	389.7	278.6	665.8	247.5	276.3	150.4	385.7	342.0
July	132.0	101.2	174.1	71.6	100.3	76.5	98.1	107.7
August	57.9	48.0	56.0	40.0	43.9	45.1	50.6	48.8
Sept.	35.0	26.2	38.0	22.1	23.2	29.0	38.8	30.3
Oct.	20.5	14.5	19.6	13.0	13.1	18.2	26.1	17.9
Nov.	12.9	10.7	13.4	8.6	8.6	12.2	13.9	11.5
Dec.	10.6	8.6	10.7	7.5	7.5	10.5	12.0	9.6
Jan.	9.4	7.4	9.0	6.9	6.9	8.8	10.5	8.4
Feb.	9.2	7.1	-	6.6	6.6	7.9	9.3	7.7
March	8.9	6.4	6.7	5.8	5.8	7.2	-	6.7
April	7.8	5.8	-	5.2	5.2	6.4	-	6.0

(CFH North Fork Clearwater R. B-run Steelhead HGMP, Sept. 30, 2002, p.32)

9. Fish health protocols and issues

- Each female spawned at Dworshak NFH (eggs to be reared at Clearwater Hatchery) will have either ovarian fluid sample or kidney/spleen tissue samples taken, shipped to Eagle Fish Health Lab, and tested for viral replicating agents; only negative tested eyed eggs are transferred to Clearwater Fish Hatchery main incubation for rearing at CFH. Tissues samples (kidney/spleen) will be from at least 30 females. All eggs from virus positive females will be culled from production. Juvenile rearing inspections will be performed each quarter and diagnostic examination on demand by Eagle Fish Health Lab. No prophylactic treatments are planned at this time. (USFWS, Feb. 2008, p.6)

- A pre-liberation inspection is done 30 - 45 days prior to transportation, including an organosomatic index of fish quality. [31] 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. (pers. comm. D. Munson, IDFG, 2008)

10. Chemotherapeutant use[32]

- Eggs are water-hardened in 100 ppm iodine for 30-60 minutes and placed in egg shipping tubes and transported to Clearwater FH where they are disinfected again (iodine at 100 ppm for 15 min).

- 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, iodine flush is administered to the eggs.

- A strict disinfection protocol is followed to ensure that the surface 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 (iodine at 100 ppm for 15 min).

11. Tagging and marking of juveniles

Stock	Brood Year	Release location	Expected Release	# AD	# CWT	# PIT
Dworshak B	2007	Crooked River	144,600	144,600	60,000	3,300
Dworshak B	2007	Crooked River	72,100	0	29,000	2,600
Dworshak B	2007	Red River	83,000	83,000	30,000	2,800
Dworshak B	2007	Red River	163,500	0	0	2,900
Dworshak B	2007	SF Clear. - Red House	248,500	248,500	60,000	5,700
Dworshak B	2007	Meadow Cr.	31,400	0	0	900
Dworshak B	2007	Mill Cr.	31,400	0	0	900

[31] *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. (Adams, SM, AM Brown and RW Goede 1993)*
[32] *pers. comm. D. Munson and other IDFG staff, 2008.*

Dworshak B	2007	Lolo Cr.	45,600	0	0	1,000
Total			820,100	476,100	179,000	20,100

(USFWS, Feb. 2008, Table 1)

12. Fish Release

a) Protocols

All fish reared at the Clearwater Hatchery are transported off station for release in the upper basin of the Clearwater drainage. Fish are loaded into transport trucks using a Magic Valley Heliarc fish pump. The loading density guideline for transport vehicles is ½ pound 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. (CFH North Fork Clearwater R. B-run Steelhead HGMP, Sept. 30, 2002, p.36)

b) Number of fish released each year (subyearlings?; yearlings?; other?)

Stock	Brood Year	Release location	Program Goal
Dworshak B	2007	Crooked River	150,000
Dworshak B	2007	Crooked River	83,000
Dworshak B	2007	Red River	100,000
Dworshak B	2007	Red River	150,000
Dworshak B	2007	SF Clear. - Red House	260,000
Dworshak B	2007	Meadow Cr.	25,000
Dworshak B	2007	Mill Cr.	25,000
Dworshak B	2007	Lolo Cr.	50,000
Total			**843,000**

(USFWS, Feb. 2008, Table 1)

D. Program benefits and performance[33]

3.1.2 Standard: Program contributes to mitigation requirements.

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

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

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

[33] *CFH North Fork Clearwater R. B-run Steelhead HGMP, Sept. 30, 2002, p.5-8.*

Indicator 4: Escapement of target fish estimated.

3.2.1 Standard: Fish produced for harvest are produced and released in a manner enabling effective harvest while avoiding over harvest of non-target species.

Indicator 1: Annual number of fish produced by this program caught in fisheries estimated.
Indicator 2: Annual number of non-target fish produced by this program and caught in fisheries estimated.
Indicator 3: Angler days by fishery estimated.
Indicator 4: Catch per unit effort by fishery estimated.

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

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

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

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

1.10.2) "Performance Indicators" addressing risks.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1. Adult returns

a) Numbers of adult returns (need data for the past 10-20 years)

Adult returns for the program are collected at Dworshak NFH.

b) Return timing and age-class structure of adults

Adult returns for the program are collected at Dworshak NFH.

c) Smolt-to-adult return rates

Table: 1994-1996 smolt-to-adult return rates (CFH North Fork Clearwater R. B-run Steelhead HGMP, Sept. 30, 2002)

Release Year	Estimated No. of Juveniles Released	Estimated No. of Adults Harvested	Rack and In-river Escapement	Total Adult Returns	Estimated Smolt-to-Adult Return Rate (%)
1994	772,968	133	140	273	0.03
1995	637,743	415	213	628	0.10

1996	829,561	600	703	1,303	0.16

[1] Idaho sport fishery only.

Table: 1994-1999 smolt-to-adult return rates (Derived by Joe Krakker, USFWS, from: IDFG June 2007, May 2007b, May 2007a, June 2005, July 2003c, July 2003b, Oct. 2002, June 2002)

BY	**Stock**	**Release Location**	**Total Release**	**Estimated Harvest**	**Estimated Hatchery**	**Total**	**SAR (%)**
1992	Dwor. B	S.F. Clear.	326,300	0	2	2	.0006
1993	Dwor. B	S.F. Clear.	722,990	133	145	278	.038
1994	Dwor. B	S.F. Clear.	637,752	420	213	633	.099
1995	Dwor. B	S.F. Clear.	838,553	608	724	1,332	.159
1996	Dwor. B	S.F. Clear.	730,001	482	579	1,061	.145
1997	Dwor. B	S.F. Clear.	702,286	1,037	444	1,481	.211
1998	Dwor. B	S.F. Clear.	595,997	2,174	2,450	4,624	.776
1999	Dwor. B	S.F. Clear.	735,266	5,161	1,734	6,895	.938
2000	Dwor. B	S.F. Clear.	786,654				
2001	Dwor. B	S.F. Clear.	639,028				
2002	Dwor. B	S.F. Clear.	868,365				
2003	Dwor. B	S.F. Clear.	1,062,075				
2004	Dwor. B	S.F. Clear.	846,729				

d) Stock productivity (e.g. recruits per spawner)[34]

- 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.

- 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 S.F. Clearwater River.

- 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.

- 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

- 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.

2. Contributions to harvest and utilization (e.g. food banks)

Estimated Harvest and escapement of Clearwater FH B-run releases (Derived by Joe Krakker, USFWS, from: IDFG Dec. 2006, Sept. 2005, Dec. 2004, and Oct. 2003)

[34] *See Hatchery Review Team's Lower Snake NFH's report and HSRG 2008.*

Return Year	Estimated Harvest	Hatchery & Estimated In-River Returns	Total Return
2006/2007	7,600	890	8,490
2005/2006	2,933	670	3,603
2004/2005	1,354	617	1,971
2003/2004	1,265	150	1,415
2002/2003	5,081	1,706	6,787
2001/2002	2,422	2,789	5,211
2000/2001	1,072	322	1,394
1999/2000	442	586	1,028
1998/1999	594	788	1,382
1997/1998	220	153	373

3. Contributions to conservation

Dworshak B- Run steelhead are listed but not considered essential for recovery (habitat blocked by Dworshak Dam). Currently some releases are not AD clipped and are released into the South Fork Clearwater River and Lolo Creek for supplementation purposes as agreed to in US v OR, however the new agreement calls for discontinuing release of Dworshak B-run fish into the South Fork Clearwater River and Lolo Creek for supplementation of natural populations and the initiation of local broodstock programs for supplementing natural populations in the South Fork Clearwater and Lolo Creek. [JK]

4. Other benefits

None noted.

E. Research, monitoring, and evaluation programs

- Document LSRCP fish rearing and release practices.

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

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

- Estimate the number of wild/natural and hatchery-produced steelhead escaping to project waters above Lower Granite Dam using dam counts, harvest information, spawner surveys, and trap information (e.g., presence/absence of identifying marks and tags, number, species, size, age, length). Conduct creel surveys and angler phone or mail surveys to collect harvest information. Assess juvenile outmigration success at traps and dams using direct counts, marks, and tags. Reconstruct runs by brood year. Summarize annual mark and tag information

(e.g., juvenile out-migration survival, juvenile and adult run timing, adult return timing and survival). Develop estimates of smolt-to-adult survival for wild/natural and hatchery-produced B-run steelhead. Use identifying marks and tags and age structure analysis to determine the composition of adult B-run steelhead.

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

- Evaluate potential relationships between rearing and release history and juvenile and adult survival information. Develop hypotheses and experimental designs to investigate practices that may be limiting program success. Implement study recommendations and monitor and evaluate outcomes. (CFH North Fork Clearwater R. B-run Steelhead HGMP, Sept. 30, 2002, p.39-40)

F. Program conflicts

1. Biological conflicts (e.g. propagated stock maladapted to hatchery water source)

2. Harvest conflicts (e.g. mixed stock fishery on hatchery and wild fish limits harvest opportunities on hatchery fish)

3. Conservation conflicts and risks

a) Genetic conflicts associated with straying and natural spawning of hatchery fish (Stray rates, proportion of hatchery-origin fish on natural spawning grounds, etc. Provide tables or figures where appropriate)

- Dworshak B-run steelhead are released from Clearwater FH into the South Fork Clearwater River and Lolo Creek which are both independent populations identified by the TRT within the MPG for Snake River steelhead. (pers. comm. Joe Krakker, USFWS 2008)

b) Ecological conflicts (e.g. competition between hatchery fish and wild fish, predation,)[35]

- Adverse effects to listed salmon and steelhead could occur from the release of program steelhead smolts in the Clearwater River through predation, competition, behavior modification, and disease transmission.

[35] *CFH North Fork Clearwater R. B-run Steelhead HGMP, Sept. 30, 2002, p.15-17.*

- Predation of fall Chinook salmon fingerings or smolts by hatchery steelhead smolts is not likely to occur. This is due to the fact that these life stages of fall Chinook are present after steelhead smolts have migrated. Steelhead smolts would be too small to prey upon fall Chinook salmon larger than 67 mm, although some fall Chinook salmon during May and June would likely be smaller than this. Tagged fall Chinook from late May to mid-July range from 55-120 mm.

- Steelhead that survive and do not emigrate would likely residualize within the vicinity of the release site, with densities decreasing substantially through the summer due to harvest or mortality. In 1989 and 1990, the density of hatchery steelhead smolts in the main stem Clearwater River was lower in the fall than in the summer. Steelhead that residualize from the upper Clearwater River releases would not reside in the fall Chinook salmon production area of the lower Clearwater River. Similar to the conclusion by the USFWS, IDFG believes steelhead that did residualize would do so near their tributary release sites.

- Steelhead smolts released in the upper Clearwater could be predators of fall Chinook salmon fry as the smolts migrate downstream. However, the majority of the smolts will have migrated out of the Clearwater River by the time peak fry emergence occurs in mid-May.

- Steelhead that did not emigrate would likely remain near release sites. Few Chinook salmon fry have been found in steelhead smolt stomachs, even when smolts were released directly over emerging fry. Steelhead smolts released in the upper Clearwater River have to travel several kilometers before they encounter fall Chinook salmon production areas in the lower Clearwater River. Furthermore, steelhead smolts and fall Chinook salmon juveniles do not use the same habitat. The lack of spatial overlap would further reduce the potential for predation.

4. Other conflicts between the hatchery program, or fish produced by the program, and other non-hatchery issues

ESA-listed steelhead and bull trout may be trapped at Clearwater Fish Hatchery satellite facilities. All un-marked adult steelhead and bull trout are passed immediately above weirs with a minimum of handling. We anticipate that no adverse effect occurs to ESA-listed steelhead or bull trout from the operation of program satellite facilities. (CFH North Fork Clearwater R. B-run Steelhead HGMP, Sept. 30, 2002, p.15-17)

III. Magic Valley Fish Hatchery

A. Description of hatchery[36]

The hatchery building houses the incubation and early rearing room with 40 upwelling 12gal capacity incubators. Each incubator is capable of handling and hatching 50,000-75,000eyed eggs. During Brood Year 2005, two incubators were placed on stainless steel stands on the floor of each raceway. During Brood Year 2006, hatchery personnel began to replace the heavy stainless steel stands (60 lbs. each) with three pieces of 8" X 8" X16" aluminum square stock tubing (9.4 lbs. each). There are 20 concrete tanks (4 ft x 3 ft x 40 ft, 418 cubic ft of rearing space) with a capacity of rearing 100,000 steelhead fingerlings to 200 fish per pound size. During May, 2006, four fiberglass "Canadian" troughs (2.5 ft x 1.5 ft x 21 ft) were added to the hatchery building. Sixty automatic fry feeders are included in the hatchery building as well. The hatchery building also contains an office, fish health examination room, shop, dormitory, enclosed storage room, covered vehicle storage area, feed storage room, walk-in freezer, mechanical room for water pumps, and a water chiller.

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 resulting in 16 East raceways and 16West 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 subunits. A moveable bridge equipped with 16 automatic Neilsen fish feeders spans the outdoor raceways. Two 40,000-pound bulk feed bins, equipped with fish feed fines shakers and a feed conveyor, complete the outside feeding system.

There are two tailraces outside located on opposite ends of the facility. Each flows to the North where they join in a common 54-inch pipe before entering the flow-through settling pond. The hatchery effluent water is treated by opening valves in the bottom of quiescent zones and sweeping wastes into a cleaning wastewater pond (approximately 2.5 surface acres). A hatchery flow-through wastewater pond (about 1.5 surface acres in size) settles the non-cleaning wastewater. All cleaning effluent must pass through both ponds prior to discharge.

B. Hatchery water sources[37]

The MVH water supply collection facility is located on the North wall of the Snake River canyon. It collects the 59°F spring water from Crystal Springs in a covered concrete channel system, which consolidates the flow in a metal building. A 42-inch pipeline has the capacity to deliver 125.47 cfs of water via gravity flow to the outside raceways. Water may be diverted from the headrace supply line for use in the auxiliary supply waterlines. The auxiliary supply line allows supplemental water usage between raceway sections to improve water quality in the lower sections and to clean upper quiescent zones without dewatering the bottom section. The hatchery building receives water through a 14-inch pipeline, which branches off prior to going through the outside raceways. Water going to the hatchery building is degassed in packed columns above each individual raceway.

[36] *IDFG Aug. 2007, p.2-3.*
[37] *IDFG Aug. 2007, p.3.*

C. Adult broodstock collection facilities

All steelhead broodstock for the program are collected at Dworshak NFH, E.F. Salmon River facility, Squaw Creek facility, Sawtooth FH, and Pahsimeroi FH (see Dworshak NFH and Sawtooth FH facility descriptions. The Dworshak NFH description is located in Appendix B. of the Lower Snake NFHs report).

D. Broodstock holding and spawning facilities

All steelhead broodstock for the program are held and spawned at Dworshak NFH, E.F. Salmon River facility, Sawtooth FH, and Pahsimeroi FH (see Dworshak NFH and Sawtooth FH facility descriptions. The Dworshak NFH description is located in Appendix B. of the Lower Snake NFHs report).

E. Incubation facilities

Early egg incubation occurs at Clearwater FH, Pahsimeroi FH, and Sawtooth FH (see Clearwater FH and Sawtooth FH facility descriptions)

As a result of a continued reduction in water flow (>25%), production numbers for BY2008 have been decreased by approximately twenty percent from the original target of two million smolts. Transfer of eggs should occur between 370 and 450 TUs. As a result of the completion of the new Pahsimeroi Hatchery, eggs received from Pahsimeroi may arrive later due to their ability to incubate with chilled water. Delayed transfer of eggs is beneficial because fish will be off feed for fewer days during the final rearing period. Egg shipments and deliveries will be coordinated with Sawtooth FH, Pahsimeroi FH, and Clearwater FH. Eyed eggs are loaded into upwelling incubators at 50,000 to 65,000 eggs per jar with a flow rate of 6 to 8 gpm. All stocks are reared in the incubation building. (IDFG May 2008, p.15)

All eggs received are treated with Povidone Iodine at 100-ppm for ten minutes, and put into the upwelling incubators (50,000-75,000 eggs per incubator, 15 gals/min).The eggs hatch within five days and emerge from the incubators into the hatchery tanks twelve days after hatching. (IDFG Aug. 2007, p.4)

F. Indoor rearing facilities

Sac fry volitionally swim from incubators 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. Rangen's 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 transfer to outside raceways. Fish are reared inside to a maximum density index of 0.60 and a maximum flow index of 1.19. (IDFG May 2008, p.15)

Each of the 20 hatchery tanks (with a flow of 100-250 gals/min) averaged100,000 feeding fry until they reached between 100 and 200 per pound or approximately 2.5inches long. At that time, fish were adipose clipped then transferred to the larger outside raceways. (IDFG Aug. 2007, p.4)

G. Outdoor rearing facilities

Fish are transferred at approximately 30,000 fish per outside section for a total of 52 sections. Transfer to outside raceways is scheduled to begin in mid- July and completed by mid-August. Fish will range in size from 125 to 300 fpp. (IDFG May 2008, p.15)

At that time, fish were adipose clipped then transferred to the larger outside raceways. (IDFG Aug. 2007, p.4)

The upper decks are used for initial outside rearing. Screens are placed at the fifty foot keyway and the upper 100 foot section is divided into two rearing sections. Approximately thirty thousand fish will be placed in each section. Once outside, fish are hand-fed Rangen's #3 and #4 crumble then graduate to larger sizes as growth continues. For approximately the last seven months of growth, smolts are fed Rangen's 470 extruded slow sinking feed. Feeding duration varies by fish and feed size from as high as six times per day, to as low as three times per day. When fish approach density indexes of 0.30, inventory in the lower 50 feet of the A deck, they will be moved to the lower 100 feet (B section) and the inventory in the upper 50 feet will have the entire A section for the final rearing period. The NOAA Fisheries 180 to 250 mm length at release criteria is met by adjusting the hatchery constant. Sample counts are performed monthly on representative ponds and length frequencies are calculated prior to release. During March 2009, IDFG staff will PIT tag a representative group of fish from each stock being reared. (IDFG May 2008, p.15)

H. Release locations and facilities[38]

- 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.

- East Fork Salmon River naturals reared at Magic Valley FH are transported off-station for direct-stream release into the East Fork Salmon River.

- 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, 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).

[38] *IDFG May 2008.*

I. Outmigrant monitoring facilities

The IDFG performs CWT, PIT tagging, and smolt to adult return evaluations. PIT tags are used to evaluate juvenile migration and adult return success. Expectations for brood year 2008 PIT tagging include approximately 20,000 from LSRCP funding. Funding from the CSS project is uncertain at this point. Coded-wire tags will be used to measure adult contribution to fisheries, as well as evaluate total adult returns by release group. (IDFG May 2008, p.17)

J. Additional or special facilities[39]

- 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 eventually terminate continued transfers of eyed eggs from the Clearwater Basin.

- 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 facility is used to collect and spawn steelhead for the East Fork "naturals" program.

K. Outreach and public education facilities/programs

At each of the fish hatchery facilities funded by LSRCP, a visitor center was included in the original project design, 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.

In addition to the self-guided tours, hatchery personnel provide guided tours for school groups or other organized groups with advance notice. Hatchery personnel may also be available to make presentations on hatchery activities to schools or civic groups off the hatchery grounds when requested, if time is available. Idaho Department of Fish and Game 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.

Table: The approximate numbers of annual contacts made through public outreach activities by Magic Valley Fish Hatchery Staff.

Outreach Activity	Number of Hatchery Personnel Involved	Number of Public Contacted
Public Visits –Self-guided	1	250
Guided Tours of Facilities	1 - 3	10 – 100
Free Fishing Day	1 - 3	300
Off-site talks and presentations	1 – 2	20 - 75

(pers. comm. Rick Lowell, IDFG 2008)

[39] *pers. comm. IDFG staff, 2008.*

L. Special issues or problems (e.g. water and property rights issues, law suits, etc.)

Water in springs are diminishing. Tied to the ongoing greater Snake River Plain water rights legal issue.

IIIA. Magic Valley FH B-run Steelhead

A. General information

Magic Valley FH was constructed in 1987 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. Magic Valley FH was designed to rear 349,800 pounds (1,749,000 smolts) of steelhead (5 fpp) for release off station. All adults for the program are trapped at Sawtooth FH, East Fork Salmon River facility, Squaw Creek facility, Pahsimeroi FH, and Dworshak NFH. The adult return goal for the program is 11,600 steelhead back to the project area (above Lower Granite Dam). (USFWS May 1990, p.29)

B. Stock/Habitat/Harvest Program Goals and Purpose

1. Purpose and justification of program

Magic Valley FH was constructed in 1987 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. Magic Valley FH was designed to rear 349,800 pounds (1,749,000 smolts) of steelhead (5 fpp) for release off station (USFWS May 1990, p.29)

2. Goals of program

The goal of this program is to return 11,600 steelhead above Lower Granite Dam to mitigate for survival reductions resulting from construction and operation of the four lower Snake River dams. (USFWS May 1990, p.29)

3. Objectives of program

- 475,000 Pahsimeroi A, 480,000 Sawtooth A, 830,000 Dworshak B, 110,000 upper Salmon River B, and 75,000 East Fork Salmon natural A, eggs or swim up fry are requested to provide for a release of 690,000 Pahsimeroi/Sawtooth A; 691,000 Dworshak B; 60,000 Upper Salmon B; and 50,000 East Fork natural smolts. (IDFG May 2008, p.15 & 87)

- Adult return of 11,600 steelhead above Lower Granite Dam.

- The objectives of Idaho Fish and Game Department for the Magic Valley Hatchery are to reestablish historic fish runs into the Salmon River, enhance the wild spawning population, and increase sport and tribal fishery opportunities.

4. Type of program (Integrated or Segregated)

The Salmon River B-run steelhead program was designed as an *Isolated Harvest Program*.

5. Alignment of program with ESU-wide plans[40]

There is currently no ESU wide hatchery plan or recovery for steelhead in the Snake River.

6. Habitat description and status where fish are released.

- Unlike other subbasins in the Columbia River basin, the Salmon subbasin has large areas where the composition, structure, and function of the aquatic, wetland and riparian ecosystems have been relatively undisturbed by anthropogenic effects. (NWPPC May 28, 2004, p.3-10)

- Twelve percent of the total stream length in the Upper Salmon watershed is identified as being impaired by sedimentation. There are about 2,585 points of water diversion and record of 603 stream-alteration permits. There are 216 road culverts in the Upper Salmon watershed, and only 10 are known to allow adult fish passage. Sediments impact approximately 12% of streams in the watershed, with the Salmon River, Yankee Fork, and seven other creeks in the watershed included on the 303(d) list as sediment -impaired streams. (NWPPC May 28, 2004, p.3-12)

- The primary limiting factor expressions in the mainstem Salmon River from the Pahsimeroi River upstream to the East Fork Salmon River (excluding the area known as the 12-mile reach) are increased fine sediments and reduction in discharge (primarily at low flows) Some barriers to fish movement from the mainstem into tributaries are present. These barriers are a concern because fish use the tributaries as thermal refuge when water temperatures in the main river increase. (NWPPC May 28, 2004, p.3-12-3-13)

7. Size of program and production goals (No. of spawners and smolt release goals)

- Approximately 157 Dworshak B-run females are needed for the Clearwater FH allocation that is transferred to Magic Valley FH at a 1:1 male to female ratio. (USFWS, Feb. 2008, Table 3)

- Approximately 35 upper Salmon R. B-run females are needed for the Sawtooth FH allocation that is transferred to Magic Valley at a 1:1 male to female ratio (IDFG May 2008, p.12). 35 females (based on the 2002 to 2006 data) would equate to an average of 159,645 eyed eggs for transfer to Magic Valley FH for an average smolt release of 123,086 (based on 2002-2006 egg to smolt survival rates at Magic Valley for the upper Salmon R. B stock). The table below identifies an IDFG objective of 60k release. (Collected at Squaw Creek Ponds)

[40] *Refer to "I. Columbia River Gorge" section "D. ESUs identified by NMFS and Current ESA status" for list of ESUs.*

Table: Proposed 2008 B-run Steelhead Releases From Magic Valley FH (IDFG May 2008, Table 7)

Stock	Brood Year	Release location	Program Goal
Dworshak B	2007	L.Salmon R. Stinky Springs	215,000
Dworshak B	2007	Squaw Ck. Pond	60,000
Dworshak B	2007	Squaw Ck.	191,000
Dworshak B	2007	Lower E.F. Salmon R.	225,000
Upper Salmon River B	2007	Squaw Ck.	60,000

C. Description of program and operations

1. Broodstock goal and source

- Broodstock for the Dworshak NFH B-run steelhead program was originally obtained by collecting wild/natural fish returning to the North Fork Clearwater River. Broodstock collection was initiated in 1969, several years before Dworshak Dam was completely closed. This is the only source of broodstock that has ever been used. (DNFH B-run Steelhead HGMP Oct. 1, 2002, p.29)

- Broodstock for the upper Salmon River B-run steelhead program is obtained by collecting returning Dworshak B adults trapped in Squaw Creek resulting from smolt releases into Squaw Creek. (IDFG Aug. 2007, Aug. 2006a, Oct. 2005, Aug. 2004, Sept. 2003, Mar. 2003, Oct. 2001, Jan. 2001, May 2000, Sept.1999a.).

2. Adult collection procedures and holding[41]

- All Dworshak adults are collected and held at Dworshak NFH and all upper Salmon River B-run adults are collected at Squaw Creek and held at the East Fork Salmon facility.

- A weir and trap box will be put into place in Squaw Creek approximately 200 meters upstream of the confluence of Squaw Creek and the Salmon River. Trapping occurs from late March through early May. Heavy springtime runoff and freezing temperatures can have an effect on the weir and trap operation and must be monitored daily.

  If the fish is a female larger than 75 cm in length or a male larger than 79 cm in length, then these fish are considered B-run steelhead. All marked B-run fish are taken to the East Fork facility for spawning. These fish receive a unique external mark to differentiate from East Fork steelhead. Fish not meeting the criteria for B-stock fish are considered A-stock fish. These fish are examined for CWT. If CWT is present, the snout is taken and the carcass brought to Sawtooth FH. If no CWT is detected, then unmarked fish are released into Squaw Creek above the weir. Marked fish not meeting the size criteria are released

[41] *IDFG May 2008, p.12-13.*

into the Salmon River after receiving another identifying mark. All unmarked fish are released above the Squaw Creek weir. Genetic material samples are collected from all unmarked fish trapped at the weir and 100% of the marked B-run fish taken to the East Fork facility and spawned for broodstock.

3. Adult spawning

a) Spawning protocols

- All spawning of Dworshak B-run will occur at Dworshak NFH. Our expected first spawn date for Clearwater Hatchery egg collection is March 6. Spawning occurs on every Tuesday. When possible 1:1 male:female spawning will be used. On spawning days, eggs taken for CFH and Magic Valley will be from fresh fish that have entered DNFH trap since the last spawning day or fish that were green (not ripe) on previous spawning days and returned to the holding pond. Incubation to eyed stage of eggs destined for CFH production will occur at Dworshak NFH. All eggs from positive IHNV parentage will be culled at this point. At Dworshak NFH, the eggs will be shocked and then transferred to Clearwater Hatchery where they will be disinfected and placed in Heath egg trays. (USFWS, Feb. 2008, p.6)

- All spawning for the upper Salmon River B-run steelhead is conducted at the East Fork Salmon River trap/spawn facility. All B-run hatchery fish are spawned following a 1:1 random mating protocol. Eggs are incubated at Sawtooth FH and shipped as eyed eggs to Magic Valley FH for final incubation and rearing. Production depends on how many broodstock are available, (750,000 smolts release – 70 pair B-run) and backfill with Dworshak stock. Prior to incubation; all eggs will be water hardened with a 100 mg/l solution of iodine for one hour. After eggs manifest a strong "eye" the eggs are sorted and enumerated mechanically. (IDFG May 2008, p.13)

b) No. of males and females spawned each year over past 10 years (table)

- See Dworshak B-run steelhead section in the Lower Snake NFH Briefing Document.

Table: Number of upper Salmon River B-run Steelhead (returning to Squaw Creek Ponds) males and females spawned from 2002 thru 2007 (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007b, Nov. 2006, Dec. 2005, Sept. 2004b, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

BY	Males	Females	Fecundity	Green Eggs	% Eye Up	Eyed Eggs
2007	17	21	6,834	143,521	.564	80,935
2006	25	33	6,379	210,516	.713	150,015
2005	8	8	6,308	50,317	.875	44,009
2004	5	19	6,321	120,105	.452	54,337
2003	11	16	8,024	128,379	.608	78,006
2002	26	17	5,782	98,302	.826	81,206

4. Fertilization

a) Protocols

- All upper Salmon River B-run steelhead are spawned following a 1:1 random mating protocol. Eggs are incubated at Sawtooth FH. (IDFG May 2008, p.13)

- For Dworshak B-run steelhead see Appendix B of the Lower Snake NFHs Report.

b) Number of eggs collected and fertilized each year over past 10 years (table)

- See the Dworshak B-run steelhead section in Appendix B of the Lower Snake NFHs Report.

Table: Number of upper Salmon River B-run Steelhead (returning to Squaw Creek Ponds) males and females spawned from 2002 thru 2007. (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007b, Nov. 2006, Dec. 2005, Sept. 2004b, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

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2003	11	16	8,024	128,379	.608	78,006
2002	26	17	5,782	98,302	.826	81,206

5. Incubation

- All upper Salmon River B-run steelhead eggs are incubated at Sawtooth FH and shipped as eyed eggs to Magic Valley FH for final incubation and rearing (IDFG May 2008, p.13)

- After hardening in the Argentine solution, the green eggs were put away at two females' eggs per Heath tray. All incubated eggs were treated with a 1,667 ppm 15-minute formalin flow-through treatment three times per week for fungal and bacterial control. Well temperatures varied from 40oF at the beginning of incubation to 44oF when the last eyed-eggs were shipped. Ten temperature units (TUs) per day was the average during the incubation period. Eye-up occurred at 360 TUs and the eggs were shocked at 380 TUs.

  The eggs were shocked by putting them in a half-full three-gallon bucket of water, then pouring them into a quarter-full bucket of water from about three feet high. One day after shocking, the eggs were machine-picked, using a Jensorter model JM4 machine, which picks and enumerates eggs. A day or two after picking, the eyed eggs are handpicked before transfer to the rearing hatcheries. The eggs were loaded at 50,000 to 100,000 eggs per 48-quart cooler full of well water. Then the cooler was strapped shut and shipped. (IDFG Nov. 2007b, p.17)

6. Ponding

a) Protocols

All eggs received were treated with Povidone Iodine at 100-ppm for ten minutes, and put into the upwelling incubators (50,000-75,000 eggs per incubator, 15 gals/min).The eggs hatched within five days and emerged from the incubators into the hatchery tanks twelve days after hatching. Sac fry volitionally swim from incubators 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. Rangen's 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 transfer to outside raceways. Fish are reared inside to a maximum density index of 0.60 and a maximum flow index of 1.19. Fish are transferred at approximately 30,000 fish per outside section for a total of 52 sections. Transfer to outside raceways is scheduled to begin in mid- July and completed by mid-August. Fish will range in size from 125 to 300 fpp (IDFG Aug. 2007, p.4) (IDFG May 2008, p.16)

b) Number of fry ponded each year, including % hatch each year

*Table: Egg to Release survival for Magic Valley FH upper Salmon River B-run Steelhead for BY2002 thru BY 2007 (*Derived by Joe Krakker, USFWS, from: *IDFG Aug. 2007, Aug. 2006a, Oct. 2005, Aug. 2004, Sept. 2003, Mar. 2003, Oct. 2001, Jan. 2001, May 2000, Sept.1999a.)*

BY	Eyed Eggs	% Hatch	Smolts Stocked	Surplus Stocked	Eyed Egg to Release Survival
2007	80,148	.97	62,315	0	.778
2006	149,260	.97	127,266	6,030	.893
2005	41,802	.97	31,015	0	.742
2004	53,722	.97	35,448	0	.66
2003	78,006	.97	65,341	0	.84
2002	81,206	.97	58,140	0	.72

*Table: Egg to Release survival for Magic Valley FH Dworshak B-run Steelhead for BY1998 thru BY 2006 (*Derived by Joe Krakker, USFWS, from: *IDFG Aug. 2007, Aug. 2006a, Oct. 2005, Aug. 2004, Sept. 2003, Mar. 2003, Oct. 2001, Jan. 2001, May 2000, Sept.1999a.)*

BY	Eyed Eggs	% Hatch	Smolts Stocked	Surplus Stocked	Eyed Egg to Release Survival
2007	863,651	.87	690,329	0	.80
2006	932,190	.87	614,383	203,600	.88
2005	945,000	.87	735,324	0	.78
2004	1,145,829	.87	747,157	0	.65

2003	932,191	.87	651,637	0	.70
2002	1,019,468	.87	817,657	0	.80
2001	1,131,772	.87	646,739	0	.57
2000	544,006	.87	317,650	0	.58
1999	1,446,208	.87	1,106,133	3,000	.77
1998	1,303,112	.98	1,121,504	21,851	.88

7. Rearing/feeding protocols

- The upper decks are used for initial outside rearing. Screens are placed at the fifty foot keyway and the upper 100 foot section is divided into two rearing sections. Approximately thirty thousand fish will be placed in each section. Once outside, fish are hand-fed Rangen's #3 and #4 crumble then graduate to larger sizes as growth continues. For approximately the last seven months of growth, smolts are fed Rangen's 470 extruded slow sinking feed. Feeding duration varies by fish and feed size from as high as six times per day, to as low as three times per day. When fish approach density indexes of 0.30, inventory in the lower 50 feet of the A deck, they will be moved to the lower 100 feet (B section) and the inventory in the upper 50 feet will have the entire A section for the final rearing period. The NOAA Fisheries 180 to 250 mm length at release criteria is met by adjusting the hatchery constant. Sample counts are performed monthly on representative ponds and length frequencies are calculated prior to release. During March 2009, IDFG staff will PIT tag a representative group of fish from each stock being reared. (IDFG May 2008, p.16)

8. Fish growth profiles[42]

- Fish were primarily fed Rangen 470 extruded salmon diet using Haskell's (1967) feeding rate formula. The feeding rate was calculated using a 10.0 hatchery constant. Fish are started on feed as one-inch swim-up fry and hatchery growth ends with an approximate 8.30-inch smolt. The fish had a conversion of 0.95 pounds of feed to produce a pound of fish. Generally, an inch of growth per month for the first three months is achieved when the fish are fed every day. An intermittent schedule of five days on and two days off feed was implemented in September to insure the fish met target size. The steelhead maintained an average .65 to .75-inch per month growth using this system. This schedule was used until the beginning of February at which time all fish were put on feed seven days a week. Piper's (1970) formulas for density and flow indices were used to calculate the densities and flows for each tank or raceway. The maximum recommended density index of .30 or 1.19flow index was not reached until the end of March in some raceways. Cumulative average density and flow indices at time of release remained close to the maximum parameters set by the LSRCP performance indicator program.

- Maximum flow for the year occurred during October at 89.7 cfs (84.8 cfs, October 2005).Spring flows began their seasonal decline during the last four months of rearing. In anticipation of decreasing flow, and to maintain a water turnover rate of two per hour or greater, only 27raceways were used for final production rearing. Each of the outside 27 raceways had about2.7 cfs prior to distribution in April.

[42] *IDFG Aug. 2007, p.5.*

9. Fish health protocols and issues

- Infectious hematopoietic necrosis (IHN) virus caused clinical losses in Pahsimeroi-A, Sawtooth-A, and Dworshak-B stocks at Magic Valley Steelhead Hatchery. One vat of Pahsimeroi-A fry were destroyed due to IHN, but were replaced with swim-up fry from Oxbow Hatchery. This was the only detection of virus in the indoor vats. Other episodes involved larger fish in the outside raceways, with isolations almost always detected in conjunction with bacterial infections. There is no effective treatment available for any viruses. Clinical bacterial coldwater disease (CWD), caused by *Flavobacterium psychrophilum*, was diagnosed from East Fork-B and Pahsimeroi-A stocks in the indoor vats during June. Treatment with oxytetracycline-medicated feed (OTC) was applied under INAD protocols. Response to treatment was positive but not exceptional. Both of these groups were very small fry at the time. Small fish are not aggressive feeders and OTC is highly water soluble, so the fish may not have been able to ingest the targeted therapeutic dose.

  The presence of CWD was detected 8 times from fish in the outside raceways, from all stocks except for Upper Salmon River-B. In all but one instance, IHN virus was also present. Because of the virus, all clinical episodes were allowed to run their course without intervention. The one instance when the bacterium was isolated from East Fork-B fish without the virus present, clinical signs were minimal and the isolation was considered a carrier state. *Aeromonas sobria*(a cause of motile aeromonad septicemia or MAS) was isolated from Dworshak-B fish twice, both times in conjunction with IHN and CWD.

  (IDFG Aug. 2007, p.6)

- Dworshak B-run steelhead have had higher incidences of health problems and disease than other steelhead stocks reared at Magic Valley FH. 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. (Compiled data from Magic Valley FH broodyear reports)

10. Chemotherapeutant use

- 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). (pers. comm. IDFG staff, 2008)

11. Tagging and marking of juveniles

Table: BY 2007 B-run steelhead releases and marks for Magic Valley FH in 2008 (IDFG May 2008, Table 7)

Stock	Release Location	Estimated Release	AD	CWT	PIT
Dworshak B	L. Salmon R. Stinky Sprgs.	215,000	215,000	60,000	4,700
Dworshak B	Squaw pond	60,000	60,000	60,000	1,500

Dworshak B	Squaw Ck.	191,000	191,000	0	4,800
Dworshak B	Lower E.F. Salmon R.	225,000	225,000	0	4,300
Upper Salmon R. B	Squaw Ck.	60,000	60,000	60,000	6,200

- Adipose fin clipping is tentatively scheduled to begin in mid July and should be completed by mid August. If fish are large enough (<150/lb), coded-wire-tagging will be accomplished concurrently with adipose clipping. Typically the East Fork Natural Stock and Upper Salmon B Stock are marked later in August due to the later arrival of eggs. Timing of marking is set up at the Salmon River Basin spring meeting. Marking is coordinated with Niagara Springs FH, Hagerman National Fish Hatchery (NFH), and the IDFG Marking Crew. (IDFG May 2008, p.17)

12. Fish Release

a) Protocols

Smolt distribution generally occurs in April through early May. Hatchery personnel continued to target 5,000 lbs. per load to meet IHOT (Integrated Hatcheries Operation Team) recommendations. (IDFG Aug. 2007, p.3)

b) Number of fish released each year (subyearlings?; yearlings?; other?)

Table: BY 2007 B-run steelhead releases and marks for Magic Valley FH in 2008 (IDFG May 2008, Table 7)

Stock	Release Location	Estimated Release	AD	CWT	PIT
Dworshak B	L. Salmon R. Stinky Sprgs.	215,000	215,000	60,000	4,700
Dworshak B	Squaw pond	60,000	60,000	60,000	1,500
Dworshak B	Squaw Ck.	191,000	191,000	0	4,800
Dworshak B	Lower E.F. Salmon R.	225,000	225,000	0	4,300
Upper Salmon R. B	Squaw Ck.	60,000	60,000	60,000	6,200

D. Program benefits and performance

1. Adult returns

a) Numbers of adult returns (need data for the past 10-20 years)

- Adult Dworshak B-run steelhead for the program are collected at Dworshak NFH. (USFWS 2008, Appendix B)

- *Table: B-run steelhead returns to Squaw Ck from 2002 thru 2006. (upper Salmon River B-run releases initiated in 2003 with BY 2002 smolts)* (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007b, Nov. 2006, Dec. 2005, Sept. 2004b, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

Year	Males	Females	Total
2007	26	26	52
2006	31	39	70
2005	3	18	21
2004	5	19	24
2003	8	16	24
2002	15	18	33

]

- *Tables: Estimated harvest and escapement of Magic Valley FH Dworshak B-run releases in the Salmon River for broodyear 1992-1999. (Derived by Joe Krakker, USFWS, from IDFG, LSRCP Steelhead Hatchery Evaluation Reports – Harrington 1997-2004)*

MVFH					
Upper Salmon River releases					
BY	**Stock**	**Harvest**	**Hatchery**	**Total**	**SAR**
1992	Dwor B	385	58	443	0.06%
1993	Dwor B	225	10	235	0.04%
1994	Dwor B	476	27	503	0.08%
1995	Dwor B	180	47	227	0.03%
1996	Dwor B	481	33	514	0.10%
1997	Dwor B	132	8	140	0.02%
1998	Dwor B	1,273	26	1,299	0.18%
1999	Dwor B	2,040	30	2,070	0.38%
	sum	**5,192**	**239**	**5,431**	**0.90%**
	92-99 ave	**649**	**30**	**679**	**0.11%**

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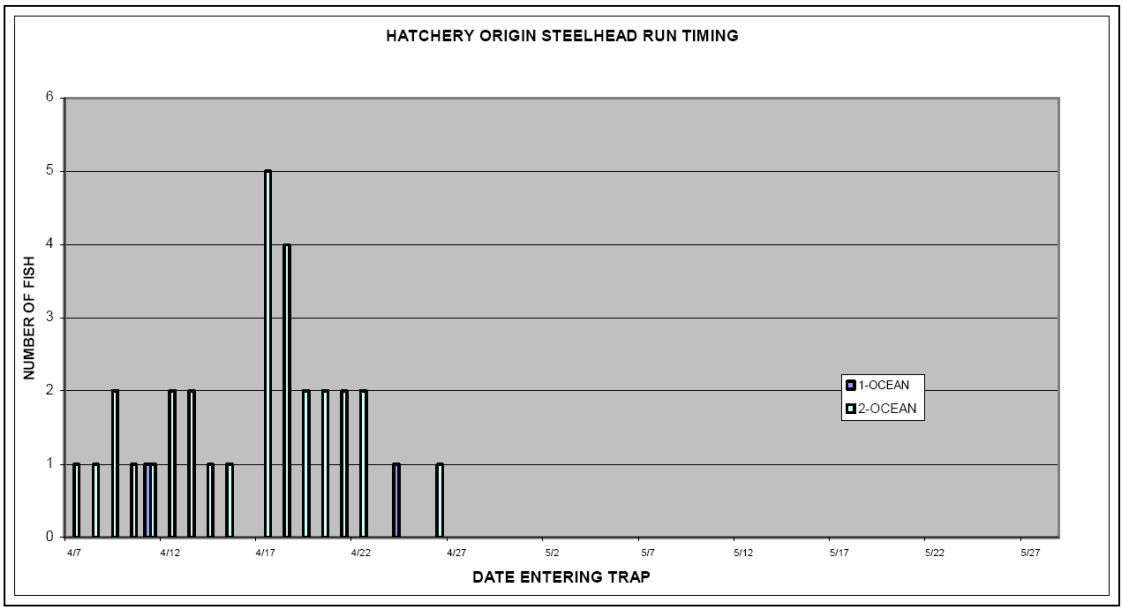
MVFH Little Salmon River releases BY	Stock	Harvest	Hatchery	Total	SAR
1992	Dwor B	164	164	328	0.10%
1993	Dwor B	98	97	195	0.08%
1994	Dwor B	152	152	14	0.09%
1995	Dwor B	331	331	662	0.16%
1996	Dwor B	226	235	461	0.19%
1997	Dwor B	0	0	0	0.00%
1998	Dwor B	297	12	309	0.10%
1999	Dwor B	309	18	327	0.11%
	sum	**1,577**	**1,009**	**2,296**	**0.83%**
92-99 ave		**197**	**126**	**287**	**0.10%**

b) Return timing and age-class structure of adults

- Adult Dworshak B-run steelhead for the program are collected at Dworshak NFH (USFWS 2008, Appendix B).

- Figure: Adult upper Salmon River B-run steelhead for the program were collected at Squaw Ck. between late -March and early -May from 2002 and 2006. (IDFG Aug. 2003, Appendix Q)

2002 SQUAW CREEK TRAP RUN TIMING
HATCHERY ORIGIN STEELHEAD



c) Smolt-to-adult return rates

- Adult Dworshak B-run steelhead for the program are collected at Dworshak NFH. (USFWS 2008, Appendix B)

- *Table: Adult Dworshak B-run steelhead SAR's for MVFH releases of BY 1992 thru BY 1999. (Derived by Joe Krakker, USFWS, from: IDFG June 2007, May 2007b, May 2007a, June 2005, July 2003c, July 2003b, Oct. 2002, June 2002) (Also See SARS within tables under section 1,a) "Numbers of adult returns" above)*

BY	Release Location	Total Release	Estimated Harvest	Estimated Hatchery	Total Return	SAR (%)
1992	E.F. Salmon R.	497,400	216	34	250	.05
	Slate Ck.	187,100	169	24	193	.10
	L. Salmon Hazard C.	325,301	164	164	328	.01
1993	L. Salmon Hazard C.	189,000	78	77	155	.08
	Salmon R. Slate Ck.	120,215	107	3	110	.09
	E.F. Salmon R.	192,400	20	2	22	.01
	L. Salmon Hazard C	49,725	20	20	40	.08
	Salmon R. Slate Ck.	91,140	91	2	93	.10
	E.F. Salmon R.	164,740	7	3	10	.01
1994	E.F. Salmon R.	423,705	426	25	451	.11
	L. Salmon Hazard C	342,679	152	152	304	.09
	Salmon R. Slate Ck.	215,934	50	2	52	.02
1995	L. Salmon Hazard C	403,281	331	331	662	.16
	E.F. Salmon R	210,459	77	17	94	.04
	E.F. Salmon R	38,320	17	4	21	.05
	Salmon R. Slate Ck.	236,297	27	12	39	.02
	E.F. Salmon R	178,675	59	14	73	.04
1996	E.F. Salmon R	292,954	466	17	483	.16
	L. Salmon Stinky Sp.	240,530	226	235	461	.19
	Salmon R. Slate Ck.	213,211	15	16	31	.01
1997	E.F. Salmon R	286,026	117	7	124	.04

	L. Salmon Stinky Sp.	280,949	0	0	0	.00
	E.F. Salmon R	35,700	15	1	16	.04
	Salmon R. Squaw Pd.	52,800	0	0	0	.00
1998	E.F. Salmon R	268,925	523	0	523	.19
	Salmon R. Tunnel Rk	78,134	86	3	89	.11
	Salmon R. Squaw C.	204,806	375	4	379	.19
	Salmon R. Squaw Pd.	107,010	164	11	175	.16
	Salmon R. Squaw Pd.	78,244	125	8	133	.17
	L. Salmon Stinky Sp.	324,555	297	12	309	.10
1999	E.F. Salmon R	239,981	908	15	923	.38
	Salmon R. Squaw C.	193,636	731	8	739	.38
	Salmon R. Squaw C.	106,135	401	7	408	.38
	L. Salmon Stinky Sp.	295,884	304	18	322	.11
	L. Salmon Stinky Sp.	4,639	5	0	5	.11

Table: Comparison of Steelhead SARs and Age Composition by Stock in Salmon River (Provided by Sam Sharr, IDFG, 2008)

Group#	Brood Year 2002					Brood Year 2003				
	# Released	# w/ CWT	Tag Rate	Return Rate	% 2-Ocean	# Released	# w/ CWT	Tag Rate	Return Rate	% 2-Ocean
Sawtooth A-Steelhead	747,901	34,600	4.6%	0.90%	45%	756,720	85,656	11.3%	0.56%	21%
Upper Salmon River B-run steelhead	58,140	56,396	97.0%	0.73%	79%	58,377	56,625	97.0%	0.27%	81%
Dworshak B-run steelhead, Squaw Creek Pond acclimation/release	62,930	61,042	97.0%	0.28%	91%	64,840	62,895	97.0%	0.16%	76%
Dworshak B-run steelhead, Squaw Creek direct-stream release	202,079	68,744	34.0%	0.31%	93%	NA	NA	NA	NA	NA
Dworshak B-run steelhead, Little Salmon River direct-stream release	0	0	0.0%	NA	NA	189,623	66,561	35.1%	0.15%	100%

d) Stock productivity (e.g. recruits per spawner)

- Adult Dworshak B-run steelhead for the program are collected at Dworshak NFH (USFWS 2008, Appendix B).
- Adult upper Salmon River B-run steelhead for the program are collected at Squaw Ck.
- 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 propagated within the Salmon River basin. The HSRG (2009) estimated R/S = 7.1 and 2.5 for Dworshak B-run steelhead released into the Little Salmon River and Squaw Creek, respectively.

2. Contributions to harvest and utilization (e.g. food banks)

See the contribution to harvest within tables under section 1,a) "Numbers of adult returns" above.

3. Contributions to conservation

Dworshak B- Run steelhead are listed but not considered essential for recovery (habitat blocked by Dworshak Dam). Currently all releases are AD clipped and are released into the upper Salmon and Little Salmon River for harvest purposes. The upper Salmon River and Little Salmon River do not contain B-run steelhead populations as identified by the TRT. (pers. comm. Joe Krakker, USFWS 2008)

4. Other benefits

None identified here.

E. Research, monitoring, and evaluation programs

The IDFG performs CWT, PIT tagging, and smolt to adult return evaluations. PIT tags are used to evaluate juvenile migration and adult return success. Expectations for brood year 2008 PIT tagging include approximately 20,000 from LSRCP funding. Funding from the CSS project is uncertain at this point. Coded-wire tags will be used to measure adult contribution to fisheries, as well as evaluate total adult returns by release group. (IDFG May 2008, p.17)

F. Program conflicts

1. Biological conflicts (e.g. propagated stock maladapted to hatchery water source)

- Dworshak B-run steelhead have had higher incidences of health problems and disease than other steelhead stocks reared at Magic Valley FH. 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. (Compiled data from Magic Valley FH broodyear reports).

- 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.

- 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.

2. Harvest conflicts (e.g. mixed stock fishery on hatchery and wild fish limits harvest opportunities on hatchery fish)

No information provided.

3. Conservation conflicts and risks

a) Genetic conflicts associated with straying and natural spawning of hatchery fish (Stray rates, proportion of hatchery-origin fish on natural spawning grounds, etc. Provide tables or figures where appropriate)

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. Dworshak B-run steelhead are released from Magic Valley FH into the upper Salmon River and Little Salmon River which are both independent populations identified by the TRT within the MPG for Snake River steelhead and not identified as B-run populations. (pers. comm. Joe Krakker, USFWS 2008)

b) Ecological conflicts (e.g. competition between hatchery fish and wild fish, predation, etc.)

- 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 from cross-contamination.

- 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.

- 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.

- Releases of large numbers of non-native hatchery steelhead in the Salmon River pose a predation risk to listed salmonid juveniles in the watershed.

- Steelhead outplanted to various sites in the Salmon River basin pose a fish health risk to natural fish populations in those areas.

4. Other conflicts between the hatchery program, or fish produced by the program, and other non-hatchery issues

- 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.

- The release locations above four Columbia River and four Snake River dams significantly reduces 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.

IIIB. Magic Valley FH A-run Steelhead and East Fork Salmon River "Natural" Steelhead

A. General information

Magic Valley FH was constructed in 1987 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. Magic Valley FH was designed to rear 349,800 pounds (1,749,000 smolts) of steelhead (5 fpp) for release off station. All adults for the program are trapped at Sawtooth FH, East Fork Salmon River facility, Squaw Creek facility, Pahsimeroi FH, and Dworshak NFH. The adult return goal for the program is 11,600 steelhead back to the project area (above Lower Granite Dam). (USFWS May 1990, p.29)

B. Stock/Habitat/Harvest Program Goals and Purpose

1. Purpose and justification of program

Magic Valley FH was constructed in 1987 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. Magic Valley FH was designed to rear 349,800 pounds (1,749,000 smolts) of steelhead (5 fpp) for release off station. (USFWS May 1990, p.29)

2. Goals of program

The goal of this program is to return 11,600 steelhead above Lower Granite Dam to mitigate for survival reductions resulting from construction and operation of the four lower Snake River dams. (USFWS May 1990, p.29)

3. Objectives of program

- 475,000 Pahsimeroi A, 480,000 Sawtooth A, 830,000 Dworshak B, 110,000 upper Salmon River B, and 75,000 East Fork Salmon natural A, eggs or swim up fry are requested to provide for a release of 690,000 Pahsimeroi/Sawtooth A; 691,000 Dworshak B; 60,000 Upper Salmon B; and 50,000 East Fork natural smolts. (IDFG May 2008, p.15 & 87)

- Adult return of 11,600 steelhead above Lower Granite Dam.

- The objectives of Idaho Fish and Game Department for the Magic Valley Hatchery are to reestablish historic fish runs into the Salmon River, enhance the wild spawning population, and increase sport and tribal fishery opportunities.

4. Type of program (Integrated or Segregated)

The upper Salmon River A-run steelhead program was designed as an *Isolated Harvest Program*. However, some broodstock management, eyed-egg production, and smolt production may occur to support ongoing Shoshone-Bannock Tribes streamside and in stream incubation programs and smolt release programs for natural production augmentation pursuant to U.S. v. Oregon agreements. The Sawtooth Fish Hatchery, Magic Valley Fish Hatchery and the Hagerman NFH are associated with the Salmon River A-run steelhead program. (Salmon R. A-run Steelhead HGMP Sept. 30, 2002, p.3)

5. Alignment of program with ESU-wide plans[43]

There is currently no ESU wide hatchery plan or recovery for steelhead in the Snake River.

6. Habitat description and status where fish are released.

- Unlike other subbasins in the Columbia River basin, the Salmon subbasin has large areas where the composition, structure, and function of the aquatic, wetland and riparian ecosystems have been relatively undisturbed by anthropogenic effects. (NWPPC May 28, 2004, p.3-10)

- Twelve percent of the total stream length in the Upper Salmon watershed is identified as being impaired by sedimentation. There are about 2,585 points of water diversion and record of 603 stream-alteration permits. There are 216 road culverts in the Upper Salmon watershed, and only 10 are known to allow adult fish passage. Sediments impact approximately 12% of streams in the watershed, with the Salmon River, Yankee Fork, and seven other creeks in the watershed included on the 303(d) list as sediment -impaired streams. (NWPPC May 28, 2004, p.3-12)

- The primary limiting factor expressions in the mainstem Salmon River from the Pahsimeroi River upstream to the East Fork Salmon River (excluding the area known as the 12-mile reach) are increased fine sediments and reduction in discharge (primarily at low flows) Some barriers to fish movement from the mainstem into tributaries are present. These barriers are a concern because fish use the tributaries as thermal refuge when water temperatures in the main river increase. (NWPPC May 28, 2004, p.3-12, 13)

7. Size of program and production goals (No. of spawners and smolt release goals)

- Approximately 116 Sawtooth A-run steelhead females (avg. fecundity of 4,792 and green egg to eye up survival of 86.3%) are needed to meet the 2008 Magic Valley FH request of 480,000 eyed eggs.

- Magic Valley has requested 475,000 eyed eggs or swim up fry from Pahsimeroi FH (Pahsimeroi stock).

[43] *Refer to "I. Columbia River Gorge" section "D. ESUs identified by NMFS and Current ESA status" for list of ESUs.*

- Approximately 10 East Fork Salmon River females are needed to meet the 2008 Magic Valley FH request of 475,000.

- Table: Proposed 2008 A-run Steelhead Releases From Magic Valley FH. (IDFG May 2008, Table 7)

Stock	Brood Year	Release location	Program Goal
E.F. Naturals	2007	E.F. Salmon Weir	60,000
Pahsimeroi	2007	Salmon R. @ Slate Ck.	30,000
Pahsimeroi	2007	Salmon R. @ Red Rock	120,000
Pahsimeroi	2007	Salmon R. @ Slate Ck.	60,000
Pahsimeroi	2007	Salmon R. @ Shoup Br.	80,000
Sawtooth	2007	Yankee Fk.	60,000
Sawtooth	2007	Yankee Fk.	30,000
Pah/Saw	2007	Salmon R. @ Colston Cor.	140,000
Pah/Saw	2007	Salmon R. @ Tunnel Rk.	60,000
Pah/Saw	2007	Salmon R. @ McNabb Pt.	120,000
Pahsimeroi	2007	Pahsimeroi R. @ Trap	30,000
Sawtooth	2007	Valley Ck.	50,000

C. Description of program and operations

1. Broodstock goal and source

- Snake River steelhead and indigenous Salmon River steelhead were used to found all hatchery A-run programs in Idaho. The Pahsimeroi Hatchery program was initiated with progeny of adult steelhead trapped at Oxbow and Hells Canyon dams from 1966 through 1968. Beginning in 1967, juvenile steelhead produced from spawning events that resulted from these collections were released in the Pahsimeroi River. However, Oxbow-origin smolts were released into the Pahsimeroi River and the upper Salmon River intermittently through 1970. Adult broodstock collections were initiated at the Pahsimeroi Hatchery in 1969. Returning Snake River stock and some indigenous Salmon River stock were trapped and used as broodstocks. The Sawtooth Fish Hatchery broodstock was founded with adults that returned from hatchery-produced smolt releases and from natural steelhead adults trapped at the facility. Naturally-produced steelhead adults were integrated into the hatchery broodstock until the early 1990s. It is likely that the natural component of the upper Salmon River is hatchery influenced. (Salmon R. A-run Steelhead HGMP Sept. 30, 2002, p.28-29)

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

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

Hatchery-produced Salmon River A-run steelhead were developed from Snake River steelhead and indigenous Salmon River steelhead to found the Pahsimeroi Hatchery mitigation program. This program was initiated with progeny of adult steelhead trapped at Oxbow and Hells Canyon dams from 1966 through 1968. Adult broodstock collections were initiated at the Pahsimeroi Hatchery in 1969. Returning Snake River stock and some indigenous Salmon River stock were trapped and used to found the Pahsimeroi broodstock. With the implementation of the Sawtooth Fish Hatchery program, adults from the Pahsimeroi Fish Hatchery were mixed with locally returning adults and used to create the Sawtooth Fish Hatchery broodstock used in the upper Salmon River and East Fork Salmon River. The East Fork Salmon River program transitioned from planting A-run steelhead to B-run steelhead in 1982 and has been primarily supported by annual releases of Dworshak National Fish Hatchery stock with a smaller percentage of locally returning hatchery A-run East Fork Salmon River returns. (East Fork Salmon R. Summer Steelhead HGMP, Sept. 30, 2002, p.24)

2. Adult collection procedures and holding

All steelhead for the Magic Valley A-run steelhead program are collected at Sawtooth FH, Pahsimeroi FH, and the East Fork Salmon Facility. Ladder and trap operations will begin the last week of March and continue until early May. At Sawtooth FH steelhead volitionally swim into attraction water into a single adult holding pond. The trapped steelhead are removed from the holding pond twice a week, counted into the male/female holding ponds, or spawned if ripe. Unmarked steelhead and other species are released above the weir, hatchery fish are spawned with surplus hatchery fish outplanted, or given to the tribes, or distributed to welfare programs. (IDFG May 2008, p.10)

3. Adult spawning

a) Spawning protocols

- Approximately 525 females (m/f ratio is variable, generally more males than females 65:35 or 60:40) will be spawned (Sawtooth FH), representative of the run, which will provide enough eyed eggs to meet egg requests (Average fecundity 4,700 of 525 females produces 2,467,500 green eggs at average 85% eye-up). Spawning protocol is random 1: 1 with two female's eggs combined prior to water hardening of eggs. (IDFG May 2008, p.10)

- Continuing with the Natural Steelhead Program that began in 2001, the plan for trapping and spawning returning steelhead in 2008 is to retain enough eggs taken from Hatchery-Origin steelhead (designated as H-O by presence of a Coded Wire Tag or frayed fins from hatchery rearing) enhanced with a component of steelhead eggs taken

from Natural-Origin steelhead (designated as N-O by lack of tag present and unmarked or undamaged fins) to produce 50,000 smolts for the East Fork Weir Release Group (EFWRG) of non-adipose fin-clipped smolts. Anticipating a lower egg-to-smolt survival conversion of natural steelhead reared in a hatchery than that of hatchery steelhead, the target egg take was increased to 70,000 steelhead eggs to achieve the target of 50,000 smolts. In order to incorporate natural steelhead genetics into the hatchery broodstock, one of every three N-O females trapped at the EFSR weir in 2008 is to be crossed with a HO male. Spawning occurs when ripe fish are available. Green eggs are brought to Sawtooth FH for incubation and sent to Magic Valley FH for final incubation and rearing. (IDFG May 2008, p.12)

b) No. of males and females spawned each year over past 10 years (table)

Table: Number of Sawtooth A-run Steelhead males and females spawned from 1998 thru 2007. (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007b, Nov. 2006, Dec. 2005, Sept. 2004b, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

BY	Males	Females	Fecundity	Green Eggs	% Eye Up	Eyed Eggs
2007	526	526	4,810	2,472,200	.832	2,104,531
2006	452	452	5,174	2,338,433	.876	2,049,530
2005	542	542	4,535	2,458,137	.866	2,129,319
2004	576	576	4,582	2,639,117	.853	2,251,142
2003	508	508	5,527	2,807,840	.842	2,363,746
2002	542	542	5,274	2,858,525	.884	2,526,935
2001	633	633	4,707	2,867,634	.8	2,300,978
2000	870	870	4,465	3,950,103	.89	3,516,250
1999	364	364	4,330	1,526,046	.877	1,338,178
1998	246	246	4,538	1,116,350	.882	984,600

Table: Number of E.F. Salmon "Naturals" Steelhead males and females spawned from 1998 thru 2007. (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007b, Nov. 2006, Dec. 2005, Sept. 2004b, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

BY	Males	Females	Fecundity	Green Eggs	% Eye Up	Eyed Eggs
2007	57	46	5,460	251,181	.767	192,777
2006	28	14	6,267	87,737	.897	78,700
2005	4	13	4,651	61,129	.924	56,478
2004	10	6	4,400	26,405	.602	15,918
2003	9	11	7,835	86,184	.672	57,876
2002	20	10	4,821	48,205	.672	32,382
2001	20	60	4,565	142,348	.580	81,647
2000	15	15	4,493	67,389	.762	51,384
1999	18	16	3,903	62,442	.928	57,954
1998	3	3	3,850	11,500	.670	7,700

4. Fertilization

a) Protocols

- Spawning protocol at Sawtooth FH is random 1: 1 with two female's eggs combined prior to water hardening of eggs. (IDFG May 2008, p.10)

- Continuing with the Natural Steelhead Program that began in 2001, the plan for trapping and spawning returning steelhead in 2008 is to retain enough eggs taken from Hatchery-Origin steelhead (designated as H-O by presence of a Coded Wire Tag or frayed fins from hatchery rearing) enhanced with a component of steelhead eggs taken from Natural-Origin steelhead (designated as N-O by lack of tag present and unmarked or undamaged fins) to produce 50,000 smolts for the East Fork Weir Release Group (EFWRG) of non-adipose fin-clipped smolts. Anticipating a lower egg-to-smolt survival conversion of natural steelhead reared in a hatchery than that of hatchery steelhead, the target egg take was increased to 70,000 steelhead eggs to achieve the target of 50,000 smolts. In order to incorporate natural steelhead genetics into the hatchery broodstock, one of every three N-O females trapped at the EFSR weir in 2008 is to be crossed with a HO male. Spawning occurs when ripe fish are available. Green eggs are brought to Sawtooth FH for incubation and sent to Magic Valley FH for final incubation and rearing. (IDFG May 2008, p.12)

b) Number of eggs collected and fertilized each year over past 10 years (table)

Table: Number of Sawtooth A-run Steelhead males and females spawned from 1998 thru 2007. (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007b, Nov. 2006, Dec. 2005, Sept. 2004b, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

BY	Males	Females	Fecundity	Green Eggs	% Eye Up	Eyed Eggs
2007	526	526	4,810	2,472,200	.832	2,104,531
2006	452	452	5,174	2,338,433	.876	2,049,530
2005	542	542	4,535	2,458,137	.866	2,129,319
2004	576	576	4,582	2,639,117	.853	2,251,142
2003	508	508	5,527	2,807,840	.842	2,363,746
2002	542	542	5,274	2,858,525	.884	2,526,935
2001	633	633	4,707	2,867,634	.8	2,300,978
2000	870	870	4,465	3,950,103	.89	3,516,250
1999	364	364	4,330	1,526,046	.877	1,338,178
1998	246	246	4,538	1,116,350	.882	984,600

Table: Number of E.F. Salmon Steelhead "Natural" males and females spawned from 1998 thru 2007. (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007b, Nov. 2006, Dec. 2005, Sept. 2004b, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

BY	Males	Females	Fecundity	Green Eggs	% Eye Up	Eyed Eggs

2007	57	46	5,460	251,181	.767	192,777
2006	28	14	6,267	87,737	.897	78,700
2005	4	13	4,651	61,129	.924	56,478
2004	10	6	4,400	26,405	.602	15,918
2003	9	11	7,835	86,184	.672	57,876
2002	20	10	4,821	48,205	.672	32,382
2001	20	60	4,565	142,348	.580	81,647
2000	15	15	4,493	67,389	.762	51,384
1999	18	16	3,903	62,442	.928	57,954
1998	3	3	3,850	11,500	.670	7,700

5. Incubation

- 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. (IDFG May 2008, p.11)

- After hardening in the Argentine solution, the green eggs were put away at two females' eggs per Heath tray. All incubated eggs were treated with a 1,667 ppm 15-minute formalin flow-through treatment three times per week for fungal and bacterial control. Well temperatures varied from 40oF at the beginning of incubation to 44oF when the last eyed-eggs were shipped. Ten temperature units (TUs) per day was the average during the incubation period. Eye-up occurred at 360 TUs and the eggs were shocked at 380 TUs. The eggs were shocked by putting them in a half-full three-gallon bucket of water, then pouring them into a quarter-full bucket of water from about three feet high. One day after shocking, the eggs were machine-picked, using a Jensorter model JM4 machine, which picks and enumerates eggs. A day or two after picking, the eyed eggs are handpicked before transfer to the rearing hatcheries. The eggs were loaded at 50,000 to 100,000 eggs per 48-quart cooler full of well water. Then the cooler was strapped shut and shipped. (IDFG Nov. 2007b, p.17)

6. Ponding

a) Protocols

All eggs received were treated with Povidone Iodine at 100-ppm for ten minutes, and put into the upwelling incubators (50,000-75,000 eggs per incubator, 15 gals/min).The eggs hatched within five days and emerged from the incubators into the hatchery tanks twelve days after hatching. Sac fry volitionally swim from incubators 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. Rangen's 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 transfer to

outside raceways. Fish are reared inside to a maximum density index of 0.60 and a maximum flow index of 1.19. Fish are transferred at approximately 30,000 fish per outside section for a total of 52 sections. Transfer to outside raceways is scheduled to begin in mid- July and completed by mid-August. Fish will range in size from 125 to 300 fpp (IDFG Aug. 2007, p.4) and (IDFG May 2008, p.16)

b) Number of fry ponded each year, including % hatch each year

Table: Egg to release survival for Magic Valley FH Pahsimeroi A-run Steelhead for BY1998 thru BY 2007. (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007b, Nov. 2006, Dec. 2005, Sept. 2004b, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

BY	Eyed Eggs	% Hatch	Smolts Stocked	Surplus Stocked	Egg to Release Survival
2007	496,518	.99	372,394	80,835	.913
2006	747,535	.99	536,450	72,000	.814
2005	624,365	.99	446,277	121,895	.91
2004	854,718	.99	688,397	3,925	.81
2003	846,410	.99	647,023	0	.76
2002	910,249	.99	773,272	0	.85
2001	906,282	.99	860,824	0	.95
2000	946,319	.99	790,258	0	.84
1999	515,375	.99	418,592 63,120 presmolts	102,075	.93
1998	887,000	.99	819,902	0	.92

Table: Egg to release survival for Magic Valley FH Sawtooth A-run Steelhead for BY1999 thru BY 2007 (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007b, Nov. 2006, Dec. 2005, Sept. 2004b, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

BY	Eyed Eggs	% Hatch	Smolts Stocked	Surplus Stocked	Egg to Release Survival
2007	409,157	.99	340,803	46,145	.946
2006	338,094	.99	295,958	0	.93
2005	338,448	.99	304,301	0	.899
2004	480,000	.99	348,080	0	.73
2003	483,081	.99	364,549	0	.75
2002	399,000	.99	293,345	0	.74
2001	399,000	.99	328,811	0	.82
2000	991,665	.99	876,085	0	.88
1999	389,982	.99	358,025	0	.92
1998	0		0	0	

Table: Egg to release survival for Magic Valley FH E.F. Salmon Steelhead for BY1999 thru BY 2007. (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007b, Nov. 2006, Dec. 2005, Sept. 2004b, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

BY	Eyed Eggs	% Hatch	Smolts Stocked	Surplus Stocked	Egg to Release Survival
2007	185,100	.97	155,079	12,887	.907
2006	66,543	.97	50,592	0	.76
2005	54,110	.97	31,073	0	.574
2004	57,876	.97	42,953	0	.74
2003	15,918	.97	11,116	0	.7
2002	32,382	.97	27,707	0	.89
2001	81,622	.97	63,156	0	.77
2000	51,384	.97	38,024	0	.74
1999	57,954	.97	51,866	0	.89

7. Rearing/feeding protocols

The upper decks are used for initial outside rearing. Screens are placed at the fifty foot keyway and the upper 100 foot section is divided into two rearing sections. Approximately thirty thousand fish will be placed in each section. Once outside, fish are hand-fed Rangen's #3 and #4 crumble then graduate to larger sizes as growth continues. For approximately the last seven months of growth, smolts are fed Rangen's 470 extruded slow sinking feed. Feeding duration varies by fish and feed size from as high as six times per day, to as low as three times per day. When fish approach density indexes of 0.30, inventory in the lower 50 feet of the A deck, they will be moved to the lower 100 feet (B section) and the inventory in the upper 50 feet will have the entire A section for the final rearing period. The NOAA Fisheries 180 to 250 mm length at release criteria is met by adjusting the hatchery constant. Sample counts are performed monthly on representative ponds and length frequencies are calculated prior to release. During March 2009, IDFG staff will PIT tag a representative group of fish from each stock being reared. (IDFG May 2008, p.16)

8. Fish growth profiles

Fish were primarily fed Rangen 470 extruded salmon diet using Haskell's (1967) feeding rate formula. The feeding rate was calculated using a 10.0 hatchery constant. Fish are started on feed as one-inch swim-up fry and hatchery growth ends with an approximate 8.30-inch smolt. The fish had a conversion of 0.95 pounds of feed to produce a pound of fish. Generally, an inch of growth per month for the first three months is achieved when the fish are fed every day. An intermittent schedule of five days on and two days off feed was implemented in September to insure the fish met target size. The steelhead maintained an average .65 to .75-inch per month growth using this system. This schedule was used until the beginning of February at which time all fish were put on feed seven days a week. Piper's (1970) formulas for density and flow indices were used to calculate the densities and flows for each tank or

raceway. The maximum recommended density index of .30 or 1.19flow index was not reached until the end of March in some raceways. Cumulative average density and flow indices at time of release remained close to the maximum parameters set by the LSRCP performance indicator program.

Maximum flow for the year occurred during October at 89.7 cfs (84.8 cfs, October 2005).Spring flows began their seasonal decline during the last four months of rearing. In anticipation of decreasing flow, and to maintain a water turnover rate of two per hour or greater, only 27raceways were used for final production rearing. Each of the outside 27 raceways had about 2.7 cfs prior to distribution in April. (IDFG Aug. 2007, p.5)

9. Fish health protocols and issues

Infectious hematopoietic necrosis (IHN) virus caused clinical losses in Pahsimeroi-A, Sawtooth-A, and Dworshak-B stocks at Magic Valley Steelhead Hatchery. One vat of Pahsimeroi-A fry were destroyed due to IHN, but were replaced with swim-up fry from Oxbow Hatchery. This was the only detection of virus in the indoor vats. Other episodes involved larger fish in the outside raceways, with isolations almost always detected in conjunction with bacterial infections. There is no effective treatment available for any viruses. Clinical bacterial coldwater disease (CWD), caused by *Flavobacterium psychrophilum,* was diagnosed from East Fork-B and Pahsimeroi-A stocks in the indoor vats during June. Treatment with oxytetracycline-medicated feed (OTC) was applied under INAD protocols. Response to treatment was positive but not exceptional. Both of these groups were very small fry at the time. Small fish are not aggressive feeders and OTC is highly water soluble, so the fish may not have been able to ingest the targeted therapeutic dose.

The presence of CWD was detected 8 times from fish in the outside raceways, from all stocks except for Upper Salmon River-B. In all but one instance, IHN virus was also present. Because of the virus, all clinical episodes were allowed to run their course without intervention. The one instance when the bacterium was isolated from East Fork-B fish without the virus present, clinical signs were minimal and the isolation was considered a carrier state. *Aeromonas sobria*(a cause of motile aeromonad septicemia or MAS) was isolated from Dworshak-B fish twice, both times in conjunction with IHN and CWD. (IDFG Aug. 2007, p.6)

10. Chemotherapeutant use[44]

- Fish are not anesthetized so that surplus adults can be used for human consumption.
- 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.
- 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).

[44] *Pers. comm. IDFG staff, 2008.*

11. Tagging and marking of juveniles

- Adipose fin clipping is tentatively scheduled to begin in mid July and should be completed by mid August. If fish are large enough (<150/lb), coded-wire-tagging will be accomplished concurrently with adipose clipping. Typically the East Fork Natural Stock and Upper Salmon B Stock are marked later in August due to the later arrival of eggs. Timing of marking is set up at the Salmon River Basin spring meeting. Marking is coordinated with Niagara Springs FH, Hagerman NFH, and the IDFG Marking Crew. (IDFG May 2008, p.17)

- See section 12,b) below for the number of fish marked and tagged.

12. Fish Release

a) Protocols

Smolt distribution generally occurs in April through early May. Hatchery personnel continued to target 5,000 lbs. per load to meet IHOT (Integrated Hatcheries Operation Team) recommendations. (IDFG Aug. 2007, p.3)

b) Number of fish released each year (subyearlings?; yearlings?; other?)

Table: Proposed 2008 A-run Steelhead Releases From Magic Valley FH (IDFG May 2008, Table 7)

Stock	Release location	Estimated Release	AD	CWT	PIT
E.F. Naturals	E.F. Salmon Weir	60,000	0	60,000	1,300
Pahsimeroi	Salmon R. @ Slate Ck.	30,000	30,000	30,000	600
Pahsimeroi	Salmon R. @ Red Rock	120,000	120,000	30,000	1,400
Pahsimeroi	Salmon R. @ Slate Ck.	60,000	0	0	1,300
Pahsimeroi	Salmon R. @ Shoup Br.	80,000	80,000	0	1,400
Sawtooth	Yankee Fk.	60,000	60,00	30,000	900
Sawtooth	Yankee Fk.	30,000	0	0	700
Pah/Saw	Salmon R. @ Colston Cor.	140,000	140,000	30,000	1,400
Pah/Saw	Salmon R. @ Tunnel Rk.	60,000	60,000	0	1,300
Pah/Saw	Salmon R. @ McNabb Pt.	120,000	120,000	30,000	1,400
Pahsimeroi	Pahsimeroi R. @ Trap	30,000	30,000	30,000	600
Sawtooth	Valley Ck.	50,000	0	0	1,000

D. Program benefits and performance

1. Adult returns

a) Numbers of adult returns (need data for the past 10-20 years)

- Adult Pahsimeroi A-run steelhead for the program are collected at Pahsimeroi FH.
- Adult Sawtooth A-run stock and E.F. Salmon R. "Naturals" stock steelhead are collected at Sawtooth FH and E.F. Salmon Facility respectively.

Table: A-run Steelhead Returns to Sawtooth FH from 1998 thru 2007. (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007b, Nov. 2006, Dec. 2005, Sept. 2004b, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

Year	Marked Male	Marked Female	Marked Total	Unmarked Male	Unmarked Female	Unmarked Total
2007	2,131	1,897	4,028	4	17	21
2006	1,103	817	1,920	13	9	22
2005	928	566	1,494	14	15	29
2004	1,481	925	2,406	11	7	18
2003	1,154	1,277	2,431	14	16	30
2002	3,443	3,566	7,009	56	39	95
2001	1,665	1,353	3,018	24	13	37
2000	1,073	973	2,046	9	6	15
1999	526	397	923	3	7	10
1998	524	239	763	3	3	6

Table: "Natural" Steelhead Returns to E.F. Salmon River Facility from 1998 thru 2007. (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007b, Nov. 2006, Dec. 2005, Sept. 2004b, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

Year	Marked Male	Marked Female	Marked Total	Unmarked Male	Unmarked Female	Unmarked Total
2007	72	78	150	3	13	16
2006	1	0	1	101	95	196
2005	39	39	78	11	10	21
2004	4	0	4	15	8	23
2003	3	0	0	14	30	44
2002	11	0	11	8	19	27
2001	22	29	51	3	8	11
2000	24	18	42	2	4	6
1999	30	16	46	3	7	10
1998	10	3	13	2	12	14

- *Tables: Estimated harvest and escapement of Magic Valley FH A-run releases (Pahsimeroi and Sawtooth stocks) and East Fork Naturals steelhead releases in the Salmon River for broodyear 1992-1999. (Derived by Joe Krakker, USFWS, from IDFG, LSRCP Steelhead Hatchery Evaluation Reports – Harrington 1997-2004)*

Upper Salmon River releases					
BY	**Stock**	**Harvest**	**Hatchery**	**Total**	**SAR**
1992	Pah A	1,415	857	2,272	0.25%
1993	Pah A	1,955	1,178	3,133	0.65%
1994	Pah A	4,153	2,007	6,160	0.90%
1995	Pah A	3,227	1,478	4,705	0.64%
1996	Pah A	1,753	1,039	2,792	0.36%
1997	Pah A	1,075	761	1,836	0.63%
1998	Pah A	4,815	4,386	9,201	1.10%
1999	Pah A	3,453	5,781	9,234	2.24%
	sum	**21,846**	**17,487**	**39,333**	**6.77%**
	92-99 ave	**2,731**	**2,186**	**4,917**	**0.85%**

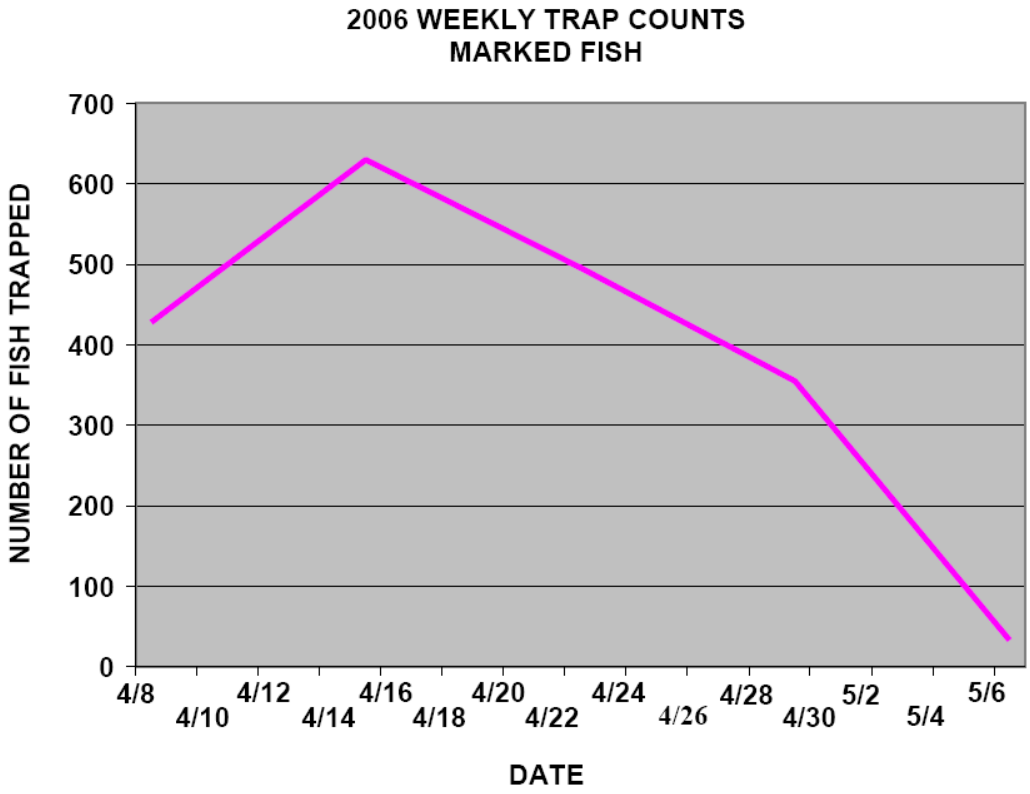
Upper Salmon River releases					
BY	**Stock**	**Harvest**	**Hatchery**	**Total**	**SAR**
1992	Saw A				
1993	Saw A				
1994	Saw A				
1995	Saw A				
1996	Saw A				
1997	Saw A	2,195	960	3,155	0.77%
1998	Saw A				
1999	Saw A	3,063	5,023	8,086	2.22%
	sum	**5,258**	**5,983**	**11,241**	**2.98%**
	97,99 ave	**2,629**	**2,992**	**5,621**	**1.49%**

BY	**Stock**	**Harvest**	**Hatchery**	**Total**	**SAR**
1992					
1993	E.F. B	348	138	486	0.30%
1994	E.F. B	128	14	142	0.22%
1995	E.F. B	29	10	39	0.06%
1996	E.F. B	193	52	245	0.19%
1997	E.F. B	467	71	538	0.18%
1998					
1999					
	sum	**1,165**	**285**	**1,450**	**0.95%**
	93-97 ave	**233**	**57**	**290**	**0.19%**

b) Return timing and age-class structure of adults

- Adult Pahsimeroi A-run steelhead for the program are collected at Pahsimeroi FH.
- Adult Sawtooth stock and E.F. Salmon R. stock "naturals" steelhead are collected at Sawtooth FH and E.F. Salmon Facility respectively.

Appendix M. Run Timing Graph for 2006 Steelhead Trapped at Sawtooth.



*This graph does not include unmarked fish trapped. Twenty-two unmarked steelhead (13 males/ 9 females) were trapped at Sawtooth between April 8 and May 6, 2006.

(IDFG Nov. 2007b, Appendix M)

Table: Age at Return of A-run Steelhead to Sawtooth FH in 2006 (IDFG Nov. 2007b, p.14)

Age Class of Adults	MALES		FEMALES		TOTAL	
	No.	%	No.	%	No.	%
Hatchery 1-Oceans	884	67.22	431	32.78	1315	88.02
Hatchery 2-Oceans	44	24.58	135	75.42	179	11.98
Natural 1-Oceans	6	46.15	7	53.85	13	44.83
Natural 2-Oceans	8	50.0	8	50.0	16	55.17
Total 1-Oceans	890	67.02	438	32.98	1328	87.20
Total 2-Oceans	52	26.67	143	73.33	195	12.80

c) Smolt-to-adult return rates

- Adult Pahsimeroi A-run steelhead for the program are collected at Pahsimeroi FH.
- Adult Sawtooth A-run steelhead and E.F. Salmon R. "naturals" stock steelhead are collected at Sawtooth FH and E.F. Salmon Facility respectively.
- *Table: Adult A-run steelhead SAR's for MVFH releases of BY 1992 thru BY 1999. (Derived by Joe Krakker, USFWS, from: IDFG June 2007, May 2007b, May 2007a, June 2005, July 2003c, July 2003b, Oct. 2002, June 2002) (Also See SARS within tables under section 1,a) "Numbers of adult returns" above)*

BY	Release Location	Total Release	Estimated Harvest	Estimated Hatchery	Total Return	SAR (%)
1992	Salmon R. Challis	260,600	488	283	771	.29
	Lemhi R.	198,500	288	174	462	.23
	N.F. Salmon	190,500	327	199	526	.28
	Salmon R. Ellis Br.	266,300	312	201	513	.19
1993	L. Salmon Warm Sp.	114,730	33	33	66	.06
	Pahsimeroi	121,500	448	283	731	.60
	E.F. Salmon R.	160,040	348	138	486	.18
	Pahsimeroi	362,940	1,507	895	2,402	.66
	L. Salmon Warm Sp.	352,820	99	99	198	.06
1994	E.F. Salmon R.	65,000	128	14	142	.22
	N.F. Salmon	115,050	934	464	1,398	1.22
	Salmon R. McNabb	207,845	1,106	414	1,520	.73
	Lemhi R.	198,270	1,018	689	1,707	.86
	Salmon R. Bruno Br.	162,870	1,095	440	1,535	.94
1995	E.F. Salmon	67,256	29	10	39	.06

	R.					
	Salmon R. Bruno Br.	207,245	509	306	815	.39
	Salmon R. McNabb	201,969	800	345	1,145	.57
	N.F. Salmon	127,708	997	365	1,362	1.07
	Lemhi R.	201,212	921	462	1,383	.69
1996	N.F. Salmon	134,311	545	190	735	.55
	Salmon R. McNabb	154,471	249	219	468	.30
	E.F. Salmon R.	131,220	193	52	245	.19
	Lemhi R.	241,510	595	344	939	.39
	Salmon R. Bruno Br.	150,280	242	214	456	.3
1997	E.F. Salmon R.	126,920	201	57	258	.2
	Salmon R. McNabb	158,660	968	302	1,270	.80
	Salmon R. Shoup Br.	108,915	357	285	642	.59
	Salmon R. Red Rk.	137,060	566	357	923	.67
	Salmon R. Slate Ck.	174,580	266	14	280	.16
	Salmon R. Cottonwood	142,650	870	373	1,243	.87
	Lemhi R.	154,565	509	404	913	.59
1998	Salmon R. Red Rk.	171,764	1,179	898	2,077	1.21
	Salmon R. Shoup Br.	132,420	900	693	1,593	1.20
	Salmon R. Tunnel Rk.	129,213	588	676	1,264	.98
	L. Salmon Stinky Sp.	41,620	82	168	250	.6
	Salmon R. SFH	39,660	169	212	381	.96
	Salmon R. McNabb	121,210	552	633	1,185	.98
	Lemhi R.	85,980	359	449	808	.94
1999	Salmon R. Tunnel Rk.	108,673	1,007	1,425	2,432	2.24
	Salmon R. Shoup Br.	67,928	520	954	1,474	2.17
	Salmon R. Kilpatrick	21,500	177	302	479	2.23
	Salmon R. Eyehole	21,500	177	302	479	2.23
	Salmon R. McNabb	105,578	845	1,482	2,327	2.20
	Salmon R. Cottonwood	45,753	366	642	1,008	2.20

	Lemhi R.	113,367	1,007	1,591	2,598	2.29
	L.Salmon Stinky Sp.	115,423	1,757	1,621	3,378	2.84
	Salmon R. Lewis& Clk	61,732	524	867	1,391	2.25
	Salmon R. Cottonwood	36,419	292	512	804	2.21
	Salmon R. Colston C	11,533	95	162	257	2.23
	Salmon R. Colston C	9,092	75	128	203	2.23
	Salmon R. Challis	24,491	176	344	520	2.12
	Salmon R. Challis	21,250	170	298	468	2.20
	Salmon R Waggonham.	1,845	16	26	42	2.27
	Salmon R Waggonham.	39,246	333	551	884	2.25
	Lemhi R.	24,040	204	338	542	2.25

d) Stock productivity (e.g. recruits per spawner)

- Adult Pahsimeroi A-run steelhead for the program are collected at Pahsimeroi FH.
- Adult Sawtooth A-run steelhead and E.F. Salmon R. "naturals" stock steelhead are collected at Sawtooth FH and E.F. Salmon Facility respectively.
- The HSRG (2009) estimated R/S = 12.6 for hatchery-origin Pahsimeroi A-run and Sawtooth A-run steelhead released in the Salmon River.
- The HSRG (2009) estimated the habitat productivity and capacity for the East Fork Salmon River population as R/S max = 1.50 and C = 1,048 natural-origin adults, respectively. The HSRG (2009) estimated R/S = 7.1 for hatchery-origin East Fork "natural" steelhead released in the E.F. Salmon River.

2. Contributions to harvest and utilization (e.g. food banks)

- Also see the contribution to harvest within tables under section 1,a) "Numbers of adult returns" above.

Table: Estimated Harvest and escapement of Magic Valley FH A-run releases (Derived by Joe Krakker, USFWS, from: IDFG Dec. 2006, Sept. 2005, Dec. 2004, and Oct. 2003)

Return Year	Estimated Harvest	Hatchery & Estimated In-River Returns	Total Return
2006/2007			
2005/2006			

2004/2005			
2003/2004			
2002/2003			
2001/2002			
2000/2001			
1999/2000	3,229	1,147	4,376
1998/1999	1,716	1,243	2,959
1997/1998	4,589	1,889	6,478

Table: Summary of IDFG steelhead fishery interview data (unexpanded) for Snake, Clearwater, and Salmon rivers for run years 2001-2006. (Derived by Joe Krakker, USFWS, from: IDFG Dec. 2006, Sept. 2005, Dec. 2004, Oct. 2003)

Year	River	No. Anglers	Total Hours Fished
2006-2007	Snake	1,242	6,940
	Clearwater	8,342	37,071
	Salmon	16,088	106,449
2005-2006	Snake	608	3,817
	Clearwater	6,480	25,787
	Salmon	14,683	109,569
2004-2005	Snake	894	5,162
	Clearwater	7,074	28,180
	Salmon	15,643	118,799
2003-2004	Snake	939	6,352
	Clearwater	6,629	28,512
	Salmon	16,923	114,942
2002-2003	Snake	1,653	9,963
	Clearwater	6,013	28,151
	Salmon	15,623	114,778
2001-2002	Snake	1,375	7,774
	Clearwater	9,500	37,667
	Salmon	21,114	159,490

3. Contributions to conservation

Pahsimeroi, Sawtooth, and E.F. Salmon R. A- Run steelhead are not listed. Currently some releases are not AD clipped and are released into the upper Salmon and Little Salmon River to meet US v OR agreements. These stocks of steelhead are not part of the populations identified by the TRT for conservation and recovery purposes. (pers. comm. Joe Krakker, USFWS 2008)

4. Other benefits

None identified here.

E. Research, monitoring, and evaluation programs

The IDFG performs CWT, PIT tagging, and smolt to adult return evaluations. PIT tags are used to evaluate juvenile migration and adult return success. Expectations for brood year 2008 PIT tagging include approximately 20,000 from LSRCP funding. Funding from the CSS project is

uncertain at this point. Coded-wire tags will be used to measure adult contribution to fisheries, as well as evaluate total adult returns by release group. (IDFG May 2008, p.17)

F. Program conflicts

1. Biological conflicts (e.g. propagated stock maladapted to hatchery water source)

- 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.

2. Harvest conflicts (e.g. mixed stock fishery on hatchery and wild fish limits harvest opportunities on hatchery fish)

- 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.

3. Conservation conflicts and risks

a) Genetic conflicts associated with straying and natural spawning of hatchery fish (Stray rates, proportion of hatchery-origin fish on natural spawning grounds, etc. Provide tables or figures where appropriate)

Pahsimeroi, Sawtooth, and E.F. Salmon A-run steelhead are released from Magic Valley FH into the upper Salmon River into multiple independent populations identified by the

TRT within the MPG for Snake River steelhead. (pers. comm. Joe Krakker, USFWS 2008)

b) Ecological conflicts (e.g. competition between hatchery fish and wild fish, predation,)

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 ecological and genetic risks to ESA listed steelhead populations (e.g. Lemhi River) and non-listed resident rainbow trout populations.

4. Other conflicts between the hatchery program, or fish produced by the program, and other non-hatchery issues

None identified here.

IV. Sawtooth Fish Hatchery

A. Description of hatchery

- Sawtooth Fish Hatchery is part of the Lower Snake River Compensation Plan and has been in operation since 1985. The hatchery and East Fork satellite facility were built by the U.S. Army Corp of Engineers and is funded through the U.S. Fish & Wildlife Service. Sawtooth Fish Hatchery is located five miles south of Stanley, Idaho. The facility's 71 acres borders the Salmon River to the west, Highway 75 to the east and U.S. Forest Service ground to the south and north. The Sawtooth Fish Hatchery weir is approximately 400 river miles from Lower Granite Dam and 950 river miles from the mouth of the Columbia River. Chinook salmon *Oncorhynchus tshawytscha* are released directly into the river at the hatchery and above the hatchery in the headwaters of the Salmon. Sawtooth Fish Hatchery steelhead are released at the hatchery and along the upper Salmon River downstream to near Challis, Idaho. Sawtooth Fish Hatchery has operated a satellite facility on the East Fork of the Salmon River since 1984. The facility is situated eighteen miles upstream on the East Fork Salmon River. The mouth of the East Fork Salmon River is located 42 miles downriver from Sawtooth Fish Hatchery. The property was purchased from the Bureau of Land Management and is surrounded by private land. An access road easement was purchased from a private landowner who has property surrounding the location. The east side of the property borders the East Fork of the Salmon River. Historically, all East Fork fish have been returned to the East Fork River. (IDFG Nov. 2007, p. 3)

- The hatchery's main building is 134 ft by 166 ft and consists of an office, meeting room, lab, visitor/interpretive center, wood shop, welding/fabrication shop, intake collection box/chemical room, shop office, incubation and early rearing room, one inside storage room and two outside covered storage areas, generator room, furnace room and a fish food freezer/chemical equipment storage room. The hatchery has four pump houses (each is 14 ft x 11 ft). One is for domestic water and three are production wells. An intake building (15 ft x 37 ft) is located one-half mile upstream from the hatchery and Salmon River water is collected for outside production rearing. The temporary employee dorm and adult spawning facility are located 300 yards downstream of the hatchery building. The dorm (38 ft x 72 ft) has three bedrooms with a bath in each, attached public rest-room facilities, storage and laundry room, living and dining room with an open kitchen. The adult facility consists of three adult ponds and an enclosed spawning shed (35 ft x 52 ft). There are five resident houses at Sawtooth, all about 1,360 square ft with attached single car garages and separate woodsheds.

  The East Fork has a roof structure over a 28 ft travel trailer that is used as office space while the trap is in operation. The other building is a combination shop, storage and spawning shed (22 ft x 44 ft). (IDFG Nov. 2007, p. 4)

B. Hatchery water sources

- Sawtooth Fish Hatchery 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 fish 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 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. No fish are reared at the East Fork trap.

(IDFG Nov. 2007, p. 5)

C. Adult broodstock collection facilities

All spring Chinook salmon broodstock for the program are collected at Sawtooth FH. All steelhead broodstock for the program are collected at Squaw Creek, E.F. Salmon River, Sawtooth FH, and Pahsimeroi FH.

D. Broodstock holding and spawning facilities

All spring Chinook salmon broodstock for the program are held and spawned at Sawtooth FH, while steelhead broodstock for the program are held and spawned at the E.F. Salmon River facility, Sawtooth FH, and Pahsimeroi FH.

E. Incubation facilities

- Early incubation of steelhead occurs at Sawtooth FH prior to transfer of eyed steelhead eggs to Magic Valley FH and Hagerman NFH. All spring Chinook salmon are incubated at Sawtooth FH.

- Production capacities for Sawtooth Fish Hatchery include 100 stacks of Flex-a-lite Consolidated Inc. (FAL) incubators containing 800 trays with the potential to incubate five million Chinook eggs or seven million steelhead eggs. (IDFG Nov. 2007, p. 5)

- Eggs will be water hardened/disinfected with a 100 mg/l solution of buffered iodine. Formalin will be added to each incubation stack to retard fungus development daily at a rate of 1,667 ppm (15-min drip). Formalin treatments will be 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. Normally one female's eggs are incubated in a single incubation tray (IDFG May 2008, p.12)

F. Indoor rearing facilities

Inside rearing consists of ten semi-square tanks with an individual volume of 17 ft^3 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 ft^3 and a capacity for 100,000 fry each. (IDFG Nov. 2007, p. 5)

G. Outdoor rearing facilities

Outside rearing consists of 12 fry raceways each with 750 ft^3 of rearing space and 28 production raceways each with 2,700 ft^3 of rearing space. Each production raceway has a capacity to raise 100,000 Chinook to smolt stage for a total capacity of 2.8 million fish. These production raceways are serial reuse that flow from an upper raceway to a lower one. (IDFG Nov. 2007, p. 5)

H. Release locations and facilities

All Spring Chinook salmon are released from Sawtooth FH into the Salmon River. All steelhead are reared at Magic Valley FH and Hagerman NFH prior to release. (see MVFH and HNFH briefs)

I. Outmigrant monitoring facilities

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 will be determined from a representative sample prior to release. A CWT retention check will be completed before release. IDFG research personnel will PIT 15,000 fish, early-March of 2008, and monitor PIT tag detection at dams. (IDFG May 2008, p.30)

J. Additional or special facilities

None

K. Outreach and public education facilities/programs[45]

- The facility has a well developed visitors' center in an area that receives considerable tourist traffic. Sawtooth FH receives 50,000 visitors per year.
- Hatchery staff provide tours on-site and contribute to 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.
- Sawtooth FH is including on a driving tour on 1610 am.
- The facility has high school education programs, teacher pen pals, and performs "Trout in the Classroom" every three years.

[45] *Pers. comm. IDFG staff, 2008.*

L. Special issues or problems (e.g. water and property rights issues, law suits, etc.)

None.

IVA. Sawtooth FH A-run Steelhead

Adult A-run steelhead are collected at the Sawtooth FH weir and juveniles direct stream released immediately below the weir. See the Magic Valley FH A-run Steelhead section above for more information about the A-run steelhead program for the Salmon River.

IVB. Sawtooth FH Spring Chinook

A. General information

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. Sawtooth FH was designed to rear 149,000 pounds (2,980,000 smolts) of spring Chinook salmon (20 fpp) for release both on and off station. All adults for the program were to be trapped at Sawtooth FH and the East Fork Salmon satellite facility. The East Fork Salmon River satellite facility includes adult trapping/holding facilities and rearing/acclimation ponds. The adult return goal for the program is 19,445 salmon back to the project area (above Lower Granite Dam). (USFWS May 1990, p.17)

B. Stock/Habitat/Harvest Program Goals and Purpose

1. Purpose and justification of program

- 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. Sawtooth FH was designed to rear 149,000 pounds (2,980,000 smolts) of spring Chinook salmon (20 fpp) for release both on and off station. (USFWS May 1990, p.17)

- The original production design for SFH was for 2.3 million smolts including 1.3 million smolts in the Salmon River at SFH, 700,000 for the East Fork Salmon River and 300,000 smolts released in Valley Creek. The Valley Creek component of the program has never been pursued and the East Fork Salmon River component was changed in 1998 to a natural production program. Approximately, 350 females and 350 males are needed for broodstock for the SFH spring Chinook salmon program. This number includes jacks and accounts for pre-spawning mortality. This brood level will provide 1.5 million green eggs at 4,300 egg fecundity and 1.3 million smolts at an average of 88% eyed egg-to-smolt survival to meet the SFH component. An additional 250 pairs are required to reach the original production design of 2.3 million smolts. Currently, SFH has sufficient specific, pathogen-free water to rear 450,000 parr to 7 cm target size prior to transfer to final rearing on raw river water. (USFWS May 1990, p.46)

2. Goals of program

The goal of this program is to return 19,445 spring Chinook salmon above Lower Granite Dam to mitigate for survival reductions resulting from construction and operation of the four lower Snake River dams. (CFH Spring Chinook HGMP, Sept. 30, 2002, p3)

3. Objectives of program

- The original production design for SFH was for 2.3 million smolts including 1.3 million smolts in the Salmon River at SFH, 700,000 for the East Fork Salmon River and 300,000 smolts released in Valley Creek. The Valley Creek component of the program has never been pursued and the East Fork Salmon River component was changed in 1998 to a natural production program.

- Approximately, 350 females and 350 males are needed for broodstock for the SFH spring Chinook salmon program. This number includes jacks and accounts for pre-spawning mortality.

- This brood level will provide 1.5 million green eggs at 4,300 egg fecundity and 1.3 million smolts at an average of 88% eyed egg-to-smolt survival to meet the SFH component.

- An additional 250 pairs are required to reach the original production design of 2.3 million smolts Currently, SFH has sufficient specific, pathogen-free water to rear 450,000 parr to 7 cm target size prior to transfer to final rearing on raw river water.

(IDFG May 2008, p.30)

4. Type of program (Integrated or Segregated)

The Salmon River spring Chinook salmon program was envisioned as an Isolated Harvest Program but has operated as an Integrated Recovery Program since its inception. Hatchery x hatchery broodstock spawn crosses are performed using no natural (unmarked) parents. Resulting progeny may be ESA-listed or not depending on brood year and parental origin. In addition, hatchery x natural crosses are performed (resulting in ESA-listed progeny) to support an ongoing supplementation research. (Salmon R. Spring Chinook HGMP Sept 30, 2002, p.3)

5. Alignment of program with ESU-wide plans

There is currently no ESU-wide hatchery plan for spring Chinook salmon. Spring Chinook salmon at Sawtooth FH are listed in the Snake River Basin.

6. Habitat description and status where fish are released.

Unlike other subbasins in the Columbia River basin, the Salmon subbasin has large areas where the composition, structure, and function of the aquatic, wetland and riparian ecosystems have been relatively undisturbed by anthropogenic effects. Twelve percent of the total stream length in the Upper Salmon watershed is identified as being impaired by sedimentation. Water diversion (primarily during low flow), altered riparian areas, increased water temperatures, and some fish-passage barrier issues were among the areas of secondary concern in unspecified tributaries to the East Fork Salmon River and headwater areas. Focal terrestrial habitat fragmentation associated with land uses, development, and habitat conversion has 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 it currently does. Currently, 54% of the watershed has not been impacted by timber harvest. Seven percent of the watershed has been highly impacted by timber-harvest activities, and 4% has been moderately impacted. Thirty four percent of the Upper Salmon watershed has been classified as having only low impacts from timber-harvest activities. (NWPPC May 28, 2004, p.3-10—3-16)

7. .Size of program and production goals (No. of spawners and smolt release goals)

Approximately 350 females and 350 males are needed for Sawtooth allocations at a 1:1 male to female ratio to produce 1.5 million green eggs at an average fecundity of 4,300 eggs per female to release 1.3 million smolts at an .88 average eyed egg to smolt survival rate. (IDFG May 2008, p.30)

Stock	Brood Year	Release location	Program Goal
Upper Salmon R.	2006	Sawtooth FH	1,300,000

C. Description of program and operations

1. Broodstock goal and source

The Salmon River spring Chinook broodstock was developed primarily from endemic sources. Prior to the construction of the Sawtooth Fish Hatchery in 1985, Chinook salmon smolts were periodically released in the vicinity of the present hatchery (first records from 1966). While locally returning adults were used as much as possible, juveniles were released from adults sourced at Rapid River Fish Hatchery, Hayden Creek Fish Hatchery (Lemhi River tributary), and Marion Forks Fish Hatchery (Oregon) in 1967 (Salmon R. Spring Chinook HGMP Sept 30, 2002, p.27)

2. Adult collection procedures and holding

- Depending on spring runoff conditions, ladder and trap operations will begin between mid-May and mid-June and continue through Labor Day weekend of 2008. Trapped fish are removed daily, examined for marks, gender, injuries, treated with injectable erythromycin as necessary, and either placed into one of three adult holding ponds or released directly into the Salmon River above the hatchery, depending upon what mark or gender the fish may have. All unmarked fish are released above the hatchery intake after daily trap operations have ended. Brood fish are made up of marked hatchery fish. (IDFG May 2008, p.46)

- Brood fish trapped at this facility will be examined for pathogens during routine spawning. Upon arrival at the trap, adult Chinook salmon will be injected with a 20 mg/kg intra-peritoneal injection of erythromycin to control Renibacterium. To reduce

prespawning mortality due to Ichthyophthirius multifilis, adult holding water will be treated with 167 mg/l formalin for up to 7 days per week. Once water temperatures exceed 65ºF, an extended formalin treatment of 40 mg/l for 6 hours will be implemented if I. multifilis is detected. All brood females will be sampled for Renibacterium salmoninarum by ELISA technology. Eggs from females with optical densities of 0.25 and above will be culled from production, unless egg take needs are not met. Sixty Chinook salmon carcasses of fish that will be released above the Sawtooth FH weir to spawn naturally may be sampled for viral replicating agents to ascertain IHNV prevalence, estimate risk of horizontal infection to Sawtooth FH production fish, and to facilitate the decision process in regards to the timing of fish production events. Brood Chinook salmon will be examined for viral replicating agents (60 fish by ovarian fluid sample and 30 fish will have kidney/spleen sample taken for viral assay). A 20 fish sample will be required to monitor Myxobolus cerebralis prevalence. The APHIS veterinarian-in-charge will be notified if reportable pathogens are detected. Pre-spawning mortality of adult spring Chinook salmon will be categorized by suspected cause. (IDFG May 2008, p.47)

- Adults will be treated with formalin at least three times a week and up to seven days per week depending on river water temperatures and fish health. Pre-spawning mortalities will be investigated to determine the cause of death with fish health samples being sent to the Eagle Fish Health Lab. Genetic samples will be collected from all unmarked fish and all hatchery spawned broodstock. (IDFG May 2008, p.47)

3. Adult spawning

a) Spawning protocols

Approximately, 350 females and 350 males are needed for broodstock for the Sawtooth FH spring Chinook salmon program. Marked hatchery fish will be spawned with marked hatchery fish across brood years where possible using the following spawning protocol; > 100 pairs then 1m: 1f random cross, 50 to 100 pair then 2m : 1f split random cross , 25 to 50 pair then 3m: 1f split random cross and < 25 pair then 4m : 1f split random cross. The split random cross includes eggs from one female being split in equal groups of one, two, three to four then each group fertilized by one male. After fertilization the eggs are recombined into a single group for incubation and water hardening. (IDFG May 2008, p.47)

b) No. of males and females spawned each year over past 10 years (table)

Table: Number of male and female spring Chinook spawned at Sawtooth FH for BY1998 thru BY2005 (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007, Nov. 2006, Dec. 2005, Sept. 2004, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

BY	Males	Jacks	Females	Fecundity	Green Eggs	% Eye Up	Eyed Eggs
2007	63	20	72	5,231	376,639	.824	310258
2006	3	82	60	3,729	223,758	.844	188,742
2005	142	14	297	3,985	1,183,537	.889	1,051,935
2004	266	46	434	4,912	1,999,254	.877	1,752,39

							5
2003	29	25	33	5,290	174,575	.837	145,744
2002	152	9	194	5,348	1,037,558	.887	920,651
2001	375	7	382	4,950	1,890,845	.916	1,732,927
2000	81	84	88	5,163	454,355	.926	420,733
1999	44	11	12	5,303	63,642	.93	59,373
1998	25	2	27	5,165	139,469	.93	129,593

4. Fertilization

a) Protocols

Each female's eggs were fertilized using 1 male and combined with another females' eggs fertilized with a different male, then water hardened for one hour in a 100 ppm titrateable iodine solution. The eggs were then put into Heath incubator trays, with two females per tray. Spawning crosses were random cross-matings 1:1 (f/m). (IDFG Nov. 2007, p.8)

b) Number of eggs collected and fertilized each year over past 10 years (table)

Table: Number and survival of spring Chinook eggs spawned at Sawtooth FH for BY1998 thru BY2005 (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007, Nov. 2006, Dec. 2005, Sept. 2004, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

BY	Males	Jacks	Females	Fecundity	Green Eggs	% Eye Up	Eyed Eggs
2007	63	20	72	5,231	376,639	.824	310,258
2006	3	82	60	3,729	223,758	.844	188,742
2005	142	14	297	3,985	1,183,537	.889	1,051,935
2004	266	46	434	4,912	1,999,254	.877	1,752,395
2003	29	25	33	5,290	174,575	.837	145,744
2002	152	9	194	5,348	1,037,558	.887	920,651
2001	375	7	382	4,950	1,890,845	.916	1,732,927
2000	81	84	88	5,163	454,355	.926	420,733
1999	44	11	12	5,303	63,642	.93	59,373
1998	25	2	27	5,165	139,469	.93	129,593

5. Incubation

Eggs will be water hardened/disinfected with a 100 mg/l solution of buffered iodine. Formalin will be added to each incubation stack to retard fungus development daily at a rate of 1,667 ppm (15-min drip). Formalin treatments will be 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. Normally one female's eggs are incubated in a single incubation tray. (IDFG May 2008, p.47)

6. Ponding

a) Protocols

The Sawtooth Fish Hatchery stock swim-up fry were transferred from the Heath trays to vats. The vats contained PVC baffles every four feet. Starting flows for the swim-up fry were set at 20 gpm per vat. As the fish grew, the flows were increased to a maximum of 110 gpm. Early rearing well water varied in temperature from 46o F to 40o F. All fry were started on Bio Oregon starter #2, and initially fed by hand. Feed amounts and sizes varied according to manufacturer recommendations as the fish grew. Automatic belt feeders were used once the fry exhibited a good feed response. All fish were fed a 28-day prophylactic treatment of Bio Oregon erythromycin medicated feed at a rate of 2.25 grams active/100 lbs. of fish starting on June 6 and ending on July 3, 2006. Erythromycin medicated feed is fed as a prophylactic for BKD. The fish were transferred outside for final rearing starting on April 5 with fish moves completed May 15, 2006. Fish averaged 191 fish per pound (fpp) and 2.6 inches in length when moved to the outside raceways. (IDFG Nov. 2007, p.8)

b) Number of fry ponded each year, including % hatch each year

Table: (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007, Nov. 2006, Dec. 2005, Sept. 2004, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

BY	Eyed Eggs	Fry	% Eyed Egg to Fry	Smolt Release	% Fry to Smolt	% Eyed Egg to Smolt
2007	310,258					
2006	188,742					
2005	1,051,935	1,014,736	.965	995,262	.981	.946
2004	1,752,395	1,693,210	.966	1,552,544	.917	.886
2003	145,744	136,830*	.939	134,769	.985	.925
2002	920,651	879,040*	.955	821,415	.934	.892
2001	1,732,927	1,213,215*	.700	1,105,169	.911	.638
2000	420,733	402,777	.957	385,761	.958	.917
1999	59,373	59,111	.966	57,134	.967	.962
1998	129,593	127,064	.980	123,425	.971	.952

*Culling of eggs from females with BKD occurred after eyed egg stage in 2003 (1 female), 2002 (3 females), and 2001 (85 females)

7. Rearing/feeding protocols

- All fry were started on Bio Oregon starter #2, and initially fed by hand. Feed amounts and sizes varied according to manufacturer recommendations as the fish grew. Automatic belt feeders were used once the fry exhibited a good feed response. All fish were fed a 28-day prophylactic treatment of Bio Oregon erythromycin medicated feed at a rate of 2.25 grams active/100 lbs. of fish starting on June 6 and ending on July 3, 2006. Erythromycin medicated feed is fed as a prophylactic for BKD. The fish were transferred outside for final rearing starting on April 5 with fish moves completed May 15, 2006. Fish averaged

191 fish per pound (fpp) and 2.6 inches in length when moved to the outside raceways. (IDFG Nov. 2007, p.8)

- The Sawtooth spring Chinook were placed into eight full raceways for final rearing until release. Initial densities were 0.13 lbs/ ft3 and water flows were 500 gpm. All outside fish were fed Bio Oregon grower feed. A second 28 day prophylactic Bio Oregon erythromycin medicated feed treatment was fed from August 9 through September 15, 2006 at a rate of 4.5 grams active per 100 pounds of fish, to prevent the onset of BKD. (IDFG Nov. 2007, p.8-9)

8. Fish growth profiles

Appendix I.1. Feed Schedule for Sawtooth Chinook, BY05.

Fpp	% BW Fed	Feed Size	Timing	
1816---825		.035	str #2	11/05 – 01/06
1816---825		.035	str #2	01/06- 02/06
825-----189		.035	str #3/1.0/1.3mm	02/06 - 03/06
324-----189		.023	1.3mm	03/06 - 04/06
189-----91		.024	1.5mm	04/06 – 05/06
189-----91		.024	1.5mm	05/06 – 06/06
189-----91		.024	1.5mm	06/06 – 06/06
91-------53		.022	1.5/2.0mm	07/06 – 08/06
53------36		.020	2.0/2.5mm	08/06 – 09/06
36------23		.020	2.5mm	9/056– 10/06
<23		Maintenance	2.5/3.0	10/06- release

(IDFG Nov. 2007, p.33)

9. Fish health protocols and issues

Chinook salmon reared at this facility will be inspected by EFHL 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. The preliberation sample will consist of 20 randomly collected fish that will be examined for *R. salmoninarum*, *Myxobolus cerebralis*, and viral replicating agents. Goede's organosomatic index will also be performed on these fish. This sample will be taken within 45 days of release. One metaphylactic feeding of erythromycin-medicated feed will be applied to juveniles with a target dose of 100 mg/kg for 28 days. The APHIS veterinarian-in-charge will be notified if reportable pathogens are detected. (IDFG May 2008, p. 48)

10. Chemotherapeutant use

- Adult spring Chinook retained for broodstock 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. Adults released upstream do not receive antibiotic injections.

- 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.
- MS-222 is used to anesthetize adult spring Chinook during sorting for spawning or passing upstream.
- 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.
- 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.

11. Tagging and marking of juveniles

Stock	Brood Year	Release location	Expected Release	# AD	# CWT	# PIT
Upper Salmon R.	2006	Sawtooth FH	174,000	0	174,000	15,000

12. Fish Release

a) Protocols

Fish were released into the Salmon River at the Sawtooth Fish Hatchery weir. The fish were released in the afternoon through the outside raceway tailrace pipe. River water temperature was in the low 40's at time of release. (IDFG May 2008, p.9)

b) Number of fish released each year (subyearlings?; yearlings?; other?)

Stock	Brood Year	Release location	Program Goal
Upper Salmon R.	2006	Sawtooth FH	1,300,000

D. Program benefits and performance

3.1.2 Standard: Program contributes to mitigation requirements.

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

3.1.3 Standard: Program addresses ESA responsibilities.

Indicator 1: ESA Section 7 Consultation completed.

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

Indicator 1: Marking rate by type in each release group documented.

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

Indicator 1: Annual number of spawners on spawning grounds estimated in specific locations.
Indicator 2: Spawner-recruit ratios estimated is specific locations.
Indicator 3: Number of redds in natural production index areas documented in specific locations.

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

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

1.10.2) "Performance Indicators" addressing risks.

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

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

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

Indicator 1: Number of natural-origin spawners removed for broodstock determined annually and documented.
Indicator 2: Natural origin spawners released to migrate to natural spawning areas documented.
Indicator 3: Number of adults, eggs or juveniles placed in natural rearing areas managed.

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

Indicator 1: Life history characteristics of natural and hatchery-produced populations are measured (e.g., juvenile dispersal timing, juvenile size at outmigration, juvenile sex ratio at outmigration, adult return timing, adult age and sex ratio, spawn timing,

hatch and swim-up timing, rearing densities, growth, diet, physical characteristics, fecundity, egg size).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Indicator 1: Mortality rates in trap documented.
Indicator 2: Prespawning mortality rates of trapped fish in hatchery or after release documented.

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

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

1. Adult returns

a) Numbers of adult returns (need data for the past 10-20 years)

Table: Adult Returns of Spring Chinook to Sawtooth FH from 1998 thru 2007 (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007, Nov. 2006, Dec. 2005, Sept. 2004, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

Year	Females	Males	Jacks	Total
2007	139	167	1,282	1,588
2006	321	344	96	761
2005	711	646	204	1,561
2004	694	670	654	2,018
2003	415	299	522	1,236
2002	902	786	98	1,786
2001	876	1,000	227	2,103
2000	159	275	91	525
1999	35	82	79	196
1998	77	72	4	153

b) Return timing and age-class structure of adults

Figure: Spring Chinook Return Timing to Sawtooth FH in 2005. (IDFG Nov. 2007, p.25)

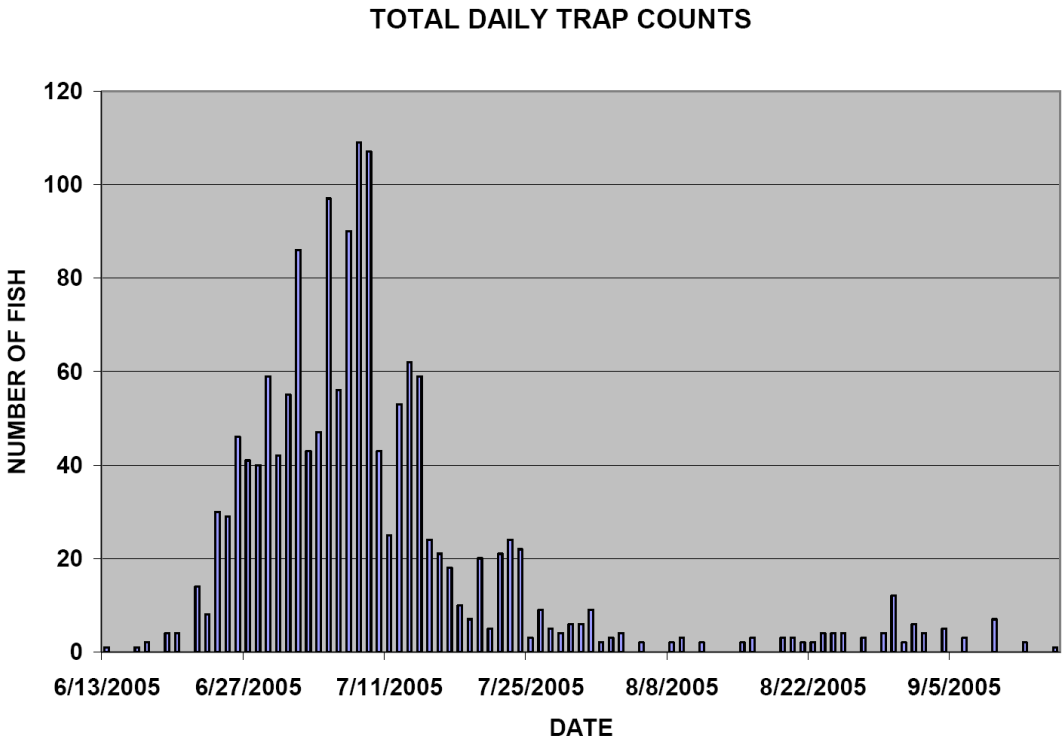


Table: Spring Chinook Age At Return to Sawtooth FH from 1998 thru 2007 (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007, Nov. 2006, Dec. 2005, Sept. 2004, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

Year	I Ocean Male	II Ocean Male	III Ocean Male	I Ocean Female	II Ocean Female	III Ocean Female
2007						
2006						
2005	204	594	52	0	586	125
2004	654	628	42	2	651	41
2003	522	92	207	0	101	314
2002	98	482	304	0	476	426
2001	227	924	76	0	740	136
2000	376	299	59	0	201	51
1999	79	57	25	0	21	14
1998	4	17	55	0	16	61

c) Smolt-to-adult return rates

(Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007, Nov. 2006, Dec. 2005, Sept. 2004, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

Brood Year	Release Year	Number Released	3-Year Returns	4-year Returns	5-Year Returns	Total Returns	SAR (%)
1991	92-93	774,583	2	11	7	20	.003
1992	93-94	213,830	8	23	26	57	.027
1993	94-95	334,313	21	72	23	116	.035
1994	1996	25,006	1	3	3	7	.028
1995	1997	4,756	0	12	37	49	1.030
1996	1998	43,161	60	135	32	227	.526
1997	1999	223,240	279	1,219	327	1,825	.818
1998	2000	123,425	176	531	131	838	.679
1999	2001	57,134	65	91	73	229	.401
2000	2002	385,761	476	926	175	1,577	.409
2001	2003	1,105,169	407	1,182	67	1,656	.150
2002	2004	821,415	205	358			
2003	2005	134,769	40				
2004	2006	1,552,544					
2005	2007	995,262					

d) Stock productivity (e.g. recruits per spawner)

Overall mean smolt-to-adult survivals and adult recruits per spawner have averaged SAR = 0.1% and R/S = 2.0 adults, respectively (HSRG 2009).

2. Contributions to harvest and utilization (e.g. food banks)

It is still too early (2008) to set salmon seasons, but Fish and Game anticipates opening some stretches of river that haven't seen a salmon season in 30 years. Seasons this year may include Chinook fishing on the upper Salmon River. The last time anglers could fish for Chinook in the Sawtooth Valley was in 1977. (IDFG 2008b)

3. Contributions to conservation

Upper Salmon River spring Chinook propagated at Sawtooth FH are listed as a part of the Snake River Spring Chinook ESU. There is currently no recovery plan developed for Snake River Spring/Summer Chinook. The program was operating under a Section 10 Permit although the Permit is currently expired.

4. Other benefits

The spring Chinook program at Sawtooth FH is a part of the ongoing ISS study.

E. Research, monitoring, and evaluation programs[46]

- Monitoring and evaluation of "Performance Indicators"
- Document LSRCP fish rearing and release practices.
- Document, report, and archive all pertinent information needed to successfully manage spring Chinook salmon spawning, rearing, and release practices. (e.g., number and composition of fish spawned, spawning protocols, spawning success, incubation and rearing techniques, juvenile mark and tag plans, juvenile release locations, number of juveniles released, size at release, migratory timing and success of juveniles, and fish health management).
- Document the contribution LSRCP-reared spring Chinook salmon make toward meeting mitigation and management objectives. Document juvenile out-migration and adult returns.
- Estimate the number of wild/natural and hatchery-produced spring Chinook salmon escaping to project waters above Lower Granite Dam using dam counts, harvest information, spawner surveys, and trap information (e.g., presence/absence of identifying marks and tags, number, species, size, age, length). Conduct creel surveys and angler phone or mail surveys to collect harvest information. Assess juvenile outmigration success at traps and dams using direct counts, marks, and tags. Reconstruct runs by brood year. Summarize annual mark and tag information (e.g., juvenile out-migration survival, juvenile and adult run timing, adult return timing and survival). Develop estimates of smolt-to-adult survival for wild/natural and hatchery-produced spring Chinook salmon. Use identifying marks and tags and age structure analysis to determine the composition of adult spring Chinook salmon.
- Identify factors that are potentially limiting program success and recommend operational modifications, based on the outcome applied studies, to improve overall performance and success.
- Evaluate potential relationships between rearing and release history and juvenile and adult survival information. Develop hypotheses and experimental designs to investigate practices that may be limiting program success. Implement study recommendations and monitor and evaluate outcomes.

F. Program conflicts

1. Biological conflicts (e.g. propagated stock maladapted to hatchery water source)

- 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.

[46] *Salmon R. Spring Chinook HGMP Sept 30, 2002, p.45-46.*

- Sawtooth FH spring Chinook smolts outplanted into the Yankee Fork 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 and passed upstream of the Upper Salmon River 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.

2. Harvest conflicts (e.g. mixed stock fishery on hatchery and wild fish limits harvest opportunities on hatchery fish)

- 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 Shoshone-Bannock Tribes fish in the Upper Salmon River Basin, including Yankee Fork. Preliminary 2008 estimate of harvest by the Shoshone-Bannock Tribes was 28 natural and 400 hatchery spring Chinook in the upper Salmon River.

- The Upper Salmon River was open for sport harvest of spring Chinook salmon in 2008 for the first time in 30 years.

3. Conservation conflicts and risks

a) Genetic conflicts associated with straying and natural spawning of hatchery fish (Stray rates, proportion of hatchery-origin fish on natural spawning grounds, etc. Provide tables or figures where appropriate)

Table: Number of Marked and Unmarked Spring Chinook Released Above Sawtooth FH Weir from 1998 Thru 2007 (Derived by Joe Krakker, USFWS, from: IDFG Nov. 2007, Nov. 2006, Dec. 2005, Sept. 2004, Aug. 2003, Jan 2003, Aug 2001, Oct. 2000, Sept. 1999b)

Year	Unmk Female	Unmk Male	Unmk Jack	Mk Female	Mk Male	Mk Jack	Total Released	Mk (%)
2007	52	85	49	10	12	0	208	10.6
2006	88	152	56	41	45	12	394	24.9
2005	125	117	39	71	67	46	465	39.6

2004	154	262	67	99	71	56	709	31.9
2003	285	207	46	94	61	38	731	26.4
2002	314	447	33	310	180	56	1,340	40.7
2001	255	317	47	202	244	166	1,231	49.7
2000	116	275	91	43	0	0	525	8.2
1999	16	51	13	6	3	40	129	38.0
1998	42	39	2	5	4	0	92	9.8

b) Ecological conflicts (e.g. competition between hatchery fish and wild fish, predation, etc.) [47]

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

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

4. Other conflicts between the hatchery program, or fish produced by the program, and other non-hatchery issues

None identified here.

[47] *Salmon R. Spring Chinook HGMP Sept 30, 2002, p.21-22.*

V. McCall Fish Hatchery

A. Description of hatchery[48]

McCall Fish Hatchery (MCFH) was built in 1979 as a result of the Water Resources Development Act enacted by Congress in 1976. A portion of this Act is the Lower Snake River Fish and Wildlife Compensation Plan (LSRCP). The LSRCP compensates Idaho for fish and wildlife losses caused by the Lower Snake River Projects (Ice Harbor, Lower Monumental, Little Goose, and Lower Granite dams). The MCFH was the first hatchery built as a partial fulfillment of the LSRCP. The US Fish and Wildlife Service (USFWS) administer funding for LSRCP to the Idaho Department of Fish and Game (IDFG).

The MCFH is located within the city limits of McCall, along the North Fork of the Payette River, approximately 0.16 km (1/4 mile) downstream from Payette Lake. A satellite facility for trapping and spawning adult Chinook salmon Oncorhynchus tshawytscha is located on the South Fork Salmon River near Warm Lake, approximately 26 miles east of Cascade.

The main production for MCFH is summer Chinook reared to smolt size. There is also a resident trout program funded solely by the Department. The first salmon reared at the MCFH were transferred in from the Mackay Fish Hatchery and the Dworshak/Kooskia NFH complex. These eggs were the products of adult summer Chinook trapped at Little Goose and Lower Granite dams. The first eggs from the South Fork of the Salmon River were received in August 1980.

The hatchery facility consists of six buildings on approximately 15 acres. The largest building consists of a shop, parking garage, incubation and early rearing area, generator room, and feed/freezer room. The office and a three-bedroom dormitory are contained in one building. There is a visitor center with restrooms, a flow chart for a self-guided tour, and historical information signs. There are three residences for permanent personnel also located on the site.

The fish production facilities include:1. Twenty-six eight-tray stacks of FAL (Flex-A-Lite, Consolidated) vertical flow (Heath type) incubators. 2. Fourteen concrete vats 4-ft x 40-ft x 2-ft (water depth); 320 cubic feet of rearing area per vat. 3. Two concrete rearing ponds 196-ft x 40.5-ft x 4-ft (water depth); 23,814 cubic feet of rearing space per pond. 4. One concrete collection basin 101-ft x 15-ft x 4-ft (water depth). The hatchery is designed to raise a maximum capacity of 1,000,000 smolts, averaging 17 fish per pound.

B. Hatchery water sources

Hatchery water is obtained by gravity flow from Payette Lake through a 36-inch underground pipeline. Water may be taken from the surface or up to 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 (cfs) 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 a somewhat "distilled" system for rearing fish (Appendix 12). The pH stays about 6.8. There is no

[48] *IDFG Aug. 2006b, p.2.*

indication of problems with heavy metals and temperature is maintained at 52°F to 56°F, with a low of 37°F. (IDFG Aug. 2006b, p.3)

C. Adult broodstock collection facilities

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 removable weir, fish ladder, trap, two adult holding ponds (10-ft x 90-ft), and a covered spawning area. Water is supplied from the South Fork Salmon River through a 33-inch underground pipeline. (IDFG Aug. 2006b, p.3)

D. Broodstock holding and spawning facilities

Holding capacity for the facility is approximately 1,000 adult salmon. Some adults are passed above the weir to spawn naturally, with an additional group transported to Stolle Meadows for Idaho Supplementation research. Eggs collected at the facility are transported "green" to MCFH for incubation and rearing. (IDFG Aug. 2006b, p.3)

E. Incubation facilities

The McCall Fish Hatchery has 26 eight-tray vertical incubation stacks (Heath-type) available for incubating eggs. 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. In years where spawn targets are not met, eggs from single females are typically loaded in incubator trays. Incubator flows are set at 5 to 6 gpm. Eggs typically reach the eyed-stage of development at approximately 600 Fahrenheit temperature units (FTUs). (MFH Summer Chinook HGMP Sept. 30, 2002, p.36)

F. Indoor rearing facilities

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). Density (DI) and flow (FI) indices are maintained to not exceed 0.30 and 1.5, respectively (Piper et al. 1982). 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. (MFH Summer Chinook HGMP Sept. 30, 2002, p.37)

G. Outdoor rearing facilities

Fish are transferred to outside rearing ponds (two ponds 196 ft long x 40.5 ft wide x 4 ft deep) in early May and early July. Generally, transfer to outside rearing ponds occurs concurrently with fin clipping and tagging. 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. During final rearing, outside raceways are cleaned every other day but dead fish are removed daily. (MFH Summer Chinook HGMP Sept. 30, 2002, p.37)

H. Release locations and facilities

All fish reared at the McCall Fish Hatchery are transported off station for release in the South Fork Salmon River at Knox Bridge or to Stolle Meadows Pond for acclimation prior to release to the South Fork Salmon River (MFH Summer Chinook HGMP Sept. 30, 2002, p.41)

I. Outmigrant monitoring facilities

All SFSR summer Chinook will be ad-clipped, approximately 250,000 will be coded-wire-tagged and approximately 52,000 will receive a PIT tag. Marking crews will hand ad-clip approximately 512,200 by early-June into Pond 1. MATS will be used to ad clip 263,100 and ad/cwt 250,000 early-July into Pond 2. PIT tags will be inserted into approximately 52,000 presmolts from Pond 1 in February 2009. Approximately two weeks prior to release a sample of 300 summer Chinook (crowded with a seine to make selection more random) from each pond will be checked by McCall FH hatchery staff to provide a baseline for mark quality, release size and fish condition. (IDFG May 2008, p.40)

J. Additional or special facilities

None.

K. Outreach and public education facilities/programs

- McCall FH is in an area with significant tourist traffic, receiving approximately 5,000 visitors per year.

- 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.

- Hatchery staff provides tours on-site and contribute to school programs and community outreach on and offsite.

L. Special issues or problems (e.g. water and property rights issues, law suits, etc.)

None.

VA. McCall FH Summer Chinook

A. General information

McCall FH was constructed in 1981 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. McCall FH was designed to rear 61,300 pounds (1,000,000 smolts) of summer Chinook salmon (15 fpp) for release off station. All adults for the program are trapped at the South Fork Salmon facility. The adult return goal for the program is 8,000 summer Chinook salmon back to the project area (above Lower Granite Dam). (USFWS May 1990, p.22)

B. Stock/Habitat/Harvest Program Goals and Purpose

1. Purpose and justification of program

McCall FH was constructed in 1981 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. McCall FH was designed to rear 61,300 pounds (1,000,000 smolts) of summer Chinook salmon (15 fpp) for release off station (USFWS May 1990, p.22)

2. Goals of program

The goal of this program 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. (USFWS May 1990, p.22)

3. Objectives of program

- McCall FH requires 1,360 returning SFSR summer Chinook to support program release objectives of 300,000 eyed eggs for SBT Dollar Creek in-stream incubator boxes and a 1.0 million hatchery smolt release at Knox Bridge on the South Fork Salmon River. Typically, 454 females and 906 males (including 36 jacks) need to be ponded as broodstock. On average this should allow for spawning of 385 females given an average pre-spawning mortality rate of 15%. Assuming a BKD High culling rate of 5% and an average fecundity of 4,300 eggs per female would provide a total of 1,338,000 eyed eggs. A rearing mortality rate of 3%, post-eye, at MCFH would allow for a goal release of 1,000,000 smolts. (IDFG May 2008, p.39)

- IDFG objectives include; 1. Restore summer Chinook salmon to the South Fork Salmon River; historically a major summer Chinook stream in Idaho. 2. Trap and spawn adult salmon returning to the South Fork Salmon River. 3. Raise 1,000,000 summer Chinook smolts for release into the South Fork Salmon River. 4. Work with management and

research to identify optimum operating procedures for the MCFH. (IDFG Aug. 2006b, p.2)

4. Type of program (Integrated or Segregated)

The McCall Fish Hatchery program was designed as an *Isolated Harvest Program*. However, some broodstock management, rearing, and juvenile releases support ongoing supplementation research. (MFH Summer Chinook HGMP Sept. 30, 2002, p.3)

5. Alignment of program with ESU-wide plans

There is currently no ESU wide hatchery plan or recovery for summer Chinook salmon in the Snake River.

6. Habitat description and status where fish are released.

Due in large part to its remoteness and relatively roadless management, the South Fork Salmon watershed has not been significantly impacted by altered hydrology. Twenty-one percent of the total stream length in the South Fork Salmon watershed is identified as being impaired by sedimentation. The primary factors in the main South Fork Salmon drainage are increased fine sediment and reduced riparian habitat quality. The South Fork Salmon watershed is federally classified as roadless for management purposes, but where roads do occur they occur immediately adjacent to waterways. Under that management scheme, the fire regime more closely resembles natural processes. Fire activity has burned large amounts of the watershed during the last decade. Historically, timber harvest had greater impacts to habitat quality and quantity in the South Fork Salmon watershed than it does now. Timber-harvest activities occurred throughout the watershed with varied levels of impact. Currently, 37% of the watershed has not been impacted by timber harvest. The remaining 63% of the watershed is evenly split between having low, moderate, or high impacts from timber-harvest activities. (NWPPC May 28, 2004, p.3-33-3-34)

7. Size of program and production goals (No. of spawners and smolt release goals)

- Typically, 454 females and 906 males (including 36 jacks) need to be ponded as broodstock. On average this should allow for spawning of 385 females given an average pre-spawning mortality rate of 15%. Assuming a BKD High culling rate of 5% and an average fecundity of 4,300 eggs per female would provide a total of 1,338,000 eyed eggs. A rearing mortality rate of 3%, post-eye, at MCFH would allow for a goal release of 1,000,000 smolts. (IDFG May 2008, p.39)

- *Proposed 2008 Summer Chinook Salmon Releases From McCall FH (IDFG May 2008, Table 3)*

Stock	Brood Year	Release location	Program Goal
S.F. Salmon	2006	S.F. Salmon R. (Knox Br.)	1,000,000

C. Description of program and operations

1. Broodstock goal and source

The program was founded with adult summer Chinook salmon collected between 1974 and 1979 at Ice Harbor, 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. 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. (MFH Summer Chinook HGMP Sept. 30, 2002, p.27)

2. Adult collection procedures and holding[49]

A new permanent bridge/ weir, with a concrete sill across the river bottom was completed and operational for the 2007 return year. The new design has eliminated the need for a large crew to work in the river to assembly the previously used temporary weir. No changes to ladder/ trap standard operating procedures are anticipated during the 2008 return year. The SFSR weir will be installed after high water when river flows begin to subside. The new bridge/ weir design will allow for an earlier placement and is tentatively expected to occur when the F.S. USGS Krassel Gauging Station staff reading reaches 4.0 to 4.2; approximately the second week of June. Hatchery personnel will monitor flows physically at the SFSR and on-line to determine the appropriate river stage when to lower weir panels.

Upstream migration of returning salmon will be stopped by the SFSR weir allowing for adult interception in the adjoining trap. All Chinook will be processed through the trap where they will be identified by mark type, sexed, measured, scanned for PIT tags and any definable injuries will be noted. Supplementation production ended with BY2002 and the last adult returns from this group took place in 2007; no further supplementation adult returns should occur on the SFSR. 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. Reserve salmon intended for brood stock will also be injected with erythromycin and then placed into the holding ponds separated by sex. Excess reserve Chinook not intended for use as brood stock 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 for transport downstream near Roaring Creek (during fisheries) or are dispatched for subsistence purposes.

During periods of heavy fish movement access into the trap will be 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 will continue through the end of spawning to a point when no fish have been trapped for 1 week and then water will be shut off. Depending on previous trapping results the weir may be removed at this time or left in place for an additional period.

[49] *IDFG May 2008, p.49.*

All unmarked returning salmon will be 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 will be segregated, in a method to be determined, and then transferred to Nez Perce fishery personnel who will be responsible for transporting/releasing the fish into Johnson Creek. All unmarked salmon will be scanned using a coded-wire-tag detection wand as part of being processed through the SFSR Trap. On a positive CWT detection, additional attention will be exercised to check for the possible presence of an elastomer mark. At this writing, in the absence of any visibly detectable elastomer mark, the disposition of an unmarked/CWT returning salmon has not been determined by IDFG Fishery Bureau Staff.

3. Adult spawning

a) Spawning protocols

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 and each batch is fertilized with milt from a different male. Eggs from each female are recombined into one bucket after 2 minutes. A 1:1 pairing is utilized for the Shoshone Bannock Tribal egg box production. A minimum of 297 reserve females will be spawned for MCFH needs and 88 reserve females to provide eyed eggs for SBT in-stream incubators (1,000,000 McCall FH to smolt, 300,000 SBT to eye). Spawn taking activities will take place on Tuesdays and Fridays and may potentially begin at primary sort - August 8, 2008. Daily spawning activities are limited to a maximum of 120 females per day. A kidney sample, for ELISA BKD analysis, will be collected from all females spawned. Ovarian fluid and cranial wedges, number to be determined by fish pathologists, will be collected from a portion of the spawned females for viral testing and whirling disease. All eggs collected will be linked to tracking fish identification number to an individual egg tray that will correspond to disease samples collected. (IDFG May 2008, p.50)

b) No. of males and females spawned each year over past 10 years (table)

Table: Number of S.F. Salmon River summer Chinook salmon males and females spawned from 1997 thru 2007. (Derived by Joe Krakker, USFWS, from: IDFG Aug. 2007, Aug. 2006a, Oct. 2005, Aug. 2004, Sept. 2003, Mar. 2003, Oct. 2001, Jan. 2001, May 2000, Sept.1999a.)

BY	Females	Males	Jacks	Fecundity	Green Eggs	% Eye Up	Eyed Eggs
2007							
2006	432	432	34	4,366	1,885,963	.869	1,683,159
2005	438	438	34	4,570	2,001,830	.888	1,777,700
2004	457	457	34	4,460	2,038,292	.865	1,763,425
2003	481	481	34	5,401	2,598,233	.831	1,634,181
2002	381	381	34	4,747	1,804,033	.873	1,325,348
2001	417	417	25	4,354	1,793,667	.748	1,139,385
2000	361	361	12	4,377	1,580,053	.860	1,149,313

1999	427	427	10	4,423	1,892,572	.837	1,480,273
1998	301	301	15	4,793	1,433,237	.808	1,053,017
1997	563	563	15	4,497	2,532,059	.862	2,173,735

4. Fertilization

a) Protocols[50]

Spawning procedures remained relatively consistent with recent years. Reserve fish were spawned with reserve fish. Hatchery staff tried to spawn unmarked fish with ventral clips (supplementation) when possible; however, due to the difficulty in finding suitable males ventral fish were at times spawned with other ventral fish and unmarked with unmarked. All spawned-out carcasses were returned to the river. Approximately 34 jacks were used in the spawning process. The eggs from one female were halved into two colanders and fertilized with two males producing a male to female ratio of 2 to 1. The colanders were then placed into activation buckets for approximately two minutes. The eggs were then recombined and placed in an iodine (100 ppm) solution and allowed to harden for one hour. After hardening, the eggs were placed in numbered egg bags and packed in coolers for transportation back to the hatchery.

Reserve females were double loaded into hatchery incubation egg trays. This was done to allow eggs from listed fish to be culled individually if needed. Ovarian fluid was collected from a sample of females by pathology personnel and tested for viruses. Kidney samples were collected from all spawned females to assess BKD levels through ELISA testing. ELISA optical density values of 0.25 or greater were considered high positive for bacterial kidney disease. Females with values of 0.19 or greater were culled out from the population. A total of 41 females returned ELISA values of 0.19 or greater. Seven hatchery females were culled during spawning operations. Trays with double females lost two fish, bringing the total effective number of females culled to 82. Overall average fecundity was 4,460 eggs/female and average eye up was 86.5 %.

b) Number of eggs collected and fertilized each year over past 10 years (table)

Table: Number of S.F. Salmon River summer Chinook salmon males and females spawned from 1997 thru 2007. (Derived by Joe Krakker, USFWS, from: IDFG Aug. 2007, Aug. 2006a, Oct. 2005, Aug. 2004, Sept. 2003, Mar. 2003, Oct. 2001, Jan. 2001, May 2000, Sept.1999a.)

BY	Females	Males	Jacks	Fecundity	Green Eggs	% Eye Up	Eyed Eggs
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2002	381	381	34	4,747	1,804,033	.873	1,325,348

[50] *IDFG Aug. 2006b, p.5-6.*

2001	417	417	25	4,354	1,793,667	.748	1,139,385
2000	361	361	12	4,377	1,580,053	.860	1,149,313
1999	427	427	10	4,423	1,892,572	.837	1,480,273
1998	301	301	15	4,793	1,433,237	.808	1,053,017
1997	563	563	15	4,497	2,532,059	.862	2,173,735

5. Incubation

Incubator flows were set at a five gallon per minute rate, and incubators were loaded at 2 females per tray due to space concerns. The eggs were treated with 1,667 ppm of formalin for 15 minutes starting three days after fertilization and continuing on a daily basis until the eggs started to hatch. Eggs eyed-up at approximately 600 thermal units (TU) and were then shocked, picked, and enumerated. Hatching began at approximately 925 TU . (IDFG Aug. 2006b, p.5-6)

6. Ponding

a) Protocols

- Fry were sent out to the concrete 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 gallons per minute (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. (IDFG Aug. 2006b, p.5-6)

b) Number of fry ponded each year, including % hatch each year

Table: Egg to Release survival for McCall FH Summer Chinook Salmon for BY1997 thru BY 2006 (Derived by Joe Krakker, USFWS, from: IDFG Aug. 2007, Aug. 2006a, Oct. 2005, Aug. 2004, Sept. 2003, Mar. 2003, Oct. 2001, Jan. 2001, May 2000, Sept.1999a.)

BY	Eyed Eggs	% Hatch	Smolts Stocked	Surplus Stocked	Eyed Egg to Release Survival
2007					
2006	1,683,159				
2005	1,777,700	.803	1,087,170	337,950 eggs	.822
2004	1,763,425	.965	1,096,130	311,200 eggs	.772
2003	1,634,181	.923	1,047,530	317,500 eggs 220,000 parr	.715
2002	1,325,348	.823	1,088,810	353,391 eggs 80,340 parr	.805
2001	1,139,385	.724	1,053,660	61,800 parr	.722
2000	1,149,313	.834	1,064,250	46,975 parr	.797
1999	1,480,273	.817	1,165,231	120,339 eggs 178,714 parr	.792
1998	1,053,017	.805	1,039,930	0	.783
1997	2,173,735	.852	1,182,611	334,027 eggs	.706

				49,872 parr	

7. Rearing/feeding protocols

- 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 MCFH, 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. They are adipose clipped, ventral clipped, coded wire tagged (CWT), and enumerated as they are moved to the ponds. (IDFG Aug. 2006b, p.5-6)

- At swim-up summer Chinook fry will be transferred into 12 indoor vats with screens initially placed at ½ vat length. Approximately 86,400 fry will be reared in each vat. Hourly hand feeding during the day will commence when 80% of set out fry achieve swim-up. Flows will initial be set at 80 gpm then increased to 130 gpm (maximum) when fry are well on feed. Individual vats will be extended to full length when the density index reaches 0.50 to 0.55. Approximately ½ of the fry will be marked (hand ad-clipped) into an outdoor pond in early June (180 – 280 fpp). At this time remaining fry will be subdivided into emptied vats to provide space for continued rearing (42,500 to 58,400 in 11 vats). Remaining fry (100 – 180 fpp) will be marked (MATS Automated Trailer) into the second outdoor pond in early July with individual vat densities ranging from 0.30 to 0.41 (flow indices 0.75 – 1.02).

  Final: Two outdoor rearing ponds will be utilized for rearing the reserve parr to smolt. Summer Chinook in the ponds will be hand fed a dry pellet diet with a low phosphorus formulation and fortified with an EIBS vitamin pack. Sample counts will be conducted monthly to monitor growth. (MFH Summer Chinook HGMP Sept. 2002, p.40)

8. Fish growth profiles

Month	Water Temp (ºC)	Fish Length (mm)	Percent Body Weight Fed Per Day	Conversion Rate
December	**4.3**	**36.0**	**0.9**	**4.4**
January	**3.4**	**38.1**	**1.3**	**3.7**
February	**3.3**	**40.6**	**1.4**	**1.8**
March	**3.4**	**43.2**	**1.6**	**1.7**
April	**3.8**	**48.2**	**1.7**	**1.5**
May	**5.7**	**58.4**	**1.7**	**1.2**
June	**8.8**	**71.1**	**2.0**	**1.0**
July	**11.5**	**86.4**	**2.1**	**1.3**
August	**11.1**	**104.1**	**2.1**	**1.4**
September	**9.5**	**114.3**	**1.3**	**1.6**
October	**7.9**	**119.4**	**0.9**	**2.1**
November	**6.6**	**124.5**	**0.6**	**1.9**
December	**4.3**	**129.5**	**0.3**	**1.6**
January	**3.4**	**132.1**	**0.2**	**2.4**

February	**3.3**	**132.1**	**0.2**	**2.5**
March	**3.4**	**134.6**	**0.2**	**n/a**

(IDFG 2002 South Fork Salmon River Summer Chinook HGMP, p 38-39)

9. Fish health protocols and issues

Chinook salmon reared at this facility are being inspected by the EFHL on a quarterly basis for *Renibacterium salmoninarum*, viral replicating agents, parasites, and bacterial pathogens. Diagnostic services will be provided upon request. The preliberation sample will consist 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. (IDFG May 2008, p.40-41)

10. Chemotherapeutant use[51]

- Adults receive formalin treatment about 5 days/week to control the spread of fungus and parasites related to pre-spawning mortality.
- 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.
- 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.

11. Tagging and marking of juveniles

Stock	Brood Year	Release location	Expected Release	# AD	# CWT	# PIT
South Fork Salmon	2006	Salmon R. at Knox Bridge	1,061,000	1,061,000	253,000	52,000

(draft 2008 Salmon River AOP, Table 3)

12. Fish Release

a) Protocols

All fish reared at the McCall Fish Hatchery are transported off station for release in the South Fork Salmon River at Knox Bridge or to Stolle Meadows Pond for acclimation

[51] *Pers. comm. IDFG staff and MFH Summer Chinook HGMP Sept. 2002.*

prior to release to the South Fork Salmon River. Fish are loaded into transport trucks using a Magic Valley Heliarc fish pump. The loading density guideline for transport vehicles is ½ pound 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. (MFH Summer Chinook HGMP Sept. 30, 2002, p.41)

b) Number of fish released each year (subyearlings?; yearlings?; other?)

Stock	Brood Year	Release location	Program Goal
South Fork Salmon R.	2006	Salmon R. at Knox Bridge	1,000,000

(IDFG May 2008, Table 3)

D. Program benefits and performance[52]

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

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

3.1.2 Standard: Program contributes to mitigation requirements.

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

3.1.3 Standard: Program addresses ESA responsibilities.

Indicator 1: ESA Section 7 Consultation completed.

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

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

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

[52] *MFH Summer Chinook HGMP Sept. 30, 2002, p.4-8.*

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

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

Indicator 1: Annual number of spawners on spawning grounds estimated in specific locations.
Indicator 2: Spawner-recruit ratios estimated is specific locations.
Indicator 3: Number of redds in natural production index areas documented in specific locations.

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

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

1.10.2) "Performance Indicators" addressing risks.

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

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

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

Indicator 1: Number of spawners of natural origin removed for broodstock managed.
Indicator 2: Number and origin of spawners migrating to natural spawning areas managed.
Indicator 3: Number of eggs or juveniles placed in natural rearing areas managed.

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

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

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

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

Indicator 3: Timing of hatchery releases documented.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1. Adult returns

a) Numbers of adult returns (need data for the past 10-20 years)

Table: Adult returns to harvest and hatchery, 1997-2007 (Derived by Joe Krakker, USFWS, from: IDFG Aug. 2007, Aug. 2006a, Oct. 2005, Aug. 2004, Sept. 2003, Mar. 2003, Oct. 2001, Jan. 2001, May 2000, Sept.1999a.)

Year	Females	Males	Jacks	Total
2007				
2006	950	898	295	2,151
2005	1,474	1,249	491	3,214
2004	2,594	2,615	980	6,189
2003	3,003	3,301	1,794	8,098
2002	3,846	3,623	1,134	8,603
2001	4,204	5,626	1,092	10,922
2000	1,771	1,625	3,416	6,812
1999	601	617	743	1,961
1998	498	400	76	974
1997	1,498	2,016	45	3,659

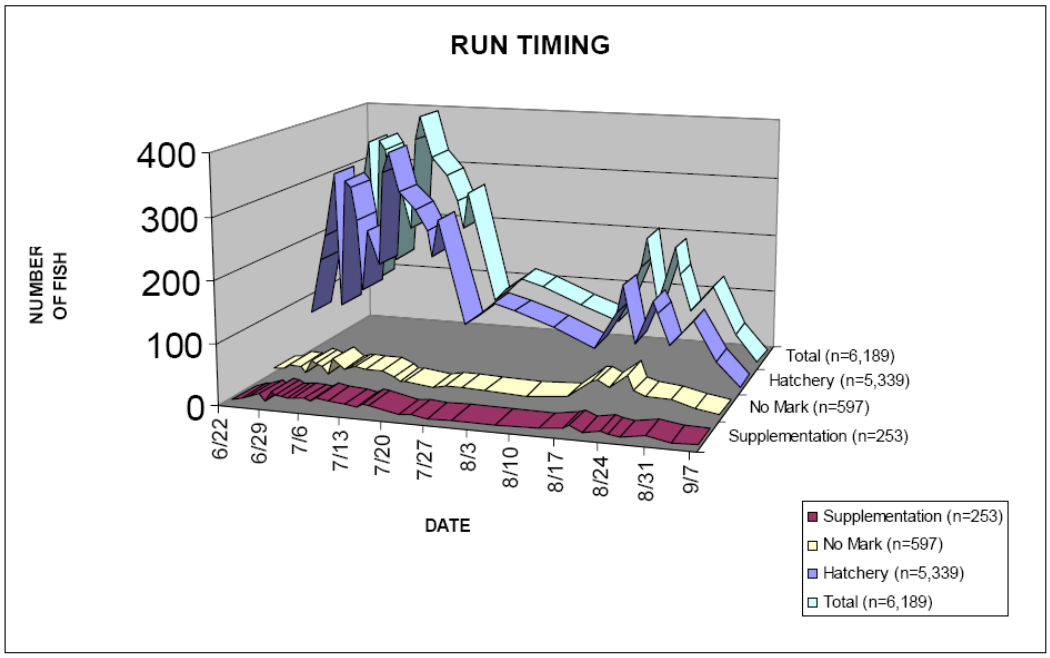
b) Return timing and age-class structure of adults

Appendix 1. Age distribution of 2004 summer Chinook returns to McCall Fish Hatchery, South Fork Salmon River based on CWT and length frequency data.

	Males		Females	
Age	CWT* Estimate	Length/ frequency Estimate	CWT Estimate	Length/ frequency Estimate
3	904	980	0	0
4	2,471	2,433	2,428	2,456
5	220	182	166	138
Totals	**3,595**	**3,595**	**2,594**	**2,594**

(IDFG Aug. 2006b, p.10)

Appendix 6. McCall Fish Hatchery South Fork Salmon River Chinook run timing graph Brood Year 2004.



(IDFG Aug. 2006b, p.17)

c) Smolt-to-adult return rates

Table: Estimated escapement and harvest of brood year 1996 -1999 hatchery-origin Chinook salmon adults from McCall Fish Hatchery (Derived by Joe Krakker, USFWS, from: IDFG Jan. 2008, Nov. 2007a, April 2007, Jan. 2007, Sept. 2004a, July 2003a)

			Return Age From BY				
Brood Year	Number Released	Year Released	1-ocean	2-ocean	3-ocean	Total	SAR (%)
2003							
2002							
2001							
2000							
1999	1,165,231	2001	1,477	5,831	460	7,768	.667
1998	1,039,930	2000	1,065	10,716	4,407	16,188	1.56
1997	1,232,483	1999	3,383	15,287	2,570	21,240	1.72
1996	418,862	1998	113	246	10	369	.088

d) Stock productivity (e.g. recruits per spawner)

The HSRG (2009) 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.

2. Contributions to harvest and utilization (e.g. food banks)

Table: Estimated Summer Chinook Salmon Harvest in the South Fork Salmon River, Idaho from 1997 through 2007 (Derived from IDFG 1997-2007 Harvest Reports by Joe Krakker 2008)

Year	Est. Anglers	Est. Hrs. Fished	Est. Fish Caught	Est. Fish Harvested
1997	2,217	10,876	684	442
2000	1,812	9,289	1,377	867
2001	9,971	53,377	13,512	6,082
2002	13,649	75,707	14,292	6,843
2003	14,966	80,948	13,103	5,456
2004	7,037	37,856	4,253	2,591
2005	6,154	24,166	1,429	1,131
2006	4,029	15,172	531	364
2007	3,422	16,759	1,034	724

3. Contributions to conservation[53]

To maintain, rehabilitate, and enhance salmon population viability, the SBT initiated an in-stream incubation program in Dollar Creek, a tributary of the South Fork Salmon River. Eyed summer Chinook eggs are placed into hatch-boxes in late fall, incubated in stream water, and allowed to volitionally emigrate at approximately the same time as fry in the natural system. This supplementation activity is designed to mimic natural production to develop a naturally spawning tributary component of the SFSR in order to increase abundance, genetic diversity, and productivity of summer Chinook salmon as well as increase knowledge of fishery management and hatchery supplementation.

In 2006, staff and IDFG spawned adult Chinook salmon at the South Fork Salmon River and outplanted over 300,000 eyed eggs in Dollar Creek. However, as a result of intensive forest fires during July-October, 2007, staff requested IDFG to release pre-spawned adult summer Chinook salmon in lieu of taking eggs for the egg-box program.

On August 24 and 28, 2007, McCall Fish Hatchery personnel released 90 females and 70 males; and 100 females and 125 males, respectively for a total release of 385 adult Chinook salmon. The release site, Roaring Creek, was located approximately 1.5 miles below the Dollar Creek confluence with the South Fork Salmon River. This site was utilized due to the lack of ready access to Dollar Creek and the necessity to get in and out because of forest fires.

4. Other benefits

McCall FH summer Chinook salmon were included in the Idaho Supplementation Study.

[53] *IDFG May 2008, p.80, p.45-46.*

E. Research, monitoring, and evaluation programs[54]

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

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

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

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

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

F. Program conflicts

1. Biological conflicts (e.g. propagated stock maladapted to hatchery water source)

None identified.

2. Harvest conflicts (e.g. mixed stock fishery on hatchery and wild fish limits harvest opportunities on hatchery fish)

McCall FH summer Chinook are listed as threatened under the Endangered Species Act.

[54] *MFH Summer Chinook HGMP Sept. 30, 2002, p.44-45.*

3. Conservation conflicts and risks

a) Genetic conflicts associated with straying and natural spawning of hatchery fish (Stray rates, proportion of hatchery-origin fish on natural spawning grounds, etc. Provide tables or figures where appropriate)

- 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.

b) Ecological conflicts (e.g. competition between hatchery fish and wild fish, predation,)

There are potential adverse effects to listed adult summer Chinook salmon and their progeny from the release of hatchery summer Chinook salmon upstream of the South Fork Salmon River weir for natural spawning. None will result in direct mortality of adults. These effects include: changes in fitness, growth, survival and disease resistance of the listed population. The effects may result in decreased productivity or long-term adaptability (Kapuscinski and Jacobson 1987; Bowles and Leitzinger 1991). These changes are more likely when the hatchery and natural stocks are not genetically similar or locally adapted. However, some increase in natural production can be expected when hatchery-reared fish are sufficiently similar to wild fish and natural rearing habitats are not at capacity (Reisenbichler 1983). We believe this is the case with the South Fork Salmon River recognizing that releasing hatchery summer Chinook salmon to spawn naturally can increase natural production, but not necessarily productivity. (MFH Summer Chinook HGMP Sept. 30, 2002, p.21)

4. Other conflicts between the hatchery program, or fish produced by the program, and other non-hatchery issues

None identified here.

VI. References

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