

**SAWTOOTH FISH HATCHERY
and
EAST FORK SATELLITE**

**2002 Spring Chinook Brood Year Report
2003 Steelhead Brood Year Report**

By

**Brent R. Snider, Fish Hatchery Manager II
Roger Elmore, Assistant Hatchery Manager
Mel Hughes, Fish Culturist
Holly Lehman, Fish Culturist
Doug Munson, Fish Health Pathologist**

**IDFG 04-34
September 2004**

TABLE OF CONTENTS

	<u>Page</u>
2002 SPRING CHINOOK SALMON	1
ABSTRACT	1
INTRODUCTION	2
Funding Source	2
Location	2
Species Reared.....	2
Broodstock History	2
OBJECTIVES	3
Mitigation Goals	3
Idaho Department of Fish and Game Objectives	3
FACILITY DESCRIPTION.....	3
Hatchery Description	3
Production Capabilities.....	4
RECOMMENDATIONS.....	4
WATER SUPPLY.....	5
Source	5
Quantity and Temperature.....	5
Water Quality	5
STAFFING	5
FISH HEALTH	6
SAWTOOTH FISH HEALTH SECTION	6
Diseases Encountered and Treatment	6
Organosomatic Index	6
Acute Losses.....	6
Other Assessments	7
FISH PRODUCTION	7
Spring Chinook Adult Collection	7
Adult Treatments.....	7
Prespawning Mortality	7
Spawning Operations	8

TABLE OF CONTENTS Continued

	<u>Page</u>
Incubation	8
Early Rearing	8
Final Rearing.....	9
Fish Marking	9
Fish Distribution	9
SOUTH FORK SUMMER CHINOOK.....	9
PAHSIMEROI CHINOOK.....	10
SOCKEYE SALMON	10
Fish Production	10
Experimental Overwinter Group.....	11
BY 2002 Sockeye Releases.....	11
2003 STEELHEAD	13
ABSTRACT	13
FISH PRODUCTION	14
Steelhead Adult Collection	14
Sawtooth Trap.....	14
East Fork Salmon River Natural Steelhead	14
Squaw Creek Trap	15
Spawning Operations.....	15
Sawtooth Trap.....	15
East Fork Salmon River Trap	17
Squaw Creek Trap	17
Pahsimeroi Stock Egg Incubation	17
Adult Treatments.....	19
Prespawning Mortality.....	19
Incubation	19
Release of BY03.....	19
Fish Marking	19
CONCLUSIONS/RECOMMENDATIONS.....	20
Sawtooth Fish Hatchery	20

TABLE OF CONTENTS Continued

	<u>Page</u>
APPENDICES	
Appendix A. Sawtooth Fish Hatchery Chinook Smolt Releases and Returns (marked and unmarked).....	22
Appendix A.1 Sawtooth Fish Hatchery Chinook Smolt Releases and Hatchery Returns (marked fish)	23
Appendix B. Sawtooth Fish Hatchery Water Quality Analysis of the Salmon River	24
Appendix B1. Sawtooth Fish Hatchery Water Quality Analysis of Well 1&2 Mix.....	25
Appendix C. Sawtooth Fish Hatchery Results of Disease Sampling.....	26
Appendix D. Sawtooth Fish Hatchery Spring Chinook Run Timing -2002.....	28
Appendix E. Sawtooth Fish Hatchery Age Class Totals from All Trapped Chinook, Return Year 2002	29
Appendix E.1. Sawtooth Fish Hatchery Spring Chinook Salmon Length Frequency Distribution for 2002	30
Appendix F. Sawtooth Fish Hatchery Age Class Breakdown by Released Chinook, Return Year 2002	34
Appendix G. Sawtooth Fish Hatchery Spring Chinook Spawning Matrix 2002 return year	34
Appendix H. Survival Table for Chinook (BY02) and Steelhead (BY03) from Green Eggs to Released Smolts, at Sawtooth Fish Hatchery and East Fork Sites	35
Appendix I. Rearing Water Temperatures, BY02 Spring Chinook at Sawtooth Fish Hatchery	36
Appendix I.1. Feed Schedule for Sawtooth/Pahsimeroi Chinook, BY02	37
Appendix J. Summary of Marked Spring Chinook Released, Brood Year 2002.....	37
Appendix K. Summary of Sawtooth Fish Hatchery Spring Chinook Smolt Releases, Brood Year 2002.....	38
Appendix L. Sawtooth Fish Hatchery Summary of Smolt Releases and Marks.....	39
Appendix L.1. Sawtooth Fish Hatchery Production Cost Table (Includes Chinook BY02, Steelhead BY03, and Sockeye BY02)	40

TABLE OF CONTENTS Continued

	<u>Page</u>
Appendix M. Run Timing for Steelhead, Return Year 2003, Sawtooth trap.....	41
Appendix N. Steelhead Returns by Year Class and Sex, Return Year 2003	42
Appendix O. Run timing for Steelhead, Return Year 2003, East Fork Trap.	44
Appendix P. East Fork Steelhead Length Frequency Distribution, Return Year 2003	45
Appendix Q. Run Timing for Steelhead, Return Year 2003, Squaw Creek Trap	47
Appendix R. Squaw Creek Trap Length Frequency Distribution, Return Year 2003	48
Appendix S. Fish Health Autopsy Results	50

LIST OF TABLES

Table 1. 2003 Sawtooth Steelhead Spawn Data.....	16
Table 2. 2003 East Fork Salmon River Steelhead Spawn Data	18
Table 3. 2003 Squaw Creek Steelhead Spawn Data	18
Table 4. Pahsimeroi Steelhead Spawn Data	18
Table 5. Steelhead Eyed Egg or Fry Shipments From Sawtooth Fish Hatchery in 2003	16

2002 SPRING CHINOOK SALMON

ABSTRACT

The Sawtooth Fish Hatchery trap and weir were put into operation on May 28, 2002 and operated through September 9, 2002. A total of 1,786 adult spring Chinook salmon *Oncorhynchus tshawytscha* (786 males, 902 females, and 98 jacks) were trapped. Released above the weir were 1,340 fish (447 unmarked males, and 180 marked males; 314 unmarked females and 310 marked females, and 33 unmarked jacks and 56 marked jacks) to spawn naturally. There were 88 pre-spawning mortalities.

Spawning began on August 12 and continued through September 9, on nine spawning days. Fish spawned for production consisted of 194 females, 152 males, and 9 jacks that produced 1,037,558 green eggs (5,348 eggs per female), which yielded 920,651 eyed-eggs for an eye-up rate of 88.7%. After receiving ELISA based BKD results from Eagle Fish Health Lab (EFHL), 16,044 eggs from three females were culled due to having ELISA-based BKD of 0.40 or greater and are not included in egg inventory summaries. This leaves 309,491 reserve eyed-eggs, 372,538 supplementation reserve eyed-eggs, and 210,972 Idaho Supplementation Studies (ISS) eggs remaining for production (893,001). From these eyed-eggs, 879,040 fry were ponded which resulted in a smolt release of 821,415 smolts.

INTRODUCTION

Funding Source

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

Location

Sawtooth Fish Hatchery is located five miles south of Stanley. The facility's 71 acres border the Salmon River to the west, Highway 75 to the east and US Forest Service (USFS) ground to the south and north. The SFH 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. Steelhead are released at the hatchery and along the upper Salmon River downstream to near Challis.

The SFH 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 SFH. The property was purchased from the Bureau of Land Management (BLM) 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

The SFH 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 SFH for incubating. The Chinook are reared at SFH with the steelhead being transferred as eyed-eggs to other hatcheries for rearing.

Broodstock History

Historically, all of the SFH 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 SFH 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 (now NOAAF) prescribes fish handling for Chinook salmon under permits #1179 and #1186. All unmarked steelhead are released along with enough marked hatchery fish to ensure pairing of adults. At the East Fork, all Chinook salmon trapping has been discontinued. 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 LSRCP, SFH'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, each about 1,360 square feet (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 cubic feet [cuft]) 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 the SFH 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 cuft and a capacity of 15,000 swim-up fry each, six semi-square rearing tanks with an individual volume of 50 cuft and a capacity for 30,000 fry each, and 14 inside rearing vats with an individual volume of 391 cuft and a capacity for 100,000 fry each. Outside rearing consists of 12 fry raceways each with 750 cuft of rearing space and 28 production raceways each with 2,700 cuft 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 flows from an upper raceway to a lower one.

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

RECOMMENDATIONS

Recommendations for SFH include developing additional wells for disease-free rearing water; modifying the river water intake to reduce winter icing problems; replacing the backup generator; seal coating hatchery roadways; and making modifications to the weir for resident fish movement.

East Fork recommendations include modifying the intake screen to exclude fish fry; modifying the velocity barrier to prevent injury to migrating fish; and developing 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 wellwater 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 specific pathogen free water (SPF), for spawning and egg hardening. No fish are reared at the East Fork trap.

Quantity and Temperature

The SFH wells provide approximately 900 gallons per minute (gpm) 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 cubic feet per second (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.

Water Quality

The most recent water quality analysis from the SFH 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 Treatment. BY02 Sawtooth spring Chinook salmon experienced elevated mortality during the first prophylactic application of erythromycin-medicated feed. Since the treatment was almost completed, the hatchery staff was directed to complete the treatment and not disturb the fish. BY02 Chinook salmon experienced elevated mortality and morbidity due to external mycosis *Saprolegnia parasitica*. This infection was exacerbated by high turbidity in the Salmon River during the high run-off period in June. The hatchery staff was directed to treat this problem with 167-ppm formalin for one hour, three times per week, for one week. These applications of formalin were efficacious in reducing mortality. Preliberation sampling of the BY02 Chinook salmon did not detect *Renibacterium salmoninarum* (RS) in DFAT or ELISA samples. Viral replicating agents were not detected during preliberation sampling, but *Myxobolus cerebralis* (MC) was detected in one of 20 fish. Smolt health autopsy results are detailed in Appendix S.

Adult spring Chinook salmon were injected with Gallimycin (injectable erythromycin) at target dose rate of 20 mg/kg. These injections were intended to limit prespawning mortality due to RS, the causative agent of bacterial kidney disease (BKD). Prespawning mortality in Chinook salmon (7 males and 81 females) was 19.7%. No Infectious hematopoietic necrosis virus (IHNV) was detected in brood samples taken from adult Chinook salmon. All 116 brood fish were sampled. *M. cerebralis* was detected in 4 of the 31 adults sampled. ELISA testing of brood females for RS detected high optical densities (optical density of 0.25 and above) in 3% of the fish spawned at Sawtooth Hatchery. The eggs from these fish were culled.

Adult steelhead A-Group were examined for pathogens during spawning activities. Four fish out of the 25 fish sampled were positive for MC by pepsin/trypsin digest methods. All 550 brood female steelhead were examined for IHNV at SFH. All were negative for viral replicating agents. Twenty-six adult female steelhead B-Group were examined for IHNV at the East Fork Trap and one steelhead (B-Group) was examined from Squaw Creek pond. All of these fish were negative for IHNV. One adult steelhead out of the 11 sampled at the East Fork Trap was found to be positive for MC, while 2 of the 13 fish sampled at Squaw Creek Pond were positive. The direct fluorescent antibody test (DFAT) did not detect RS in steelhead from the 60 fish tested from Sawtooth Hatchery or from the 15 fish sampled from the East Fork Trap. One adult steelhead from the Squaw Creek Pond did test positive for RS, using DFAT.

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 SFH weir. No viral replicating agents were detected in the 61 samples taken. The EFHL 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 February of 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, efforts should be made to expand the well water capability of this facility.

FISH PRODUCTION

Spring Chinook Adult Collection

The SFH Chinook-trapping season began on May 28, 2002, and continued through September 9, 2002. The peak of the run occurred the week of June 29, 2002 (Appendix D). A total of 1,786 spring Chinook salmon were trapped including 786 males, 902 females, and 98 jacks (Appendix E, Appendix E.1). Released above the weir were 1,340 salmon (including 447 unmarked males, 314 unmarked females, 180 marked males and 310 marked females, and 33 unmarked jacks and 56 marked jacks) Appendix F. No fish were scanned for Passive Integrated Transponder (PIT) tags in 2002, as per Fisheries Bureau instructions. Sawtooth Hatchery had a male:female ratio of 49.4% male and 50.6% female.

The East Fork trap was not in operation in 2002 for spring Chinook salmon.

A total of 98 three-year-old, 958 four-year-old, and 730 five-year-old fish returned to SFH.

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 SFH 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 88 pre-spawning mortalities (7 males, 81 females) or < 5%.

Spawning Operations

Spawning activities at SFH began August 12 and concluded September 9, 2002. The nine egg takes during this period yielded 1,037,558 green eggs from 194 females for an average fecundity of 5,348 eggs per female. There were 152 males and 9 jacks used for fertilization. Each female's eggs were separated into two groups. Each group of eggs was fertilized by the sperm from one male. The two 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 two females per tray. Spawning crosses were determined by mark and age-class to create either a reserve group or a supplementation reserve group or an ISS group (Appendix G).

Incubation

Each eight-tray Heath stack had flows set at 5 gpm of wellwater. Eggs were put away at two females per tray. This averaged 10,000 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 (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 FTUs and hatch at 1,300 FTUs.

In addition to the BY02 Sawtooth eggs, the hatchery incubated 1,176,958 eyed Pahsimeroi Stock Summer Chinook eggs.

Sawtooth Fish Hatchery green eggs eyed up at an 88.7% rate, yielding 920,651 eyed-eggs (Appendix H).

Early Rearing

The SFH 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 wellwater varied in temperature from 46°F to 40°F (Appendix I).

All fry were started on Rangen's soft moist starter and 1/32, 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 4.5 grams active/100 lbs. of fish for BKD prevention. The fish were transferred outside for final rearing in May. Fish averaged 116 fish per pound (fpp) and 3.08 inches in length when moved to the outside raceways.

Final Rearing

The Sawtooth spring Chinook were placed into the upper sections of nine large raceways and into the lower sections of two raceways. Initial densities were 0.03 lbs./cuft, and water flows were 660 gpm.

All outside fish were fed Rangen soft moist grower feed. A second 28-day prophylactic BioOregon erythromycin-medicated feed treatment was fed in August and September 2002 at a rate of 4.5 grams active per 100 lbs of fish, to prevent the onset of BKD.

A third and final 28-day prophylactic BioOregon erythromycin-medicated feed treatment was fed in March and April 2004. This treatment was only given to high BKD fish in one raceway prior to release.

The finish weight of the BY02 Sawtooth Chinook smolts was 38,872 lbs. The fish were fed 42,090 lbs of feed for a conversion of 1.10. A synopsis of feeding regimes can be found in Appendix I.1.

Fish Marking

Fish marking occurred from September 15 through September 26, 2003. All ISS fish (187,961) received CWT only, 479,513 reserve fish received an ad-clip as did 47,782 BKD supplementation fish, 52,739 supplementation fish received both Coded Wire Tag (CWT) and ad-clip and 53,420 reserve fish received both CWT and ad-clip marks. In addition, 500 ISS, 250 listed supplementation reserve, and 250 listed reserve fish were PIT-tagged in February 2004. There were three PIT-tagged mortalities from the supplementation reserve group and one from the listed reserve group. The PIT tags were used to evaluate downriver migration. Also, CWT retention checks were performed in late March prior to release. Out of 522 fish checked, 518 retained CWTs or 99.2%. (Appendices J and K).

Fish Distribution

Fish releases for Sawtooth stock BY02 smolts occurred on April 13, 2004. A total of 821,415 fish were released into the Salmon River at the SFH weir. The fish were released in the evening through the outside raceway tailrace pipe. River water temperature was 50°F at time of release. Production costs for BY02 smolts can be found in Appendix L.1.

SOUTH FORK SUMMER CHINOOK

On July 23, 2002, SFH received 150 marked adult summer Chinook salmon from the South Fork Salmon River trap (75 males, 75 females). These fish were held and spawned at Sawtooth, to provide eyed-eggs to the Shoshone Bannock Tribe (SBT) streamside incubator program. Pre-spawning mortality was high as the fish were "rough looking" when they arrived at Sawtooth. There were 90 prespawn mortalities (51 males and 39 females) for a 60% loss. Spawning began on August 3, and ended on September 3, over a total of six spawn days. A

total of 36 females were spawned. Eggs were kept from 30 females, which produced 126,514 green eggs. Eggs from six females were culled (approximately 25,000) due to high ELISA BKD values and IHN virus detection. The green eggs that were kept eyed-up at an 89.6% rate, yielding 113,358 eyed eggs. The eyed eggs were given to the SBT on two separate dates: September 24 and October 2.

PAHSIMEROI CHINOOK

Sawtooth Hatchery reared Pahsimeroi Hatchery's BY02 summer Chinook due to a lack of space and pathogen free water at Pahsimeroi Fish Hatchery. Eight lots of eyed-eggs were brought to SFH between September 25 and October 23, 2002. A total of 1,176,958 eggs were incubated. Lots 6,7, and 8 swim-up fry (306,432) were returned to Pahsimeroi in late January and early February 2003 due to limited rearing space and wellwater at SFH. From eyed-egg to ponding, after dead eggs and fry were picked off, survival was 97.8%.

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 on February 25 and 26, 2003. The fish averaged 1.93 inches and 450 fish per pound (fpp) at time of moving.

All of the fish were marked from May 13 to May 23 at SFH. A total of 130,965 ISS fish received a CWT and 71,365 reserve fish received both a CWT and an ad-clip. The remaining 639,477 reserve fish were ad-clipped.

On June 9, 10 and 11, all Pahsimeroi fish were returned to Pahsimeroi Spawn Station rearing ponds. The resulting inventory of 841,350 fish were returned. Total lbs of fish shipped were 6,522 for an average of 129 fpp. Total feed fed was 6,424 lbs for an overall conversion of 0.98.

SOCKEYE SALMON

Fish Production

According to numbers received from EFHL and Burley Fish Hatchery (NMFS), an estimated total of 94,483 eyed-eggs were delivered to SFH. According to Rodney Duke's marking inventory the estimated amount of eggs delivered to Sawtooth Fish Hatchery was 83,914, a difference of 10,569 eggs. This summary is based on the marking inventory.

The eggs arrived in three separate shipments between November 27 and December 11, 2002. The eggs arrived with approximately 700 FTUs. Ponding began February 10 and ended March 30, 2003 with about 1,775 FTUs. 75,974 fry were ponded into ten semi-square 17 ft.³ rearing tanks. Initial water flows were set at three gpm.

Eggs were hand picked three times weekly from eyed-egg to ponding. A total of 3,970 dead eggs were removed before ponding. Total eyed-egg to ponding survival was 95.3%.

All fry were started on #1 BioOregon BioDiet starter. Feed size was increased in accordance with BioOregon recommendations 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 SFH for BY02 Sockeye was 2,220 lbs, with a 1.4 conversion.

All remaining feed was dispersed accordingly. Eleven lbs of leftover starter #1 was disposed of. We sent 132 lbs of starter #2 and 176 lbs of starter #3 to Hayspur Fish Hatchery. A total of 220 lbs of 2.5 mm was fed to BY02 Chinook at SFH.

As rearing densities reached 4 lbs/gpm, fish were transferred to five 2-meter fiberglass tanks with water flows set at 10gpm each. In May and June, fish were moved to cement vats with water flows at 100 gpm pathogen free well water.

Mortality was recorded daily from ponding to release. A total of 6,643 fish were lost to mortality for a 7.92% loss.

Ad-clipping and CWT marking started September 15 and ended September 16, 2003. PIT tagging by Sockeye Research occurred on October 2 and 3, 2003. A total of 77,271 fish were Ad-clipped and 5,549 fish received PIT tags. At the time of release, fish averaged 48.78 fpp and had a condition factor of $2,927 \times 10^{-7}$.

Experimental Overwinter Group

On October 7, 2003 Keith Johnson vaccinated 200 pre-smolts with Renogen. This vaccine is presented as a lyophilized live culture of a microorganism that shares common antigenic determinants with *Renibacterium salmoninarum*, and is to be resuspended with sterile diluent before use. Renogen is an aid in the prevention of Bacterial Kidney Disease (BKD) in healthy salmonids 10 grams or larger.

The vaccinated fish were held inside the incubation building on wellwater for 14 days. They were then moved outside into a small raceway and placed on river water until spring 2004. A total of 96 sockeye were released into Redfish Lake Creek at the weir, the first week in May of 2004. There were 61 fish sacrificed for health monitoring and 43 fish were unaccounted for having disappeared during the winter.

BY02 Sockeye Releases

Alturas Lake received 2,017 Ad-clipped and PIT-tagged fish at 56.82 fpp on October 6, 2003. No PIT mortalities were recorded in the Alturas Lake release group. There were 0.65% non-clipped sockeye in the Alturas Lake PIT tagged group.

Pettit Lake received 14,961 Ad-clipped fish at 42.37 fpp on October 6, 2003, including 2014 PIT tagged fish. There were no PIT mortalities recorded in the Pettit Lake release group.

Redfish Lake received 59,810 Ad-clipped fish at 41.15 fpp on 10/07/03 including 1,518 PIT-tagged fish. One pit tag mortality was recorded in this group for Vat 2 on October 7, 2003. (PIT #: 3D9.1BF1B6E90F)

There were 4.13% non-clipped sockeye in the Redfish Lake and Pettit Lake PIT-tagged groups. All sockeye released were placed into a barge and released into a pelagic zone

2003 STEELHEAD

ABSTRACT

The Sawtooth Fish Hatchery (SFH) trap and weir were put into operation on March 18, 2003 and closed May 5, 2003. A total of 2,461 adult steelhead *Oncorhynchus mykiss* (1,168 males and 1,293 females) were trapped at the SFH weir. Surplus hatchery adults were given to charitable organizations, the Idaho Food Bank, Bellevue Outreach, Shoshone-Bannock Tribe (SBT), released downstream at Torreys Hole and the Yankee Fork, and released upstream at Beaver Creek as part of Idaho Supplementation Studies (ISS). A total of 30 unmarked fish (14 males/16 females) were released above the weir. There were no pre-spawning mortalities at SFH.

Spawning began at SFH on March 27, 2003 and continued through May 5, 2003 with 12 spawning days. A total of 508 females were spawned with 508 males, yielding 2,807,840 green eggs for an average fecundity of 5,527 eggs per female. These green eggs yielded 2,363,746 eyed eggs for an eye-up percentage of 84.2%.

The East Fork Salmon River (EFSR) trap and velocity barrier were put into operation March 25, 2003, and ran through May 9, 2003. A total of 47 adult East Fork natural or unmarked steelhead were trapped. This included 17 males and 30 females. Fish released above the weir to spawn naturally included 10 unmarked males, and 19 unmarked females. There was no prespawning mortality.

East Fork spawning operations began on April 15, 2003, and continued through April 25, 2003. A total of 11 unmarked EFSR females were spawned with 10 males over 4 spawn dates, yielding 86,184 green eggs for an average fecundity of 7,835 eggs per female. These green eggs yielded 57,876 eyed-eggs for a 67.2% eye-up rate. These eggs were shipped to Magic Valley Hatchery for rearing.

The Squaw Creek Trap and weir was installed on March 26, 2003 and ran through May 8, 2003. A total of 24 adult "B-run" adults (8 males and 16 females) and 60 "A-run" adults (29 males and 31 females) were trapped. All hatchery adults were transferred to the East Fork trapping facility for pre-spawn holding. All unmarked fish were released upstream of the Squaw Creek weir for volitional spawning.

Squaw Creek Trap spawning operations occurred from April 11 through April 29, 2003 over five spawn dates. A total of 128,379 green eggs were taken from 16 marked "B-run" females for a mean fecundity of 8,024 eggs per female. These green eggs yielded 78,006 eyed-eggs or a 60.8% eye-up rate. These eggs were shipped to Magic Valley Hatchery for rearing.

There were 374,582 green eggs from Pahsimeroi Hatchery incubated at Sawtooth in 2003. These eggs eyed-up at a 62.4% rate, yielding 233,924 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 SFH weir. The HNFH stocked SFH 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. The MVFH stocked SFH 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

On March 18, 2003, the SFH adult steelhead *Oncorhynchus mykiss* weir on the Main Salmon River was installed, with the adult trap operating from March 24 through May 5. A total of 2,461 adult "A-run" steelhead were trapped in 2003, 2,431 of which (1,154 males and 1,277 females) were hatchery-produced fish and 30 (14 males and 16 females) were unmarked.

Distribution of the 2,431 hatchery-produced adults ranged from spawn-related activities to charitable giveaways and included: 1) 136 surplus adults donated to charitable organizations (Idaho Food Bank, Bellevue Outreach), 2) 1,411 adults ponded for spawn-related activities (eventually given to the public on spawn days), 3) 396 surplus adults given to the Shoshone-Bannock and Duck Valley Tribes, 4) 48 adults transported downstream and released at Torry's Hole on the Main Salmon River to recycle through the fishery, 5) 400 adults (200 pairs of males and females) outplanted to the Yankee Fork of the Salmon River for SBT natural production, 6) 10 pairs of males and females to Beaver Creek and 10 pairs of males and females to Frenchman Creek.

All returning unmarked adults (30) were released upstream of the hatchery for volitional spawning.

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

East Fork Salmon River Natural Steelhead

On March 25, 2003, the velocity barrier on the East Fork of the Salmon River (EFSR) was put into operation, with trapping operations initiated on March 25 and continuing through May 9. A total of 47 adult, unmarked steelhead were trapped, of which 3 (males) were hatchery-produced fish and 44 (15 males / 29 females) were unmarked.

Of the 47 adults trapped, 3 marked males were retained for hatchery "production" spawn crosses (crossed with returning Squaw Creek hatchery-produced females), 11 unmarked females contributed to "natural" spawn crosses, and 28 unmarked adults (10 males and 18 females) were released above the weir for volitional spawning. Prior to liberation, six of the ten natural males released above the weir were partially stripped of milt to fertilize eggs from the 11 females used for natural production.

Age-class, gender, length frequency and run timing data for returning EFSR adults (hatchery and natural origin) is provided in Appendices 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 26, 2003. Adult steelhead trapping continued through May 8, at which time weir pickets were pulled and the trap was taken out of operation between April 15 and April 19 when some trap pickets were pulled to let steelhead smolts pass. A total of 24 adult "B-run" steelhead were trapped (8 males and 16 females), 24 of which were hatchery-produced. All hatchery adults were transferred to the East Fork trapping facility for pre-spawn holding.

In addition to "B-run" adults, 60 "A-run" adults were trapped (29 males and 31 females)

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

Spawning Operations

Sawtooth Trap

Sawtooth Fish Hatchery spawning operations occurred from March 27 through May 5, 2003. A total of 508 females were crossed with 508 males over 12 spawning days to produce 2,807,840 green eggs and a mean fecundity of 5,527 eggs per female. Total green egg-take yielded 2,363,746-eyed-eggs for a percent survival to the eyed-stage of development average of 84.2%.

Eyed egg transfers to Magic Valley Steelhead Hatchery and Hagerman National Fish Hatchery totaled 480,000 and 975,000-eyed eggs, respectively. All surplus eggs were made available to biologists from the Shoshone-Bannock Tribe and resulted in an eyed egg transfer total of 373,069. All unwanted or remaining eggs were culled as development progressed beyond the window of transport safety, as determined by temperature-unit accumulation (Table 1).

Table 1. 2003 Sawtooth Steelhead Spawn Data.

Lot #	Spawn Date	Females	Total Eyed	Total Dead	Total Eggs	% Eye	Mean Fecundity
SAW 1	03/27	17	74,718	26,854	101,572	73.60%	5,975
SAW 2	03/31	30	136,477	25,296	161,773	84.40%	5,392
SAW 3	04/03	35	179,157	31,534	210,691	85.00%	6,020
SAW 4	04/07	70	339,862	66,041	404,903	83.70%	5,784
SAW 5	04/10	49	252,822	26,006	278,828	90.70%	5,690
SAW 6	04/14	62	312,510	43,026	355,545	87.90%	5,735
SAW 7	04/17	75	341,770	91,770	433,540	78.80%	5,781
SAW8	04/21	80	355,730	65,886	421,616	84.40%	5,270
SAW9	04/24	50	213,727	27,312	241,039	88.70%	4,821
SAW 10	04/28	20	80,195	25,796	105,991	75.70%	5,300
SAW 11	05/01	12	44,700	11,388	56,088	79.70%	4,674
SAW 12	05/05	8	33,069	3,185	36,254	91.20%	4,532
TOTAL		508	2,363,746	444,094	2,807,840	84.2	5,527

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	373,069	Sawtooth
Hagerman National Fish Hatchery	216,276 975,000	Pahsimeroi Sawtooth
Magic Valley Fish Hatchery	480,000 57,876 78,006	Sawtooth East Fork East Fork (Squaw Creek)
Total Eggs Shipped	216,276	Pahsimeroi*
Total Eggs Shipped	1,828,069	Sawtooth**
Total Eggs Shipped	57,876 (78,006)	East Fork (Squaw Creek)
Total Eggs Shipped	2,180,227	All Stocks

* A total of 27,499 surplus Pahsimeroi stock-eyed eggs were not shipped.

** A total of 718,935 surplus sawtooth stock-eyed eggs were not shipped.

East Fork Salmon River Trap

A total of 11 unmarked EFSR females were retained for natural-production spawn crosses in 2003, with spawning operations occurring from April 15 through April 25, 2003 (4 spawn dates). Spawning activities from the 11 naturally produced females yielded a total of 86,184 green eggs for a mean fecundity of 7,835 eggs per female. A total of 57,876-eyed eggs were obtained from natural-production crosses, for a percent survival to the eyed-stage of development average of 67.2%. A shortage of naturally produced returning males resulted in the need to first strip milt, from 6 of the 10 males released. The 3 returning marked males were crossed with marked females returning to Squaw Creek, with resulting eggs destined for hatchery-production rearing (see Squaw Creek spawn data below).

All eyed eggs (57,876) produced from EFSR crosses were transferred to the Magic Valley Steelhead Hatchery for final incubation and rearing (Table 2).

Squaw Creek Trap

A total of 16 marked "B-run" females were retained for hatchery-production spawn crosses in 2003, with spawning operations occurring from April 11 through April 29 (5 spawn dates). All spawning was conducted at the East Fork Salmon River trap/spawn facility, with spawn activities from the 16 females yielding a total of 128,379 green eggs for a mean fecundity of 8,024 eggs per female. A total of 78,006-eyed eggs were obtained from hatchery-production crosses, for a percent survival to the eyed-stage of development average of 60.8%. Males used in hatchery-production crosses included the 8 returning marked males from the Squaw Creek trap, as well as 3 marked males from the East Fork trap.

All eyed eggs (78,006) produced from East Fork/Squaw Creek "B-run" hatchery crosses were transferred to the Magic Valley Steelhead Hatchery for final incubation and rearing (Table 3).

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 well-water 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 2003, a total of 374,582 green eggs were transferred to Sawtooth from a total of 60 females (6,243 mean fecundity). Total egg transfers yielded 233,924-eyed eggs, for a percent survival to the eyed-stage of development average of 62.4%. All Pahsimeroi eggs incubated at Sawtooth were destined for Hagerman National Fish Hatchery (HNFH) to satisfy production requests. A total of 216,276-eyed eggs were transferred to HNFH, with all remaining eggs (17,648) culled after production requests had been met (Table 4).

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

Lot #	Spawn Date	# Females	Total Eyed	Total Dead	Total Eggs	% Eye	Mean Fecundity
EF1	04/15	2	9,009	8,886	17,895	50.3	8,948
EF2	04/18	1	8,175	245	8,420	97.1	8,420
EF3	04/22	4	20,959	11,897	32,856	63.8	8,214
EF4	04/25	4	19,733	7,280	27,013	73.1	6,753
TOTAL:		11	57,876	28,308	86,184	67.2	7,835

Table 3. 2003 Squaw Creek Steelhead Spawn Data.

Lot #	Spawn Date	# Females	Total Eyed	Total Dead	Total Eggs	% Eye	Mean Fecundity
1	04/11	9	33,945	40,021	73,966	45.9	8,218
2	04/15	3	21,146	3,807	24,953	84.7	8,318
3	04/22	2	12,454	699	13,153	94.7	6,577
4	04/25	1	7,129	1,545	8,674	82.2	8,674
5	04/29	1	3,332	4,301	7,633	43.7	7,633
TOTAL:		16	78,006	50,373	128,379	60.8	8,024

Table 4. Pahsimeroi Steelhead Spawn Data.

Lot #	Spawn Date	# Females	Total Eyed	Total Dead	Total Eggs	% Eye	Mean Fecundity
PAH							
TOTAL:	03/27	60	233,924	140,658	374,582	62.4	6,234

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 Argentyne 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 3-gallon bucket of water, then pouring them into a quarter-full bucket of water from about three feet high. One day after shocking, the eggs were machine-picked using a Jensorter model JM4 machine, which picks and enumerates eggs. A day or two after picking, the eyed-eggs were handpicked before transfer to the rearing hatcheries. The eggs were loaded at 50,000 to 100,000 eggs per 48-qt cooler of wellwater. Then the cooler was strapped shut and shipped.

Release of BY03

Due to a large Chinook salmon egg-take in 2002, no rearing space was available for acclimation of steelhead smolts. Hagerman NFH direct released BY03 steelhead smolts below the SFH 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 wellwater, 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			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	1,185,060	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	98	193	(2004)		
2000	2002	385,761	522	(2004)	(2005)		
2001	2003	1,105,169	(2004)	(2005)	(2006)		
2002	2004	821,415	(2005)	(2006)	(2007)		

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

Brood Year	Release Year	Number Released	Adult Returns ^a			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

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)

Hatchery Adult Returns

Brood Year	Release Year	Number Released	Adult Returns ^a				Total %
			3-year	4-year	5-year	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	(2004)	-	inc
2000	2002	385,761	476	(2004)	(2005)	-	inc
2001	2003	1,105,169	(2004)	(2005)	(2006)	-	inc
2002	2004	821,415	(2005)	(2006)	(2007)	-	inc

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

Hatchery Adult Returns

Brood Year	Release Year	Number Released	Adult Returns ^a				Total %
			3-year	4-year	5-year	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
<u>Nutrients (mg/L)</u>					
T. Ammonia as N	<0.01	0.02	0.027	0.043	0.045
T. NO ₂ + NO ₃ 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	NR0.019	<.003	
<u>Minerals (mg/L)</u>					
Sp. Conductance (umhos/cm)	168.0	159.0	167.0	157.0	135.0
Hardness as CaCO ₃	78.0	75.7	80.0	68.0	62.0
T. Alkalinity as CaCO ₃	77.5	75.2	79	74	63
Bicarbonate Alk. as CaCO ₃	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 SO ₄	5.23	5.50	12	5	<6
<u>Total Metals (ug/L)</u>					
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
<u>Miscellaneous</u>					
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.1. Sawtooth Fish Hatchery Water Quality Analysis of Well 1&2 Mix

	2002	1999
<u>Nutrients (mg/L)</u>		
Ammonia as N	<0.01	0.02
T. Phosphorus as P	0.012	7.60
<u>Minerals (mg/L)</u>		
Hardness	81.0	81.3
Alkalinity	79.0	85.7
Bicarbonate Alk. as CaCO3	79.0	85.7
<u>Total Metals (ug/L)</u>		
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
<u>Miscellaneous</u>		
T. Cyanide (mg/L)	<0.005	<0.005

Appendix C. Sawtooth Fish Hatchery Results of Disease Sampling.

BY02 Juvenile Chinook

Case #	Stock	Date	Data
03-190	Saw	06/10/03	No pathogens detected; VIRO 0/10, IHN 0/10, IPN 0/10
03-195	Saw	06/17/03	No pathogens detected; VIRO 0/5, BACTE 0/5
03-207	Saw	07/08/03	<i>Aeromonas sobria</i> 16/20; VIRO 0/20, FAT 0/20,
	Saw	07/08/03	<i>Pseudomonas putida</i> 4/20
03-475	Saw	11/04/03	No pathogens detected; VIRO 0/10, FAT 0/10, BACTE
0/10	04-126	Saw	03/16/04 WHD 1/20 VIRO 0/20, FAT 0/20, ELISA 0/20,

Return Year 2002 Chinook Broodstock

Including South Fork Chinook

Case #	Stock	Date	Data
02-423	Saw	08/03/02	No pathogens detected; VIRO 0/11,
02-361	Saw	08/12/02	No pathogens detected; VIRO 0/28, NAVHS 0/5
02-362	Saw	08/11/02	No pathogens detected; VIRO 0/6, NAVHS 0/1
02-363	Saw	08/12/02	No pathogens detected; VIRO 0/8, NAVHS 0/2
02-377	Saw	08/12/02	RS; ELISA 2/28 (LOW 2)
02-378	So. Fork	08/13/02	No pathogens detected; VIRO 0/5, NAVHS 0/1, ELISA 0/5
02-376	Saw	08/14/02	RS; VIRO 0/13, NAVHS 0/1, ELISA 1/13 (HIGH1)
02-379	Saw	08/17/02	No pathogens detected; VIRO 0/13, NAVHS 0/1
02-390	Saw	08/19/02	RS; VIRO 0/25, ELISA 8/25 (LOW 5, HIGH 3)
02-389	So. Fork	08/20/02	RS; VIRO 0/6, ELISA 1/6 (LOW 1)
02-392	Saw	08/22/02	BKD; VIRO 0/17, NAVHS 0/2, ELISA 16/17 (LOW 12, HIGH 4), PTD-WHD 0/15
02-405	So. Fork	08/23/02	RS; VIRO 0/5, NAVHS 0/3, ELISA 2/5 (LOW 1, HIGH 1)
02-403	Saw	08/26/02	BKD; VIRO 0/43, NAVHS 0/3, ELISA 12/43 (LOW 9, HIGH 3)
02-404	So. Fork	08/27/02	RS; VIRO 0/9, NAVHS 0/1, ELISA 1/9 (LOW 1)
02-406	Saw	08/28/02	No pathogens detected; VIRO 0/20, NAVHS 0/2
02-413	Saw	08/29/02	BKD; VIRO 0/40, NAVHS 0/4, ELISA 23/40 (LOW 20, HIGH 3)
02-414	So. Fork	08/29/02	PTD-WHD 0/5 IHN; IHN 2/8, IPNV 0/8, NAVHS 0/1, ELISA 3/5 (LOW 1, HIGH 2)
02-425	Saw	09/03/02	BKD; VIRO 0/15, NAVHS 0/7, ELISA 11/15 (LOW 10, HIGH 1)
02-426	So. Fork	09/03/02	BKD; VIRO 0/6, ELISA 1/3 (HIGH 1)
02-424	Saw	09/03/02	No pathogens detected; VIRO 0/4
02-433	Saw	09/05/02	RS; VIRO 0/14, NAVHS 0/3, ELISA 2/14 (LOW 2)
02-434	Saw	09/05/02	No pathogens detected; VIRO 0/8
02-443	Saw	09/09/02	No pathogens detected; VIRO 0/2 NAVHS 0/2, ELISA 0/2
02-444	Saw	09/09/02	IHN; IHN 1/8, IPNV 0/8
02-445	Saw	09/09/02	No pathogens detected; VIRO 0/35, NAVHS 0/4

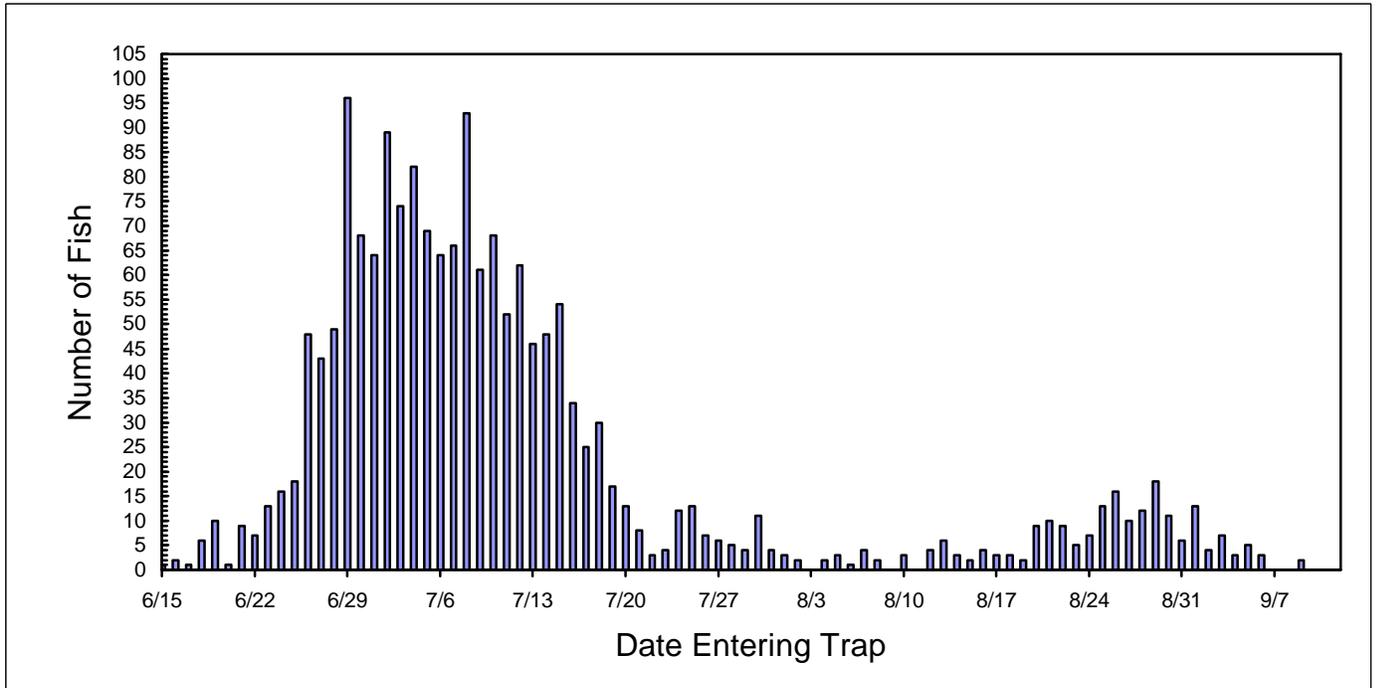
Return year 2003 Steelhead Broodstock

Case #	Stock	Date	Data
03-106	Saw-A	03/27/03	No pathogens detected; VIRO 0/17, NAVHS 0/9
03-107	Saw-A	03/31/03	No pathogens detected; VIRO 0/30, NAVHS 0/2
03-134	Saw-A	04/03/03	No pathogens detected; VIRO 0/35, NAVHS 0/4
03-135	Saw-A	04/07/03	No pathogens detected; VIRO 0/70, NAVHS 0/8

Appendix C. Continued

Return year 2003 Steelhead Broodstock			
Case #	Stock	Date	Data
03-139	Saw-A	04/10/03	No pathogens detected; VIRO 0/49, NAVHS 0/13
03-148	Saw-A	04/14/03	No pathogens detected; VIRO 0/64, NAVHS 0/6
03-150	Saw-A	04/17/03	No pathogens detected; VIRO 0/75, NAVHS 0/10
03-161	Saw-A	04/21/03	No pathogens detected; VIRO 0/80, NAVHS 0/10
03-164	Saw-A	04/24/03	No pathogens detected; VIRO 0/50, NAVHS 0/10
03-166	Saw-A	04/28/03	WHD; VIRO 0/20, FAT 0/60, PTD-WHD 4/25
03-171	Saw-A	05/01/03	No pathogens detected; VIRO 0/12, NAVHS 0/12
03-180	Saw-A	05/05/03	No pathogens detected; VIRO 0/8
03-146	EF-B	04/11/03	No pathogens detected; VIRO 0/9, NAVHS 0/2
03-181	EF-B	04/15/03	WHD; FAT 0/15, PTD-WHD 1/11
03-147	EF-B	04/15/03	No pathogens detected; VIRO 0/5, NAVHS 0/2
03-160	EF-B	04/18/03	No pathogens detected; VIRO 0/1
03-162	EF-B	04/22/03	No pathogens detected; VIRO 0/6
03-165	EF-B	04/25/03	No pathogens detected; VIRO 0/5, NAVHS 0/5
03-182	SC-B	04/11/03	BKD, WHD; FAT 1/16,PTD-WHD 213
03-170	SC-B	04/29/03	No pathogens detected; VIRO 0/1, NAVHS 0/1

Appendix D. Sawtooth Fish Hatchery Spring Chinook Run Timing – 2002.



Appendix E. Sawtooth Fish Hatchery Age Class Totals from All Trapped Chinook, Return Year 2002.

Sawtooth	Length (Fk)	Year class	Number
Males	≤ 64 cm	3-year old	98
	64-82 cm	4-year old	482
	> 82 cm	5-year old	304
Subtotal			884
Females	≤ 64 cm	3-year old	0
	64-82 cm	4-year old	476
	> 82 cm	5-year old	426
Subtotal			902
Total			1786

Appendix E.1. Sawtooth Fish Hatchery Spring Chinook Salmon Length Frequency Distribution for 2002.

MALES

TOTAL TRAPPED		HATCHERY PONDED		HATCHERY RELEASED		UNMARKED PONDED		UNMARKED RELEASED	
FL(CM)	NUMBER	FL(CM)	NUMBER	FL(CM)	NUMBER	FL(CM)	NUMBER	FL(CM)	NUMBER
39	0	39	0	39	0	39	0	39	0
40	0	40	0	40	0	40	0	40	0
41	0	41	0	41	0	41	0	41	0
42	1	42	0	42	1	42	0	42	0
43	0	43	0	43	0	43	0	43	0
44	2	44	0	44	2	44	0	44	0
45	2	45	0	45	1	45	0	45	1
46	4	46	1	46	3	46	0	46	0
47	2	47	0	47	2	47	0	47	0
48	5	48	0	48	2	48	0	48	3
49	2	49	0	49	2	49	0	49	0
50	4	50	0	50	4	50	0	50	0
51	4	51	1	51	3	51	0	51	1
52	5	52	0	52	4	52	0	52	1
53	12	53	2	53	8	53	0	53	2
54	5	54	0	54	4	54	0	54	1
55	7	55	1	55	5	55	0	55	1
56	5	56	1	56	2	56	0	56	2
57	6	57	0	57	3	57	0	57	3
58	3	58	0	58	2	58	0	58	1
59	3	59	0	59	2	59	0	59	1
60	5	60	0	60	1	60	0	60	4
61	4	61	2	61	0	61	0	61	2
62	1	62	0	62	1	62	0	62	0
63	5	63	0	63	1	63	0	63	4
64	11	64	1	64	4	64	0	64	6
65	3	65	2	65	1	65	0	65	0
66	9	66	3	66	0	66	0	66	6
67	15	67	0	67	6	67	2	67	7
68	10	68	1	68	1	68	1	68	7
69	18	69	2	69	3	69	1	69	12
70	30	70	2	70	8	70	1	70	19
71	26	71	6	71	4	71	2	71	14
72	40	72	2	72	11	72	0	72	27
73	38	73	4	73	10	73	0	73	24
74	24	74	5	74	5	74	2	74	12
75	36	75	5	75	9	75	4	75	18
76	34	76	3	76	8	76	1	76	22
77	38	77	7	77	8	77	2	77	21
78	34	78	6	78	10	78	5	78	13
79	37	79	5	79	10	79	1	79	21

Appendix E1. Continued.

80	34	80	8	80	18	80	0	80	8
81	34	81	8	81	8	81	1	81	17
82	22	82	5	82	2	82	1	82	14
83	24	83	6	83	9	83	2	83	7
84	20	84	6	84	6	84	0	84	8
85	23	85	2	85	5	85	0	85	16
86	16	86	3	86	8	86	0	86	5
87	14	87	5	87	4	87	0	87	5
88	15	88	2	88	4	88	0	88	9
89	9	89	1	89	4	89	1	89	3
90	15	90	9	90	1	90	0	90	5
91	13	91	3	91	3	91	0	91	7
92	8	92	0	92	2	92	1	92	3
93	11	93	3	93	2	93	0	93	6
94	8	94	0	94	2	94	0	94	6
95	9	95	1	95	0	95	1	95	7
96	9	96	2	96	1	96	1	96	5
97	6	97	0	97	1	97	0	97	5
98	13	98	1	98	0	98	1	98	11
99	7	99	0	99	0	99	0	99	7
100	21	100	4	100	2	100	1	100	14
101	9	101	0	101	0	101	2	101	7
102	12	102	0	102	1	102	0	102	11
103	11	103	1	103	0	103	0	103	10
104	7	104	0	104	0	104	1	104	6
105	7	105	0	105	1	105	1	105	5
106	9	106	0	106	0	106	0	106	9
107	3	107	0	107	0	107	0	107	3
108	3	108	0	108	0	108	0	108	3
109	2	109	0	109	0	109	0	109	2
TOTALS:	884		132		236		36		480

AGE 3 HATCHERY MALES RELEASED:	56
AGE 4 HATCHERY MALES RELEASED:	122
AGE 5 HATCHERY MALES RELEASED:	58
TOTAL HATCHERY MALES RELEASED:	236
AGE 3 HATCHERY MALES PONDED:	9
AGE 4 HATCHERY MALES PONDED:	74
AGE 5 HATCHERY MALES PONDED:	49
TOTAL HATCHERY MALES PONDED:	132

AGE 3 NATURAL MALES RELEASED:	33
AGE 4 NATURAL MALES RELEASED:	262
AGE 5 NATURAL MALES RELEASED:	185
TOTAL NATURAL MALES RELEASED:	480
AGE 3 NATURAL MALES PONDED:	0
AGE 4 NATURAL MALES PONDED:	24
AGE 5 NATURAL MALES PONDED:	12
TOTAL NATURAL MALES PONDED:	36

Appendix E.1. Continued.

FEMALES

TOTAL TRAPPED		HATCHERY PONDED		HATCHERY RELEASED		UNMARKED PONDED		UNMARKED RELEASED	
FL(CM)	NUMBER	FL(CM)	NUMBER	FL(CM)	NUMBER	FL(CM)	NUMBER	FL(CM)	NUMBER
55	1	55	0	55	1	55	0	55	0
56	0	56	0	56	0	56	0	56	0
57	0	57	0	57	0	57	0	57	0
58	1	58	0	58	1	58	0	58	0
59	1	59	0	59	0	59	0	59	1
60	0	60	0	60	0	60	0	60	0
61	1	61	0	61	0	61	0	61	1
62	0	62	0	62	0	62	0	62	0
63	1	63	1	63	0	63	0	63	0
64	1	64	0	64	0	64	0	64	1
65	0	65	0	65	0	65	0	65	0
66	4	66	0	66	3	66	1	66	0
67	5	67	1	67	1	67	0	67	3
68	5	68	0	68	3	68	0	68	2
69	8	69	3	69	1	69	2	69	2
70	8	70	3	70	5	70	0	70	0
71	5	71	0	71	5	71	0	71	0
72	18	72	4	72	9	72	0	72	5
73	21	73	6	73	10	73	1	73	4
74	32	74	5	74	18	74	0	74	9
75	45	75	15	75	20	75	1	75	9
76	40	76	8	76	24	76	1	76	7
77	63	77	8	77	33	77	2	77	20
78	42	78	8	78	22	78	1	78	11
79	63	79	17	79	27	79	2	79	17
80	43	80	9	80	14	80	5	80	15
81	37	81	7	81	22	81	2	81	6
82	31	82	7	82	14	82	0	82	10
83	37	83	13	83	12	83	1	83	11
84	22	84	5	84	7	84	0	84	10
85	23	85	8	85	8	85	0	85	7
86	23	86	10	86	5	86	0	86	8
87	20	87	7	87	6	87	0	87	7
88	25	88	7	88	6	88	1	88	11
89	26	89	15	89	6	89	2	89	3
90	47	90	15	90	9	90	2	90	21
91	29	91	16	91	4	91	3	91	6
92	33	92	8	92	3	92	1	92	21
93	25	93	7	93	3	93	1	93	14
94	29	94	9	94	0	94	2	94	18
95	16	95	3	95	0	95	1	95	12

Appendix E.1. Continued

96	15	96	4	96	2	96	0	96	9
97	17	97	6	97	4	97	0	97	7
98	15	98	3	98	0	98	0	98	11
99	15	99	6	99	1	99	1	99	7
100	4	100	0	100	0	100	0	100	4
101	3	101	1	101	0	101	0	101	2
102	2	102	0	102	0	102	0	102	2
103	1	103	0	103	0	103	0	103	0
104	0	104	0	104	0	104	0	104	0
105	0	105	0	105	0	105	0	105	0
106	0	106	0	106	0	106	0	106	0
107	0	107	0	107	0	107	0	107	0
108	0	108	0	108	0	108	0	108	0
109	0	109	0	109	0	109	0	109	0
110	0	110	0	110	0	110	0	110	0
TOTALS:	902		245		310		33		314

AGE 4 HATCHERY FEMALES RELEASED:	233
AGE 5 HATCHERY FEMALES RELEASED:	77
TOTAL HATCHERY FEMALES RELEASED:	310
AGE 4 HATCHERY FEMALES PONDED:	102
AGE 5 HATCHERY FEMALES PONDED:	143
TOTAL HATCHERY FEMALES PONDED:	245

AGE 4 NATURAL FEMALES RELEASED:	123
AGE 5 NATURAL FEMALES RELEASED:	191
TOTAL NATURAL FEMALES RELEASED:	314
AGE 4 NATURAL FEMALES PONDED:	18
AGE 5 NATURAL FEMALES PONDED:	15
TOTAL NATURAL FEMALES PONDED:	33

Appendix F. Sawtooth Fish Hatchery Age Class Breakdown by Released Chinook, Return Year 2002.

Sawtooth	Length (Fk)	Age Class	Number
Males	≤ 64 cm	3-year old	89
	64-82 cm	4-year old	384
	> 82 cm	5-year old	243
Total Males			716
Females	≤ 82 cm	4-year old	356
	> 82 cm	5-year old	268
Total Female			624
Total released			1340

Appendix G. Sawtooth Fish Hatchery Spring Chinook Spawning Matrix, 2002 return year.

Group	Sex	Number in Group
All Fish Combined	Male	152 (9 jacks)
	Female	194

Appendix H. Survival Table for Chinook (BY02) and Steelhead (BY03) from Green Eggs to Released Smolts, at Sawtooth Fish Hatchery and East Fork Sites.

CHINOOK				
Green egg Number	Eyed egg Number	Percent Survival	Released Smolts	Percent Survival From green

Sawtooth Fish Hatchery Fish

1,037,558	920,651	88.7	821,415	79.1
-----------	---------	------	---------	------

STEELHEAD				
Green egg Number	Eyed egg Number	Percent Survival		

Sawtooth Fish Hatchery eggs

2,807,840	2,363,746	84.2		
-----------	-----------	------	--	--

distributed as follows: 975,000 Hagerman NFH
 373,069 Shoshone-Bannock Streamside incubators
 480,000 Magic Valley FH
 718,935 culled

East Fork eggs

86,184	57,876 to Magic Valley FH	67.2		
--------	---------------------------	------	--	--

Squaw Creek eggs

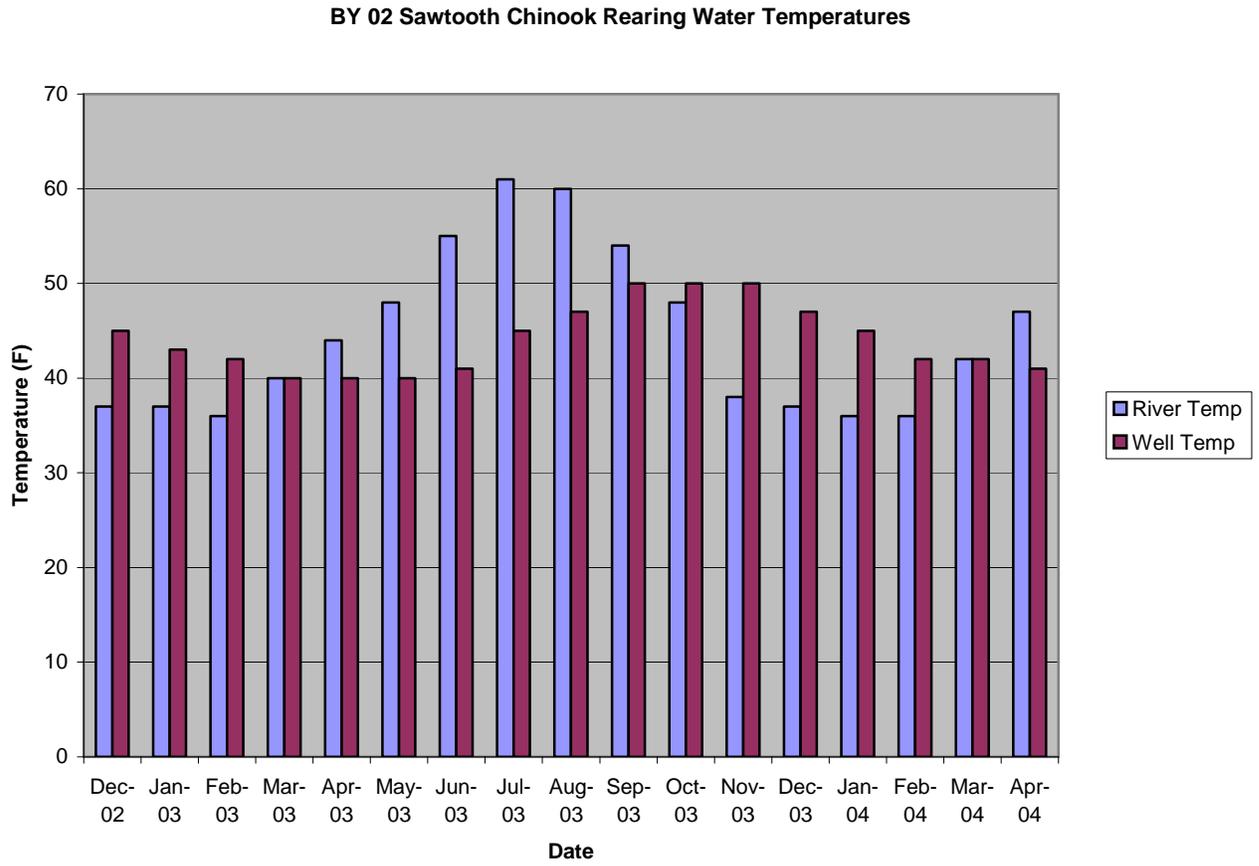
128,379	78,006 to Magic Valley FH	60.8		
---------	---------------------------	------	--	--

Pahsimeroi FH eggs

374,582	216,276 to Hagerman NFH 17,648 culled	62.4		
---------	--	------	--	--

All steelhead raised at other hatcheries.

Appendix I. Rearing Water Temperatures, BY02 Spring Chinook at Sawtooth Fish Hatchery.



Appendix I.1. Feed Schedule for Sawtooth/ Pahsimeroi Spring Chinook, BY02.

Fpp	% BW Fed	Feed Size	Timing
su-----800		.035	str., 1/32
800---500		.033	1/32
500---400		.025	3/64
400---350		.025	3/64
350---300		.023	3/64
300---250		.022	3/64
250---150		.024	3/64,1/16
150---110		.024	1/16
110----90		.025	1/16
90-----50		.022	1/16, 3/32
50-----17		.020	3/32
≤ -----17	Maintenance	3/32	10/01 - release

Appendix J. Summary of Marked Spring Chinook Released, Brood Year 2002.

Mark	Sawtooth Fish Hatchery Stock	
	Number Released	Location
AdClip/CWT	52,739 (Supplementation)	SFH Weir (4/13/04)
AdClip/CWT	53,420 (Reserve)	SFH Weir (4/13/04)
AdClip	255,759 (Supplementation)	SFH Weir (4/13/04)
Ad Clip	223,754 (Reserve)	SFH Weir (4/13/04)
Ad Clip	47,782 (BKD Supplementation)	SFH Weir (4/13/04)
CWT only	187,961 (ISS)	SFH Weir (4/13/04)

Total Release (PIT) 821,415(996)

Pahsimeroi Stock

Adipose Clip	639,477 (Reserve)
CWT	130,965 (ISS)
AdClip/CWT	71,635 (Reserve)
All 841,200 transferred to Pahsimeroi FH June 9 – 11, 2003	

Appendix K. Summary of Sawtooth Fish Hatchery Spring Chinook Smolt Releases, Brood Year 2002

Raceway	Number	Tag Code	Fish per Pound	Pounds	Designation
L1	87,605		20.2	3,904	.Supp.Res.
L2A	52,739		24.1	2,801	.Supp.Res.
L2B	63,874		18.2	2,565	.Supp.Res.
L3	104,280		19.2	4,413	.Supp.Res.
L4A	53,420		25.2	2,966	Reserve
L4B	66,101		20.0	2,912	Reserve
L5	48,492		25.8	2,760	Reserve
L6	109,161		20.3	4,878	Reserve
L7	93,950		23.1	4,771	Supp.
L8	94,011		21.7	4,498	Supp.
L14	47,782		22.8	2,404	.Supp. BKD
Total	821,415		20.9	38,872	

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

		<u>Steelhead</u>		<u>Sawtooth Fish Hatchery Stock BY03</u>	
<u>Mark</u>		<u># PIT</u>	<u># Fish</u>		<u>Release</u>
<u>Type</u>	<u>CWT Code</u>		<u>Released</u>	<u>Date</u>	<u>Site</u>
AD	none		668,414	04/16/04-05/05/04	Direct Release at SFH weir
AD/CWT	10-85-70	298**	88,193		
	10-86-70				
	10-87-70				
	10-88-70				
none	none	595	326,546	05/11/04-05/13/04	Yankee Fork
none	none	299	24,156	05/11/04-05/13/04	Valley Creek
AD	none		13,330	05/06/04	Lemhi River
TOTAL		1,192	1,120,639		

		<u>Steelhead</u>		<u>East Fork Stock BY03</u>	
<u>Mark</u>		<u># PIT</u>	<u># Fish</u>		<u>Release</u>
<u>Type</u>	<u>CWT Code</u>		<u>Released</u>	<u>Date</u>	<u>Site</u>
None	none	**	42,953	04/24/04	E. Fk Salmon River (above E Fk. Weir)
<u>Squaw Creek Upper Salmon River B Stock</u>					
AD	10/01/71		23,708	04/05 & 06/04	Squaw Pond
AD	10/02/71		22,590	04/05 & 06/04	Squaw Pond
AD	10/03/71		21,015	04/05 & 06/04	Squaw Pond
TOTAL			65,341		

** number PIT tagged available from IDFG, marking supervisor

Appendix L.1. Sawtooth Fish Hatchery Production Cost Table (Includes Chinook BY02, Steelhead BY03, and Sockeye BY02).

Chinook BY 02						
Smolt Number	Lbs. Feed	Cost Feed	Lbs of Smolts	Total Cost	Cost per 1,000	Cost per lb.
Sawtooth						
821,415	42,090	\$45,557	38,872	\$212,843	\$259	\$5.47
Pahsimeroi						
841,350	6,424	\$0*	6,534**	\$112,634	\$134	\$17.23

East Fork

No BY02 East Fork spring Chinook salmon were reared. Costs were incurred operating the trap.

Steelhead BY 03				
Green Stock	Eyed Eggs	Total Eggs	Cost	Cost per 1,000 eyed eggs
Sawtooth	2,807,840	2,363,746	\$92,648	\$39.19
Squaw Cr/EF	214,563	135,882	\$39,225	\$288.66
Pahsimeroi	374,582	216,276	\$15,321	\$70.84
Totals	3,396,985	2,715,904	\$147,194	

Sockeye BY 02				
Smolt Number	Lbs Smolts	Total Cost	Cost per 1,000	Cost per lb.
76,788	1,574	\$33,526	\$435.66	\$21.29

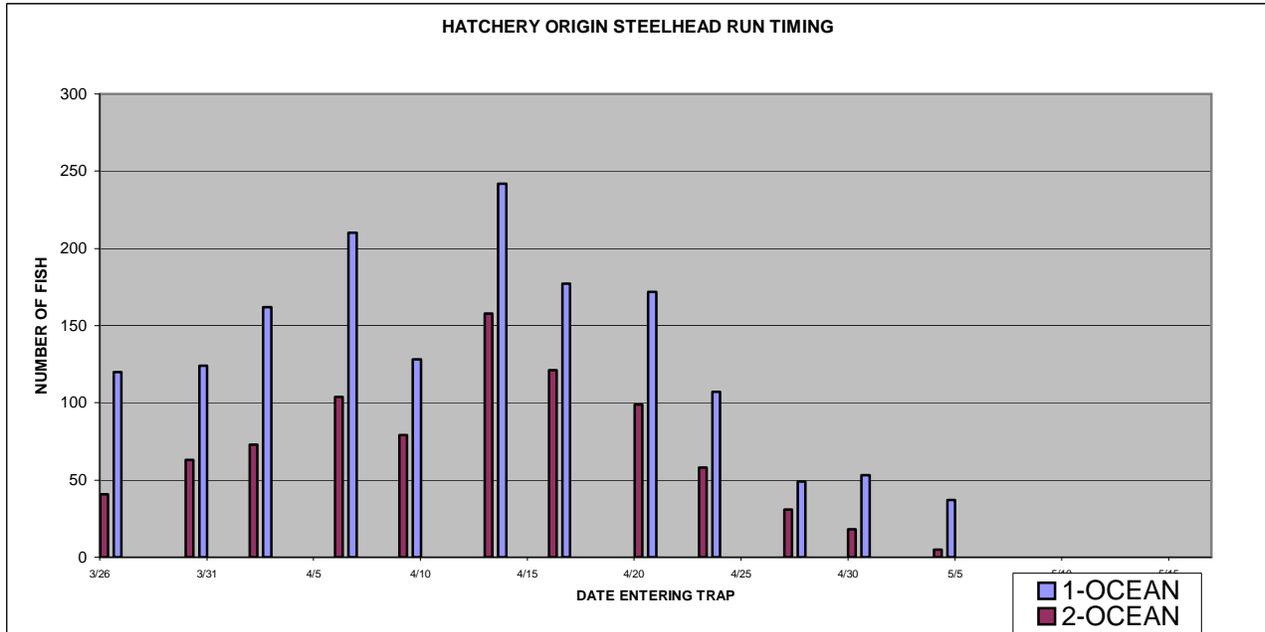
Note: Total costs less capital outlay. Costs include operating East Fork fish trap and running wells for entire rearing period. Costs are proportional species and stock.

* PFH purchased feed

** presmolts

Appendix M. Run Timing for Steelhead, Return Year 2003, Sawtooth trap.

2003 SAWTOOTH FISH HATCHERY STEELHEAD RUN TIMING HATCHERY ORIGIN STEELHEAD



2003 SAWTOOTH FISH HATCHERY STEELHEAD RUN TIMING NATURAL ORIGIN STEELHEAD



Appendix N. Steelhead Returns by Year Class and Sex, Return Year 2003

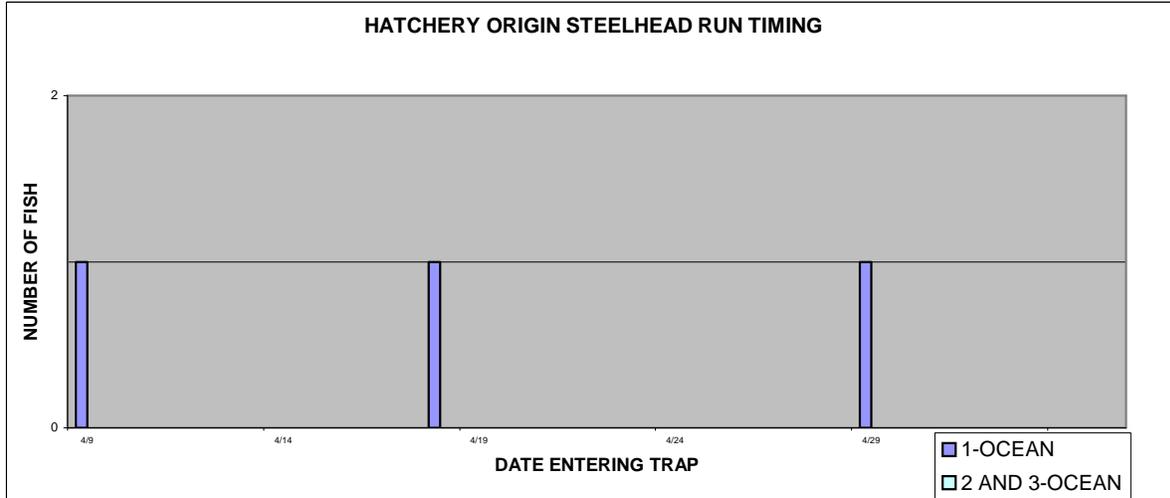
FK.LN (cms)	NATURALS (RELEASED)		HATCHERY (ADIPOSE CLIPS)		HATCHERY (OTHER MARKS)		FK.LN (in)
	Male	Fem	Male	Fem	Male	Fem	
50	0	0	1	0	0	0	19.7
51	0	0	4	1	1	0	20.1
52	0	0	2	3	0	0	20.5
53	0	0	8	6	1	0	20.9
54	0	0	15	16	2	0	21.3
55	0	1	28	33	3	1	21.7
56	0	1	58	55	2	5	22.0
57	0	0	54	64	1	3	22.4
58	0	0	98	95	12	7	22.8
59	1	0	112	92	4	5	23.2
60	0	1	140	84	6	3	23.6
61	0	1	124	63	3	3	24.0
62	2	0	101	38	11	0	24.4
63	0	0	65	25	3	1	24.8
64	0	0	42	9	1	1	25.2
65	0	0	32	3	0	3	25.6
66	0	0	13	11	2	5	26.0
67	3	0	12	21	1	7	26.4
68	0	0	7	33	1	14	26.8
69	0	1	5	38	1	21	27.2
70	2	2	9	65	3	35	27.6
71	0	0	7	45	4	18	28.0
72	1	2	9	69	6	30	28.3
73	0	1	15	70	4	22	28.7
74	2	1	11	47	8	22	29.1
75	0	2	14	23	7	11	29.5
76	1	1	16	13	9	5	29.9
77	1	0	12	14	3	1	30.3
78	1	0	16	10	4	0	30.7
79	0	1	10	2	1	1	31.1
80	0	1	6	3	1	1	31.5
81	0	0	1	1	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	2	0	0	0	33.1
85	0	0	0	0	0	0	33.5
TOTALS	14	16	1049	1052	105	225	

Appendix N. Continued

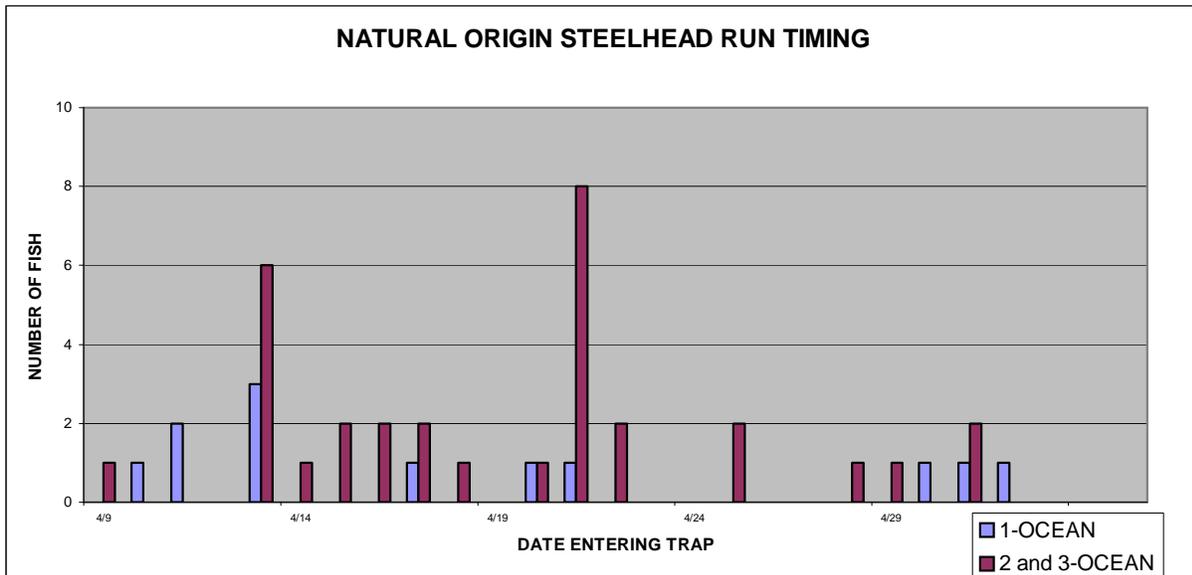
AGE-CLASS OF ADULTS	MALES		FEMALES		TOTAL	
	No.	%	No.	%	No.	%
HATCHERY 1-OCEANS	962	83.4	619	48.5	1581	65.0
HATCHERY 2-OCEANS	192	16.6	658	51.5	850	35.0
NATURAL 1-OCEANS	6	42.9	4	25.0	10	33.3
NATURAL 2-OCEANS	8	57.1	12	75.0	20	66.7
TOTAL 1-OCEANS	968	82.9	623	48.2	1591	64.6
TOTAL 2-OCEANS	200	17.1	670	51.8	870	35.4

Appendix O. Run Timing for Steelhead, Return Year 2003, East Fork Trap.

2003 EAST FORK STEELHEAD RUN TIMING HATCHERY ORIGIN STEELHEAD



2003 EAST FORK STEELHEAD RUN TIMING NATURAL ORIGIN STEELHEAD



Appendix P. East Fork Trap Steelhead Length Frequency Distribution, Return Year 2003.

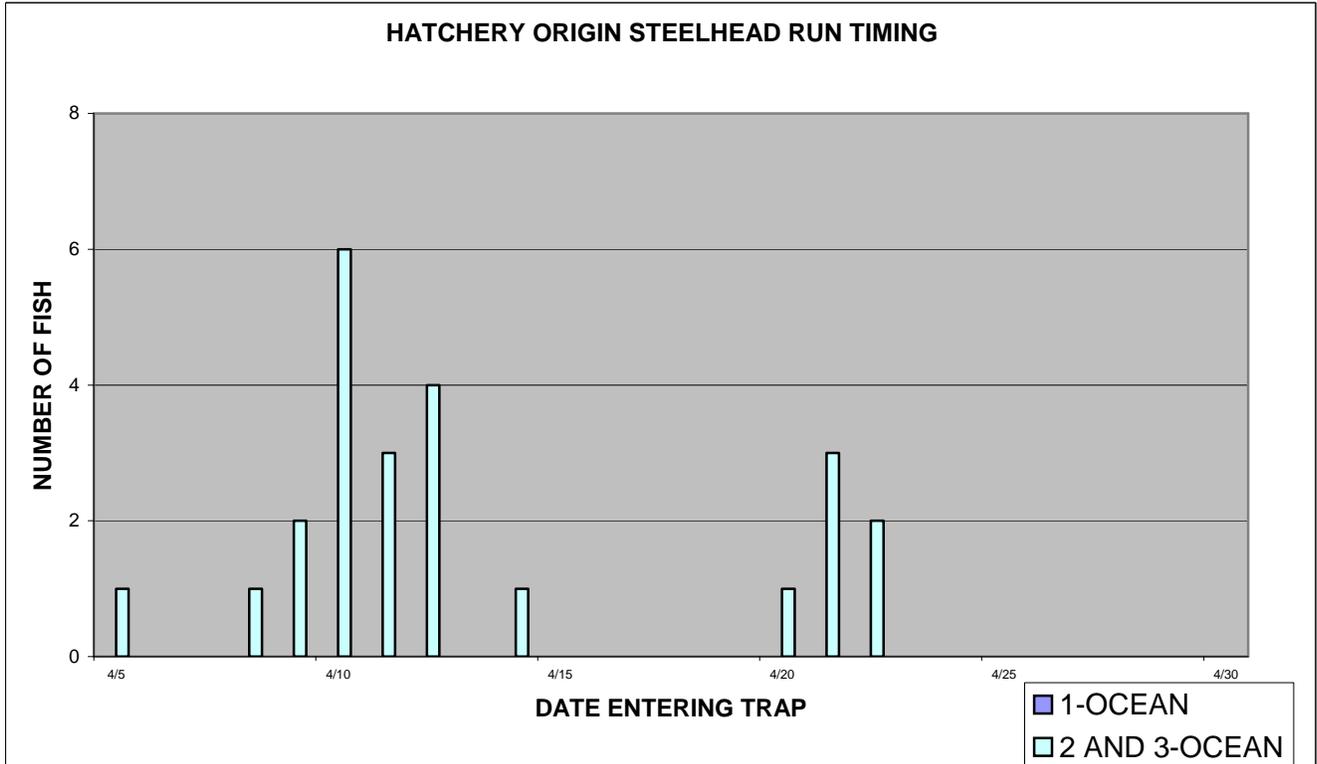
FK.LN (cms)	NATURALS (RELEASED)		HATCHERY (ADIPOSE CLIPS)		HATCHERY (OTHER MARKS)		FK.LN (in)
	Male	Fem	Male	Fem	Male	Fem	
50	0	0	0	0	0	0	19.7
51	0	1	0	0	0	0	20.1
52	0	0	0	0	0	0	20.5
53	0	0	0	0	0	0	20.9
54	0	0	0	0	0	0	21.3
55	0	0	0	0	0	0	21.7
56	0	0	1	0	0	0	22.0
57	0	0	0	0	0	0	22.4
58	0	0	0	0	0	0	22.8
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	1	1	0	0	0	24.4
63	1	0	0	0	0	0	24.8
64	0	0	0	0	0	0	25.2
65	1	1	0	0	1	0	25.6
66	2	2	0	0	0	0	26.0
67	0	0	0	0	0	0	26.4
68	0	1	0	0	0	0	26.8
69	0	1	0	0	0	0	27.2
70	0	0	0	0	0	0	27.6
71	0	1	0	0	0	0	28.0
72	0	1	0	0	0	0	28.3
73	2	0	0	0	0	0	28.7
74	0	1	0	0	0	0	29.1
75	1	1	0	0	0	0	29.5
76	0	1	0	0	0	0	29.9
77	1	3	0	0	0	0	30.3
78	1	6	0	0	0	0	30.7
79	0	6	0	0	0	0	31.1
80	1	1	0	0	0	0	31.5
81	0	0	0	0	0	0	31.9
82	0	2	0	0	0	0	32.3
83	2	0	0	0	0	0	32.7
84	0	0	0	0	0	0	33.1
85	2	0	0	0	0	0	33.5
TOTALS	14	30	2	0	1	0	

Appendix P. Continued

AGE-CLASS OF ADULTS	MALES		FEMALES		TOTAL	
	No.	%	No.	%	No.	%
HATCHERY 1-OCEANS	3	100.0	0	0	3	100.0
HATCHERY 2-OCEANS	0	0.0	0	0	0	0.0
NATURAL 1-OCEANS	6	42.9	6	20.0	12	27.3
NATURAL 2-OCEANS	8	57.1	24	80.0	32	72.7
TOTAL 1-OCEANS	9	52.9	6	20.0	15	31.9
TOTAL 2-OCEANS	8	47.1	24	80.0	32	68.1

Appendix Q. Run Timing for Steelhead, Return Year 2003, Squaw Creek Trap.

2003 SQUAW CREEK TRAP RUN TIMING HATCHERY ORIGIN STEELHEAD



Appendix R. Squaw Creek Trap Length Frequency Distribution, Return Year 2003.

FK.LN (cms)	NATURALS (RELEASED)		HATCHERY (ADIPOSE CLIPS)		HATCHERY (OTHER MARKS)		FK.LN (in)
	Male	Fem	Male	Fem	Male	Fem	
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	0	28.3
73	0	0	0	0	0	0	28.7
74	0	0	0	0	0	0	29.1
75	0	0	0	1	0	0	29.5
76	0	0	0	0	0	0	29.9
77	0	0	0	3	0	0	30.3
78	0	0	1	2	0	0	30.7
79	0	0	0	2	0	0	31.1
80	0	0	0	3	0	0	31.5
81	0	0	3	2	0	0	31.9
82	0	0	1	0	0	0	32.3
83	0	0	0	1	0	0	32.7
84	0	0	0	1	0	0	33.1
85	0	0	0	0	0	0	33.5
86	0	0	0	1	0	0	33.9
87	0	0	2	0	0	0	34.3
88	0	0	1	0	0	0	34.6
TOTALS	0	0	8	16	0	0	

Appendix R. Continued.

AGE-CLASS OF ADULTS	MALES		FEMALES		TOTAL	
	No.	%	No.	%	No.	%
HATCHERY 1-OCEANS	0	0.0	0	0.0	0	0.0
HATCHERY 2-OCEANS	8	100.0	16	100.0	24	100.0
NATURAL 1-OCEANS	0	0.0	0	0.0	0	0.0
NATURAL 2-OCEANS	0	0.0	0	0.0	0	0.0
TOTAL 1-OCEANS	0	0.0	0	0.0	0	0.0
TOTAL 2-OCEANS	8	100.0	16	100.0	24	100.0

Appendix S. Fish Health Autopsy Results

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 FOURTH 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			
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

SEX	20	M: 0	20	F: 0	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
-----	----	------	----	------	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

GENERAL REMARKS:

FINS: GONADS:
 SKIN: OTHER: Fish at 22 FPP

Submitted by:

Approved by:

**Brent R. Snider
Fish Hatchery Manager II**

**Roger Elmore
Assistant Hatchery Manager**

**Mel Hughes
Fish Culturist**

**Holly Lehman
Fish Culturist**

**Doug Munson
Fish Health Pathologist**

**Virgil K. Moore, Chief
Fisheries Bureau**

**Tom Rogers
Anadromous Fish Hatcheries Supervisor**