SAWTOOTH FISH HATCHERY
and
EAST FORK SATELLITE

2003 Spring Chinook Brood Year Report
2004 Steelhead Brood Year Report

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2003 SPRING CHINOOK SALMON

ABSTRACT

In 2003, the Sawtooth Fish Hatchery adult spring Chinook salmon *Oncorhynchus tshawytscha* weir on the Main Salmon River was installed on June 12 and operated through September 9. A total of 1,236 adult Chinook were trapped in 2003, of which 698 (476 jacks / 92 adult males / 130 females) were hatchery-produced (marked) fish and 538 (46 jacks / 207 adult males / 285 females) were unmarked. Of the total fish trapped, 731 (193 marked, 538 unmarked) were released above the hatchery weir for volitional spawning and included: 38 marked jacks, 61 marked adult males, 94 marked females, 46 unmarked jacks, 207 unmarked adult males, and 285 unmarked females. The remaining 505 Chinook salmon were retained for 2003 hatchery spawn crosses and included: 438 marked jacks, 29 marked adult males, 36 marked females and 2 unmarked adult males. Hatchery reared marked fish are defined as fish with either an adipose clip only, adipose clip/CWT, or CWT only.

Spawning began on August 14, and continued through September 8, with a total of seven spawning days. 2003 spawn crosses were made by 1:2 (F/M) split random cross mating. Production spawning consisted of 33 females, crossed with 29 adult males and 25 jacks that produced 174,575 green eggs (5,290 eggs per female), which yielded 145,744 eyed eggs for an eye-up rate of 83.7%. After receiving ELISA based BKD results from Eagle Fish Health Lab, the eggs of one female (5,290) were culled due to having ELISA based BKD of 0.20 or greater and are not included in egg inventory summaries. All eggs in this group are classified as supplementation. From these eyed eggs, 136,830 fry were ponded which resulted in a smolt release of 134,769 smolts.

INTRODUCTION

Funding Source

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.

Location

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 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 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.

Species Reared

Sawtooth Fish Hatchery is involved in trapping, spawning, and rearing spring Chinook salmon to the smolt stage for release. A-run steelhead 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 East Fork natural steelhead. 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 1970's and early 1980's as fry and smolt plants.

At both facilities, some returning adult fish are released to spawn naturally. At Sawtooth, all unmarked Chinook are released above the hatchery for natural production. Depending on marked Chinook return numbers, supplementation fish are released above the hatchery to supplement natural production. Numbers of fish released depends on marked and unmarked fish returns. The National Marine Fisheries Service (now NOAAF) under permits # 1179 and # 1186 prescribes fish handling for Chinook salmon At the East Fork, Chinook salmon trapping did not occur. 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 of 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 1.3 million Chinook smolts for release at SFH.
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 x 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 sq 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).

Production Capabilities

Trapped adult capacity at the East Fork trap consists of two 68-ft x 10-ft x 4.5-ft adult holding ponds (3,060 cu 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 ten semi-square tanks with an individual volume of 17 cu ft and a capacity of 15,000 swim-up fry each, 6 semi-square rearing tanks with an individual volume of 50 cu ft and a capacity for 30,000 fry each, and 14 inside rearing vats with an individual volume of 391 cu ft and a capacity for 100,000 fry each. Outside rearing consists of 12 fry raceways each with 750 cu ft of rearing space and 28 production raceways each with 2,700 cu ft 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.

The adult facility has three concrete adult fish holding ponds with 4,500 cu ft 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, replace the backup generator, seal coating hatchery roadways, and make modifications to the weir for resident fish movement, and a new office entry for winter safety concerns.

East Fork recommendations include modifying the intake screen to exclude fish fry, modifying the velocity barrier to prevent injury to migrating fish, and 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 approximately 900 gpm of pumped water and temperatures range from 39ºF (4ºC) in the winter to 52ºF (11ºC) in the summer. The Salmon River provides up to 55 cfs of gravity-flow water and ranges in temperature from 32^0F (0^0C) in the winter to 68^0F (20^0C) in the summer.

Water Quality

The most recent water quality analysis from the Sawtooth Fish Hatchery collection box at the river, well #1, and well #2 was completed in 2002. Results are 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

SAWTOOTH FISH HEALTH SECTION

Diseases Encountered and Treatments. Diseases were not encountered in BY03 Spring Chinook reared at this facility. *Renibacterium salmoninarum* was detected in routine sampling of brood Chinook. *M. cerebralis* was detected in brood steelhead, brood Chinook salmon and BY03 juvenile Chinook at preliberation. The two steelhead stocks that were positive for *M. cerebralis* were the Sawtooth A group, and the Squaw Creek pond B group. Two prophylactic applications of erythromycin were given to BY03 Chinook to reduce the risk of an epizootic of bacterial kidney disease (BKD).

Organosomatic Index. See Appendix S.

Acute Losses. Neither acute nor chronic losses were experienced at this facility.

Other Assessments. An epizootic of Infectious Hematopoietic Necrosis caused extensive mortality in raceway of BY00 spring Chinook at this facility. In an effort to ascertain the prevalence in the feral and wild fish that inhabit the Salmon River and Sawtooth Fish Hatchery, an extensive sampling effort was implemented. IHNV was not detected from 60 Chinook carcasses sampled above the Sawtooth Hatchery weir. Also 100 % of the female brood stock has been sampled for IHNV without viral replicating agent detection. During the 2005 Chinook salmon spawning at this facility, samples for viral replicating agents should be collected mostly from five year old fish. During 2004, 17 of the 24 anadromous adult sockeye salmon trapped at Sawtooth Hatchery were tested positive for IHNV. Furthermore, not all the returning adult sockeye were trapped at Sawtooth Hatchery. Some of the returning adults were left in the river until the weir was removed at the hatchery. We can assume that a high proportion of these fish carried IHNV and that some of these fish continued to migrate up the Salmon River into Sawtooth Hatchery's water source. This demonstrates the need for expansion of well water capacity at Sawtooth Hatchery. With more well water, fish can be held in the indoor nursery raceways longer. This will allow the fish to mature on pathogen-free water until these fish are more immuno-competent. This also allows fish to be reared on pathogen-free water until the risk of horizontal infection from adult salmon is reduced by time, thus avoiding host-pathogen contact.

Whirling disease exposure trials in the upper Salmon River, above Sawtooth Hatchery, demonstrated that the parasite has been established in that portion of the river.

Adult steelhead A Group were examined for pathogens during spawning activities. One fish, out of the 19 fish sampled, was positive for *M. cerebralis (*MC) by pepsin/trypsin digest methods. All brood female steelhead trout (576) were examined for IHNV at Sawtooth Hatchery. All were negative for viral replicating agents. 19 adult female steelhead trout B Group were examined for IHNV at the East Fork Trap and six steelhead (B Group) were examined from Squaw Creek pond. All of these fish were negative for IHNV. No adult steelhead trout were found to be positive for MC out of the 6 sampled at the East Fork Trap,

while 1 fish was positive of the 20 fish sampled at Squaw Creek Pond. The direct fluorescent antibody test (DFAT) detected 27 RS in steelhead from the 54 fish tested from Sawtooth Hatchery and 1 from the 5 fish sampled from the East Fork Trap. 12 adult steelhead out of 19 tested positive for RS, using DFAT, from the Squaw Creek Pond.

Organosomatic Index. See Appendix C.

Acute Losses. Acute losses were not experienced at this facility.

Other Assessments. Samples for viral replicating agents were taken from adult spring Chinook salmon carcasses gathered above the Sawtooth Hatchery weir. Viral replicating agents were not detected in the 60 samples taken. The Eagle Fish Health Laboratory will continue to monitor the Chinook salmon released above the weir for IHNV. This monitoring effort was initiated after BY00 spring Chinook salmon juveniles experienced an epizootic of IHNV in the February 2002. The results from this testing helped determine the appropriate timing of placing sockeye salmon into the outdoor raceways at this facility. Furthermore, if IHNV is in the water source for this hatchery, then efforts should be made to expand the well water capability of this facility.

FISH PRODUCTION

Spring Chinook Adult Collection

The Sawtooth Fish Hatchery Chinook-trapping season began on June 12, 2003 and continued through September 9, 2003. The peak of the run occurred the week of July 12, 2003 (Appendix D). A total of 1,236 spring Chinook salmon were trapped including 299 males, 415 females, and 522 jacks (Appendix E). Released above the weir were 731 salmon (including 207 unmarked males, 285 unmarked females, 61 marked males and 94 marked females, and 46 unmarked jacks and 38 marked jacks) Appendix F. No fish were scanned for PIT tags in 2003, as per Fisheries Bureau instructions. Sawtooth Hatchery had a male: female ratio of 66% male and 34% female.

The East Fork trap was not in operation in 2003 for spring Chinook salmon.

A total of 522 three-year old, 193 four-year old, and 521 five-year old fish returned to Sawtooth Fish Hatchery.

Adult Treatments

Sawtooth Fish Hatchery female 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 10 pre-spawning mortalities (5 jacks, 2 adult males, 3 females) or 1.9%.

Spawning Operations

Spawning activities at Sawtooth Fish Hatchery began August 14, and concluded September 8, 2003. The seven egg takes during this period yielded 174,575 green eggs from 33 females for an average fecundity of 5,290 eggs per female. There were 29 males and 25 jacks used for fertilization. Each female's eggs were fertilized using 2 males and water hardened for one hour in a 100 ppm titrate-able iodine solution. The eggs were then put into Heath incubator trays, with one female per tray. Spawning crosses were determined by mark and age class to create a supplementation group. (see Appendix G).

Incubation

Each eight-tray Heath stack had flows set at 5 gpm of well water. Eggs were put away at one female per tray. This averaged 5,290 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 three times per week for fungal control until machine picked.

Well temperatures ranged from 50°F to 44°F during the incubation period. The eggs eyed-up at 500 Fahrenheit thermal units (FTUs). Just after eye-up, at about 530 FTUs, the eggs were shocked by dropping them from one container to another. The eggs were then picked and enumerated using a Jensorter Fish Egg Sorter with Counters Model JM4C. Any dead eggs were then hand picked and counted until hatch at 1,300 FTUs.

Sawtooth Fish Hatchery green eggs eyed up at an 83.7% rate, yielding 145,744 eyed eggs (Appendix H).

In addition to the BY03 Sawtooth eggs, the hatchery incubated 1,098,646 eyed Pahsimeroi stock summer Chinook eggs.

Early Rearing

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 46°F to 40°F (Appendix I).

All fry were started on BioOregon starter #2, and initially fed by hand. Feed amounts and sizes varied according to manufacturer recommendations as the fish grew (Appendix I.1). Automatic belt feeders were used once the fry exhibited a good feed response. All fish were fed a 28-day prophylactic treatment of BioOregon erythromycin medicated feed during part of May and June, at a rate of 2.25 grams active/100 lbs of fish for BKD prevention. The fish were transferred outside for final rearing in June. Fish averaged 66 fish per pound (fpp) and 3.52 inches in length when moved to the outside raceways.

Final Rearing

The Sawtooth spring Chinook were placed into one full raceway and one upper section of another. Initial densities were 0.04 lbs/cuft, and water flows were 660 gpm.

All outside fish were fed BioOregon grower feed. A second 28-day prophylactic BioOregon erythromycin medicated feed treatment was fed in September 2003 at a rate of 2.25 grams active per 100 lbs of fish, to prevent the onset of BKD.

The finish weight of the BY03 Sawtooth Chinook smolts was 7,093 lbs. The fish were fed 9,528 lbs of feed for a conversion of 1.3. A synopsis of feeding regimes can be found in Appendix I.1.

Fish Marking

Fish marking occurred May 24 to May 28, 2004. Fish were classified as listed reserve and had left ventral fin clips. 500 fish were pit tagged on February 22, 2005 (Appendix J, Appendix K).

Fish Distribution

Fish releases for Sawtooth stock BY03 smolts occurred on March 31, 2005. A total of 134,769 fish were released into the Salmon River at the Sawtooth Fish Hatchery weir. The fish were released in the evening through the outside raceway tailrace pipe. River water temperature was 50ºF at time of release. Production costs for BY03 smolts can be found in Appendix L.1.

PAHSIMEROI CHINOOK

Sawtooth Hatchery reared Pahsimeroi Hatchery's BY03 summer Chinook due to a lack of space and pathogen free water at Pahsimeroi Fish Hatchery. Nine lots of eyed eggs were brought to Sawtooth Hatchery between September 24 and October 23, 2003. A total of 1,188,646 eggs were incubated. Lots 6, 7, 8 and 9 swim up fry (297,743) were returned to

Pahsimeroi in January and early February 2004 due to limited rearing space and well water at SFH. From eyed egg to ponding after dead eggs and fry were picked off, survival was 94.4%.

The Pahsimeroi 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. All Pahsimeroi fish were moved to outside raceways by truck from February 9 through March 17, 2004 as weather permitted. The fish averaged 1.92 inches and 102 fpp at time of moving.

All of the fish were marked from May 18 to May 25, 2004 at SFH. A total of 79,542 reserve fish received an AD/CWT and 655,463 reserve fish received AD only.

On June 7 and 8, 2004 all Pahsimeroi fish were returned to Pahsimeroi Spawn Station rearing ponds. The resulting inventory number of 734,105 fish were returned. Total lbs of fish shipped was 10,339 for an average of 71 fpp. Total feed fed was 9,007 lbs for an overall conversion of .91.

SOCKEYE SALMON

Fish Production

According to numbers received from the Department's Eagle Fish Hatchery and the NMFS Burley Fish Hatchery, an estimated total of 200,005 eyed eggs were delivered to Sawtooth Fish Hatchery. According to Rodney Duke's marking inventory the estimated amount of eggs delivered to Sawtooth Fish Hatchery was 191,757. A total difference of 8,248 eggs. This summary is based on the marking inventory.

The eggs arrived in three separate shipments between November 19, 2003 and December 3, 2003. The eggs arrived with approximately 608 FTUs. Ponding began February 2, 2004, and ended March 16, 2004 with about 1900 FTUs. 187,462 fry were ponded into ten semi-square 17 ft^3 rearing tanks at 5 gpm and five 2 meter fiberglass tanks with water flows 10 gpm.

Eggs were hand picked three times weekly from eyed egg to ponding. A total of 4,295 dead eggs were removed before ponding. Total eyed egg to ponding survival was 97.7%.

All fry were started on #1 BioOregon BioDiet starter. Feed size was increased with accordance to BioOregon's recommendation with the exception that 20% of the feed was one size smaller to assure smaller fish would get adequate amounts of feed. The total amount of feed fed at Sawtooth for BY03 Sockeye was 3,350 lbs, with a 1.1 conversion.

All remaining feed was transferred back to Eagle Fish Hatchery.

As rearing densities reached 3 lbs/gpm, fish were transferred to cement vats with water flows at 100 gpm pathogen free well water.

Mortality was recorded daily from ponding to release. In total, 16,452 fish were lost to mortality for an 8.78% loss.

Ad-clipping and CWT marking started September 21, 2004 and ended September 24, 2004. PIT tagging by Sockeye Research occurred September 29 and 30 2004. In total 105,156 fish were Ad-clipped, 40,078 were AD/CWT, 25,776 fish received no clips, and 1,013 fish received PIT tags. At the time of release, fish averaged 42.7 fpp and had a condition factor of 2,986 $x10^{-7}$.

BY03 Sockeye Releases

Alturas Lake received 21,129 AD only clipped, 1,003 AD/PIT @ 36 fpp on October 6, 2003.

Pettit Lake received 29,700 Ad clipped fish @ 42.37 fpp on October 6, 2003, including 1,013 PIT tagged fish.

Redfish Lake received 79,887 Ad clipped fish @ 41.15 fpp on October 6, 2003 including 1,003 PIT tagged fish.

All sockeye released were transferred by barge and released into the lake.

The remaining 40,078 fish were transferred to outside small raceways at Sawtooth and reared as an overwinter group to be released the following spring.

2004 STEELHEAD

ABSTRACT

The Sawtooth Fish Hatchery trap and weir were put into operation on March 15, 2004 and closed April 29, 2004. A total of 2,424 adult steelhead *Oncorhynchus mykiss* (1,492 males and 932 females) were trapped at the Sawtooth Fish Hatchery weir. Surplus hatchery adults were given to the Idaho Food Bank, and the Rupert Food Bank; released downstream at Torry's Hole and the Yankee Fork, and released upstream at Beaver Creek as part of Steelhead Supplementation Studies (SSS). A total of 18 unmarked fish (11 males/7 females) were released above the weir. There were no pre-spawning mortalities at Sawtooth Fish Hatchery.

Spawning began at Sawtooth Fish Hatchery on March 26, 2004 and continued through April 29, 2004 with 11 spawning days. A total of 576 females were spawned with 576 males, yielding 2,639,117 green eggs for an average fecundity of 4,582 eggs per female. These green eggs yielded 2,251,142 eyed eggs for an eye-up percentage of 85.3%.

The East Fork Salmon River (EFSR) trap and velocity barrier were put into operation March 29, 2004, and ran through April 25, 2004. A total of 27 adult East Fork steelhead were trapped for the Natural Steelhead Program. This included 19 males and 8 females. Fish released above the weir to spawn naturally included 5 unmarked males and 2 unmarked females. There was no prespawning mortality

East Fork spawning operations began on April 9, 2004, and continued through April 13, 2003. A total of 6 unmarked EFSR females were spawned with 10 males over 2 spawn dates, yielding 26,405 green eggs for an average fecundity of 4,400 eggs per female. These green eggs yielded 15,918 eyed eggs for a 60.2% eye-up rate. These eggs were shipped to Magic Valley Hatchery for final incubation and rearing.

The Squaw Creek Trap and weir was installed on March 23, 2004, and ran through April 26, 2004. A total of 24 adult "B-run" adults (5 males and 19 females) and 66 "A-run" adults (51 males and 15 females) were trapped. All marked B-run adults were transferred to the East Fork trapping facility for pre-spawn holding. All unmarked and A-run fish were released upstream of the Squaw Creek weir for volitional spawning.

Squaw Creek Trap spawning operations ran from April 6 through April 27, 2004 over 7 spawn dates. All spawning was conducted at the East Fork Salmon River trap/spawn facility, with spawn activities from the 19 females yielding a total of 120,105 green eggs for a mean fecundity of 6,321 eggs per female. These green eggs yielded 54,337 eyed eggs or a 45.2% eye-up rate. These eggs were shipped to Magic Valley Hatchery for final incubation and rearing.

There were 1,519,183 green eggs from Pahsimeroi Hatchery incubated at Sawtooth in 2004. These eggs eyed up at a 71.1% rate, yielding 1,080,870 eyed eggs.

The Sawtooth and East Fork stock eyed eggs were released as smolts by their respective rearing hatcheries during the spring of 2004. Hagerman National Fish Hatchery (HNFH) stocked direct release smolts (4.3 fpp) at the Sawtooth Fish Hatchery weir. The HNFH stocked Sawtooth stock smolts into the Yankee Fork of the Salmon River and into the Lemhi River as well. Magic Valley Fish Hatchery (MVFH) stocked East Fork stock smolts at 4.1 fpp were mixed with Dworshak smolts and released into Squaw Creek Pond. MVFH stocked Sawtooth stock smolts into the Yankee Fork and into Valley Creek and Upper Salmon River B or Squaw Pond stock smolts back into Squaw Pond.

FISH PRODUCTION

Steelhead Adult Collection

Sawtooth Trap

In On March 15, 2004, the Sawtooth Fish Hatchery adult steelhead *Oncorhynchus mykiss,* weir on the Main Salmon River was installed, with the adult trap operating from March 24 through April 29. A total of 2,424 adult "A-run" steelhead were trapped in 2004, 2,406 of which (1,481 males / 925 females) were marked (hatchery-produced) fish and 18 (11 males / 7 females) were unmarked (natural origin).

Distribution of the 2,406 marked adults ranged from spawn-related activities to charitable giveaways and included:

1) 165 surplus adults donated to charitable organizations (Idaho Falls Food Bank and Rupert Food Bank),
2) 1,606 adults ponded for spawn-related activities (eventually given to the public on spawn days),
3) 175 adult males were transported downstream and released at Torry's Hole on the Main Salmon River to recycle through the fishery,
4) 400 adults (200 pair male/female) outplanted to the Yankee Fork of the Salmon River for Shoshone-Bannock Tribe natural production,
5) 60 adults (30 pair male/female) to Beaver Creek,

All returning unmarked adults (18) were released upstream of the Hatchery for natural spawning

Age class, gender, length frequency and run timing data for returning Sawtooth adults (hatchery and natural origin) is provided in Appendix M, N.

East Fork Salmon River Natural Steelhead

In 2004, the velocity barrier on the East Fork of the Salmon River (EFSR) was put into operation on March 29, with trapping operations initiated on March 29 and continuing through April 25. A total of 27 adult steelhead were trapped for the Natural Steelhead Program, of which 4 (all males) were marked fish and 23 (15 males / 8 females) were unmarked.

Of the 23 unmarked fish trapped, 10 unmarked males and 6 unmarked females contributed to "natural" spawn crosses, and 7 unmarked adults (5 males / 2 female) were released above the weir for natural spawning.

Age class, gender, length frequency and run timing data for returning EFSR adults (hatchery and natural origin) is provided in Appendix O, P.

Squaw Creek Trap

A weir and trap were installed on Squaw Creek 200 meters upstream of the confluence of the Salmon River on March 23, 2004. Adult steelhead trapping continued through April 26, at which time weir pickets were pulled and the trap was taken out of operation. A total of 24 adult "B-run" steelhead were trapped (5 males / 19 females), of which all 24 were marked. All marked adults were transferred to the East Fork trapping facility for pre-spawn holding.

In addition to "B-run" adults, 66 "A-run" adults were trapped (51 males / 15 females) and later released.

Age class, gender, length frequency and run timing data for returning Squaw Creek adults (hatchery and natural origin) is provided in Appendix Q, R.

Spawning Operations

Sawtooth Trap

Sawtooth Fish Hatchery spawning operations ran from March 26 through April 29, 2004. A total of 576 females were crossed with 576 males over 11 spawning days to produce 2,639,117 green eggs and a mean fecundity of 4,582 eggs per female. Total green egg take yielded 2,251,142-eyed eggs for a percent survival to the eyed-stage of development average of 85.3% .

Eyed egg transfers to Magic Valley Steelhead Hatchery and Hagerman National Fish Hatchery totaled 507,081 and 950,033-eyed eggs, respectively. 360,886 eggs were made available to biologists from the Shoshone-Bannock Tribe. Eyed egg transfer totaled 1,818,000. All unwanted or remaining eggs were culled as development progressed beyond the window of transport safety, as determined by temperature-unit accumulation. (Table 5)

East Fork Salmon River Trap

A total of 6 unmarked East Fork Natural females and 10 unmarked East Fork Natural males were retained for natural-production spawn crosses in 2004, with spawning operations occurring from April 9 through April 13 (2 spawn dates). Spawning activities from the 6 naturally produced females yielded a total of 26,405 green eggs for a mean fecundity of 4,400 eggs per female. A total of 15,918-eyed eggs were obtained from natural-production crosses, for a percent survival to the eyed-stage of development average of 60.2% (Table 2).

All eyed eggs (15,918) produced from EFSR natural crosses were transferred to the Magic Valley Steelhead Hatchery for final incubation and rearing (Table 5).

Squaw Creek Trap

A total of 19 marked "B-run" females and 5 marked "B-run" males were retained for hatchery-production spawn crosses in 2004, with spawning operations occurring from April 6 through April 27 (7 spawn dates). All spawning was conducted at the East Fork Salmon River trap/spawn facility, with spawn activities from the 19 females yielding a total of 120,105 green eggs for a mean fecundity of 6,321 eggs per female. A total of 54,337-eyed eggs were obtained from hatchery-production crosses, for a percent survival to the eyed-stage of development average of 45.2% (Table 3). Males used in hatchery-production crosses included the 5 returning marked males from the Squaw Creek trap.

All eyed eggs (54,337) produced from East Fork/Squaw Creek "B-run" hatchery crosses were transferred to the Magic Valley Steelhead Hatchery for final incubation and rearing (Table 5).

Pahsimeroi Stock Egg Incubation

As in past years, Sawtooth Fish Hatchery incubates a portion of the Pahsimeroi Fish Hatchery egg take. Incubating eggs at Sawtooth takes advantage of cooler wellwater temperatures to slow development of the eggs. All egg shipments are transferred as "green" eggs, with eggs transported in perforated egg-tubes and insulated coolers.

In 2004, a total of 1,080,870 green eggs were transferred to Sawtooth from a total of 306 females (4,965 mean fecundity). Total egg transfers yielded 1,519,183-eyed eggs, for a percent survival to the eyed-stage of development average of 71.1%. All Pahsimeroi eggs incubated at Sawtooth were destined for Hagerman National Fish Hatchery (HNFH) and Magic Valley Fish Hatchery (MVFH) to satisfy production requests. A total of 212,000-eyed eggs were transferred to HNFH and 822,473-eyed eggs were sent to MVFH with all remaining eggs (46,397) culled after production requests had been met. (Table 5)

Adult Treatments

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

Prespawning Mortality

There were no female pre-spawning mortalities at Sawtooth in 2003.

Incubation

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 40°F at the beginning of incubation to 44°F 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 a height of about three feet. 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 of well water. Then the cooler was strapped shut and shipped.

Release of BY 03

Due to a large Chinook salmon egg take in 2003, no rearing space was available for acclimation of steelhead smolts. Hagerman NFH released BY03 steelhead smolts directly below the Sawtooth FH weir into the Salmon River. The total BY03 smolt release was 756,607 fish at 4.3 fpp.

Fish Marking

Fish marking was completed in the rearing hatcheries and is available from individual rearing facility reports.

CONCLUSIONS/RECOMMENDATIONS

Sawtooth Fish Hatchery

Due to limited well water, only the number of green eggs required to meet the eyed egg goal should be collected.

APPENDICES

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

Brood Year	Release Year	Number Released	Adult Returns [a] 3-year	4-year	5-year	Total Returns	%
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	1,185,060	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	133	308	.092
1994	1996	25,006	10	33	39	82	.032
1995	1997	4,756	4	78	110	192	4.0
1996	1998	43,161	79	500	212	791	1.83
1997	1999	223,240	376	1,664	730	2,770	1.24
1998	2000	123,425	227	958	521	1,706	1.38
1999	2001	57,134	98193	83	374	.65	
2000	2002	385,761	522	1,281	175	1,978	.50
2001	2003	1,105,169	654	1182	(2006)		
2002	2004	821,415	204	(2006)	(2007)		
2003	2005	134,812	(2006)	(2007)	(2008)		

Appendix A. Continued.

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

Brood Year	Release Year	Number Released	Adult Returns [a] 3-year	4-year	5-year	Total Returns	%
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

No Trapping Operations 1998-2003 For Chinook

[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 reserve Chinook smolts released were marked.
(See individual brood year reports for specific mark types)

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

Hatchery Adult Returns

Brood Year	Release Year	Number Released	Adult Returns [a] 3-year	4-year	5-year	Total Returns	%
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	3	7	.028
1995	1997	4,756	0	12	37	49	1.03
1996	1998	43,161	60	135	32	227	0.53
1997	1999	223,240	279	1,219	327	1,825	0.82
1998	2000	123,425	176	531	131	838	0.68
1999	2001	57,134	65	91	73	229	0.40
2000	2002	385,761	476	926	175	1,577	0.41
2001	2003	1,105,169	407	1182	(2006)	-	inc
2002	2004	821,415	204	(2006)	(2007)	-	inc
2003	2005	134,769					

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

Brood Year	Release Year	Number Released	Adult Returns [a] 3-year	4-year	5-year	Total Returns	%
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

[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.

	2002	1999	1996	1993	1985
Nutrients (mg/L)					
T. Ammonia as N	<0.01	0.02	0.027	0.043	0.045
T. NO2 + NO3 as N	NR	NR	0.006	0.073	0.088
T. Kjeldahl Nitrogen as N	<0.10	<0.10	0.20	<.05	0.26
T. Phosphorus as P	0.010	0.005	<.05	<.05	0.02
Ortho Phosphate as P	0.009	<0.005	NR	0.019	<.003
Minerals (mg/L)					
Sp. Conductance (umhos/cm)	168.0	159.0	167.0	157.0	135.0
Hardness as CaCO3	78.0	75.7	80.0	68.0	62.0
T. Alkalinity as CaCO3	77.5	75.2	79	74	63
Bicarbonate Alk. as CaCO3	77.5	75.2	79	74	63
Calcium	27.9	26.8	27.4	24	20.8
Magnesium	1.93	2.1	2.9	1.9	1.8
Sodium	4.69	4.26	5.5	7.0	3.8
Potassium	0.53	0.48	0.7	0.7	<1
Fluoride	0.83	0.60	0.29	0.85	0.58
Sulphate as SO4	5.23	5.50	12	5	<6
Total Metals (ug/L)					
Arsenic, Total	<0.003	<0.005	<10	<10	<10
Boron, Total	0.01	NR	<10	<80	1
Cadmium, Total	<0.0005	<0.0005	<1	<1	<1
Chromium, +6	NR	NR	NR	<10	<50
Chromium, Total	<0.002	<0.002	<2	<10	<50
Copper, Total	<0.01	<0.01	<10	<10	<10
Iron, Total	0.03	0.02	20	20	120
Lead, Total	0.004	<0.002	<5	<5	<50
Manganese, Total	<0.01	<0.01	1	<10	10
Mercury, Total	<0.0002	<0.0002	<.5	<.5	<.5
Nickel, Total	<0.003	<0.003	<5	<10	<50
Silver, Total	<0.002	<0.002	<1	<1	<1
Zinc, Total	0.002	<0.001	3	<2	<1
Miscellaneous					
Turbidity (NTU)	0.36	0.98	0.45	<1	1.8
pH (SU)	7.94	7.97	8.04	8.0	8.1
Total Cyanide (mg/L)	<0.005	<0.005	<.005	<.005	<.005
Total Residue	NR	NR	NR	NR	97

Appendix B. (Continued). Sawtooth Fish Hatchery Water Quality Analysis of Well 1 & 2 Mix

	2002	1999
Nutrients (mg/L)		
Ammonia as N	<0.01	0.02
T. Phosphorus as P	0.012	7.60
Minerals (mg/L)		
Hardness	81.0	81.3
Alkalinity	79.0	85.7
Bicarbonate Alk. as CaCO3	79.0	85.7
Total Metals (ug/L)		
Arsenic	0.005	<0.005
Cadmium	<0.0005	<0.0005
Chloride	0.72	0.56
Cobalt	<0.01	<0.01
Copper	<0.01	<0.01
Lead	<0.002	<0.002
Mercury	<0.0002	<0.0002
Selenium	0.013	<0.005
Miscellaneous		
T. Cyanide (mg/L)	<0.005	<0.005

Appendix C. Sawtooth Fish Hatchery Results of Disease Sampling.(only positive results are listed)

BY03 Juvenile Chinook

Case #	Stock	Date	Data
05-052	Saw	03/02/03	VIRO 0/20, DFAT 0/20,PTD-MYXOB 0/20, RS 4/4
04-297 CWD	Saw	07/27/03	IHN 0/10, IPN 1/10, BKD 0/10, FUD 0/10, ERM 0/10, 0/10, MAS 5/10

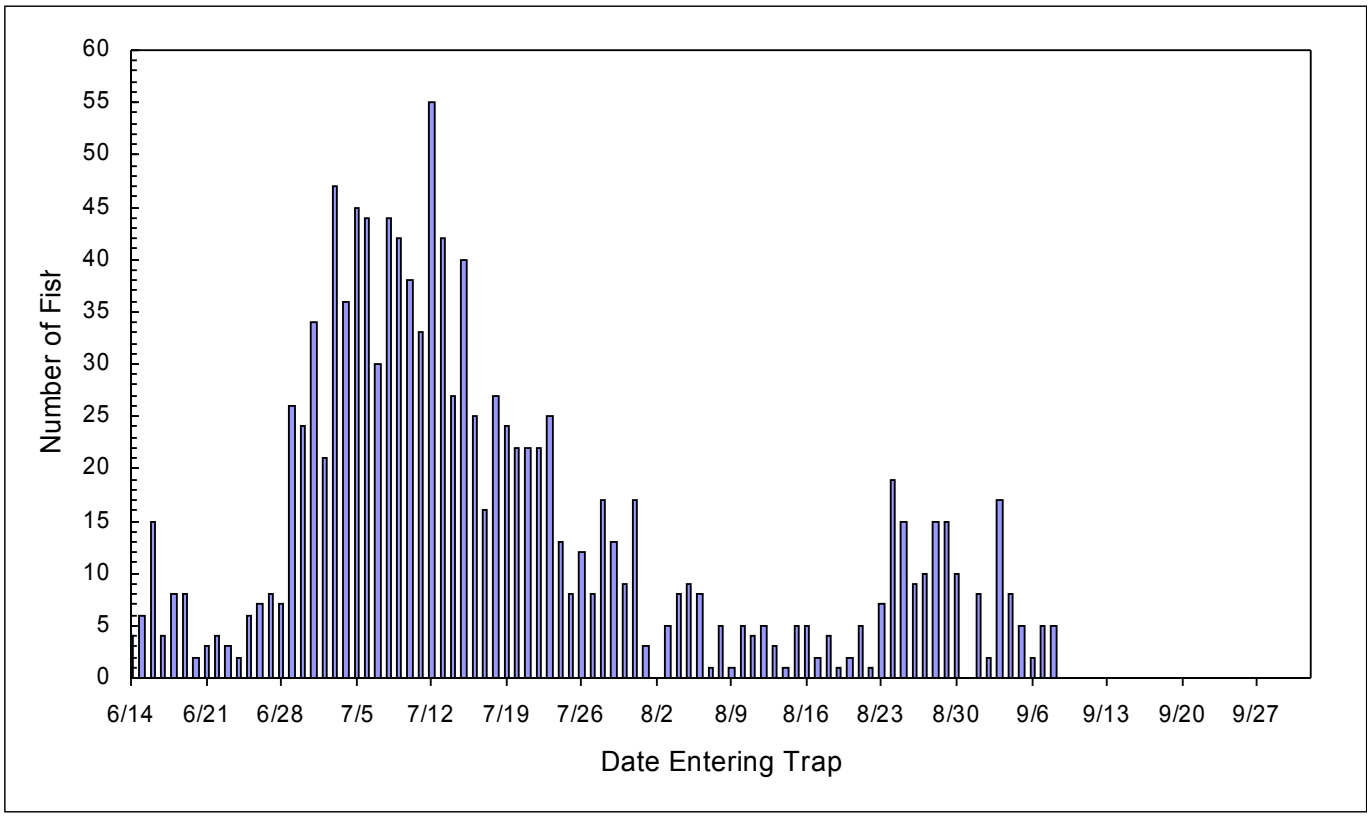
Return Year 2003 Chinook Broodstock Including South Fork Chinook

Case #	Stock	Date	Data
03-262	Saw	08/14/03	RS; IHN 0/2,IPN 0/2, BKD 1/1,
03-293	Saw	08/25/03	RS; IHN 0/10,IPN 0/10, BKD 1/4,
03-329	Saw	08/28/03	RS; IHN 0/20,IPN 0/20, BKD 6/10,
03-331	Saw	09/02/03	RS; IHN 0/6,IPN 0/6, BKD 1/4,
03-346	Saw	09/05/03	RS; IHN 0/18, IPN 0/18, NAVHS 0/2, BKD 3/7, WHD 4/31

Return year 2004 Steelhead Broodstock

Case #	Stock	Date	Data
04-202	Saw-A	04/12/05	RS; ELISA 27/54 (LOW 27), PTD-MYXOBOLUS CEREBRALIS 1/9
04-203	EF-B	04/12/05	RD; ELISA 1/5 (LOW 1), PTD-WHD 0/6
04-204	SC-B	04/16/05	RS; WHD; ELISA 12/19, PTD-WHD 1/20

Appendix D. Sawtooth Fish Hatchery Spring Chinook Run Timing – 2003.



Appendix E. Sawtooth Fish Hatchery Age Class Totals from All Trapped Chinook, Return Year 2003.

Sawtooth	Length (Fk)	Year class	Number
Males	≤ 64 cm	3-year old	522
	64-82 cm	4-year old	92
	> 82 cm	5-year old	207
Subtotal			**821**
Females	≤ 64 cm	3-year old	0
	64-82 cm	4-year old	101
	> 82 cm	5-year old	314
Subtotal			**415**
Total			**1236**

Appendix E.1. No Appendix E.1 Available Due to Software Modifications.

Appendix F. Sawtooth Fish Hatchery Age Class Breakdown by Released Chinook, Return Year 2003.

Sawtooth	Length (Fk)	Age Class	Number
Males	≤ 64 cm	3-year old	84
	64-82 cm	4-year old	83
	> 82 cm	5-year old	185
Total Males			**352**
Females	≤ 82 cm	4-year old	86
	> 82 cm	5-year old	293
Total Females			**379**
Total released			**731**

Appendix G. Sawtooth Fish Hatchery Spring Chinook Spawning Matrix, 2003 return year.

Group	Sex	Number in Group
All Fish Combined	Male	54 (25 jacks)
	Female	33

Appendix H. Survival Table for Chinook (BY03) and Steelhead (BY04) from Green Eggs to Released Smolts, at Sawtooth Fish Hatchery and East Fork Sites.

CHINOOK

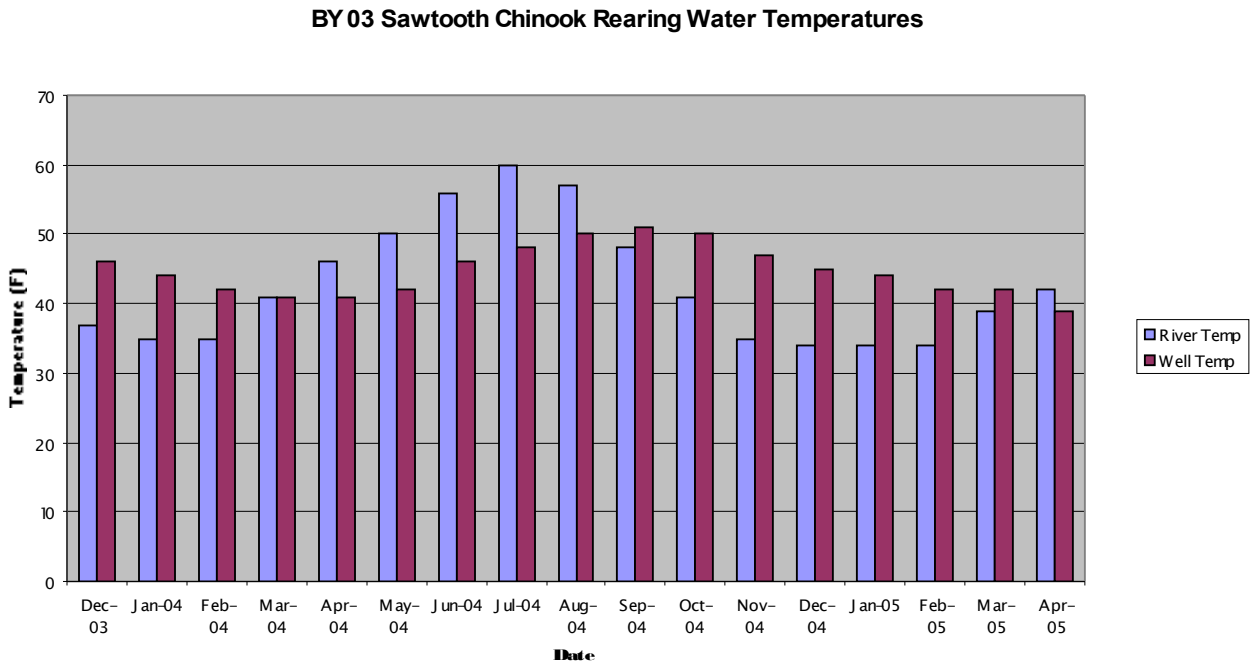
	Green Egg Number Number	Eyed Egg Number	Percent Survival	Released Smolts	Survival From Green Eggs
Sawtooth Fish Hatchery	174,575	145,744	83.5	134,812	77.2

STEELHEAD

	Green egg Number	Eyed Egg Number	Percent Survival	
Sawtooth Fish Hatchery				Distributed as Follows:
	2,639,117	2,251,142	85.3	950,033 Hagerman NFH 360,886 Shoshone-Bannock Streamside Incubators 507,081 Magic Valley FH 433,143 culled
East Fork eggs				Distributed as Follows:
	26,405	15,918	60.2	15,918 to Magic Valley FH
Squaw Creek eggs				Distributed as Follows:
	120,105	54,337	45.2	54,337 to Magic Valley FH
Pahsimeroi FH eggs				Distributed as Follows:
	1,519,183	1,080,870	71.1	212,000 to Hagerman NFH 822,473 to Magic Valley FH 46,397 culled

All steelhead raised at other hatcheries.

Appendix I. Rearing Water Monthly Average Temperatures, BY03 Spring Chinook at Sawtooth Fish Hatchery.



Appendix I.1. Feed Schedule for Sawtooth/ Pahsimeroi Spring Chinook, BY03.

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

Appendix J. Summary of Marked Spring Chinook Released, Brood Year 2003.

Mark	Number Released	Location
Sawtooth Fish Hatchery Stock		
LV only	134,769 (Reserve)	SFH Weir (3/31/05)
Total Release (PIT)	**134,769(500)**	
Pahsimeroi Stock		
Adipose Clip	655,463(Reserve)	
AdClip/CWT	79,542(Reserve)	
All 734,105 transferred to Pahsimeroi FH June 7 and 8, 2004		

Appendix K. Summary of Sawtooth Fish Hatchery Spring Chinook Smolt Releases, Brood Year 2003

Raceway	Number	Tag Code	Fish per Pound	Pounds	Designation
L1	65,435		19	3444	Reserve
L2A	41,494		20	2075	Reserve
L2B	27,840		18	1547	Reserve
Total			**134,769**		**19**
			7093		

Appendix L. Sawtooth Fish Hatchery Summary of BY04 Steelhead Smolt Releases and Marks.

Date	Stock	Plant Site	Number Released	Mark	CWT	PIT	Rearing Hatchery
4/11-15/05	Sawtooth A	Sawtooth Weir	214,707	AD	88,408	294	Hagerman National
4/18/2005	Sawtooth A	Sawtooth Weir	121,085	AD	---	---	Hagerman National
5/4-5/05	Sawtooth A	Yankee Fork	29,870	---	---	299	Hagerman National
4/26/2005	Sawtooth A	Yankee Fork	30,451	AD	---	297	Magic Valley
4/26/2005	Sawtooth A	Yankee Fork	160,000	AD	---	27,269	Magic Valley
4/26/2005	Sawtooth A	Valley Creek	30,100	---	---	298	Magic Valley
4/14/2005	Sawtooth A	Tunnel Rock	53,926	AD	---	---	Magic Valley
4/13-14/05	Sawtooth A	McNabb Point	105,388	AD	28,845	300	Magic Valley
		TOTALS	745,527		117,253	28,757	

Date	Stock	Plant Site	Number Released	Mark	CWT	PIT	Rearing Hatchery
5/2,3,10/05	Dworshak B	East Fork Salmon River	100,150	AD	---	271	Hagerman National
4/4/2005	Dworshak B	Squaw Creek Acclimation Pond	51,660	AD	51,660	500	Magic Valley
4/18-22/05	Dworshak B	Squaw Creek Direct Release	244,237	100% AD, 26,682 AD/RV	---	499	Magic Valley
4/15-21/05	Dworshak B	East Fork Salmon River (lower)	236,818	AD	---	---	Magic Valley
		TOTALS	632,865		51,660	1,270	
4/22/2005	Natural B	East Fork Salmon River (above E.F. weir)	11,116	---	11,116	---	Magic Valley
4/4/2005	USB	Squaw Creek Acclimation Pond	35,448	AD	35,448	900	Magic Valley
		TOTAL STEELHEAD SMOLT RELEASE	**1,424,956**		**215,477**	**30,927**	

** number PIT tagged available from IDFG, marking supervisor

Appendix L.1. Sawtooth Fish Hatchery Production Cost Table (Includes Chinook BY03,Steelhead BY04, and Sockeye BY03).

Chinook BY 03

Smolt Number	Lbs. Feed	Cost Feed	Lbs of Smolts	Total Cost	Cost per 1,000	Cost per lb.
Sawtooth						
134,769	13,772	$16,079	7,093	$252,000	$1,870	$35.53
Pahsimeroi						
734,105	9,007	$0*	10,340**	$84,000	$114	$8.12
East Fork						
No BY02 East Fork spring Chinook salmon were reared.						

Steelhead BY 04

Stock	Green Eggs	Eyed Eggs	Total Cost	..... Cost per 1,000 eyed eggs
Sawtooth	2,639,117	2,251,142	$109,200	$45.51
Squaw Cr/EF	146,510	70,255	$42,000	$239.12
Pahsimeroi	1,519,183	1,080,870	$16,800	$15.54
Totals	4,304,810	3,402,267	$168,000	$303.17

Sockeye BY 03

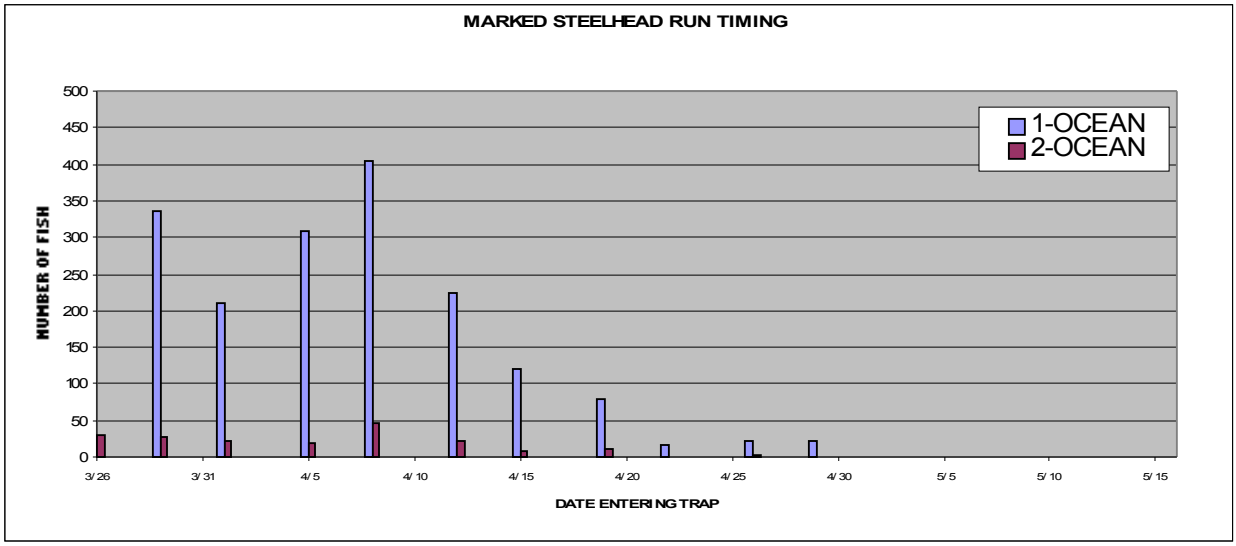
Smolt Number	Lbs Smolts	Total Cost	Cost per 1,000	Cost per lb.
168,770	4,127	$33,600	$199.09	$8.14

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

* PFH purchased feed
** presmolts

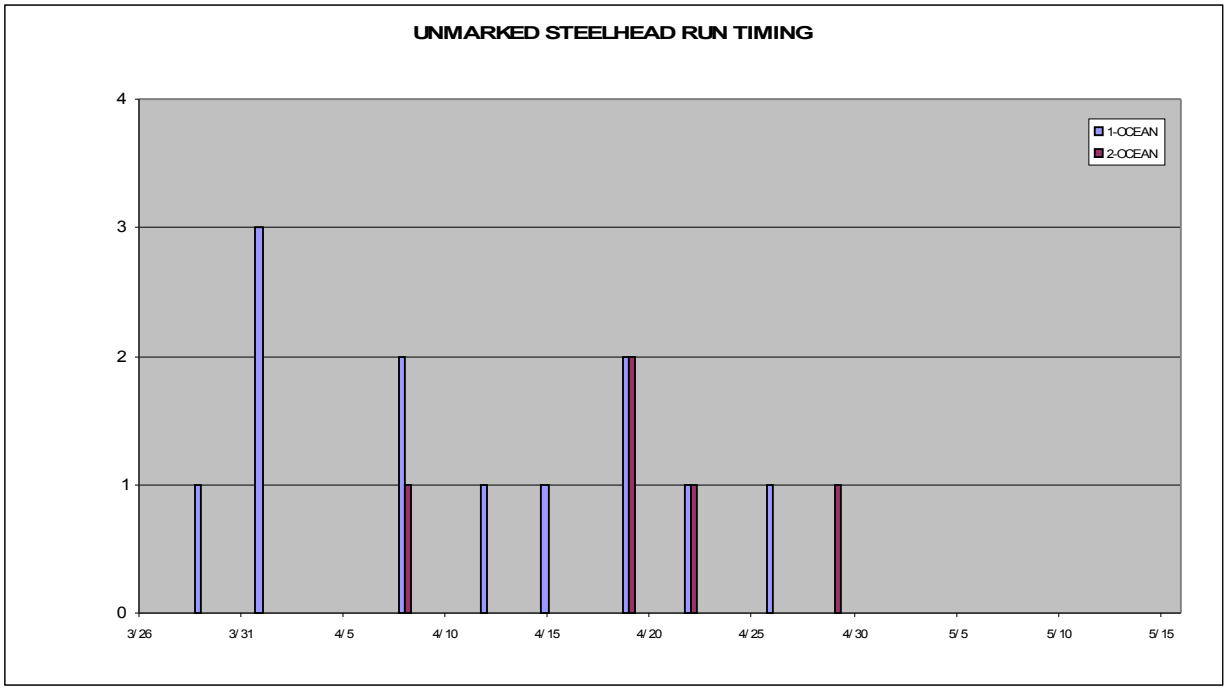
Appendix M. Run Timing for Steelhead, Return Year 2004, Sawtooth trap.

2004 SAWTOOTH FISH HATCHERY STEELHEAD RUN TIMING MARKED STEELHEAD



Appendix M. Continued.

2004 SAWTOOTH FISH HATCHERY STEELHEAD RUN TIMING
UNMARKED STEELHEAD



Appendix N. Sawtooth Fish Hatchery Steelhead Length Frequency Distribution and Age Return Year Breakdown.

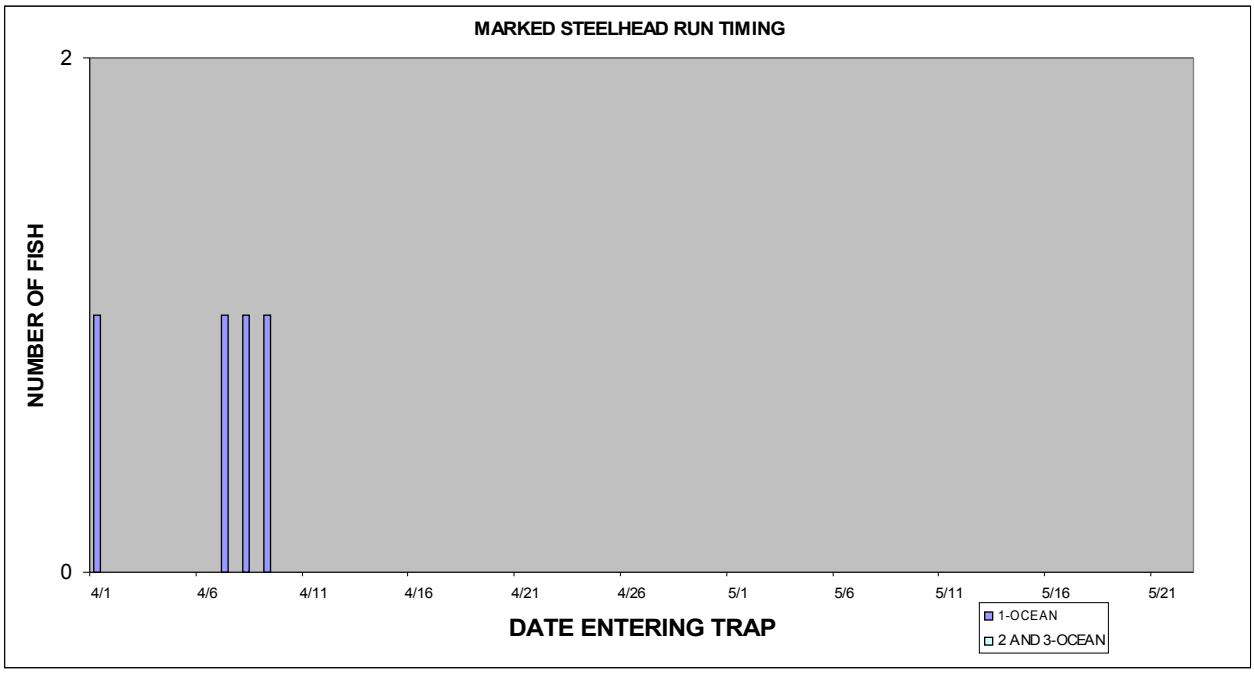
FK.LN (cms)	MARKED (RELEASED) Male	Fem	UNMARKED (ADIPOSE CLIPS) Male	Fem	MARKED (OTHER MARKS) Male	Fem	FK.LN (in)
50	0	0	4	1	1	0	19.7
51	1	0	10	6	0	0	20.1
52	0	0	7	10	0	0	20.5
53	0	0	15	19	2	1	20.9
54	0	0	55	44	1	4	21.3
55	0	1	81	55	3	5	21.7
56	0	0	107	96	7	5	22.0
57	1	0	161	129	12	10	22.4
58	1	0	177	125	16	5	22.8
59	2	0	214	94	9	5	23.2
60	2	0	191	78	6	3	23.6
61	1	2	143	38	14	0	24.0
62	0	0	88	25	6	1	24.4
63	0	0	51	13	1	2	24.8
64	0	0	18	4	0	1	25.2
65	0	0	10	12	2	0	25.6
66	2	0	5	12	0	2	26.0
67	0	1	6	19	1	2	26.4
68	0	0	6	23	0	0	26.8
69	0	1	3	13	0	0	27.2
70	0	1	4	27	0	1	27.6
71	0	0	7	12	0	0	28.0
72	0	1	10	5	0	0	28.3
73	0	0	11	9	0	0	28.7
74	0	0	5	8	0	0	29.1
75	0	0	5	1	0	0	29.5
76	0	0	2	0	0	0	29.9
77	0	0	2	0	0	0	30.3
78	0	0	1	0	0	0	30.7
79	0	0	1	0	0	0	31.1
80	1	0	0	0	0	0	31.5
81	0	0	0	0	0	0	31.9
82	0	0	0	0	0	0	32.3
83	0	0	0	0	0	0	32.7
84	0	0	0	0	0	0	33.1
85	0	0	0	0	0	0	33.5
TOTALS	11	7	1,400	878	81	47	**AVERAGE** 26.6

Appendix N. Continued.

AGE-CLASS OF ADULTS	MALES		FEMALES		TOTAL	
	No.	%	No.	%	No.	%
MARKED 1-OCEANS	1424	96.2	791	85.5	2215	92.1
MARKED 2-OCEANS	57	3.8	134	14.5	191	7.9
UNMARKED 1-OCEANS	10	90.9	3	42.9	13	72.2
UNMARKED 2-OCEANS	1	9.1	4	57.1	5	27.8
TOTAL 1-OCEANS	1434	96.1	794	85.2	2228	91.9
TOTAL 2-OCEANS	58	3.9	138	14.8	196	8.1

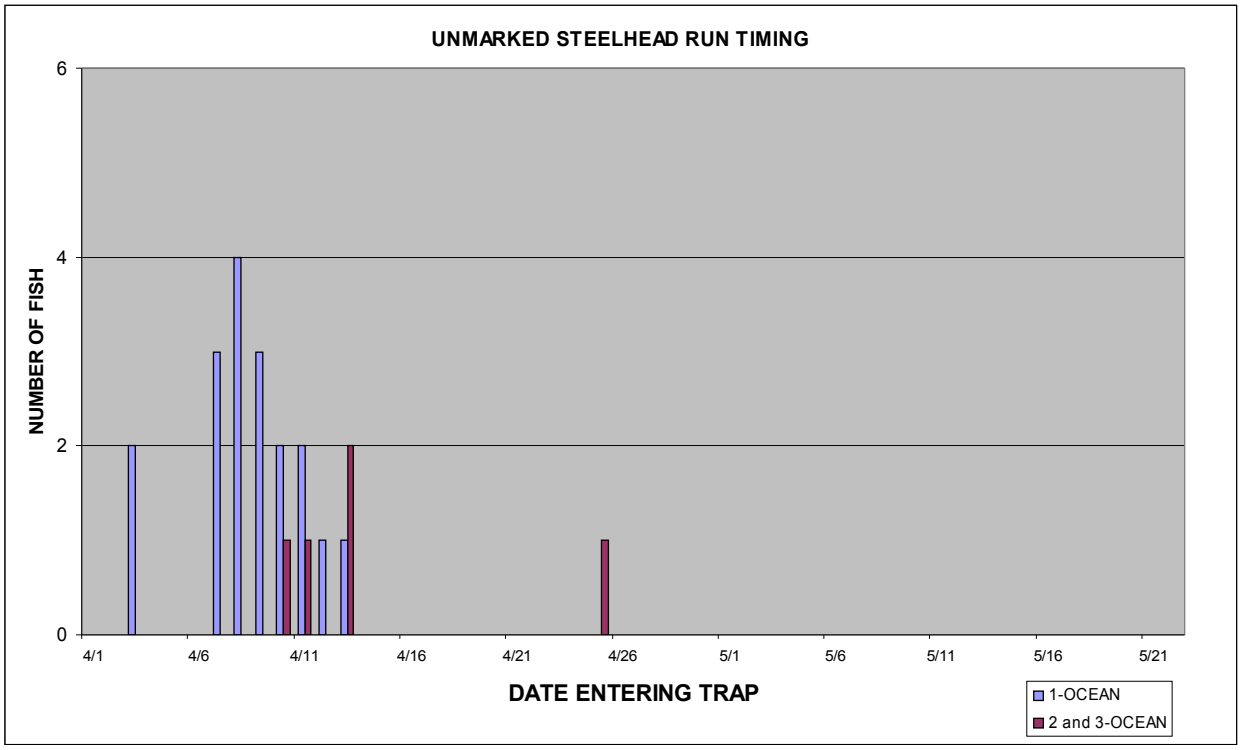
Appendix O. Run Timing for Steelhead, Return Year 2004, East Fork Trap.

2004 EAST FORK STEELHEAD RUN TIMING
MARKED STEELHEAD



Appendix O. Continued.

2004 EAST FORK STEELHEAD RUN TIMING
UNMARKED STEELHEAD



Appendix P. East Fork Trap Length Frequency Distribution. Return Year 2004.

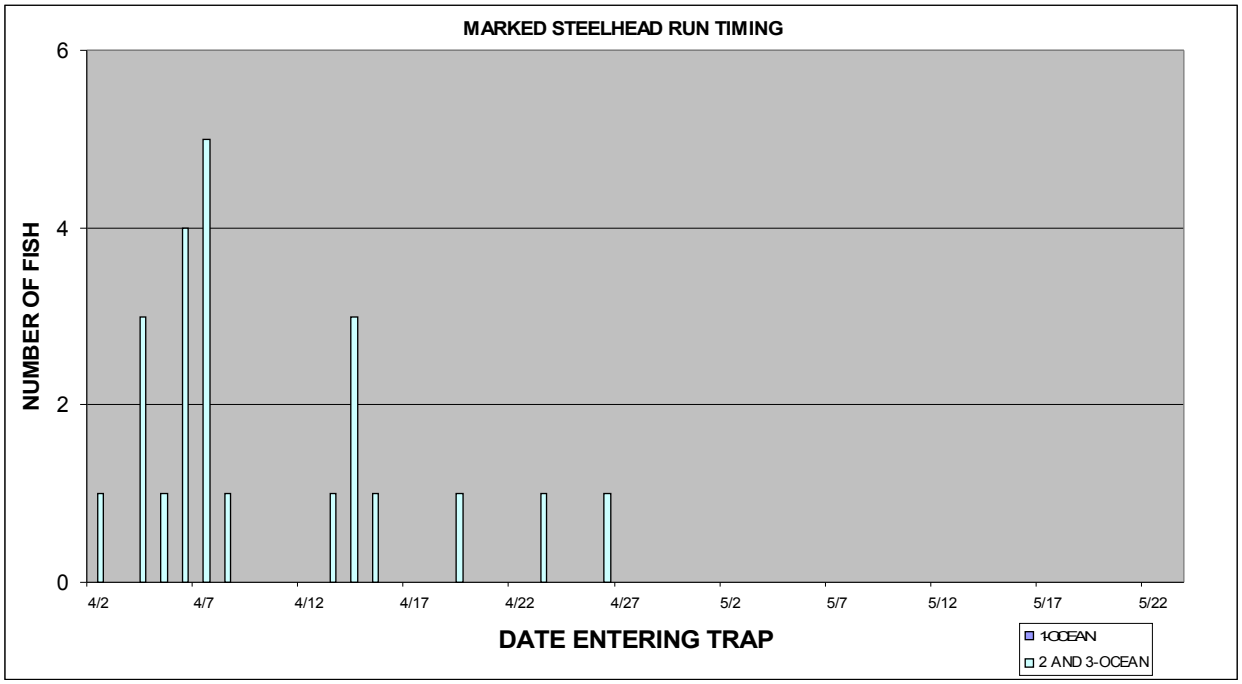
FK.LN (cms)	UNMARKED (RELEASED) Male	Fem	MARKED (ADIPOSE CLIPS) Male	Fem	MARKED (OTHER MARKS) Male	Fem	FK.LN (in)
50	0	0	0	0	0	0	19.7
51	0	0	0	0	0	0	20.1
52	0	0	0	0	0	0	20.5
53	1	0	0	0	0	0	20.9
54	0	0	0	0	0	0	21.3
55	0	0	0	0	0	0	21.7
56	0	0	1	0	0	0	22.0
57	0	0	0	0	0	0	22.4
58	1	0	0	0	0	0	22.8
59	3	0	2	0	0	0	23.2
60	1	0	0	0	0	0	23.6
61	1	0	1	0	0	0	24.0
62	3	1	0	0	0	0	24.4
63	0	0	0	0	0	0	24.8
64	1	1	0	0	0	0	25.2
65	1	0	0	0	0	0	25.6
66	1	1	0	0	0	0	26.0
67	0	0	0	0	0	0	26.4
68	2	0	0	0	0	0	26.8
69	0	0	0	0	0	0	27.2
70	0	0	0	0	0	0	27.6
71	0	0	0	0	0	0	28.0
72	0	0	0	0	0	0	28.3
73	0	0	0	0	0	0	28.7
74	0	1	0	0	0	0	29.1
75	0	0	0	0	0	0	29.5
76	0	1	0	0	0	0	29.9
77	0	0	0	0	0	0	30.3
78	0	1	0	0	0	0	30.7
79	0	0	0	0	0	0	31.1
80	0	1	0	0	0	0	31.5
81	0	1	0	0	0	0	31.9
82	0	0	0	0	0	0	32.3
83	0	0	0	0	0	0	32.7
84	0	0	0	0	0	0	33.1
85	0	0	0	0	0	0	33.5
TOTALS	15	8	4	0	0	0	Average 26.6

AGE-CLASS OF ADULTS	MALES		FEMALES		TOTAL	
	No.	%	No.	%	No.	%
MARKED 1-OCEANS	4	100.0	0	0.0	4	100.0
UNMARKED 2 and 3-OCEANS	0	0.0	0	0.0	0	0.0
MARKED 1-OCEANS	15	100.0	3	37.5	18	78.3
UNMARKED 2 AND 3-OCEANS	0	0.0	5	62.5	5	21.7
TOTAL 1-OCEANS	19	100.0	3	37.5	22	81.5

TOTAL 2 and 3-OCEANS	0	0.0	5	62.5	5	18.5

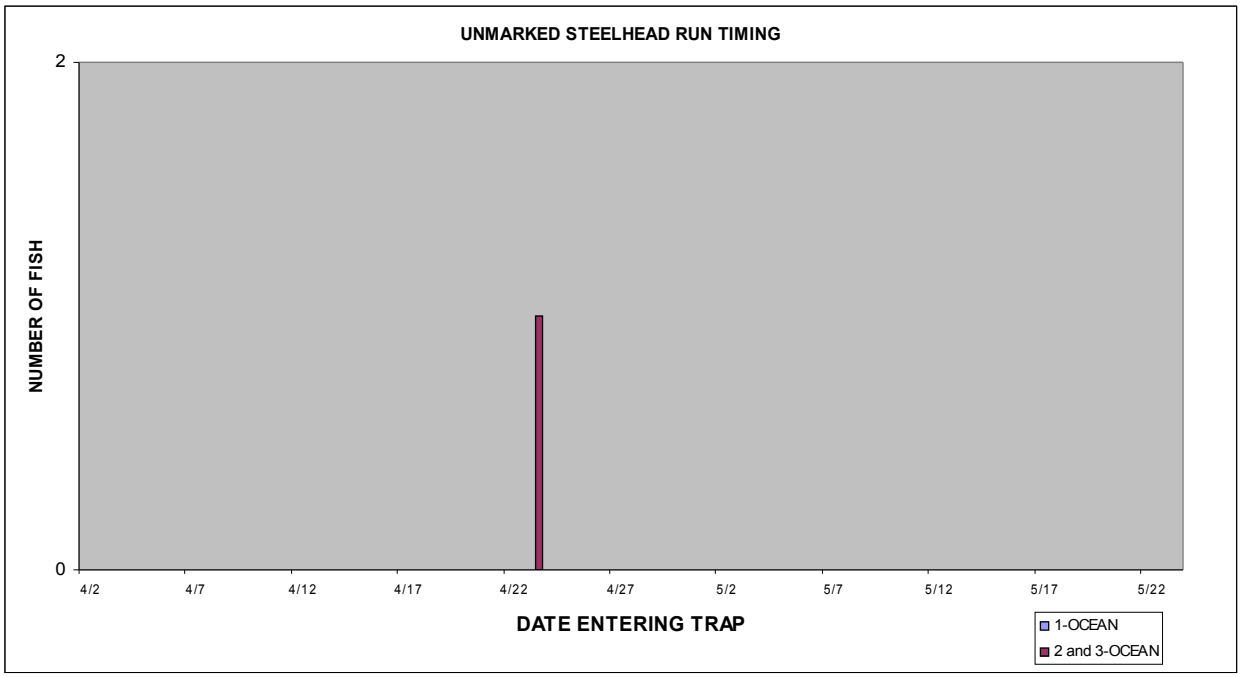
Appendix Q. Run Timing for Steelhead, Return Year 2004, Squaw Creek Trap.

2004 SQUAW CREEK TRAP RUN TIMING
MARKED STEELHEAD



Appendix Q. Continued.

2004 SQUAW CREEK TRAP RUN TIMING
UNMARKED STEELHEAD



Appendix R. Squaw Creek Trap Length Frequency Distribution, Return Year 2004.

FK.LN (cms)		UNMARKED (RELEASED) Male	Fem	MARKED (ADIPOSE CLIPS) Male	Fem	MARKED (OTHER MARKS) Male	Fem	FK.LN (in)
50		0	0	0	0	0	0	19.7
51		0	0	0	0	0	0	20.1
52		0	0	0	0	0	0	20.5
53		0	0	0	0	0	0	20.9
54		0	0	0	0	0	0	21.3
55		0	0	0	0	0	0	21.7
56		0	0	0	0	0	0	22.0
57		0	0	0	0	0	0	22.4
58		0	0	0	0	0	0	22.8
59		0	0	0	0	0	0	23.2
60		0	0	0	0	0	0	23.6
61		0	0	0	0	0	0	24.0
62		0	0	0	0	0	0	24.4
63		0	0	0	0	0	0	24.8
64		0	0	0	0	0	0	25.2
65		0	0	0	0	0	0	25.6
66		0	0	0	0	0	0	26.0
67		0	0	0	0	0	0	26.4
68		0	0	0	0	0	0	26.8
69		0	0	0	0	0	0	27.2
70		0	0	0	0	0	0	27.6
71		0	0	0	0	0	0	28.0
72		0	0	0	0	0	1	28.3
73		0	0	0	0	0	0	28.7
74		0	0	0	1	0	1	29.1
75		0	0	0	1	0	1	29.5
76		0	0	0	3	0	0	29.9
77		0	0	0	2	0	1	30.3
78		0	0	0	0	1	1	30.7
79		0	0	2	2	0	1	31.1
80		0	1	1	0	0	0	31.5
81		0	0	0	1	0	0	31.9
82		0	0	0	1	0	0	32.3
83		0	0	0	1	0	0	32.7
84		0	0	0	0	0	0	33.1
85		0	0	1	0	0	0	33.5
TOTALS		0	1	4	12	1	6	

Appendix R. Continued.

AGE-CLASS OF ADULTS	MALES	FEMALES	TOTAL

	No.	%	No.	%	No.	%
MARKED 1-OCEANS	0	0.0	0	0.0	0	0.0
MARKED 2 and 3-OCEANS	5	100.0	18	100.0	23	100.0
UNMARKED 1-OCEANS	0	#DIV/0!	0	0.0	0	0.0
UNMARKED 2 AND 3-OCEANS	0	#DIV/0!	1	100.0	1	100.0
TOTAL 1-OCEANS	0	0.0	0	0.0	0	0.0
TOTAL 2 and 3-OCEANS	5	100.0	19	100.0	24	100.0

Summary of Fish Autopsy

ACCESSION NO:	05-052	LOCATION:	Sawtooth
SPECIES:	sc	AUTOPSY DATE:	3/2/2005
STRAIN:	saw	AGE:	juv
UNIT:		SAMPLE SIZE:	20
RIVER FOR AUTOPSY:	Prelib.		
INVESTIGATOR(S):	Munson		
REMARKS:			

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
LENGTH	0.00	0.00	0.00
WEIGHT	0.00	0.00	0.00
KTL*	0.00	0.00	0.00
CTL*	0.00	0.00	0.00
HEMATOCRIT	42.55	2.37	0.06
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN	8.48	0.39	0.05

*EXPRESSED AT KTL TIMES 10 TO THE FIFTH POWER
**CONVERTED FROM KTL; EXPRESSED AS CTL TIMES 10 TO FOUTH POWER

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		FAT		MESEN. SPLEEN		GUT		HIND KIDNEY		LIVER		BILE	
N	18	N	20	N	20	0	20	0	4	B	20	0	20	N	20	A	0	0	20
B1	0	F	0	S	0	1	0	1	3	R	0	1	0	S	0	B	19	1	0
B2	0	C	0	L	0	2	0	2	7	G	0	2	0	M	0	C	1	2	0
E1	2	M	0	S&L	0			3	4	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0	Mean=0.00		4	2	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0	Mean=0.00	
H2	0			O	0			Mean=1.85								OT	0		
M1	0																		
OT	0																		

SUMMARY OF NORMALS

	18	20	20	20	20	20	20	20	20	20
SEX		M: 0		F: 0		U: 0				

GENERAL REMARKS:

FINS:

GONADS:

SKIN:

OTHER: Fish at 22 FPP

Appendix S. Continued.

Summary of Fish Autopsy

ACCESSION NO:	04-126	LOCATION:	Sawtooth
SPECIES:	sc	AUTOPSY DATE:	3/16/2004
STRAIN:	saw	AGE:	juv
UNIT:		SAMPLE SIZE:	20
RIVER FOR AUTOPSY:	Prelib.		
INVESTIGATOR(S):	Munson		
REMARKS:			

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
LENGTH	0.00	0.00	0.00
WEIGHT	0.00	0.00	0.00
KTL*	0.00	0.00	0.00
CTL*	0.00	0.00	0.00
HEMATOCRIT	41.90	3.40	0.08
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN	5.71	1.30	0.02

*EXPRESSED AT KTL TIMES 10 TO THE FIFTH POWER
**CONVERTED FROM KTL; EXPRESSED AS CTL TIMES 10 TO FOUTH POWER

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		FAT		MESEN. SPLEEN		GUT		HIND KIDNEY		LIVER		BILE	
N	20	N	20	N	20	0	20	0	0	B	20	0	20	N	20	A	0	0	20
B1	0	F	0	S	0	1	0	1	4	R	0	1	0	S	0	B	19	1	0
B2	0	C	0	L	0	2	0	2	9	G	0	2	0	M	0	C	1	2	0
E1	0	M	0	S&L	0			3	7	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0	Mean=0.00		4	0	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0	Mean=0.00	
H2	0			O	0			Mean=2.15								OT	0		
M1	0																		
OT	0																		

SUMMARY OF NORMALS

	20	20	20	20	20	20	20	20	20	20
SEX		M: 0		F: 0		U: 0				

GENERAL REMARKS:

FINS:

GONADS:

SKIN:

OTHER: Fish at 22 FPP

TABLES

Table 1. 2003 Sawtooth Steelhead Spawn Data.

Lot #	Spawn Date	# Females	Total Eyed	Total Dead	Total Eggs	% Eye	Mean Fecundity
SAW 1	03/29	40	148,081	34,118	182,199	81.30%	4,555
SAW 2	04/01	52	229,000	30,690	259,690	88.20%	4,994
SAW 3	04/05	80	305,362	57,545	362,907	84.10%	4,536
SAW 4	04/08	80	332,130	38,383	370,513	89.60%	4,631
SAW 5	04/12	76	299,734	46,946	346,680	86.50%	4,562
SAW 6	04/15	69	271,399	40,865	312,264	86.90%	4,526
SAW 7	04/19	58	210,885	36,258	247,143	85.30%	4,261
SAW 8	04/20	40	172,964	34,759	207,723	83.30%	5,193
SAW 9	04/22	44	140,154	47,725	187,879	74.60%	4,270
SAW10	04/26	24	84,377	15,565	99,942	84.40%	4,164
SAW11	04/29	13	57,056	5,121	62,177	91.80%	4,783
TOTAL:		576	2,251,142	387,975	2,639,117	85.3	4,582

Table 2. 2003 East Fork Salmon River Steelhead Spawn Data.

Lot #	Spawn Date	# Females	Total Eyed	Total Dead	Total Eggs	% Eye	Mean Fecundity
EF1	04/09	2	4,895	1,694	6,589	74.29%	3,295
EF2	04/13	4	11,023	8,793	19,816	55.63%	4,954
TOTAL:		6	15,918	10,487	26,405	60.28%	4,401

Table 3. 2003 Squaw Creek Steelhead Spawn Data.

Lot #	Spawn Date	# Females	Total Eyed	Total Dead	Total Eggs	% Eye	Mean Fecundity
1	04/06	2	3,848	5,598	9,446	40.74%	4,723
2	04/09	2	3,825	9,821	13,646	28.03%	6,823
3	04/13	2	6,632	6,891	13,523	49.04%	6,762
4	04/16	5	16,969	16,053	33,022	51.39%	6,604
5	04/20	4	16,146	12,046	28,192	57.27%	7,048
6	04/23	3	5,272	14,027	19,299	27.32%	6,433
7	04/27	1	1,645	1,332	2,977	55.26%	2,977
TOTAL:		19	54,337	65,768	120,105	45.2%	6,321

Table 4. 2003 Pahsimeroi Steelhead (@ Sawtooth) Spawn Data.

Lot #	Spawn Date	# Females	Total Eyed	Total Dead	Total Eggs	% Eye	Mean Fecundity
1	03/29	60	234,363	88,841	323,204	72.51%	5,387
2	04/01	70	247,836	111,048	358,884	69.06%	5,127
3	04/04	76	264,274	109,829	374,103	70.64%	4,922
4	04/08	50	165,975	73,710	239,685	69.25%	4,794
5	04/12	50	168,422	54,885	223,307	75.42%	4,466
Total		306	1,080,870	438,313	1,519,183	71.15%	4,965

Table 5. Steelhead Eyed Egg or Fry Shipments from Sawtooth Fish Hatchery in 2003.

HATCHERY or OFF-SITE LOCATION	NUMBER SHIPPED	STOCK
Shoshone-Bannock Streamside Incubators	360,886	Sawtooth
Hagerman National Fish Hatchery	950,033 212,000	Sawtooth Pahsimeroi
Magic Valley Fish Hatchery	507,081 15,918 54,337 822,473	Sawtooth East Fork Squaw Creek Pahsimeroi
Total Eggs Shipped	**1,034,473**	**Pahsimeroi***
Total Eggs Shipped	**1,810,000**	**Sawtooth****
Total Eggs Shipped	**15,918** **54,337**	**East Fork** **Squaw Creek**
Total Eggs Shipped	**2,922,728**	**All Stocks**

* A total of 46,397 surplus Pahsimeroi stock-eyed eggs were not shipped.
** A total of 433,143 surplus Sawtooth stock-eyed eggs were not shipped.

Table 6. Criteria for Aging Steelhead, from Jon Hanson, IDFG.

"A-Run" male-	**≤68 cm**	**- 2-year old**	**1 ocean**
	>68 cm	**- 3 or 4 year old**	**2 ocean**
"A-Run" female-	**≤65 cm**	**- 2-year old**	**1 ocean**
	>65 cm	**- 3 or 4 year old**	**2 ocean**

"B-Run" male-	**<78 cm**	**- 2 year old**	**1 ocean**
	>78 cm	**- 3 or 4 year old**	**2 or 3 ocean**
"B-Run" female-	**<74 cm**	**- 2-year old**	**1 ocean**
	>74 cm	**- 3 or 4 year old**	**2 or 3 ocean**

Submitted by:

Brent R. Snider
Fish Hatchery Manager II

Roger Elmore
Assistant Hatchery Manager

Mel Hughes
Fish Culturist

Holly Smith
Fish Culturist

Doug Munson
Fish Health Pathologist

Approved by:

_____
Virgil K. Moore, Chief
Fisheries Bureau

_____
Thomas L. Rogers
Anadromous Fish Hatcheries Supervisor