



**SAWTOOTH FISH HATCHERY  
and  
EAST FORK SATELLITE**

**2000 Spring Chinook Brood Year Report  
2001 Steelhead Brood Year Report**

**By**

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## 2000 SPRING CHINOOK SALMON

### ABSTRACT

The Sawtooth Fish Hatchery trap and weir were put into operation on May 30, 2000 and operated through September 25, 2000. A total of 986 spring chinook salmon *Oncorhynchus tshawytscha* were trapped (358 males, 252 females and 376 jacks). Released above the weir to spawn naturally were 525 fish (275 unmarked males, 116 unmarked and 43 marked females, and 91 unmarked jacks). There were five pre-spawning mortalities.

Spawning began on August 14 and continued through September 14, with nine spawning days. We spawned 89 females, 81 males and 84 jacks that produced 454,355 green eggs (5,163 eggs per female), which yielded 420,733 eyed-eggs for an eye-up rate of 93%. From these eyed-eggs, 402,777 fry were ponded which resulted in a smolt release of 385,761 smolts.

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## **INTRODUCTION**

### **Funding Source**

The Sawtooth Fish Hatchery (SFH) is part of the Lower Snake River Compensation Plan (LSRCP) and has been in operation since 1985. The hatchery and satellite facility were built by the US Army Corp of Engineers (USACE) and are 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 grounds 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. Sawtooth Fish Hatchery steelhead are released at the hatchery, along the lower Salmon, and at various other drainages around the state.

Sawtooth Fish Hatchery has operated a satellite facility on the East Fork of the Salmon River since 1984. The facility is situated eighteen miles upstream on the East Fork 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 (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**

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

The East Fork facility handles spring chinook salmon as well as B-run steelhead trout. The green eggs from fish spawned at the East Fork station are transferred to 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 (NMFS) prescribes fish handling for chinook salmon under permits # 919 and # 920. All unmarked steelhead are released along with enough marked hatchery fish to ensure pairing of adults. All chinook salmon trapping has been discontinued at the East Fork. 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 Appendices A and 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. Produce 2.4 million smolts for release, of which up to one million of the East Fork-origin smolts will be returned to the East Fork of the Salmon River.
2. Produce quality fish for supplementation programs.
3. Implement research programs at the hatchery to improve returns to the hatchery.

## **FACILITY DESCRIPTION**

### **Hatchery Description**

The hatchery's main building is 134-ft 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 feed freezer/chemical equipment room. The hatchery has four pump houses (each is 14-ft x 11-ft). One is for domestic water and three are production wells. An intake building (15-ft x 37-ft) is located one-half mile upstream from the hatchery and Salmon River water is collected for outside production rearing. The temporary employee dorm and adult spawning facility are located 300 yards downstream of the hatchery building. The dorm (38-ft x 72-ft) has three bedrooms with bath in each, attached public restroom facilities, storage and laundry room, living and dining room with an open kitchen. The adult facility consists of three adult ponds as well as an enclosed spawning shed (35-ft x 52-ft). There are five resident houses at Sawtooth, all about 1,360 sqft 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 a residence while the trap is in operation. The other building is a combination shop, storage and spawning shed (22-ft x 44-ft).

### **Production Capabilities**

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

Production capacities for 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, 6 inside 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 the capacity to raise 100,000 chinook to smolt stage for a total capacity of 2.8 million fish. These production raceways are serial re-use that flow 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, repairing gabions at the river intake, installing fence around outside raceways for predator control, and seal coating hatchery roadways.

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**

The SFH receives fish culture water from the Salmon River and from 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 pathogen free water, for spawning and egg hardening. No fish are reared at the East Fork trap.

### **Quantity and Temperature**

The SFH wells provide 3.1 cfs of pumped water and temperatures range from 39°F in the winter to 52°F in the summer. The Salmon River provides up to 55 cfs of gravity-flow water and ranges in temperature from 32°F in the winter to 68°F 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 SFH: a Hatchery Manager II; an Assistant Hatchery Manager; a Utility Craftsman and two Fish Culturists.

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

## FISH HEALTH

### Diseases Encountered and Treatment

Disease section written by A. Doug Munson, Eagle Fish Health Laboratory Anadromous Fish Pathologist. Brood year 2000 chinook were found to be infested with *Costia* (*Ichthyobodo* sp.) in July of 2001 and were successfully treated with a single application of formalin at 167 parts per million (ppm) for one hour. A pseudomonad was found as a secondary infection with the *Ichthyobodo*, but this did not warrant a medicated feed treatment. As the ice in the raceways thawed in late February 2002, mortalities were found to be elevated in large raceway 8. A concomitant infection of Infectious Hematopoietic Necrosis Virus (IHNV) and bacterial coldwater disease *Flavobacterium psychrophilum* (BCD) was found to be the source of mortality. Oxytetracycline-medicated feed was applied for 14 days under Investigational New Animal Drug INAD 9332. Little relief from mortalities was realized from the medicated feed application. *Renibacterium salmoninarum* was found via Enzyme Linked Immunosorbent Assay (ELISA) technology in both brood and juvenile chinook. Two prophylactic treatments of erythromycin-medicated feed (target dose of 100 mg/kg/day for 28 days) were applied to all juvenile chinook and an intra-peritoneal injection of erythromycin (20 mg/kg) was applied to all returning adult chinook. As in past years, *Myxobolus cerebralis* was found in brood and juvenile chinook.

Acute losses were not realized during any epizootic mentioned in the section titled "Diseases Encountered and Treatments". This epizootic produced chronic levels of mortality. Losses ranged from approximately 80 to 287 per day. The mortality rate was over 0.1% for more than five consecutive days March 3, 2002 through March 11, 2002 and April 3, 2002 through April 8, 2002. Three times, mortality was higher than the 0.1% for five consecutive days, which by Integrated Hatchery Operations Team (IHOT) standards, directs participating agencies to destroy the fish of IHNV-infected raceways. These fish were categorized as "supplemental," thus allowing the Idaho Department of Fish and Game (Department) to release these fish instead of destroying them. It is assumed that the IHNV was brought to the upper Salmon River by allowing the Nez Perce Tribe (NPT) to bring a group of Rapid River spring chinook from Lookingglass Hatchery in Oregon to Sawtooth Hatchery in 1997. Subsequent DNA analysis placed the virus isolate with the IHNV normally found at Lookingglass Hatchery. Prior to release, these fish were found to have 16/60 positive for IHNV, while the sockeye in an adjacent raceway had a prevalence of 0/60 (Appendix C).

In the future, the Department must be aware of the potential introduction of exotic pathogens into the water sources of their hatcheries and provide adequate analysis and protection. Eagle Fish Health Laboratory (EFHL) must advance the viral sampling to include 100% of all brood female salmon and steelhead by ovarian fluid samples and increase inspection sampling of fry and juvenile salmon. Wild and feral populations should be sampled to ascertain IHNV prevalence in Sawtooth's water source. Viral culling program for salmon and steelhead brood programs should be implemented. Culling parameters should be based on virus titer. Wellwater supply at this facility to accommodate extended specific pathogen free (SPF) rearing should be increased. Introduction of fish to outside raceways should be timed after risk of horizontal transmission from wild/feral fish has diminished.

## **FISH PRODUCTION**

### **Spring Chinook Adult Collection**

The SFH chinook trapping season began on May 30, 2000 and continued through September 25, 2000. The peak of the run occurred the week of June 27, 2000 (Appendix D). A total of 986 spring chinook salmon were trapped including 358 males, 252 females and 376 jacks (Appendices E and E.1). Released above the weir were 525 salmon (including 275 unmarked males, 116 unmarked and 43 marked females, and 91 unmarked jacks) Appendix F. There were 250 Coded Wire Tag (CWT) fish recoveries, and 16 Passive Integrated Transponder (PIT) detections. Sawtooth Hatchery had a male/female ratio of 74% male and 26% female.

The East Fork trap was not in operation in 2000.

A total of 376 three-year-old, 500 four-year-old, and 110 five-year-old fish returned to Sawtooth Fish Hatchery.

### **Adult Treatments**

Sawtooth Fish Hatchery 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 five pre-spawning mortalities (two males, two females and one jack).

### **Spawning Operations**

Spawning activities at SFH began on August 14 and concluded September 14, 2000. The nine egg-takes during this period yielded 454,355 green eggs from 88 females for an average fecundity of 5,163 eggs per female (one female was culled due to zero percent eye-up). There were 81 male and 84 jack salmon used for fertilization. Each female's eggs were separated into two groups. The sperm from one male fertilized each group of eggs. Spawning crosses were determined by mark and age-class (Appendix G). The two groups were then recombined and water-hardened for one hour in a 100-ppm titratable iodine solution. The eggs were then put into Heath incubator trays, with one female per tray for BKD segregation.

## **Incubation**

Each eight-tray Heath stack had flows set at 5 gpm of wellwater. Eggs were put away at one female per tray for BKD segregation. This averaged 5,163 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.

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 Brood Year 2000 Sawtooth eggs, the hatchery incubated 578,046 eyed Pahasimeroi summer chinook eggs from 123 females.

Sawtooth Fish Hatchery green eggs eyed up at a 92.6% rate, yielding 420,733 eyed eggs (Appendix H).

## **Early Rearing**

The SFH stock swim-up fry were transferred from the Heath trays to vats containing 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 Soft Moist Starter and 1/32, and initially fed by hand. Feed amounts and sizes varied according to manufacturer recommendations as the fish grew. Automatic belt feeders were used once the fry exhibited a good feed response. All fish were fed a 28-day prophylactic treatment of BioOregon erythromycin-medicated feed during May and June at a rate of 4.5 grams active/100 lbs of fish. The fish were transferred outside for final rearing in May, June and July.

## **Final Rearing**

The Sawtooth spring chinook were placed into the upper sections of six large raceways. Initial densities were 0.03 lbs/cuft and water flows were 660 gpm. Three raceways were set up as NATURES Raceways and three raceways were set up as controls for a natural rearing experiment. The NATURES Raceways contained camouflage netting to simulate under-cut banks, the bottoms were painted with six colors to simulate the natural stream bottoms, and suspended trees were used to simulate cover. Past scientific research indicates that hatchery smolts may perform better if exposed to some type of natural rearing (Appendix K).

All outside fish were fed Rangen's Soft Moist grower feed. Two 28-day prophylactic BioOregon erythromycin-medicated feed treatments were fed in August and September of 2001. It was administered at a rate of 4.5 grams active per 100 lbs of fish, to prevent the onset of BKD.

The finish weight of the Brood Year 2000 Sawtooth chinook smolts was 24,916 lbs. The fish were fed 28,417 lbs of feed for a conversion rate of 1.14. A synopsis of feeding regimes can be found in Appendix H.1.

### **Fish Marking**

Fish marking occurred from May 14 to 24, and September 24 and 25, 2001. All fish received CWTs, and 269,936 reserve fish received an ad-clip. NATURES and control raceways received different tag codes. In addition, 1,500 fish were PIT-tagged in March 2002. The PIT tags were used to evaluate downriver migration (Appendices J and K).

### **Fish Distribution**

Fish releases for Sawtooth stock Brood Year 2000 smolts occurred on April 9, April 19 and April 23, 2002. A total of 385,761 fish were released into the Salmon River at the SFH weir. The fish were released in the evening through the outside raceway tailrace pipe. Production costs for Brood Year 2000 smolts can be found in Appendix L.1.

## **SOUTH FORK SUMMER CHINOOK**

During 2000, the SFH received marked adult summer chinook salmon from the South Fork Salmon River trap. These fish were held and spawned at Sawtooth to provide eyed-eggs to the Shoshone Bannock Tribe (SBT) streamside incubator program. Spawning began on August 14 and ended on September 7, over a total of seven spawn days. A total of 71 females were spawned. Eggs from 53 females were kept which produced 207,572 green eggs. Eggs from 18 females were culled (approximately 90,000) due to high ELISA BKD values. The green eggs that were kept eyed-up at a 92.4% rate, yielding 191,734 eyed eggs. The eyed-eggs were shipped to the SBT on seven different days from September 19 to October 3.

## **PAHSIMEROI CHINOOK**

Sawtooth Hatchery reared Pahsimeroi Hatchery's Brood Year 2000 summer chinook due to a lack of space and pathogen free water at Pahsimeroi. Twelve lots of eyed-eggs were brought to SFH between September 25 and October 27, 2000. A total of 578,046 eggs were incubated. After dead egg pickoff and culling, the number at ponding amounted to 521,706 (430,271 reserve and 91,435 supplementation) for a 90% survival from eyed-eggs to ponding.

The Pahsimeroi Fish Hatchery stock swim-up fry were transferred from the Heath trays to vats containing 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. Pahsimeroi fish were moved to four outside raceways by truck on March 12 and 13, 2001. The fish averaged 2.06 inches and 374 fpp at time of moving.

All Pahsimeroi fish received a 28-day prophylactic erythromycin-medicated feed treatment beginning May 7 and ending June 3, 2001.

The supplementation fish (90,113) were CWTd the week of September 24, 2001 and the reserve fish (419,869) were ad-clipped at the same time.

On October 1, 2 and 3, 2001, all Pahsimeroi fish were returned to Pahsimeroi Fish Hatchery. The resulting inventory number was a total of 509,571 fish (90,016 CWT supplementation and 419,555 ad-clipped reserve). A total of 20,165 lbs of fish were shipped for an average of 25.2 fpp. Total feed fed was 24,183 lbs for an overall conversion of 1.2.

## **SOCKEYE SALMON**

Sawtooth Fish Hatchery received an estimated 107,073 eyed Redfish Lake sockeye eggs from Big Beef (NMFS) and Eagle Fish hatcheries in five shipments between November 21 and December 15, 2000. The eggs arrived with approximately 460 Celsius Temperature Units (CTU). At 910 to 950 CTUs fry were ponded into eight one-meter semi-square rearing tanks. Initial water flows were set at three gpm.

Eyed-egg to ponding survival was 92.8%, and yielded 99,422 fry. All fry were started on BioProducts #1 BioDiet Starter. Feed size was increased in accordance to BioProducts recommendation, with the exception that 20% of the feed was one size smaller to assure smaller fish would get adequate amounts of feed. As densities reached 4 lbs/gpm, fish were transferred to five two-meter fiberglass tanks with initial flows set at ten gpm.

In late July 2001, 6,080 fish were ad-clipped, RV-clipped and released into Pettit and Alturas lakes. Pettit Lake received 3,001 (116 fpp) and Alturas Lake received 3,079 (116 fpp).

All of the remaining Brood Year 2000 sockeye were transferred to inside vats in June. Ad marking of fall release groups, and ad/CWT marking of the smolt release group occurred during the week of September 26, 2001. Fall releases of ad-clipped fish occurred on October 9, 2001. Redfish Lake received 41,529 ad-clipped fish at 33 fpp, Alturas Lake received 5,990 ad-clipped fish at 33 fpp, and Pettit Lake received 4,993 ad-clipped fish at 33 fpp. Total fall release was 52,512.

On October 11, 2001 the remaining 38,946 AD/CWT fish were moved to an outside raceway and overwintered on raw river water. On May 7, 2002 a total of 38,673 smolts were released into the Salmon River. The fish averaged 16.45 fish per pound (fpp). The entire group of Brood Year 2000 sockeye was fed 3,175 lbs of feed during rearing at Sawtooth for an overall conversion of 1.4.

## 2001 STEELHEAD TROUT

### ABSTRACT

The SFH trap and weir were put into operation on March 19, 2001 and closed May 3, 2001. A total of 3,055 adult steelhead *Oncorhynchus mykiss* (1,689 males and 1,366 females) were trapped at the SFH weir. A total of 1,406 steelhead were released. This included 682 males (24 natural) and 724 females (13 natural). There were two pre-spawning mortalities at SFH.

Spawning began at SFH on March 26, 2001 and continued through May 3, 2001, with 12 spawning days. A total of 633 females were spawned with 633 males, yielding 2,867,634 green eggs for an average fecundity of 4,707 eggs per female. These green eggs yielded 2,300,978 eyed-eggs for an eye-up percentage of 80%.

The East Fork velocity barrier and trap were put into operation March 23, 2001 and ran through May 11, 2001. A total of 62 adult B-run steelhead were trapped. This included 25 males and 37 females. Fish released above the weir to spawn naturally included five males and five females. There were no pre-spawning mortalities.

East Fork spawning operations began on April 3, 2001 and continued through May 4, 2001, with 9 spawning days. A total of 30 females were spawned with 20 males, yielding 142,348 green eggs, for an average fecundity of 4,565 eggs per female. These green eggs yielded 81,647 eyed-eggs for a 58% eye-up rate. These eggs were shipped to Magic Valley Hatchery for rearing.

A temporary weir was installed on Squaw Creek on March 23, 2001. The trap at Squaw Creek Pond was put into operation the same day and operated until April 25, 2001. No B-run sized fish were handled and no spawning occurred.

There were 535,258 green eggs from Pahsimeroi Hatchery incubated at Sawtooth. These eggs eyed-up at a 75% rate, yielding 400,289 eyed-eggs.

The Sawtooth and East Fork stock eyed-eggs were released as smolts by their respective rearing hatcheries during the spring of 2002. Hagerman National Fish Hatchery stocked 781,706 direct release smolts (4.33 fpp) at the Sawtooth Fish Hatchery weir. East Fork stock smolts numbering 94,440 at 4.79 fpp were mixed with Dworshak smolts and released below Squaw Creek Pond.

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## FISH PRODUCTION

### Steelhead Adult Collection

The SFH weir and trap were put into operation on March 19, 2001 and closed May 3, 2001. The East Fork trap was put into operation March 28, 2001 and closed May 11, 2001. The Squaw Creek weir and trap were put into operation on March 23, 2001 and were closed on April 25, 2001. The peak of the SFH steelhead *Oncorhynchus mykiss* run occurred during the third week of April and the peak of the East Fork run occurred during the second week of April. Run timing was not determined for the Squaw Creek trap (Appendix M).

Sawtooth Fish Hatchery trapped a total of 3,055 adult fish, which included 1,689 males and 1,366 females (Appendix N). All fish were scanned for CWTs. Information regarding the CWT fish was not available. A total of 1,406 steelhead, 682 males (24 natural) and 724 females (13 natural) were released (Appendix N.1). Of the released fish, 24 males (all natural), and 24 females (13 natural) were released immediately above the weir. Some adult fish were released as part of supplementation studies conducted by Alan Byrne, Department Research Biologist. These hatchery fish (20 males and 20 females) were placed into Beaver Creek, and 20 males and 20 females were released into Frenchman Creek. Twenty pairs of hatchery fish were also released into Fourth of July and Champion creeks and into the Salmon River at the Vienna pullout. An additional 558 hatchery males and 600 hatchery females (surplus to broodstock needs) were opercle-punched and released downriver from the hatchery into the Salmon River at O'Brien Bridge to be recycled through the fishery. A total of 118 fish were re-trapped (94 male, and 24 female) and were not re-counted as new fish trapped.

The East Fork facility trapped 62 B-run adult fish, 25 males and 37 females (Appendix N). A total of 5 males (3 natural) and 5 females (all natural) were released above the velocity barrier to spawn naturally (Appendix N.1). All fish were scanned for CWTs. Information regarding the CWT fish was not available.

The Squaw Creek facility trapped four marked A-run sized steelhead. No B-run sized fish were handled. The four A-run sized fish were opercle-punched and released back into the Salmon River.

Length frequency distributions of trapped steelhead at Sawtooth and the East Fork are shown in Appendices O and P.

Sawtooth Fish Hatchery had a male/female ratio of 55% males and 45% females. The East Fork's male/female ratio was 40% male and 60% female. No ratio was established for Squaw Creek.

Specific information obtained from CWT fish at both Sawtooth Fish Hatchery and the East Fork facility was not available. However, released steelhead by adult year-class and sex are shown in Appendix Q, with length criteria established by Department personnel using historical return data (Appendix R).

### **Prespawning Mortality**

There were two female pre-spawning mortalities at SFH in 2001.

### **Spawning Operations**

Sawtooth Fish Hatchery spawned steelhead on 12 days from March 26 through May 3. Spawning took place at the East Fork on 9 days from April 3 through May 4. The fish trapped at Squaw Creek were not spawned.

At Sawtooth 1,266 fish were spawned, 633 of which were females. The East Fork facility spawned 50 fish, 30 of which were females. 2,867,634 green eggs were collected from SFH fish (4,707 per female) and 142,348 green eggs were taken from East Fork fish (4,565 per female).

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

### **Incubation**

After hardening in the Argentyne solution the green eggs were put away at two females eggs per Heath tray.

There were 535,258 green eggs received from 100 females (5,353 per female) from Pahsimeroi Hatchery that were incubated at Sawtooth. These eggs were incubated at three females 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. Sawtooth's eggs eyed-up at an 80% rate, yielding 2,300,978 eyed-eggs. East Fork eggs eyed-up at a 58% rate, yielding 81,647 eyed-eggs. Pahsimeroi eggs incubated at SFH eyed-up at a 75% rate, resulting in 400,289 eyed-eggs.

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 a height of approximately three feet. One day after shocking, the eggs were machine-picked using a Jenn-Sorter model JH machine, which picks and enumerates eggs. A day or two after picking, the eyed-eggs are handpicked before transfer to the rearing hatcheries. The eggs were loaded at 50,000 to 100,000 eggs per 48-qt cooler of wellwater. Then the cooler was strapped shut and shipped.

The SFH eggs were shipped as follows: 938,435 as eyed-eggs to Hagerman National Fish Hatchery (HNFH), 399,000 as eyed-eggs to Magic Valley Fish Hatchery (MVFH), 380,040 as eyed-eggs to the Shoshone-Bannock Tribe (SBT), and 286,760 as eyed-eggs to Hagerman State Fish Hatchery (HSFH). Magic Valley received 81,647 East Fork eyed-eggs.

The Pahsimeroi eggs were shipped as follows: 188,672 as eyed-eggs to Niagara Springs Fish Hatchery (NSFH) and 211,617 as eyed-eggs to HNFH.

There were 296,743 surplus SFH eyed-eggs that were not shipped.

### **Release Acclimation of Brood Year 2001**

Due to a large chinook salmon egg-take in 2001, no rearing space was available for acclimation of steelhead smolts. Hagerman NFH released Brood Year 2001 steelhead smolts directly below the SFH weir into the Salmon River. The total Brood Year 2001 smolt release was 781,706 fish at 4.33 fpp. East Fork stock smolts numbering 94,440 at 4.79 fpp were mixed with Dworshak smolts and released below Squaw Creek Pond.

### **Fish Marking**

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

## **CONCLUSIONS/RECOMMENDATIONS**

### **East Fork Trap**

As stated in last year's brood year report, the East Fork's adult returns are insufficient to meet egg needs or escapement goals. A decision was made to shift the East Fork program to Squaw Creek Pond.

### **Sawtooth Fish Hatchery**

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

## APPENDICES

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

Brood Year	Release Year	Number Released	Adult Returns <sup>a</sup>				Total %
			3-year	4-year	5-year	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	(2003)		
1999	2001	57,134	98	(2003)	(2004)		
2000	2002	385,761	(2003)	(2004)	(2005)		

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

Brood Year	Release Year	Number Released	Adult Returns <sup>a</sup>				Total %
			3-year	4-year	5-year	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

<sup>a</sup> 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 Brood Year 1991, 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 <sup>a</sup>				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	(2003)	-	inc
1999	2001	57,134	65	(2003)	(2004)	-	inc
2000	2002	385,761	(2003)	(2004)	(2005)	-	inc

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

**Hatchery Adult Returns**

Brood Year	Release Year	Number Released	Adult Returns <sup>a</sup>				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

<sup>a</sup> 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
<b><u>Nutrients (mg/L)</u></b>					
T. Ammonia as N	<0.01	0.02	0.027	0.043	0.045
T. NO <sub>2</sub> + NO <sub>3</sub> 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
<b><u>Minerals (mg/L)</u></b>					
Sp. Conductance (umhos/cm)	168.0	159.0	167.0	157.0	135.0
Hardness as CaCO <sub>3</sub>	78.0	75.7	80.0	68.0	62.0
T. Alkalinity as CaCO <sub>3</sub>	77.5	75.2	79	74	63
Bicarbonate Alk. as CaCO <sub>3</sub>	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 <sub>4</sub>	5.23	5.50	12	5	<6
<b><u>Total Metals (ug/L)</u></b>					
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
<b><u>Miscellaneous</u></b>					
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

	<u>2002</u>	<u>1999</u>
<b><u>Nutrients (mg/L)</u></b>		
Ammonia as N	<0.01	0.02
T. Phosphorus as P	0.012	7.60
<b><u>Minerals (mg/L)</u></b>		
Hardness	81.0	81.3
Alkalinity	79.0	85.7
Bicarbonate Alk. as CaCO <sub>3</sub>	79.0	85.7
<b><u>Total Metals (ug/L)</u></b>		
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
<b><u>Miscellaneous</u></b>		
T. Cyanide (mg/L)	<0.005	<0.005

Appendix C. Sawtooth Fish Hatchery Results of Disease Sampling.

**BY00 Juvenile Chinook**

Case #	Stock	Date	Data
01-160	Pah	05/31/01	No pathogens detected; VIRO 0/10, FAT 0/10, BACTE 0/8
01-197	Pah	06/21/01	No pathogens detected; VIRO 0/10, FAT 0/10, BACTE 0/8
01-259	Saw	07/18/01	<i>Ichthyobodo</i> , MAS; FAT 0/8, <i>Pseudomonas fluorescens</i> 6/8
01-473	Pah	10/02/01	WHD; VIRO 0/20, FAT 0/20, BACTE 0/8, PTD-WHD 2/4(x5)
02-068	Saw	03/06/02	CWD, IHN; IHNV 2/2(5), IPNV 0/10, FAT 0/10, <i>Flavobacterium psychrophilum</i> 6/8
02-089	Saw	03/19/02	RS, WHD; VIRO 0/20, FAT 0/20, ELISA 4/4(x5, low 4), PTD-WHD 2/20

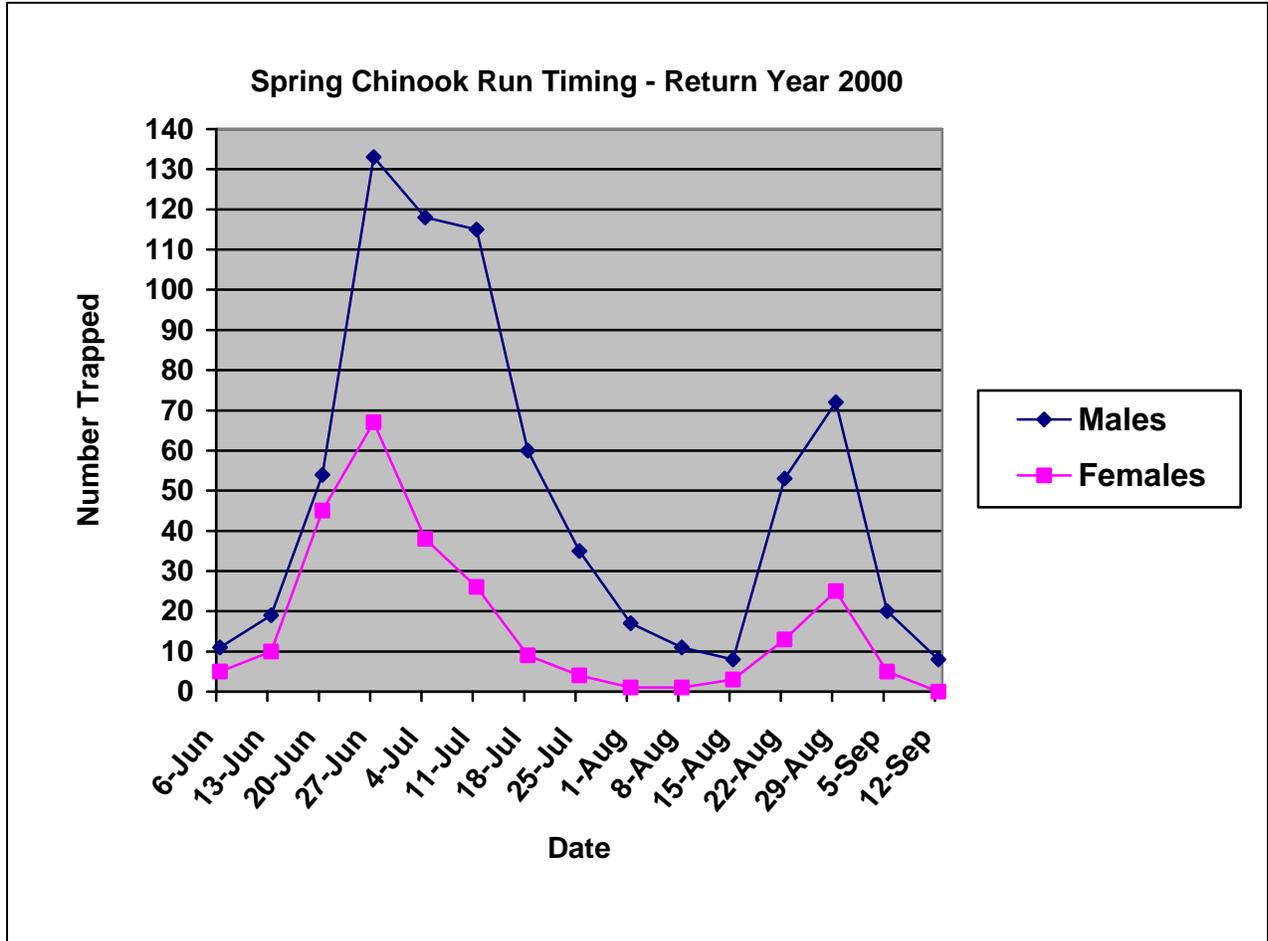
**Return Year 2000 Chinook Broodstock**

Case #	Stock	Date	Data
00-203	Saw	08/14/00	No pathogens detected; VIRO 0/3
00-227	Saw	08/21/00	RS; VIRO 0/6, ELISA 6/6 (6 low)
00-228	Saw	08/14/00	BKD; ELISA 2/3 (1 low, 1 high)
00-235	Saw	08/24/00	BKD; VIRO 0/14, ELISA 14/14 (13 low, 1 high)
00-236	Saw	08/28/00	RS; VIRO 0/16, ELISA 13/16 (13 low)
00-253	Saw	08/31/00	BKD; VIRO 0/24, ELISA 23/24 (22 low, 1 high)
00-258	Saw	09/04/00	BKD; VIRO 0/13, ELISA 11/13 (9 low, 2 high)
00-288	Saw	09/07/00	BKD; ELISA 5/6 (4 low, 1 high)
00-290	Saw	09/01/00	BKD; ELISA 3/5 (2 low, 1 high)
00-291	Saw	09/14/00	RS; ELISA 2/2 (2 low)
00-292	Saw	08/14/00	WHD; <i>Myxobolus cerebralis</i> -digest 1/5(x5)

**Return year 2001 Steelhead Broodstock**

Case #	Stock	Date	Data
01-072	Saw-A	03/26/01	No pathogens detected; VIRO 0/2
01-078	Saw-A	03/29/01	No pathogens detected; VIRO 0/10, NAVHS 0/2
01-080	Saw-A	04/02/01	No pathogens detected; VIRO 0/30, NAVHS 0/6
01-086	Saw-A	04/05/01	No pathogens detected; VIRO 0/32, NAVHS 0/4
01-091	Saw-A	04/09/01	No pathogens detected; VIRO 0/48, NAVHS 0/8
01-103	Saw-A	04/12/01	No pathogens detected; VIRO 0/68, NAVHS 0/12, FAT 0/60
01-104	Saw-A	04/16/01	No pathogens detected; VIRO 0/54
01-113	Saw-A	04/19/01	No pathogens detected; VIRO 0/24
01-114	Saw-A	04/23/01	No pathogens detected; VIRO 0/24, NAVHS 0/2
01-121	Saw-A	04/27/01	No pathogens detected; VIRO 0/12
01-126	Saw-A	04/30/01	No pathogens detected; VIRO 0/8, NAVHS 0/4
01-142	Saw-A	05/03/01	No pathogens detected; VIRO 0/8, NAVHS 0/2, PTD 0/18
01-085	EF-B	04/03/01	No pathogens detected; VIRO 0/2
01-093	EF-B	04/10/01	No pathogens detected; VIRO 0/4, NAVHS 0/2
01-105	EF-B	04/13/01	No pathogens detected; VIRO 0/2
01-112	EF-B	04/17/01	No pathogens detected; VIRO 0/11, NAVHS 0/11
01-120	EF-B	04/24/01	No pathogens detected; VIRO 0/3
01-127	EF-B	05/01/01	No pathogens detected; VIRO 0/2, NAVHS 0/2
01-144	EF-B	05/04/01	No pathogens detected; VIRO 0/3, NAVHS 0/1, FAT 0/33, PTD 0/20

Appendix D. Sawtooth Fish Hatchery Spring Chinook Run Timing Return Year 2000.



Appendix E. Sawtooth Fish Hatchery Age Class Totals from All Trapped Chinook, Return Year 2000.

<b>Sawtooth</b>	<b>Length (Fk)</b>	<b>Year class</b>	<b>Number</b>
Males	≤ 64 cm	3-year old	376
	64-82 cm	4-year old	299
	> 82 cm	5-year old	59
<b>Subtotal</b>			<b>734</b>
Females	≤ 64 cm	3-year old	0
	64-82 cm	4-year old	201
	> 82 cm	5-year old	51
<b>Subtotal</b>			<b>252</b>
<b>Total</b>			<b>986</b>

Appendix E.1. Sawtooth Fish Hatchery Spring Chinook Salmon Length Frequency Distribution for 2000.

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	1	39	1	39	0	39	0	39	0
40	1	40	0	40	0	40	0	40	1
41	2	41	2	41	0	41	0	41	0
42	3	42	2	42	0	42	0	42	1
43	8	43	6	43	0	43	0	43	2
44	8	44	8	44	0	44	0	44	0
45	13	45	11	45	0	45	0	45	2
46	19	46	17	46	0	46	0	46	2
47	21	47	15	47	0	47	0	47	6
48	33	48	27	48	0	48	1	48	5
49	34	49	30	49	0	49	0	49	4
50	35	50	27	50	0	50	0	50	8
51	27	51	19	51	0	51	0	51	8
52	24	52	18	52	0	52	0	52	6
53	24	53	20	53	0	53	0	53	4
54	22	54	20	54	0	54	0	54	2
55	20	55	15	55	0	55	1	55	4
56	21	56	13	56	0	56	0	56	8
57	9	57	6	57	0	57	0	57	3
58	15	58	7	58	0	58	1	58	7
59	9	59	4	59	0	59	0	59	5
60	6	60	4	60	0	60	0	60	2
61	4	61	2	61	0	61	1	61	1
62	5	62	0	62	0	62	0	62	5
63	6	63	3	63	0	63	1	63	2
64	6	64	2	64	0	64	1	64	3
65	2	65	1	65	0	65	0	65	1
66	5	66	1	66	0	66	0	66	4
67	1	67	0	67	0	67	0	67	1
68	5	68	0	68	0	68	0	68	5
69	7	69	0	69	0	69	1	69	6
70	11	70	1	70	0	70	3	70	7
71	14	71	0	71	0	71	2	71	12
72	16	72	0	72	0	72	1	72	15
73	21	73	1	73	0	73	5	73	15
74	18	74	0	74	0	74	3	74	15
75	26	75	4	75	0	75	2	75	20
76	21	76	3	76	0	76	2	76	16
77	28	77	3	77	0	77	1	77	24
78	23	78	2	78	0	78	1	78	20
79	23	79	5	79	0	79	0	79	18
80	37	80	4	80	0	80	2	80	31
81	27	81	3	81	0	81	4	81	20

Appendix E1. continued

82	14	82	4	82	0	82	1	82	9
83	9	83	6	83	0	83	0	83	3
84	17	84	2	84	0	84	3	84	12
85	9	85	3	85	0	85	0	85	6
86	2	86	0	86	0	86	0	86	2
87	7	87	2	87	0	87	0	87	5
88	4	88	1	88	0	88	0	88	3
89	3	89	3	89	0	89	0	89	0
90	0	90	0	90	0	90	0	90	0
91	0	91	0	91	0	91	0	91	0
92	0	92	0	92	0	92	0	92	0
93	2	93	1	93	0	93	0	93	1
94	2	94	0	94	0	94	1	94	1
95	1	95	0	95	0	95	0	95	1
96	0	96	0	96	0	96	0	96	0
97	0	97	0	97	0	97	0	97	0
98	2	98	0	98	0	98	1	98	1
99	0	99	0	99	0	99	0	99	0
100	0	100	0	100	0	100	0	100	0
101	0	101	0	101	0	101	0	101	0
102	0	102	0	102	0	102	0	102	0
103	0	103	0	103	0	103	0	103	0
104	0	104	0	104	0	104	0	104	0
105	1	105	0	105	0	105	0	105	1
106	0	106	0	106	0	106	0	106	0
TOTALS:	734		329		0		39		366

AGE CLASS BREAKDOWN INFORMATION:

AGE 3 HATCHERY MALES RELEASED:	0
AGE 4 HATCHERY MALES RELEASED:	0
AGE 5 HATCHERY MALES RELEASED:	0
TOTAL HATCHERY MALES RELEASED:	0
AGE 3 HATCHERY MALES PONDED:	279
AGE 4 HATCHERY MALES PONDED:	32
AGE 5 HATCHERY MALES PONDED:	18
TOTAL HATCHERY MALES PONDED:	329

AGE 3 NATURAL MALES RELEASED:	91
AGE 4 NATURAL MALES RELEASED:	239
AGE 5 NATURAL MALES RELEASED:	36
TOTAL NATURAL MALES RELEASED:	366
AGE 3 NATURAL MALES PONDED:	6
AGE 4 NATURAL MALES PONDED:	28
AGE 5 NATURAL MALES PONDED:	5
TOTAL NATURAL MALES PONDED:	39

## Appendix E1. 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	0	55	0	55	0	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	0	58	0	58	0	58	0	58	0
59	0	59	0	59	0	59	0	59	0
60	0	60	0	60	0	60	0	60	0
61	0	61	0	61	0	61	0	61	0
62	0	62	0	62	0	62	0	62	0
63	0	63	0	63	0	63	0	63	0
64	0	64	0	64	0	64	0	64	0
65	1	65	0	65	0	65	0	65	1
66	1	66	0	66	0	66	0	66	1
67	0	67	0	67	0	67	0	67	0
68	3	68	0	68	1	68	0	68	2
69	0	69	0	69	0	69	0	69	0
70	2	70	0	70	0	70	0	70	2
71	4	71	1	71	0	71	1	71	2
72	9	72	4	72	1	72	0	72	4
73	5	73	1	73	1	73	1	73	2
74	9	74	1	74	1	74	0	74	7
75	11	75	1	75	2	75	1	75	7
76	19	76	5	76	3	76	1	76	10
77	16	77	5	77	1	77	0	77	10
78	22	78	6	78	5	78	2	78	9
79	24	79	8	79	9	79	2	79	5
80	30	80	7	80	7	80	1	80	15
81	24	81	12	81	7	81	0	81	5
82	21	82	9	82	5	82	1	82	6
83	14	83	8	83	0	83	0	83	6
84	7	84	5	84	0	84	0	84	2
85	5	85	2	85	0	85	1	85	2
86	1	86	1	86	0	86	0	86	0
87	4	87	2	87	0	87	0	87	2
88	2	88	0	88	0	88	0	88	2
89	2	89	0	89	0	89	1	89	1
90	5	90	0	90	0	90	0	90	5
91	1	91	0	91	0	91	0	91	1
92	0	92	0	92	0	92	0	92	0
93	4	93	1	93	0	93	1	93	2
94	1	94	0	94	0	94	0	94	1
95	1	95	0	95	0	95	1	95	0

Appendix E1. continued

96	0	96	0	96	0	96	0	96	0
97	1	97	0	97	0	97	0	97	1
98	0	98	0	98	0	98	0	98	0
99	0	99	0	99	0	99	0	99	0
100	0	100	0	100	0	100	0	100	0
101	0	101	0	101	0	101	0	101	0
102	1	102	0	102	0	102	0	102	1
103	0	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	1	108	0	108	0	108	0	108	1
109	0	109	0	109	0	109	0	109	0
110	1	110	0	110	0	110	0	110	1
TOTALS:	252		79		43		14		116

AGE 4 HATCHERY FEMALES RELEASED:	43
AGE 5 HATCHERY FEMALES RELEASED:	0
TOTAL HATCHERY FEMALES RELEASED:	43
AGE 4 HATCHERY FEMALES PONDED:	60
AGE 5 HATCHERY FEMALES PONDED:	19
TOTAL HATCHERY FEMALES PONDED:	79

AGE 4 NATURAL FEMALES RELEASED:	88
AGE 5 NATURAL FEMALES RELEASED:	28
TOTAL NATURAL FEMALES RELEASED:	116
AGE 4 NATURAL FEMALES PONDED:	10
AGE 5 NATURAL FEMALES PONDED:	4
TOTAL NATURAL FEMALES PONDED:	14

Appendix F. Sawtooth Fish Hatchery Age Class Breakdown by Released Chinook, Return Year 2000.

<u>Sawtooth</u>	<u>Length (Fk)</u>	<u>Age Class</u>	<u>Number</u>
Males	≤ 64 cm	3-year-old	91
	64-82 cm	4-year-old	239
	> 82 cm	5-year-old	36
<b><u>Total Males</u></b>			<b><u>366</u></b>
Females	≤ 82 cm	4-year-old	131
	> 82 cm	5-year-old	28
<b><u>Total Females</u></b>			<b><u>159</u></b>
<b><u>Total Released</u></b>			<b><u>525</u></b>

Appendix G. Sawtooth Fish Hatchery Spring Chinook Spawning Matrix, Return Year 2000.

**Note:** **H** = Hatchery fish, **U** = Unmarked fish, **F** = female, **M** = male

<u>Spawn Date</u>	<u>UF x HM Crosses (Supplementation)</u>	<u>HF x UM Crosses (Supplementation)</u>	<u>HF x HM Crosses (Reserve)</u>	<u>F:M Ratio</u>
8/14/00	0	0	3	1:2
8/21/00	3	1	2	1:2
8/24/00	3	4	7	1:2
8/28/00	2	7	7	1:2
8/31/00	3	0	21	1:2
9/04/00	1	0	12	1:2
9/07/00	0	2	4	1:2
9/11/00	0	0	5	1:2
9/14/00	0	0	2	1:2
<b>TOTALS</b>	<b>12</b>	<b>14</b>	<b>63</b>	<b>89</b>

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Appendix H. Survival Table for Chinook (BY00) and Steelhead (BY01) from Green Eggs to Released Smolts, at Sawtooth Fish Hatchery and East Fork Sites.

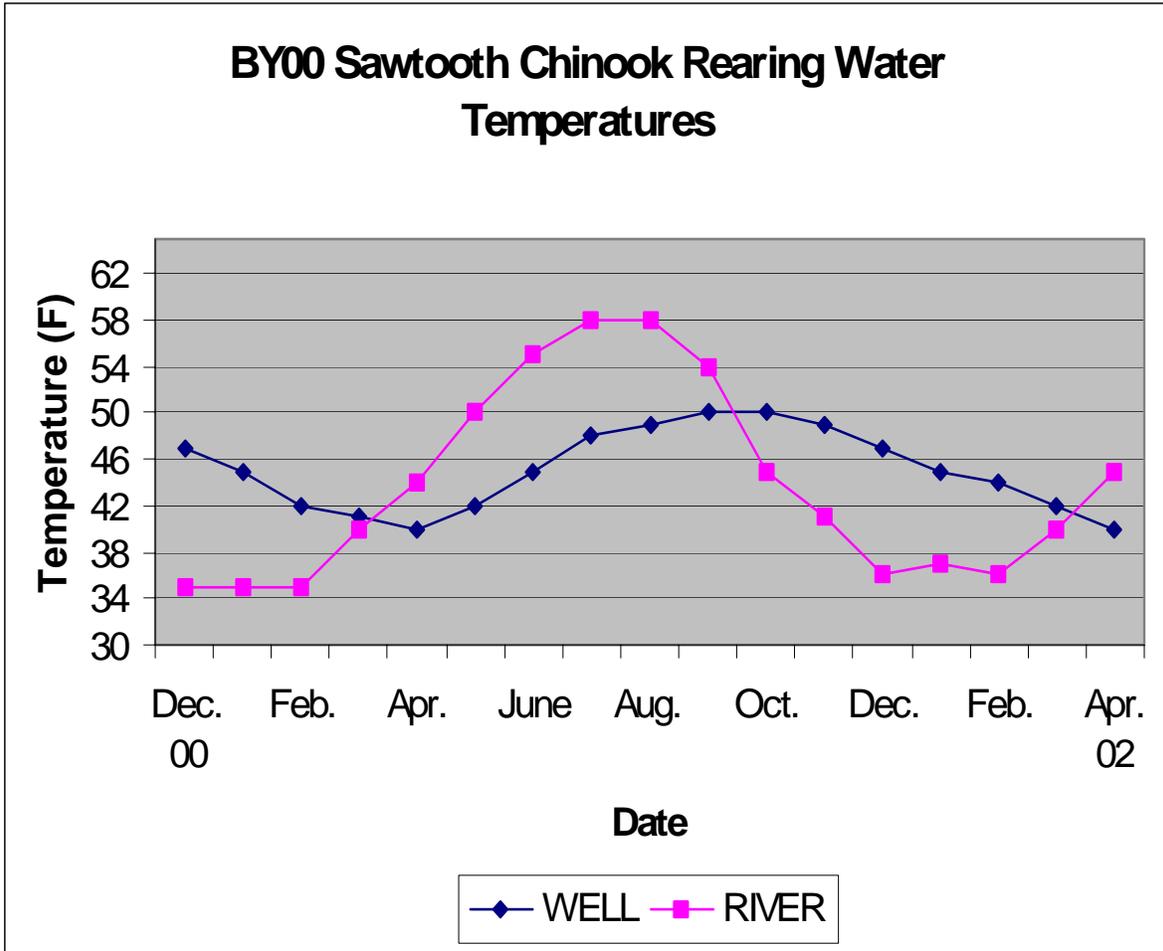
<b>CHINOOK</b>				
Green egg Number	Eyed egg Number	Percent Survival	Released Smolts	Percent Survival From green
<b><u>Sawtooth Fish Hatchery Fish</u></b>				
454,355	420,733	92.6	385,761	84.9
<b>STEELHEAD</b>				
Green egg Number	Eyed egg Number	Percent Survival		
<b><u>Sawtooth Fish Hatchery Fish</u></b>				
2,867,634	2,300,978	80.0	distributed as follows	
	2,004,235 for smolt production			
	380,040 for egg boxes			
	286,760 for resident programs			
<b><u>East Fork Fish</u></b>				
142,348	81,647	58.0		

All steelhead raised at other hatcheries.

Appendix H.1. Feed Schedule for Sawtooth/Pahsimeroi Spring Chinook, BY2000.

<b>FPP</b>	<b>% BW Fed</b>	<b>Feed Size</b>	<b>Timing</b>
su-----800	.035	str., 1/32	11/00 - 01/16/01
800---500	.033	1/32	01/01 - 02/01
500---400	.025	3/64	02/01 - 03/01
400---350	.025	3/64	03/01 - 04/01
350---300	.023	3/64	04/01 - 04/01
300---250	.022	3/64	05/01 - 06/01
250---150	.024	3/64, 1/16	06/01 - 06/01
150---110	.024	1/16	06/01 - 07/01
110----90	.025	1/16	07/01 - 08/00
90-----50	.022	1/16, 3/32	08/01 - 09/01
50-----17	.020	3/32	09/01 - 10/01
≤ -----17	Maintenance	3/32	10/01 - release

Appendix I. Rearing Water Temperatures, BY00 Spring Chinook at Sawtooth Fish Hatchery.



Appendix J. Summary of Marked Spring Chinook Released, Brood Year 2000.

<b><u>Sawtooth Fish Hatchery Stock</u></b>		
<b>Mark</b>	<b>Number Released</b>	<b>Location</b>
Ad Clip/CWT	265,642 (Reserve)	SFH Weir (4/9/02)
CWT only	108,129 (Supplementation)	SFH Weir (4/19/02)
CWT only	11,990 (Supplementation)	SFH Weir (4/23/02)
<b>Total Release (PIT)</b>	<b>385,761 (1500)</b>	
<b><u>Pahsimeroi Stock</u></b>		
Adipose Clip	419,555	Reserve
CWT only	90,016	Supplementation
Transferred to Pahsimeroi FH Oct 1 – 3 2001		
<b><u>509,571</u></b>		

Appendix K. Summary of Sawtooth Fish Hatchery Spring Chinook Smolt Releases, Brood Year 2000

<b>Raceway</b>	<b>Number</b>	<b>Tag Code</b>	<b>Fish per Pound</b>	<b>Pounds</b>	<b>Designation</b>
L1	41,627	100572	14.95	2,784	Reserve
L2	45,890	100272	16.33	2,810	Reserve*
L3	45,689	100472	13.56	3,369	Reserve
L4	44,701	100172	15.38	2,906	Reserve*
L5	45,217	100672	17.58	2,572	Reserve
L6	42,518	100372	14.54	2,924	Reserve*
L8	108,129	108171, 100972, 108271	15.80	6,844	Supplementation
S6	11,990	100972	17.00	705.3	Supp (high BKD)
<b>Total</b>	<b>385,761</b>		<b>15.5</b>	<b>24,916</b>	

\*= NATURES raceways

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

<b>Steelhead Mark Type</b>	<b>Sawtooth Fish Hatchery Stock BY01 CWT Code</b>	<b>#PIT</b>	<b># Fish Released</b>	<b>Date</b>	<b>Release Purpose</b>
AD	N/A	**	781,706	04/02	Direct Release at SFH weir, contribution
<b>TOTAL</b>			<b>781,706</b>		

\*\*number PIT tagged available from Department marking supervisor

<b>Steelhead Mark Type</b>	<b>East Fork Stock BY01 CWT Code</b>	<b>#PIT</b>	<b>#Fish Released</b>	<b>Date</b>	<b>Release Purpose</b>
	N/A	**	94,440	04/02	contribution
<b>TOTAL</b>			<b>94,440</b>		

N/A = cwt codes are available at Department Lewiston Fish Marking Lab

Appendix L.1. Sawtooth Fish Hatchery Production Cost Table (Includes Chinook BY00, Steelhead BY01, and Sockeye BY00).

Smolt Number	Lbs. Feed	Cost Feed	Chinook BY 00		Total Cost	Cost per 1,000	Cost per lb.
			Lbs of Smolts	C			
<b>Sawtooth</b>							
385,761	28,417	\$28,792	24,916	1.14	\$193,672	\$502	\$7.77
<b>Pahsimeroi</b>							
509,571	24,184	\$20,912	20,165	1.2	\$94,584	\$186	\$4.69

**East Fork**

No BY00 East Fork spring chinook salmon were reared. Costs were incurred operating the trap.

Stock	Steelhead BY 01			Cost per 1,000 eyed eggs
	Green Eggs	Eyed Eggs	Total Cost	
<b>Sawtooth</b>	2,867,634	2,300,978	\$87,828	\$38.17
<b>Squaw Cr/EF</b>	142,348	81,647	\$33,780	\$413.73
<b>Pahsimeroi</b>	535,258	400,289	\$13,512	\$33.76
<b>Totals</b>	3,545,240	2,782,914	\$135,120	

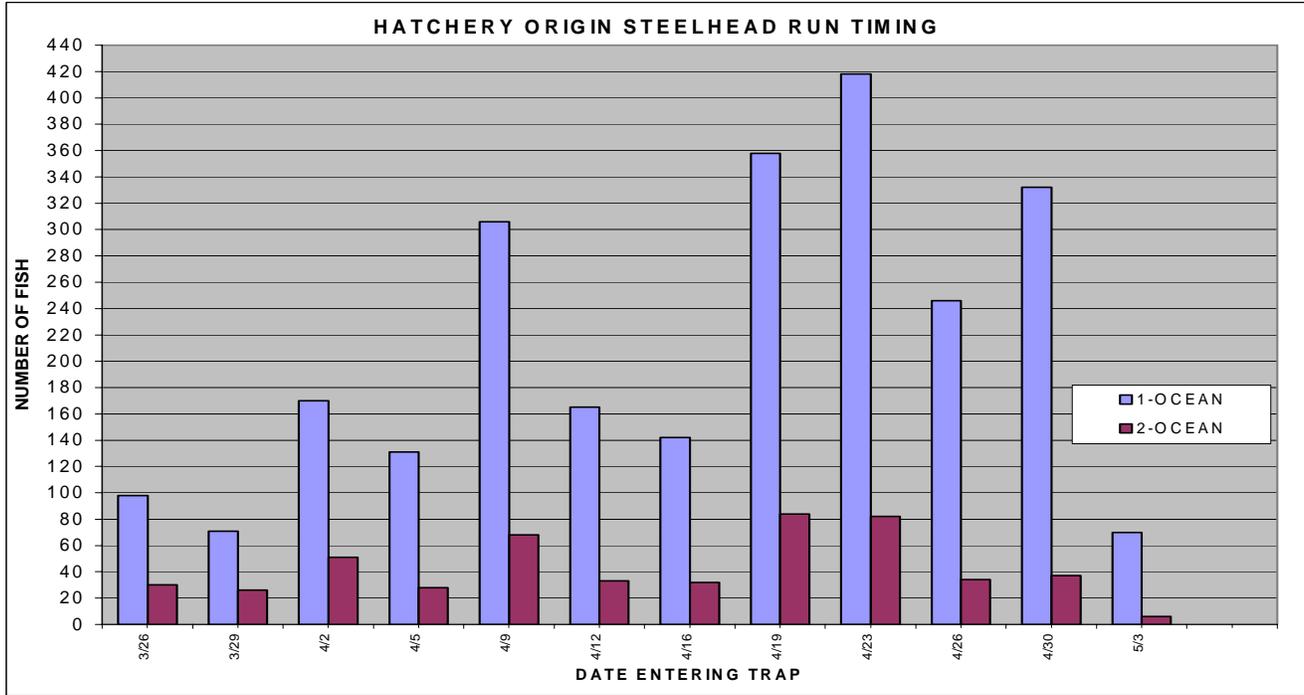
Smolt Number	Lbs Smolts	Sockeye BY 00		Cost per lb.
		Total Cost	Cost per 1,000	
91,184*	3,942*	\$27,024	\$296.37	\$6.86

(\*Note: 52,512 Fall release @ 1,591 lbs biomass & 38,672 Spring smolts @ 2,351 lbs biomass)

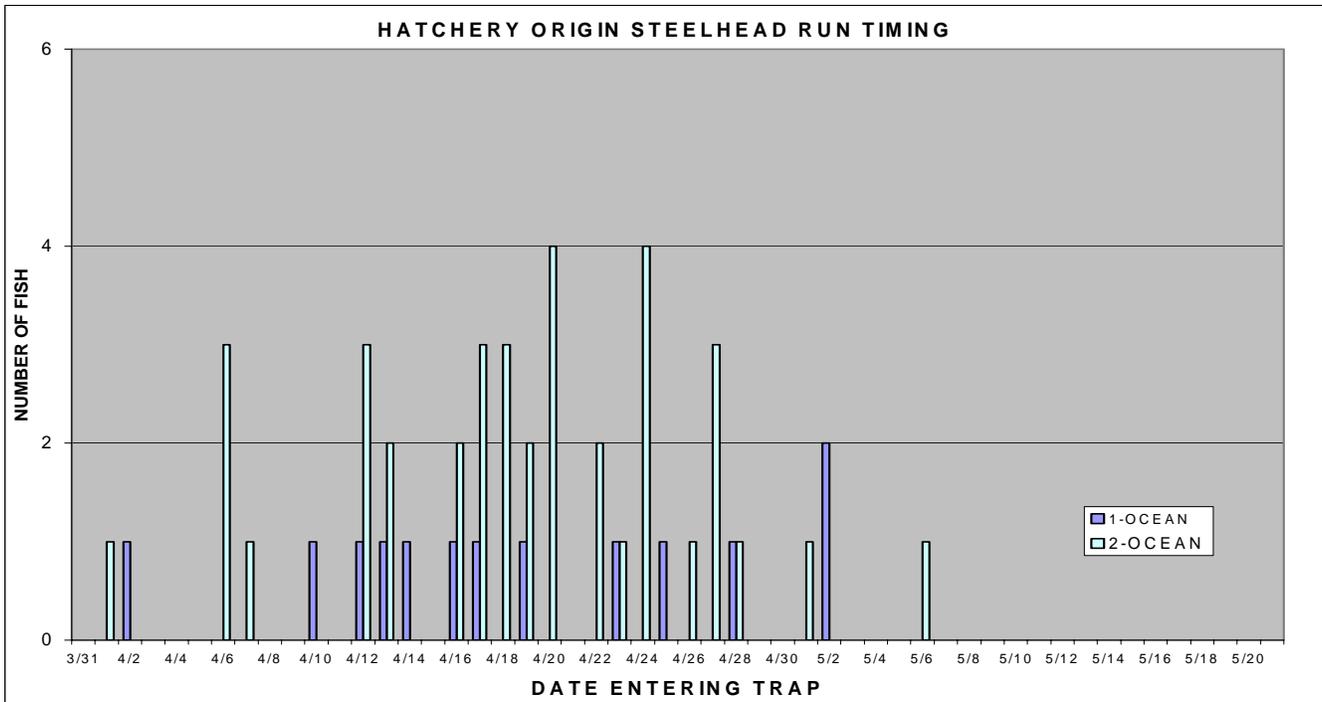
Note: Total costs less capital outlay. Costs include operating East Fork fish trap and running wells for entire rearing period. Costs are proportional species and stock.

Appendix M. Run Timing Graphs for Steelhead, Return Year 2001, Sawtooth and East Fork traps.

**2001 SAWTOOTH FISH HATCHERY STEELHEAD RUN TIMING  
HATCHERY ORIGIN STEELHEAD**



**2001 EAST FORK STEELHEAD RUN TIMING  
HATCHERY ORIGIN STEELHEAD**



Appendix N. Steelhead Returns by Year Class and Sex, Return Year 2001.

**Sawtooth Fish Hatchery**

AGE-CLASS OF ADULTS	MALES		FEMALES		TOTAL	
	No.	%	No.	%	No.	%
HATCHERY 1-OCEANS	1487	89.3	1020	75.4	2507	83.1
HATCHERY 2-OCEANS	178	10.7	333	24.6	511	16.9
NATURAL 1-OCEANS	18	75.0	6	46.2	24	64.9
NATURAL 2-OCEANS	6	25.0	7	53.8	13	35.1
TOTAL 1-OCEANS	1505	89.1	1026	75.1	2531	82.8
TOTAL 2-OCEANS	184	10.9	340	24.9	524	17.2

**East Fork**

AGE-CLASS OF ADULTS	MALES		FEMALES		TOTAL	
	No.	%	No.	%	No.	%
HATCHERY 1-OCEANS	12	54.5	1	3.4	13	25.5
HATCHERY 2-OCEANS	10	45.5	28	96.6	38	74.5
NATURAL 1-OCEANS	2	66.7	3	37.5	5	45.5
NATURAL 2-OCEANS	1	33.3	5	62.5	6	54.5
TOTAL 1-OCEANS	14	56.0	4	10.8	18	29.0
TOTAL 2-OCEANS	11	44.0	33	89.2	44	71.0

<sup>1</sup>These figures are based on criteria for aging steelhead, as described in Appendix R.

Appendix N.1. Lengths of Released Natural Steelhead from Sawtooth Fish Hatchery and East Fork Traps – Return Year 2001

<b>Sawtooth:</b>			<b>East Fork:</b>		
Fork Len. (cm)	Male	Female	Fork Len. (cm)	Male	Female
51	1	0	57	0	1
54	1	0	59	1	0
55	1	0	60	1	0
57	1	0	63	0	1
58	1	0	69	0	1
59	0	1	73	0	1
60	2	1	76	1	0
61	3	1	79	0	1
62	1	2			
64	3	1			
65	1	0			
67	3	0			
68	1	1			
69	1	1			
70	1	1			
72	2	0			
73	0	2			
74	1	1			
79	0	1			
Totals:	24	13	Totals:	3	5

Appendix O. Sawtooth Fish Hatchery Steelhead Length Frequency Distribution, Return Year 2001.

FK.LN (cms)	NATURALS (RELEASED)		HATCHERY (ADIPOSE CLIPS)		HATCHERY (OTHER MARKS)		FK.LN (in)
	Male	Fem	Male	Fem	Male	Fem	
50	0	0	5	1	0	0	19.7
51	1	0	1	3	0	1	20.1
52	0	0	4	10	0	2	20.5
53	0	0	14	11	0	3	20.9
54	1	0	24	30	0	5	21.3
55	1	0	71	56	0	9	21.7
56	0	0	93	89	0	12	22.0
57	1	0	156	130	1	22	22.4
58	1	0	172	144	1	20	22.8
59	0	1	231	139	0	26	23.2
60	2	1	241	87	2	16	23.6
61	3	1	142	68	0	8	24.0
62	1	2	133	34	1	9	24.4
63	0	0	87	31	0	3	24.8
64	3	1	51	24	0	3	25.2
65	1	0	28	22	0	2	25.6
66	0	0	17	29	0	1	26.0
67	3	0	12	35	0	4	26.4
68	1	1	18	46	0	3	26.8
69	1	1	11	40	0	2	27.2
70	1	1	28	44	0	4	27.6
71	0	0	25	42	0	0	28.0
72	2	0	26	26	0	5	28.3
73	0	2	18	18	0	0	28.7
74	1	1	10	14	0	0	29.1
75	0	0	10	8	0	0	29.5
76	0	0	12	6	0	1	29.9
77	0	0	6	2	0	0	30.3
78	0	0	5	1	0	1	30.7
79	0	1	5	1	0	0	31.1
80	0	0	2	0	0	0	31.5
81	0	0	1	0	0	0	31.9
82	0	0	1	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	24	13	1660	1191	5	162	

Appendix P. East Fork Steelhead Length Frequency Distribution, Return Year 2001.

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	1	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	1	1	0	0	0	22.4
58	0	0	0	0	0	0	22.8
59	1	0	0	0	0	0	23.2
60	1	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	1	1	0	0	0	24.8
64	0	0	1	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	1	0	1	0	0	26.8
69	0	2	0	1	0	0	27.2
70	0	0	0	0	0	0	27.6
71	0	0	1	0	0	0	28.0
72	0	0	2	3	1	0	28.3
73	0	2	2	5	2	1	28.7
74	0	0	2	3	1	1	29.1
75	0	0	1	3	1	0	29.5
76	1	0	1	1	1	0	29.9
77	0	0	0	1	1	1	30.3
78	0	0	0	4	2	3	30.7
79	0	1	0	0	0	0	31.1
80	0	0	0	0	0	0	31.5
81	0	0	0	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	0	0	0	0	33.1
85	0	0	0	0	0	0	33.5
TOTALS	3	8	13	23	9	6	

Appendix Q. Released Natural Steelhead by Year Class and Sex, Return Year 2001.

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**Sawtooth Fish Hatchery (37)**

<b>Males -</b>	2-year old -	19	<b>Females -</b>	2-year old -	6
	3 or 4-year old -	5		3 or 4-year old -	7
	<b>Total -</b>	<b>24</b>		<b>Total -</b>	<b>13</b>

**East Fork (8)**

<b>Males -</b>	2-year old -	2	<b>Females -</b>	2-year old -	2
	3 or 4-year old -	1		3 or 4-year old -	3
	<b>Total -</b>	<b>3</b>		<b>Total -</b>	<b>5</b>

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No fish were released at the Squaw Creek trap.

Appendix R. Sawtooth Fish Hatchery Criteria for Aging Steelhead.

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

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**Submitted by:**

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**Approved by:**

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