



**SAWTOOTH FISH HATCHERY  
and  
EAST FORK SATELLITE**

**1996 Spring Chinook Brood Year Report  
1997 Steelhead Brood Year Report**



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## 1996 SPRING CHINOOK SALMON

### ABSTRACT

The Sawtooth Fish Hatchery trap and weir were put into operation on June 20, 1996 but was not fully functional until July 12, and operated through September 11, 1996. A total of 156 spring chinook salmon *Oncorhynchus tshawytscha* (91 males, 38 females, and 27 jacks) were trapped. 94 fish were released above the weir (55 unmarked and 3 marked males, 15 unmarked and 13 marked females, and 5 unmarked and 3 marked jacks) to spawn naturally. There was no prespawning mortality.

Spawning began on August 12 and continued through September 11, with six spawning days. We spawned 10 females, 31 males, and 1 jack, which produced 51,743 green eggs (5,174 eggs per female), which yielded 45,128 eyed eggs for an eye-up rate of 87%. From these eyed eggs, 44,600 fry were ponded which resulted in a smolt release of 43,161 smolts.

The East Fork Satellite fish trap and velocity barrier were put into operation on June 25, 1996 and continued operating through August 30, 1996. A total of 10 spring chinook salmon (5 unmarked males, 2 unmarked females, and 3 jacks (2 unmarked)) were trapped. All ten fish were released above the weir to spawn naturally. No pre-release mortality occurred.

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## **INTRODUCTION**

### **Funding Source**

Sawtooth Fish Hatchery is part of the Lower Snake River Compensation Plan (LSRCP) and has been in operation since 1985. The hatchery and satellite facility were built by the U.S. Army Corp of Engineers (USACE) and is funded through the U.S. Fish & Wildlife Service.

### **Location**

Sawtooth Fish Hatchery is located five miles south of Stanley, Idaho. The facility's 71 acres border 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 miles from Lower Granite Dam and 950 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, along the lower Salmon and various other drainages around the state.

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 of the 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.

### **Species Reared**

Sawtooth Fish Hatchery is involved in trapping, spawning, and rearing spring chinook salmon to the smolt stage for release. A-run steelhead trout are also trapped and spawned. The steelhead eggs are incubated to eye-up then transferred to other hatcheries for rearing.

The East Fork facility handles spring chinook salmon as well as B-run steelhead trout. The green eggs from fish spawned at the East Fork station are transferred to Sawtooth Fish Hatchery for incubating. The chinook are reared at Sawtooth Fish Hatchery with the steelhead being transferred as eyed eggs to other hatcheries for rearing.

### **Broodstock History**

Historically, all of the Sawtooth Fish Hatchery and the East Fork trap broodstock have come from the upper Salmon River and the East Fork River respectively. There was some introduction of Rapid River stock at the Sawtooth Fish Hatchery site and in the headwaters of the Salmon River in the late 1970s and early 1980s as fry and smolt plants.

At both facilities, returning adult fish are released to spawn naturally. Numbers of fish released depends on marked and unmarked fish returns. The National Marine Fisheries Service (NMFS) prescribes fish handling under permits #919 and #920. Typically, at Sawtooth about two-thirds of the unmarked salmon are released. All unmarked steelhead are released along with enough marked hatchery fish to ensure pairing of adults. At the East Fork, all salmon are released until a total of twenty pairs have been passed above the weir. All unmarked steelhead are released along with enough marked hatchery fish to ensure equal adult pairings. A historical synopsis of releases and returns is shown in Appendix A and Appendix A.1.

## **OBJECTIVES**

### **Mitigation Goals**

As part of the Lower Snake River Compensation Plan, Sawtooth Fish Hatchery's mitigation goals are expressed in adult returns: 19,000 adult salmon over Lower Granite Dam.

### **Idaho Department of Fish and Game Objectives**

Idaho Department of Fish and Game (Department) objectives are:

1. To produce 2.4 million smolts for release, of which up to one million of the East Fork-origin smolts will be returned to the East Fork of the Salmon River.
2. Produce quality fish for supplementation programs.
3. Implement research programs at the hatchery to improve returns to the hatchery.

## **FACILITY DESCRIPTION**

### **Hatchery Description**

The hatchery's main building is 134 ft by 166 ft. It 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 feed freezer/chemical equipment 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. There are five resident houses at Sawtooth Fish Hatchery, each about 1,360 square ft with attached single car garages, and separate woodsheds. The adult spawning facility consists of three adult ponds and an enclosed spawning shed (35 ft x 52 ft).

The East Fork has a roof structure over a 28-ft travel trailer that is used as a residence while the trap is in operation. The other building is a combination shop; storage and spawning shed (22 ft x 44 ft).

### **Production Capabilities**

Production capacities at the East Fork trap consists of two 68 ft x 10 ft x 4.5 ft adult holding ponds (3,060 cubic ft) and a 10-ft x 17 ft fish trap. No fish are reared at this facility. All green eggs are shipped to Sawtooth Fish Hatchery.

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. Inside rearing consists of 16 semi-square tanks with individual volume of 17 cubic feet each and a capacity of 15,000 swim-up fry each; 14 inside rearing tanks with an individual volume of 50 cubic feet each and a capacity for 30,000 fry each. There are also 12 inside rearing vats with an individual volume of 391 cubic feet each and a capacity of 100,000 fry each. Outside rearing consists of 12 fry raceways with 750 cubic feet of rearing space each and 28 production raceways with 2,700 cubic feet of rearing space each. 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.

The adult facility has three concrete adult fish holding ponds with 4,500 cubic feet of holding area. Each pond can hold approximately 1,300 adults.

### **RECOMMENDATIONS**

Recommendations for Sawtooth Fish Hatchery include:

- Developing additional wells for disease-free rearing water.
- Modifying the river water intake to reduce winter icing problems, repairing gabions at the weir and intake.
- Covering raceway tailrace openings with grating for added safety.
- Installing fence around outside raceways for predator control.
- Seal-coating hatchery roadways.

East Fork recommendations include:

- Developing separate holding ponds for smolt acclimation.
- Modifying the intake screen to exclude fish fry.
- Modifying the velocity barrier to prevent injury to migrating fish.
- Develop a removal system for debris that accumulates on the weir.

## **WATER SUPPLY**

### **Source**

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.

### **Quantity and Temperature**

The Sawtooth Fish Hatchery wells provide 3.1 cfs of pumped water and temperatures range from 39° F (4° C) in the winter to 52° F (11° C) in the summer. The Salmon River provides up to 55 cfs of gravity-flow water and ranges in temperature from 32° F (0° C) in the winter to 68° F (20° C) in the summer (Appendix B).

### **Water Quality**

The most recent water quality analysis from the Sawtooth Fish Hatchery collection box at the river was completed in September 1996. Results include: hardness at 80 mg/L; total alkalinity as CaCO<sub>3</sub> at 79; bicarbonate alkalinity as CaCO<sub>3</sub> at 79; sp. conductance at 167 (umhos/cm); total ammonia as N at 0.027 (mg/L); total NO<sub>2</sub> + NO<sub>3</sub> as N at 0.006; total Kjeldahl N as N at 0.20 (mg/L); total phosphorus as P at <0.05 (mg/L); and pH at 8.04. The most noticeable variances from the 1993 tests were hardness, which was 68 mg/L in 1993 to 80 mg/L in 1996 and Kjeldahl N as N, which was <0.05 mg/L in 1993 to 0.20 mg/L in 1996. Additional information is shown in Appendix B.

## **STAFFING**

Five permanent personnel are stationed at Sawtooth Fish Hatchery: a Hatchery Manager II, an Assistant Hatchery Manager, a Utility Craftsman, and two Fish Culturists.

The temporary employee staffing includes 8 months of Fishery Technician time, 42 months of Biological Aide time, and 27 months of Laborer time.

## FISH HEALTH

### Diseases Encountered and Treatment

No major disease outbreaks were encountered with any of the BY96 spring chinook salmon raised at Sawtooth Fish Hatchery. Erythromycin was used as a prophylactic treatment as provided by INAD 4333 for control of *Renibacterium*. All fish were given two separate prophylactic, 28-day erythromycin feed treatments. Whirling disease, caused by *Myxobolus cerebralis*, was found via digest, methods once the fish were moved onto river water and an appropriate amount of time was allowed for the parasite to move through the host. Acute losses were not experienced in any production fish at Sawtooth Fish Hatchery. *Pseudomonas spp.* caused chronic mortalities at rates that did not warrant antibiotic treatment (Appendix C).

Both facilities have been relatively disease-free, although Sawtooth Fish Hatchery and East Fork chinook have had incidences of bacterial kidney disease (BKD) in the past. A BKD segregation program was implemented in 1989, with apparent success in limiting mortalities to high BKD raceways (91-153 & 91-154). In times of either warm-water temperatures or fish handling, some fish will show typical signs of this disease. The focus of the fish health program at Sawtooth Fish Hatchery is to control BKD. This segregation starts at the eye-up stage and continues until the fish are released. Whirling disease exposure is reduced by keeping the fry on pathogen-free well water for as long as possible before moving them outside on raw river water.

Several programs have been implemented at Sawtooth Fish Hatchery to help raise a better quality smolt. Outside raceway baffles were tested with two raceways, and shade-cover was installed on all the outside raceways. Baffles are used on all inside rearing vats, and light is controlled to mimic outside photoperiod. Sawtooth Fish Hatchery has taken on the role of conservation hatchery. Stocks are so depressed that optimal rearing conditions are needed to reduce risk and provide every opportunity for survival. Fish health needs for Sawtooth include increasing pathogen-free well water capacity and small rearing unit capability. This will give Sawtooth Fish Hatchery the flexibility to provide well water to outside raceways and to increase small family rearing ability. Both will limit horizontal infection of serious etiologic agents such as *Myxobolus* and *Renibacterium*.

## FISH PRODUCTION

### Spring Chinook Adult Collection

The Sawtooth Fish Hatchery chinook-trapping season began on June 20, 1996, and continued through September 11, 1996. The peak of the run occurred July 23, 1996 (Appendix D). A total of 156 spring chinook salmon were trapped including 91 males, 38 females, and 27 jacks (Appendix E). Released above the weir were 94 salmon (including 55 unmarked and 3 marked males, 15 unmarked and 13 marked females, and 5 unmarked and 3 marked jacks) (Appendix F). Coded wire tag (CWT) fish recoveries were from one 3-year old and nine 4-year old adult Chinook salmon (Appendix G). Sawtooth Fish Hatchery had a male:female ratio of 76% male and 24% female.

The East Fork trap was in operation from June 25, 1996 through August 30, 1996. The peak of the run occurred August 25, 1996 (Appendix H). A total of 10 spring chinook salmon were trapped including 5 unmarked males, 2 unmarked females, and 3 jacks (2 unmarked). All fish trapped were released above the weir to spawn naturally. The East Fork had a male:female ratio of 80% male and 20% female. No CWT fish were recovered.

Twenty-three 3-year-old, 101 4-year-old, and 28 5-year-old fish returned to Sawtooth Fish Hatchery. The East Fork had three 3-year-old, and seven 4-year-old fish return.

### **Adult Treatments**

Sawtooth Fish Hatchery and East Fork adult chinook were injected with erythromycin phosphate at a rate of 20 mg active per kg. body weight. Injections were given posterior to the pelvic fins in the peritoneal cavity. The Sawtooth Fish Hatchery ponded adults were treated three times per week in a one-hour 170 ppm formalin flush. No adults were ponded at the East Fork.

### **Prespawning Mortality**

Sawtooth Fish Hatchery had no pre-spawning mortality of ponded fish. The East Fork had no pre-release mortality.

### **Spawning Operations**

Spawning activities at Sawtooth Fish Hatchery began August 12 and concluded September 11, 1996. The six egg takes during this period yielded 51,743 green eggs from ten females for an average fecundity of 5,174 eggs per female. There were 31 male and one jack salmon used for fertilization. Each females' eggs were separated into four groups. Each group was fertilized by sperm from one male (Appendix I). The four groups were then recombined and water hardened for one hour in a 100 ppm titrateable iodine solution. The eggs were then put into Heath incubator trays, with one female per tray for BKD segregation.

All adults trapped at the East Fork Facility were released. No spawning occurred.

### **Incubation**

Each 8-tray Heath stack had flows set at 5 gpm of well water. Eggs were put away at one female per tray for BKD segregation. This averaged 5,174 eggs per tray. All incubated green eggs were treated with a 1,667 ppm formalin bath for 15 minutes starting three days after fertilization at five times per week for fungal control.

Well temperatures ranged from 50° F to 43° F during the incubation period. The eggs eyed-up at 500 Fahrenheit Thermal Units (FTU). At eye-up the eggs were shocked by dropping them from one container to another. They were then picked and enumerated by hand count. The eggs are shocked at 530 FTU and hatch at 1,300 FTU.

Sawtooth Fish Hatchery green eggs eyed up at an 87% rate, yielding 45,128 eyed eggs (Appendix J).

### **Early Rearing**

The Sawtooth Fish Hatchery stock swim-up fry were transferred from the Heath trays to semi-square tanks measuring 42 inches x 42 inches x 17 inches which were plumbed into existing vat well water supply. The swim-up fry were kept at a high density during feed training (1.2 lbs/cubic ft) until all the fish were on feed. After all the fish were eating well, they were combined and transferred to an inside vat. The vat contained PVC baffles every four feet. Starting flows for the swim-up fry were set at 3 gpm in each semi-square tank and then 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 46° F to 40° F (Appendix K).

All fry were started on BioProducts Bio-Diet Starter #2 and #3, 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 erythromycin-medicated feed during May at a rate of 4.5 grams active/100 lbs of fish. The fish were transferred outside for final rearing in July 1997.

### **Final Rearing**

The Sawtooth spring chinook were placed into the upper sections of two large raceways. Initial densities were 0.03 lbs/cuft, and water flows were 830 gpm.

All outside fish were fed Bioproducts grower feed. A second 28-day prophylactic erythromycin medicated feed treatment was fed after the fish were moved outside. It was administered at a rate of 4.5 grams active per 100 pounds of fish, to prevent the onset of BKD. In late October 1997, all outside fish were administered a three-day formalin drip treatment at 170 ppm per hour for a myotic outbreak.

The finish weight of the BY96 Sawtooth chinook smolts was 3,091 pounds. The fish were fed 4,063 pounds of feed for a conversion rate of 1.3. A synopsis of feeding regimes can be found in Appendix J.1.

### **Fish Marking**

Fish marking occurred May 13 and 14, 1997. A total of 43,880 Sawtooth stock fish were marked with an ad-clip. The fish marking crew returned March 4, 1998 and PIT-tagged 500 fish. The Passive Integrated Transponder tags were used to evaluate downriver migration (Appendix L, Appendix M).

## **Fish Distribution**

Fish release for Sawtooth stock BY96 smolts occurred on April 21, 1998. A total of 43,161 supplementation smolts were released into the Salmon River at the Sawtooth Fish Hatchery weir (Appendix N). The fish were released in the evening through the outside raceway tailrace pipe. Production costs for BY96 smolts can be found in Appendix N.1.

### **PAHSIMEROI CHINOOK**

To take advantage of available rearing space and the pathogen-free well-rearing water, Pahsimeroi Fish Hatchery transferred eyed summer chinook eggs to Sawtooth Fish Hatchery in 1996. A total of 77,900 BY96 eyed eggs or fry were shipped to Sawtooth Fish Hatchery from September 27, 1996 to November 1, 1996. One thousand fish were PIT-tagged in September of 1997. A total of 65,763 pre-smolts (3,288 pounds at 20 fpp) were transferred back to Pahsimeroi Fish Hatchery on October 20, 1997. A total of 4,090 pounds of feed were fed out for a conversion of 1.3. Pahsimeroi chinook rearing was identical to that of the Sawtooth fish with the exception of ponding. Pahsimeroi fry were ponded directly into concrete vats and moved to outside raceways in July of 1997.

### **SOCKEYE SALMON**

Sawtooth Fish Hatchery received 163,367 eyed Redfish Lake sockeye eggs from Big Beef Fish Hatchery National Marine Fisheries Service (NMFS) in two shipments on December 11, 1996 and January 11, 1997. The eggs arrived with approximately 450 CTU's (celcius temperature units). At 1,922 CTU's fry were ponded into twelve semi-square rearing tanks. Initial water flows were set at 3 gpm.

Eyed egg to ponding survival was 98.5%, yielding 160,865 fry. All fry were started on Bioproducts BioDiet Starter #1. Feed size was increased in accordance with Bioproducts recommendation, with the exception that 20% of the feed was one size smaller to assure smaller fish would get adequate amounts of feed. As densities reached 4 pounds/gpm, fish were transferred to larger rearing containers, first to 50 cu ft semi-square tanks with water flows at 8 gpm, then to inside vats with water flows at 100 gpm.

The majority of the BY96 Redfish Lake sockeye being reared were released in October 1997 as pre-smolts. Redfish Lake received 66,369 fish at 69 fpp on October 15, 1997. Alturas Lake received 70,635 fish at 72 fpp on October 16, 1997. Total release was 137,004 fish. The remaining 14,404 sockeye continued to be reared on well water over winter. On April 27, 1998 999 sockeye were released into the Salmon River below the Sawtooth Fish Hatchery weir. An additional 13,218 sockeye at 17.5 fpp were released into Redfish Lake Creek between April 28 and May 4, 1998.

## 1997 STEELHEAD TROUT

### ABSTRACT

The Sawtooth Fish Hatchery trap and weir were put into operation on March 20, 1997 and closed May 12, 1997. A total of 1,243 adult steelhead *Oncorhynchus mykiss* (767 males and 476 females) were trapped at the Sawtooth Fish Hatchery weir. A total of 148 steelhead were released. This included 108 males (six natural), and 40 females (eight natural). Of these released fish, 16 hatchery males and 12 hatchery females were released into a weired-off section of Beaver Creek, and 15 hatchery males and 11 hatchery females were released into a weired-off section of Frenchman Creek for natural-spawning study conducted by Alan Byrne, Department Research Biologist. Sixty hatchery males were released into Kids Creek Pond for additional angling opportunities. There was no prespawning mortality at Sawtooth Fish Hatchery.

Spawning began on March 31, 1997 and continued through May 8, 1997 with 12 spawning days. A total of 429 females were spawned with 429 males, yielding 1,994,076 green eggs for an average fecundity of 4,463 eggs per female. These green eggs yielded 1,795,300 eyed eggs for an eye-up percentage of 90%. The eggs were shipped as follows: Hagerman National Fish Hatchery received 792,500, Magic Valley Fish Hatchery received 525,000, Hagerman State Fish Hatchery received 118,000, and the Shoshone-Bannock Tribes received 359,800.

The East Fork velocity barrier and trap were put into operation March 28, 1997, and ran through May 25, 1997. A total of 149 adult B-run steelhead were trapped. This included 61 males and 88 females. Fish released above the weir to spawn naturally included 13 males (six natural), and seven females (six natural). There was no prespawning mortality.

An adult steelhead trap was installed on Slate Creek, a tributary of the Salmon River on March 26, 1997 and operated through April 24, 1997. A total of 13 adult steelhead were trapped. These included seven males and six females. Eight of the fish trapped were A-run steelhead (five male, three female). No unmarked fish were trapped. No fish were released above the weir. The B-run Slate Creek fish were spawned with the East Fork B-run fish. The eight A-run fish were spawned separately with the eyed eggs (10,200) going to the Shoshone-Bannock Tribes egg box program.

Spawning operations began on April 4, 1997, and continued through May 9, 1997 with 12 spawning days. Between the East Fork and Slate Creek traps, 82 females were spawned with 50 males, yielding 424,938 green eggs for an average fecundity of 5,588 eggs per female. These green eggs yielded 356,340 eyed eggs for a 91% eye-up rate. These eggs were shipped to Magic Valley Hatchery for rearing.

There were 3,319,190 green eggs from Pahsimeroi Hatchery incubated at Sawtooth Fish Hatchery. These eggs eyed up at an 81.4% rate, yielding 2,704,400 eyed eggs. Survival of eyed eggs to swim-up was 96.5%. The eggs or fry were shipped to the following hatcheries: Magic Valley received 325,000 as eyed eggs; Niagara Springs received 729,400 as eyed eggs and 721,000 as swim-up fry; Hagerman National received 375,000 as eyed eggs, and the Shoshone-Bannock Tribes received 554,000 eyed eggs for their streamside incubator program. Due to construction at Clearwater Fish Hatchery, Sawtooth Hatchery received and incubated green Dworshak stock B-run steelhead eggs. A total of 1,611,790 green eggs were received

from March 25 to April 15, 1997. The eggs were from 230 females (7,000 eggs/female) and resulted in an eyed egg total of 1,403,900 (87% eye-up). These eyed-eggs were shipped to Magic Valley Fish Hatchery.

The Sawtooth Fish Hatchery and East Fork stock eyed eggs were released as smolts during the spring of 1998. A total of 1,093,440 BY97 Sawtooth stock smolts were released as follows: acclimated release at Sawtooth weir 621,861 (including 437,398 acclimated non-study fish, and 184,463 acclimated study fish), direct released at the Sawtooth weir by Hagerman National Fish Hatchery: 61,354, and direct released to the Salmon River by Magic Valley Fish Hatchery: 410,225. East Fork stock smolts numbering 301,500 were released as follows: 126,920 were direct released at the East Fork Trap site, and 174,580 were direct released at the Slate Creek trap site. An additional 321,725 Dworshak B-run smolts were direct released below the East Fork trap. Squaw Creek acclimation/release pond received 52,800 Dworshak B-run smolts that were allowed to volitionally leave the pond.

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## FISH PRODUCTION

### Steelhead Adult Collection

The Sawtooth Fish Hatchery weir and trap was put into operation on March 20, 1997 and closed May 12, 1997. The East Fork trap was put into operation March 28, 1997 and ran through May 25, 1997. The Slate Creek trap was put into operation on March 26, 1997 and ran through April 24, 1997. The peak of the Sawtooth Fish Hatchery steelhead *Oncorhynchus mykiss* run occurred during the third week of April, the peak of the East Fork run occurred during the third week of April, and the Slate Creek run peaked during the second week of April (Appendix O).

Sawtooth Fish Hatchery trapped a total of 1,243 adult fish, which included 767 males and 476 females (Appendix P). All fish were scanned for CWT. A total of 226 fish were positive for CWT. Five were left ventral (LV)-clipped, one was Ad-LV-clipped, and 220 were Ad-clipped. One hundred forty-eight steelhead, 108 males (6 natural) and 40 females (eight natural) were released (Appendix P.1). Of the released fish, 17 males (11 hatchery and 6 natural), and 17 females (nine hatchery and eight natural) were released immediately above the weir. Sixty hatchery males were released into Kids Creek Pond near Salmon, Idaho to provide additional angling opportunity. The other adult fish were released as part of supplementation studies conducted by Alan Byrne, Department Research Biologist. These hatchery fish (31 males and 23 females) were placed into weired-off sections of Beaver Creek and Frenchman Creek.

The East Fork facility trapped 149 B-run adult fish, of which 61 were males and 88 were females (Appendix P). Thirteen males (six natural), and seven females (six natural) were released above the velocity barrier to spawn naturally (Appendix P.1). All fish were scanned for Coded Wire Tags (CWT). A total of 52 fish were positive. Twelve were Ad-clipped, 19 were Ad-LV clipped, and 21 were LV-clipped.

The trap at Slate Creek collected a total of 13 adult steelhead were collected in the trap at, of which seven were males and six were females (Appendix P). Of the 13 fish trapped, eight were A-run (three female and five male), and five were B-run (three female and two male). No unmarked steelhead were trapped. A total of five CWT tagged fish were recovered at Slate Creek. Three fish were Ad clipped and two were Ad-LV clipped. The length frequency distribution of steelhead from Sawtooth Fish Hatchery, East Fork, and Slate Creek is shown in Appendix Q, R, and S.

Sawtooth Fish Hatchery had a male:female ratio of 62% males and 38% females. The East Fork's male:female ratio was 41% male and 59% female. Slate Creek had a male:female ratio of 54% male and 46% female.

Using Kent Ball's (Department Anadromous Researcher) lengths for one- and two-ocean fish, steelhead returns by year class and sex are shown in Appendix S.

From the 226 Sawtooth Fish Hatchery CWT-fish recovered, 213 actually had tags. The information indicated 201 of the fish were one-ocean and 12 were two-ocean. From the 52 CWTs recovered at the East Fork, 45 actually had tags. Measurements indicated that 11 were one-ocean, 23 were two-ocean, and one was a three-ocean. Of the five CWT tagged fish recovered at Slate Creek, two were one ocean, and three were two-ocean. Released steelhead by adult year class and sex are shown in Appendix T.

## **Adult Treatments**

The returning adults at Sawtooth Fish Hatchery, the East Fork Satellite, and Slate Creek, are not treated or injected with any type of drug or chemicals prior to spawning.

## **Prespawning Mortality**

Sawtooth Fish Hatchery, the East Fork facility, and Slate Creek had no pre-spawning mortality.

## **Spawning Operations**

Sawtooth Fish Hatchery spawned steelhead on 12 days from March 31, through May 8. Spawning took place at the East Fork on 12 days from April 4 through May 9. The Slate Creek fish were transported to the East Fork facility, combined with the East Fork fish, and spawned together. Both facilities spawned one male with one female and then combined two females together.

At Sawtooth, 858 fish were spawned, of which 429 were females. The East Fork facility spawned 132 fish, of which 82 were females. Using the Von Bayer egg-enumeration method, 1,994,076 green eggs were collected from Sawtooth Fish Hatchery fish (4,463 per female) and 424,938 green eggs were taken from East Fork/Slate Creek fish (5,588 per female).

After fertilization, the eggs were rinsed of blood and sperm with well water. The eggs were then water hardened in a minimum 100 ppm solution of Argentine (10% iodine) solution for one hour before being put into heath trays for incubation. All eggs tested negative for virus.

## **Incubation**

After hardening in the Argentine solution, the green eggs were put away at one females' eggs per Heath tray.

There were 3,319,190 green eggs received from Pahsimeroi Hatchery and 1,611,790 green Dworshak eggs received from Clearwater Hatchery incubated at Sawtooth. These eggs were incubated at two females per Heath tray.

All incubated eggs were treated with a 1,667 ppm 15-minute formalin flow-through treatment five times per week for fungal and bacterial control. Sawtooth's eggs eyed up at a 90% rate, yielding 1,795,300 eyed eggs. East Fork/Slate Creek eggs eyed up at a 84% rate, yielding 356,340 eyed eggs. Pahsimeroi eggs incubated at Sawtooth Fish Hatchery eyed up at a 81% rate, resulting in 2,704,400 eyed eggs, and Dworshak eggs eyed up at a 87% rate, yielding 1,403,900 eyed eggs (Appendix J).

Well temperatures varied from 40°F at the beginning of incubation to 47°F when the last fry were shipped. Ten temperature units (TU's) per day was the average during the incubation period. Eye-up occurred at 360 TU's and the eggs were shocked at 380 TU's.

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 Jenn-Sorter model JH 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 of well water. Then the cooler was strapped shut and shipped.

We shipped the Sawtooth eggs as follows: 792,500 as eyed eggs to Hagerman National Hatchery, 118,000 eyed eggs to Hagerman State Hatchery, 359,800 eyed eggs to the Shoshone-Bannock Tribes. Magic Valley received 525,000 eyed Sawtooth eggs, and 356,340 East Fork eyed eggs.

The Pahsimeroi eggs were shipped as follows: 325,000 as eyed eggs to Magic Valley Hatchery; 375,000 as eyed eggs to Hagerman National Hatchery, 729,400 as eyed eggs and 721,000 as fry to Niagara Springs Hatchery, 554,000 as eyed eggs to the Shoshone-Bannock Tribes.

A total of 1,403,900 Dworshak eyed B-run steelhead eggs were shipped to Magic Valley Fish Hatchery.

The Shoshone-Bannock Tribes received an additional 10,200 eyed eggs from A-run females that were trapped at Slate Creek and spawned separately.

### **Release Acclimation of BY 97**

For the seventh year in a row, steelhead smolts were held and acclimated at Sawtooth Fish Hatchery before final release. A total of 623,584 smolts were hauled from Hagerman National Hatchery and held in 12 separate raceways, starting March 30, 1998 and continuing until April 9, 1998. They were held from 15 to 25 days. All of the fish were fed a maintenance diet of BioMoist 3.0 mm. The screens were removed on April 24, 1998. The smolts were forced out of the raceways the same day. A total of 621,861 BY97 acclimated smolts were released. The same day, an additional 61,354 BY97 smolts were hauled from Hagerman National Fish Hatchery and direct released below the Sawtooth weir, bringing the total BY97 smolt release near Sawtooth to 683,215.

### **Fish Marking**

Fish marking was completed in the rearing hatcheries and is shown in Appendix N.

## **CONCLUSIONS/RECOMMENDATIONS**

### **East Fork Trap**

As stated in last year's brood year report, the East Fork's adult returns are insufficient to meet egg needs or escapement goals. With the involved agency approvals, a lower weir and trap would boost our facility's adult numbers by capturing all the fish that drop out before reaching the trap. Another option would be to not clip the adipose fin off East Fork stock fish. A ventral fin could be clipped to identify these fish as East Fork stock. With the adipose fin attached, the East Fork stock would not be fished upon, giving us more brood stock potential. This would allow us to plant fewer Dworshak stock smolts, which are proven much less successful than East Fork stock fish.

### **Sawtooth Fish Hatchery**

If the returning number of adults show that acclimation is a viable program, then we should plan on implementing the program every spring. However, if the numbers of adults shows that there is no difference or fewer returning "acclimated" adults, then we should stop the program. Acclimation requires the hatchery to draw large amounts of water from the river, which also draws in emerging endangered natural chinook fry.

## **APPENDICES**

Appendix A. Sawtooth Fish Hatchery Chinook Smolt Releases and Returns (marked and unmarked).

Brood Year	Release Year	Number Released	Adult Returns <sup>a</sup>			Returns	Total %
			3-year	4-year	5-year		
1979	1981	None	-	-	-	291	inc
1980	1982	None	17	66	165	248	inc
1981	1983	185,375	49	1,182	796	2,027	1.08
1982	1984	230,550	292	922	875	2,086	.91
1983	1985	420,060	51	452	1,318	1,821	.43
1984	1986	347,484	17	86	190	293	.08
1985	1987	1,185,06	80	286	164	530	.05
1986	87-88	1,705,500	412	1,212	297	1,921	.11
1987	88-89	2,092,000	112	201	63	376	.02
1988	89-90	1,895,60	68	496	480	1,044	.055
1989	90-91	652,600	45	78	27	150	.023
1990	91-92	1,273,400	29	63	6	98	.008
1991	92-93	774,583	6	15	28	49	.006
1992	93-94	213,830	16	101	96	213	.099
1993	94-95	334,313	27	148	116	291	.087
1994	1996	25,006	10	33	(1999)	-	inc
1995	1997	4,756	4(1999)	(2000)	-	inc	
1996	1998	43,161	(1999)	(2000)	(2001)	-	inc

East Fork Chinook Smolt Releases and Returns (marked and unmarked).

Brood Year	Release Year	Number Released	Adult Returns <sup>a</sup>			Returns	Total %
			3-year	4-year	5-year		
1979	1981	-	-	-	69	69	inc
1980	1982	-	-	26	59	85	inc
1981	1983	-	-	193	102	317	inc
1982	1984	-	-	87	181	268	inc
1983	1985	-	22	90	519	631	inc
1984	1986	108,700	1	23	51	75	.06
1985	1987	195,100	6	55	27	88	.045
1986	1988	249,200	22	106	32	160	.064
1987	1989	305,300	12	23	23	58	.019
1988	1990	514,600	7	27	65	99	.019
1989	1991	98,300	15	18	13	46	.046
1990	1992	79,300	6	2	0	8	.010
1991	1993	35,172	0	0	0	0	.000
1992	1994	12,368	0	7	0	7	.056
1993	1995	48,845	3	7	ND	10	.020
1994	1996	-	0	ND	(1999)	-	inc
1995	1997	-	ND	(1999)	(2000)	-	inc
1996	1998	-	(1999)	(2000)	(2001)	-	inc

a Age classes based upon the following lengths: 3-yr. old: ≤ 64 cm, 4-yr. old: 64 to 82 cm 5-yr. old: >82 cm. ND means no data, trap not operated.

Appendix A.1 Sawtooth Fish Hatchery Chinook Smolt Releases and Hatchery Returns (marked fish).

Beginning with BY91, all hatchery chinook smolts released were marked.

**Hatchery Adult Returns**

Brood Year	Release Year	Number Released	Adult Returns <sup>a</sup>			Total Returns	Total %
			3-year	4-year	5-year		
1991	92-93	774,583	2	11	7	20	.002
1992	93-94	213,830	8	23	26	57	.026
1993	94-95	334,313	21	72	23	116	.035
1994	1996	25,006	1	3	(1999)	-	inc
1995	1997	4,756	0	(1999)	(2000)	-	inc
1996	1998	43,161	(1999)	(2000)	(2001)	-	inc

East Fork Chinook Smolt Releases and Hatchery Returns (marked Fish).

**Hatchery Adult Returns**

Brood Year	Release Year	Number Released	Adult Returns			Total Returns	Total %
			3-year	4-year	5-year		
1991	1993	35,172	0	0	0	0	.000
1992	1994	12,368	0	0	0	0	.000
1993	1995	48,845	1	1	ND	2	.004
1994	1996	-	0	ND	(1999)	-	inc
1995	1997	-	ND	(1999)	(2000)	-	inc
1996	1998	-	(1999)	(2000)	(2001)	-	inc

a Age classes based upon the following lengths: 3-yr. old: ≤ 64 cm, 4-yr. old: 64 to 82 cm 5-yr. old: >82 cm. ND means no data, trap not operated.

Appendix B. Sawtooth Fish Hatchery Water Quality Analysis of the Salmon River.

	1996	1993	1985
<b><u>Nutrients (mg/L)</u></b>			
T. Ammonia as N	0.027	0.043	0.045
T. NO <sub>2</sub> + NO <sub>3</sub> as N	0.006	0.073	0.088
T. Kjeldahl Nitrogen as N	0.20	<.05	0.26
T. Phosphorus as P	<.05	<.05	0.02
Ortho Phosphate as P	NR	0.019	<.003
<b><u>Minerals (mg/L)</u></b>			
Sp. Conductance (umhos/cm)	167	157	135
Hardness as CaCO <sub>3</sub>	80	68	62
T. Alkalinity as CaCO <sub>3</sub>	79	74	63
Bicarbonate Alk. as CaCO <sub>3</sub>	79	74	63
Calcium	27.4	24	20.8
Magnesium	2.9	1.9	1.8
Sodium	5.5	7.0	3.8
Potassium	0.7	0.7	<1
Fluoride	0.29	0.85	0.58
Sulphate as SO <sub>4</sub>	12	5	<6
<b><u>Total Metals (ug/L)</u></b>			
Arsenic, Total	<10	<10	<10
Boron, Total	<10	<80	1
Cadmium, Total	<1	<1	<1
Chromium, +6	NR	<10	<50
Chromium, Total	<2	<10	<50
Copper, Total	<10	<10	<10
Iron, Total	20	20	120
Lead, Total	<5	<5	<50
Manganese, Total	1	<10	10
Mercury, Total	<.5	<.5	<.5
Nickel, Total	<5	<10	<50
Silver, Total	<1	<1	<1
Zinc, Total	3	<2	<1
<b><u>Miscellaneous</u></b>			
Turbidity (NTU)	0.45	<1	1.8
pH (SU)	8.04	8.0	8.1
Total Cyanide (mg/L)	<.005	<.005	<.005
Total Residue	NR	NR	97

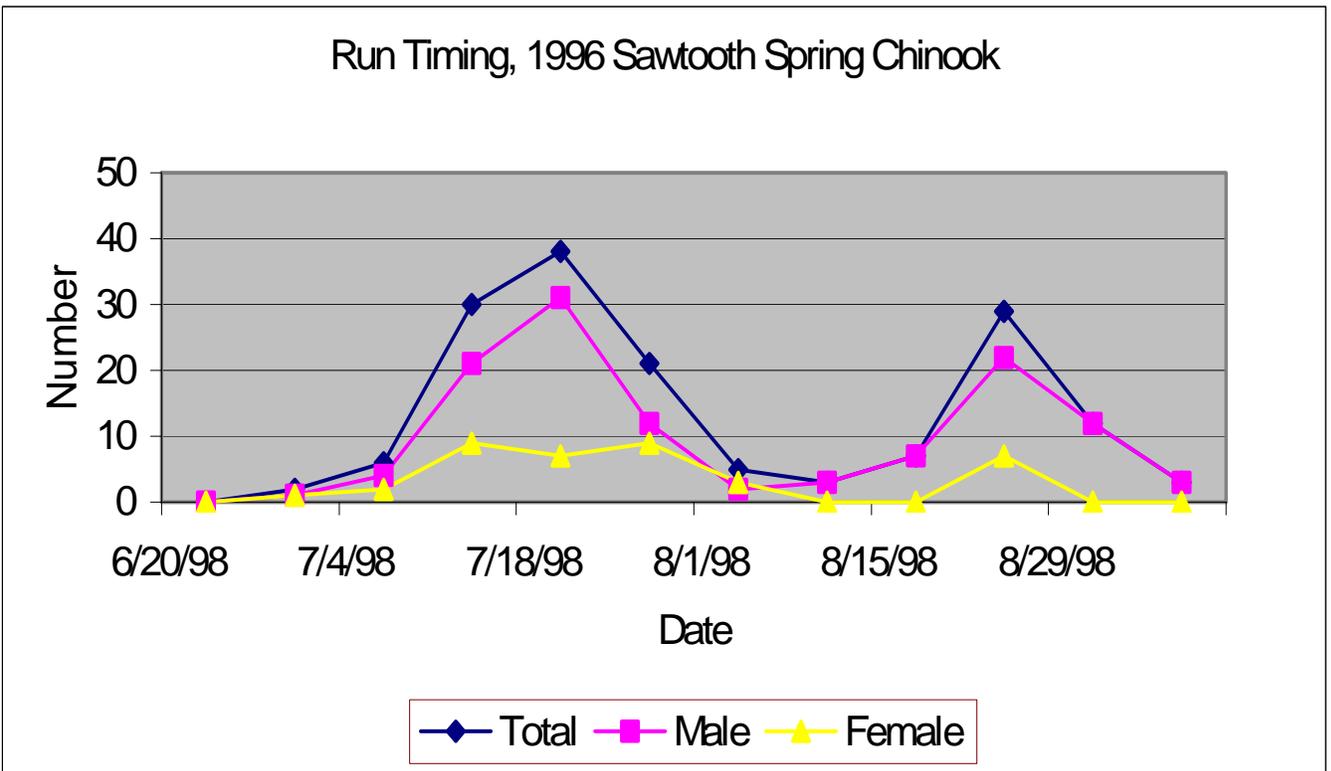
Appendix C. Sawtooth Fish Hatchery Results of Disease Sampling.

<b>BY96 Juvenile Chinook</b>			
<b>Case #</b>	<b>Stock</b>	<b>Date</b>	<b>Data</b>
97-031	Saw	02/12/97	IHN, IPN 0/5; FUR, ERM, CWD 0/4; MAS 4/5
97-187	Saw	06/16/97	BKD 0/7; FUR, ERM, CWD 0/4; MAS 2/4
97-253	Saw	08/21/97	IHN, IPN, FUR, ERM, CWD, CSH 0/7
97-421	Saw	11/04/97	IHN, IPN, BKD 0/10; FUR, ERM, CWD 0/8

<b>Return Year 1996 Chinook Broodstock</b>			
<b>Case #</b>	<b>Stock</b>	<b>Date</b>	<b>Data</b>
96-277	Saw	08/12/96	IHN, IPN 0/1
96-301	Saw	08/19/96	IHN, IPN 0/2
96-316	Saw	08/26/96	IHN, IPN 0/4
96-366	Saw	09/11/96	IHN, IPN 0/1; BKD 6/10; WHD 0/14

<b>Return year 1997 steelhead broodstock</b>			
<b>Case #</b>	<b>Stock</b>	<b>Date</b>	<b>Data</b>
97-078	Saw	03/31/97	IHN, IPN 0/2
97-084	Saw	04/03/97	IHN, IPN 0/18
97-085	EF	04/03/97	IHN, IPN 0/1
97-093	EF	04/08/97	IHN, IPN 0/2
97-094	Saw	04/08/97	IHN, IPN 0/12
97-099	Saw	04/10/97	IHN, IPN 0/27
97-103	Saw	04/14/97	IHN, IPN 0/20
97-104	EF	04/14/97	IHN, IPN 0/5
97-111	Saw	04/17/97	IHN, IPN 0/38
97-112	EF	04/16/97	IHN, IPN 0/4
97-113	Saw	04/21/97	IHN, IPN 0/51; BKD 3/5, 1High; WHD 1/1
97-114	EF	04 /18/97	IHN, IPN 0/15
97-115	Saw	04/21/97	IHN, IPN 0/10; FUR, ERM 0/6; CWD 6/6
97-125	EF	04/24/97	IHN, IPN 0/21
97-128	Saw	04/24/97	IHN, IPN 0/68
97-130	Saw	04/28/97	IHN, IPN 0/60
97-131	EF	04/25/97	IHN, IPN 0/10
97-132	EF	04/27/97	IHN, IPN 0/9
97-141	Saw	05/01/97	IHN, IPN 0/50
97-142	EF	04/29/97	IHN, IPN 0/2
97-149	Saw	05/05/97	IHN, IPN 0/36
97-150	EF	05/02/97	IHN, IPN 0/1
97-152	Saw	05/08/97	IHN, IPN 0/36
97-153	EF	05/06/97	IHN, IPN 0/6
97-156	EF	05/09/97	IHN, IPN 0/4
97-160	Saw	05/12/97	BKD 39/59, 3High; WHD ¼
97-161	EF	05/12/97	IHN, IPN 0/10; FUR, ERM 0/6; CWD 6/6

Appendix D. Sawtooth Fish Hatchery Spring Chinook Run Timing.



Appendix E. Sawtooth Fish Hatchery Age Class Totals from All Trapped Chinook, Return Year 1996.

<b>Sawtooth</b>	<b>Length (Fk)</b>	<b>Year class</b>	<b>Number</b>
Males -	≤ 64 cm	- 3-year old -	27
	64-82 cm	- 4-year old -	74
	> 82 cm	- 5-year old -	17
<b>Subtotal</b>			<b>118</b>
Females	≤ 64 cm	- 3-year old -	0
	64-82 cm	- 4-year old -	27
	> 82 cm	- 5-year old -	11
<b>Subtotal</b>			<b>38</b>
<b>Total</b>			<b>156</b>

Appendix E.1. Sawtooth Fish Hatchery Spring Chinook Salmon Length Frequency Distribution for 1996.

fork length cm	fish trapped	males	females	unmarked			marked					
				males ponded	Released	females ponded	released	ponded	males released	females ponded	released	
40	1	1						1				
46	4	4						4				
47	2	2				1		1				
48												
49	2	2						2				
50	1	1						1				
51												
52	1	1							1			
53												
54	2	2				1		1				
55	3	3						3				
56	2	2						1	1			
57												
58												
59	1	1						1				
60	1	1						1				
61	2	2				1		1				
62	2	2			1	1						
63	1	1							1			
64	2	2				1		1				
65												
66	1	1						1				
67	4	4			2	1		1				
68	5	3	2			3			2			
69	3	3			1	2						
70	3	3			2	1						
71	2	2			1	1						
72	5	5				4						
73	4	4			2			1				
74	5	1	4			1	1				3	
75	8	6	2		1	5		1			1	
76	9	8	1		2	6					1	
77	3	2	1			2		1				
78	13	10	3		5	4		1			2	
79	10	7	3		2	4		1			2	
80	9	7	2			7		1			1	
81	10	5	5		1	3	1	2		1	1	
82	7	3	4			2	2			1	1	
83	4	4			1	1			1	1		
84	4	3	1			2	1		1			
85	2		2					1			1	
86	1	1			1							
87	3		3				1	1			1	
88	1	1				1						
89	3	2	1		1	1		1				
90	1	1			1							
91	1	1							1			
92	2		2				1				1	
93	2	1	1			1		1				
94	1	1				1						
95												
96	1	1				1						
97	1	1				1						
98												
99												
100												
101	1		1						1			
TOTALS	156	118	38		24	60	6	15	28	6	4	13

Appendix F. Sawtooth Fish Hatchery Age Class Breakdown by Released Chinook, Return Year 1996.

<b>Sawtooth</b>	<b>Length (Fk)</b>	<b>Age Class</b>	<b>Number</b>
Males	< 64 cm	3-year old	8
	64-82 cm	4-year old	48
	> 82 cm	5-year old	10
<b>Total Males</b>			<b>66</b>
Females	< 82 cm	4-year old	22
	> 82 cm	5-year old	6
<b>Total Females</b>			<b>28</b>
<b>Total released</b>			<b>94</b>

Appendix G. Sawtooth Fish Hatchery Fish Hatchery Chinook Age Class Breakdown by CWT Recoveries 1996.

Sex	Length(cm)	Code	Purpose
3-year olds: (1)			
m	71	10/49/26	Supplementation
4-year olds: (9)			
f	81	10/49/29	Supplementation
f	85	10/49/29	Supplementation
f	83	10/46/12	Supplementation
m	79	10/46/04	Supplementation
m	82	10/49/29	Supplementation
m	80	10/49/27	Supplementation
m	64	10/49/27	Supplementation
m	58	10/49/27	Supplementation
m	77	10/49/29	Supplementation

Appendix H. Breakdown by Fork Length (cm), for spring chinook at the East Fork Trap, 1996. (All Released)

Sex	Length	Age	Total Number	Marked Number	Unmarked Number
M	<64cm	3	3	1	2
M	>64-≤82cm	4	5	0	5
F	>64-≤82cm	4	2	0	2
M	>82cm	5	0	0	0
F	>82cm	5	0	0	0
Totals			10	1	9

Appendix I. Sawtooth Fish Hatchery Spawning Matrix, 1996 Return Year.

Date Spawned	Female Length	Mark	Males Length	Mark	Males Length	Mark
8/12/96	87	-	75	Ad	84	Ad
			70	-	69	-
8/19/96	82	-	89	-	72	Ad
			83	Ad	81	-
			82	Ad	81	Ad
8/26/96	81	Ad	79	Ad	78	-
			75	*Ad	90	-
			76	-	82	*Ad
			78	-	67	-
			79	-	62	-
			70	*-	91	Ad
			83	*Ad	83	-
8/29/96	84	-	72	*Ad	*84	Ad
			78	*-	78	-
			78	Ad	67	-
			81	*Ad	79	-
8/30/96	82	-	66	Lv	71	-
			86	-	70	-
9/11/96	92	Ad	73	-	78	-
			76	-	73	-

\*denotes using a male a second time

-denotes an unmarked fish

Appendix J. Survival Table for Chinook (BY96) and Steelhead (BY97) from Green Eggs to Released Smolts, at Sawtooth Fish Hatchery and East Fork Sites.

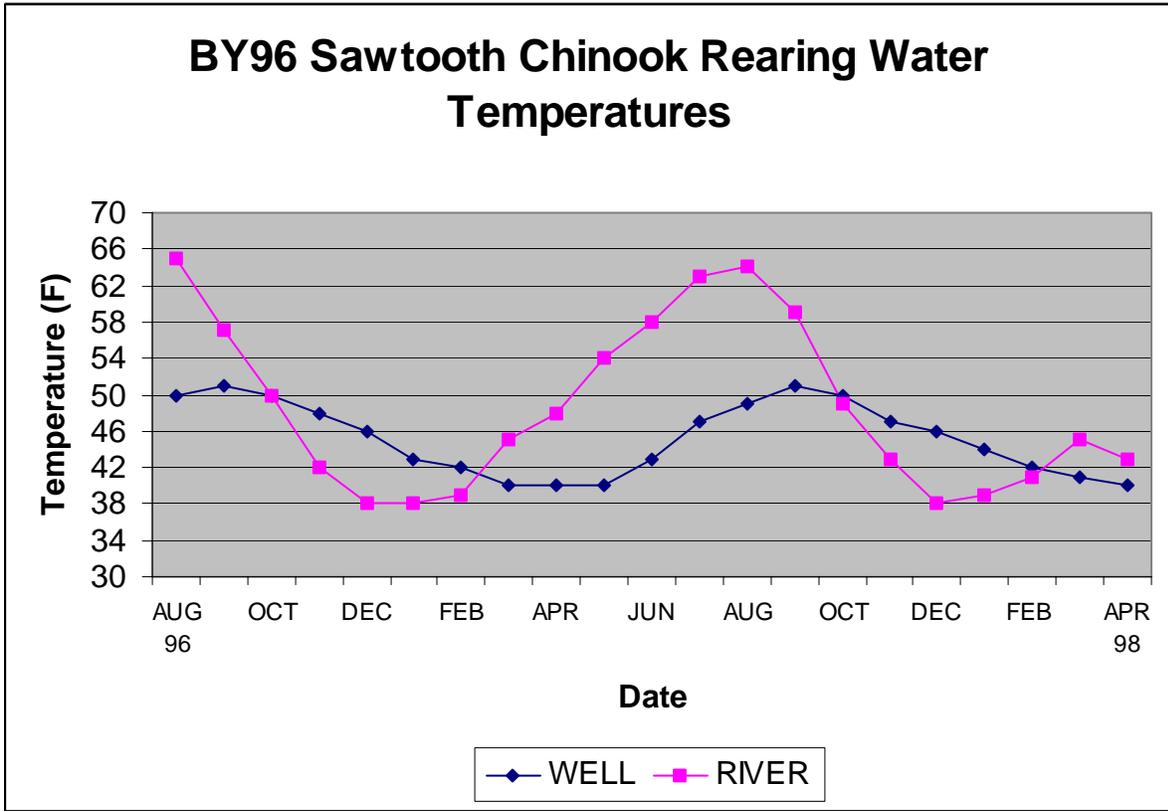
<b>CHINOOK</b>				
Green egg Number	Eyed egg Number	Percent Survival	Released Smolts	Percent Survival From green
<b><u>Sawtooth Fish Hatchery Fish</u></b>				
51,743	45,128	87	43,161	83
<b>STEELHEAD</b>				
Green egg Number	Eyed egg Number	Percent Survival	Released Smolts	Percent Survival From green
<b><u>Sawtooth Fish Hatchery Fish</u></b>				
1,994,076	1,795,300	90	distributed as follows	
	1,317,500 for smolt production		1,093,440	82.3
	477,800 for egg boxes/resident programs		N/A	N/A
<b><u>East Fork/Slate Creek Fish</u></b>				
424,938	356,340	91	301,500	71

N/A = fish numbers resulting from these eyed eggs is unknown  
 All steelhead raised at other hatcheries.

Appendix J.1. Feed Schedule for Sawtooth/Pahsimeroi Spring Chinook, BY96.

<b>Fpp</b>	<b>% BW Fed</b>	<b>Feed Size</b>	<b>Timing</b>
su ----800	.035	#2/#3 str	11/96 – 01/16/96
800---500	.033	#3 str	01/97 - 02/97
500---400	.025	1.0 mm	02/97 - 03/97
400---350	.025	1.0/1.3 mm	03/97 - 04/97
350---300	.023	1.3 mm	04/97 - 04/97
300---250	.022	1.3 mm	05/97 - 06/95
250---150	.024	1.5 mm	06/97 - 06/97
150---110	.024	1.5 mm	06/97 - 07/97
110----90	.025	1.5 mm	07/97 - 08/97
90-----50	.022	2.5 mm	08/97 - 09/97
50 -----17	.020	2.5 mm	09/97 - 10/97
≤ -----17	Maintenance	3.0 mm	10/97 – release 4/21/98

Appendix K. Rearing Water Temperatures, BY96 Spring Chinook at Sawtooth Fish Hatchery.



Appendix L. Summary of Marked Spring Chinook Released, Return Year 1996.

<b>Sawtooth Fish Hatchery Stock (All Supplementation)</b>		
<b>Mark</b>	<b>Number Released</b>	<b>Location</b>
Adipose Clip	43,161	Sawtooth Fish Hatchery Weir, 04/21/98
Adipose Clip (PIT)	495	Sawtooth Fish Hatchery Weir, 04/21/98
<b>Total Release</b>	<b>43,161 (495)</b>	<b>All designated as supplementation</b>

**Pahsimeroi Stock**

Adipose Clip (PIT)	65,763 (1,000)	Transferred to Pahsimeroi FH 10/20/97
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Appendix M. Summary of Sawtooth Fish Hatchery Spring Chinook Smolt Releases, Return Year 1996.

	<b>Number</b>	<b>Fish per Pound</b>	<b>Pounds</b>
Raceway 3	20,040	13.3	1,507
Raceway 4	23,121	14.6	1,584
<b>Total</b>	<b>43,161</b>	<b>13.9</b>	<b>3,091</b>

Appendix N. Sawtooth Fish Hatchery Summary of Smolt Releases and Marks.

Mark Type	CWT Code	#PIT	Steelhead	Sawtooth Fish Hatchery Stock BY97	
			# Fish Released	Date	Release Purpose
Ad	104717,18,19	300	61,354	04/24/98	Non Acclimated/Feed-Fast
Ad	None	None	437,398	04/24/98	Acclimated/Contribution
Ad	104547,48,03 104720	900	57,482	04/24/98	Acclimation/Feed-Fast Diet
Ad	104503,04	300	32,274	04/24/98	Acclimation/Feed-Fast Diet
Ad	104608,09 104550	900	61,930	04/24/98	Acclimation/% Body Weight Diet
Ad	104548,49,50	300	32,777	04/24/98	Acclimation/Feed-Fast Diet
Ad	102137,38,39 40,41,42	600	*125,445	04/17/98	Contribution
Ad	None		*284,780	04/17/98	Contribution
<b>Totals</b>		<b>3,300</b>	<b>1,093,440</b>		

\*Fish were released to Salmon River Sections 17/18 by Magic Valley FH (410,225 total)

Steelhead Mark Type	CWT Code	#PIT	East Fork Stock	BY97	
			# Fish Released	Date	Release Purpose
Ad-LV	104705,06,07	300	68,385	04/22/98	Contribution/ EF Weir
Ad-LV	None		58,535	04/22/98	Contribution/ EF Weir
Ad-LV	102146,47,48	300	90,850	04/24/98	Contribution/ Slate Creek
Ad-LV	None		83,730	04/24/98	Contribution/ Slate Creek
<b>Totals</b>		<b>600</b>	<b>301,500</b>		

Chinook Mark Type	Sawtooth Fish Hatchery BY96				
	CWT Code	#PIT	# Fish Released	Date	Release Purpose
AD	None	495	43,161	04/121/98	Supplementation Sawtooth FH Weir
<b>Total</b>	<b>None</b>	<b>495</b>	<b>43,161</b>		

Appendix N.1. Sawtooth Fish Hatchery Production Cost Table (Includes Chinook BY96 and Steelhead BY97).

Smolt Number	Lbs. Feed	Cost Feed	Chinook		Total Cost	Cost per..... 1,000	Cost per lb.
			Lbs of Smolts	C			
<b>Sawtooth</b>							
43,161	4,063	4,334	3,091	1.3	\$271,179	\$6,283	\$87.74

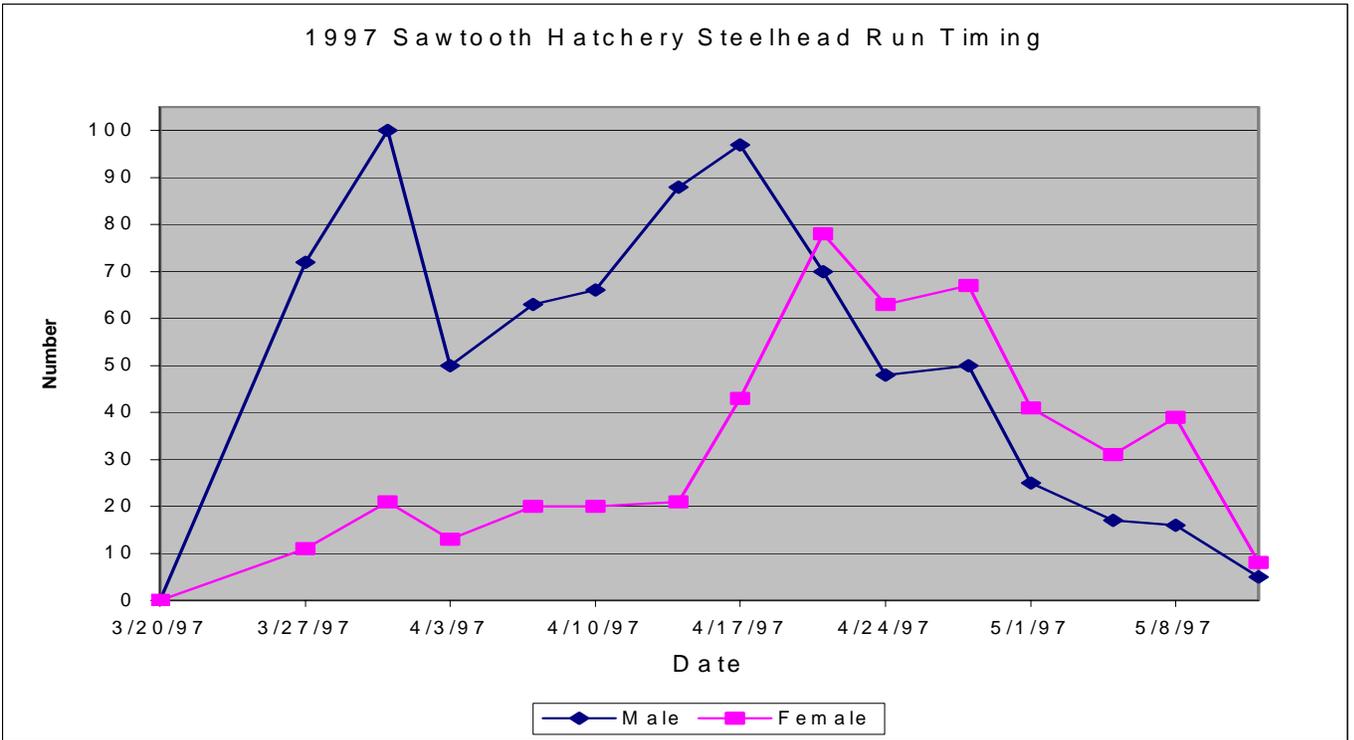
**East Fork**

No BY96 East Fork spring chinook salmon were reared. Costs were incurred operating the trap. Costs were also incurred rearing BY96 Pahsimeroi summer chinook.

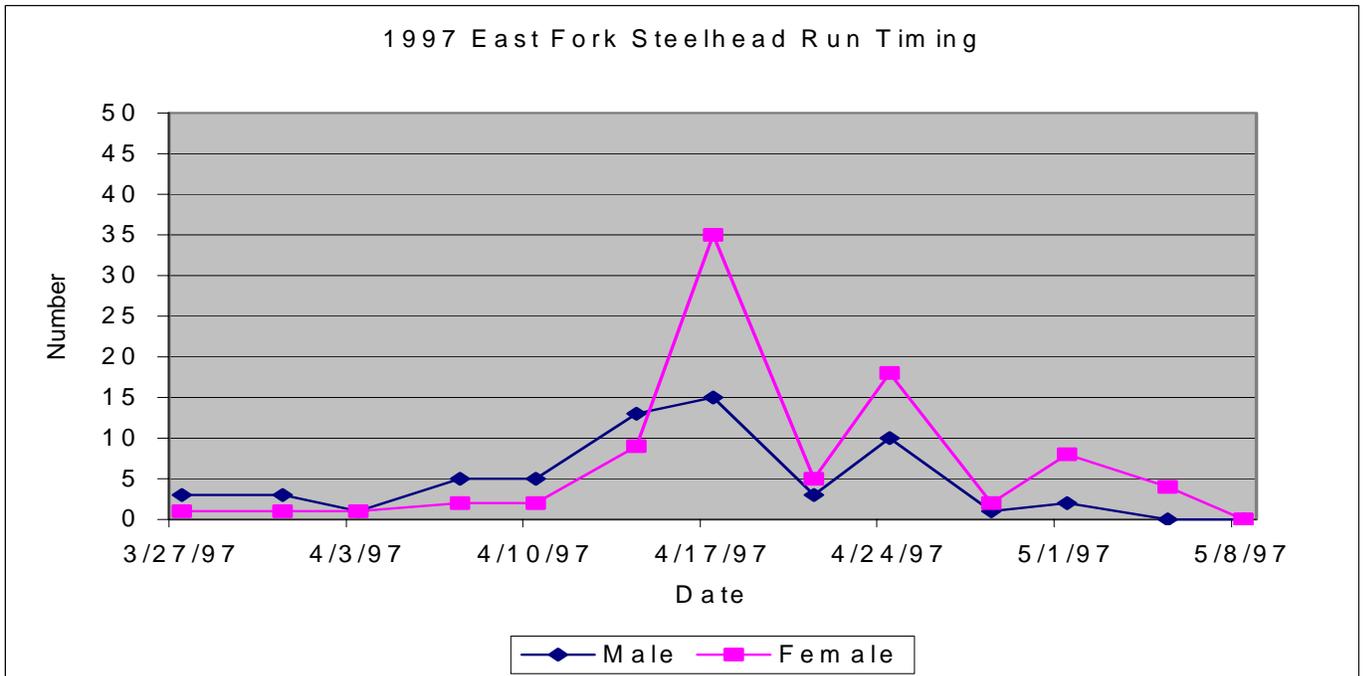
	Green Eggs	Eyed Eggs	Steelhead	
			Total Cost	Cost per 1,000 eyed eggs
<b>Sawtooth</b>				
	1,994,076	1,795,300	\$55,087	\$ 30.68
<b>East Fork</b>				
	424,938	356,340	\$38,135	\$107.02
<b>Pahsimeroi</b>				
	3,319,190	2,704,400	\$55,765	\$20.62
<b>Dworshak</b>				
	1,611,790	1,403,900	\$ 3,559	\$ 2.54
<b>Totals</b>	<b>7,349,994</b>	<b>6,259,940</b>	<b>\$152,546</b>	<b>\$24.36</b>

Note: Total costs less capital outlay. Costs include operating East Fork fish trap and running wells for entire rearing period.

Appendix 0. Run Timing Graphs for Steelhead, Return Year 1997, Sawtooth, and East Fork



Traps.



Appendix P. Steelhead Returns by Year Class<sup>1</sup> and Sex, Return Year 1997 .

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<b><u>Sawtooth Fish Hatchery (1243)</u></b>		
2-year old males		727 (5 natural)
3 or 4-year old males		<u>40 (1 natural)</u>
	<b>males</b>	767 (6 natural)
2-year old females		391 (6 natural)
3 or 4-year old females		<u>85 (2 natural)</u>
	<b>females</b>	476 (8 natural)
<b><u>East Fork (149)</u></b>		
2-year old males		27 (5 natural)
3 or 4-year old males		<u>34 (1 natural)</u>
	<b>males</b>	61 (6 natural)
2-year old females		5 (2 natural)
3 or 4-year old females		<u>83 (4 natural)</u>
	<b>females</b>	88 (6 natural)
<b><u>Slate Creek (13)</u></b>		
2-year old males		5
3 or 4-year old males		<u>2</u>
	<b>males</b>	7 (0 natural)
2-year old females		3
3 or 4-year old females		<u>3</u>
	<b>females</b>	6 (0 natural)

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<sup>1</sup>These figures are based on Kent Ball's criteria for aging steelhead, as described in Appendix U.

Appendix P.1. Lengths of Released Steelhead, Return Year 1997, from Sawtooth Fish Hatchery, and East Fork Traps.

Length	Male	Female
53	0,0	1,0
54	0,0	1,0
55	2,0	3,0
56	3,0	1,0
57	4,0	6(1n),0
58	4,0	6,0
59	11(1n),0	6(1n),0
60	7(2n),0	4(1n),0
61	5,0	4(1n),0
62	5(1n),0	2,1n
63	3,4n	2n,0
64	3,1	1,1n
65	2,1n	0,0
66	2(1n),0	1,0
67	0,0	0,0
68	1,0	2n,0
69	1,0	0,0
70	1,0	0,0
71	1,0	0,0
72	0,1	0,0
74	0,0	0,1n
75	0,1n	0,0
76	0,1	0,1n
77	0,0	0,2n
79	0,2	0,0
80	1n,0	0,1
81	0,1	0,0
82	0,1	0,0

3(1n),0 means 3 Sawtooth stock with one being unmarked; 0 East Fork stock  
 N denotes unmarked fish all others are marked fish  
 No fish were released from Slate Creek Trap.

Appendix Q. Sawtooth Fish Hatchery Steelhead Length Frequency Distribution, Return Year 1997.

FORK LENGTH (cm)	HATCHERY		NATURAL		TOTAL TRAPPED		TOTAL
	MALES	FEMALES	MALES	FEMALES	MALES	FEMALES	
50	0	0	0	0	0	0	0
51	2	1	0	0	2	1	3
52	2	3	0	0	2	3	5
53	7	6	0	0	7	6	13
54	12	2	0	0	12	2	14
55	22	20	0	0	22	20	42
56	29	28	0	0	29	28	57
57	58	50	0	1	58	51	109
58	73	64	0	0	73	64	137
59	85	53	1	1	86	54	140
60	99	61	2	1	101	62	163
61	96	33	0	1	96	34	130
62	83	27	1	0	84	27	111
63	56	16	0	2	56	18	74
64	41	10	0	0	41	10	51
65	27	11	0	0	27	11	38
66	12	7	1	0	13	7	20
67	13	10	0	0	13	10	23
68	5	14	0	2	5	16	21
69	5	11	0	0	5	11	16
70	8	13	0	0	8	13	21
71	4	10	0	0	4	10	14
72	8	8	0	0	8	8	16
73	6	5	0	0	6	5	11
74	3	5	0	0	3	5	8
75	1	0	0	0	1	0	1
76	0	0	0	0	0	0	0
77	1	0	0	0	1	0	1
78	1	0	0	0	1	0	1
79	1	0	0	0	1	0	1
80	0	0	1	0	1	0	1
81	0	0	0	0	0	0	0
82	1	0	0	0	1	0	1
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
TOTALS	761	468	6	8	767	476	1243

Appendix R. East Fork Steelhead Length Frequency Distribution, Return Year 1997.

FORK LENGTH (cm)	HATCHERY		NATURAL		TOTAL TRAPPED		
	MALES	FEMALES	MALES	FEMALES	MALES	FEMALES	TOTAL
50	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0
56	1	0	0	0	1	0	1
57	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0
60	1	0	0	0	1	0	1
61	0	0	0	0	0	0	0
62	0	0	0	1	0	1	1
63	3	0	4	0	7	0	7
64	2	0	0	1	2	1	3
65	4	0	1	0	5	0	5
66	3	0	0	0	3	0	3
67	0	3	0	0	0	3	3
68	0	0	0	0	0	0	0
69	0	3	0	0	0	3	3
70	1	3	0	0	1	3	4
71	1	6	0	0	1	6	7
72	3	4	0	0	3	4	7
73	3	5	0	0	3	5	8
74	5	9	0	1	5	10	15
75	3	6	1	0	4	6	10
76	3	16	0	1	3	17	20
77	1	11	0	2	1	13	14
78	3	5	0	0	3	5	8
79	8	4	0	0	8	4	12
80	2	6	0	0	2	6	8
81	4	1	0	0	4	1	5
82	2	0	0	0	2	0	2
83	1	0	0	0	1	0	1
84	1	0	0	0	1	0	1
TOTALS	55	82	6	6	61	88	149

Appendix S. Slate Creek B-run Steelhead Length Frequency Distribution, Return Year 1997.

Fork Length	Male	Female
68		
69		
70		
71		
72		
73		
74		
75		1
76		
77		
78	1	
79		
80		
81		
82	1	1
83		
84		1
85		
Totals	2	3

Appendix T. Released Steelhead by Year Class and Sex, Return Year 1997.

**Sawtooth Fish Hatchery (148; ( 14n))**

<b>Males -</b>	2-year old	104 (5n)	<b>Females -</b>	2-year old	37 (6n)
	3 or 4-year old	4 (1n)		3 or 4-year old	3 (2n)
	<b>Total</b>	<b>108 (6n)</b>		<b>Total</b>	<b>40 (8n)</b>

**East Fork (20; (12n))**

<b>Males -</b>	2-year old	7 (5n)	<b>Females -</b>	2-year old	2 (2n)
	3 or 4-year old -	6 (1n)		3 or 4-year old	5 (4n)
	<b>Total</b>	<b>13 (6n)</b>		<b>Total -</b>	<b>7 (6n)</b>

n- denotes natural

Appendix U. Sawtooth Fish Hatchery Criteria for Aging Steelhead, from Kent Ball, The Department.

<b>"A-run" male -</b>	≤ 68 cm - 2-year old
	> 68 cm - 3 or 4-year old
<b>"A-run" female -</b>	≤ 65 cm - 2-year old
	> 65 cm - 3 or 4-year old
<b>"B-run" male -</b>	< 73 cm - 2-year old
	> 73 cm - 3 or 4-year old
<b>"B-run" female -</b>	< 68 cm - 2-year old
	> 68 cm - 3 or 4-year old

Submitted by:

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Fish Hatchery Manager II

Kurtis Schilling  
Assistant Fish Hatchery Manager

Approved by:

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Virgil K. Moore, Chief  
Bureau of Fisheries

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Tom Rogers  
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