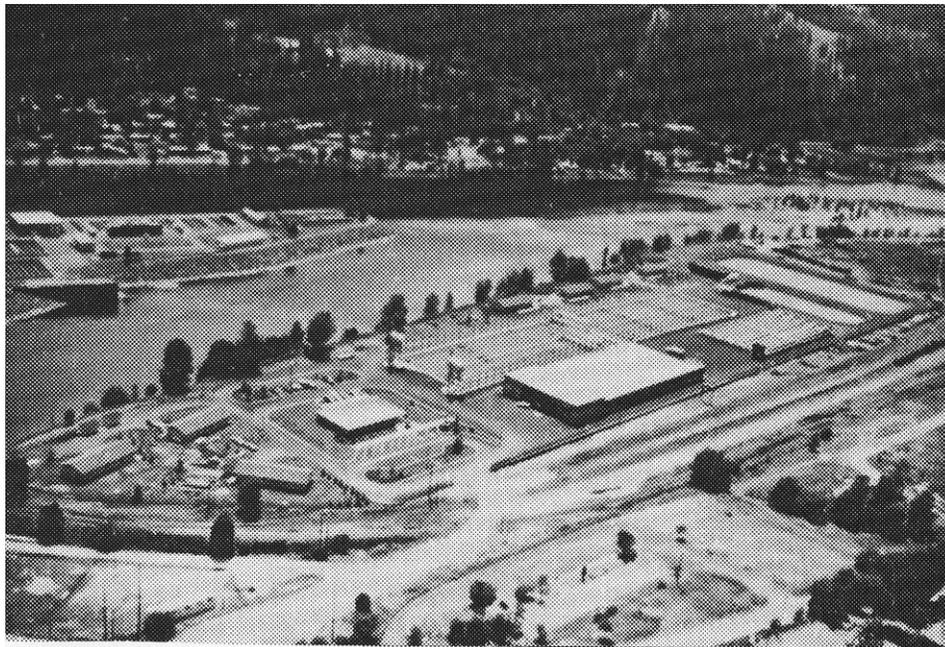




**CLEARWATER FISH HATCHERY**  
**1996 Chinook Brood Year**  
**1997 Steelhead Brood Year Report**



by

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## **ABSTRACT**

### **Clearwater Fish Hatchery**

Chinook salmon *Oncorhynchus tshawytscha* are raised at Clearwater Fish Hatchery (CFH). All chinook are brought on station as either green or eyed eggs, then reared on station until they are transported to the satellite facilities or directly released.

### **Crooked River**

The Crooked River weir was installed on June 1 and taken out of operation on September 18, 1996. The run total was 299 fish, of which there were 92 jacks, 3 one-ocean females, 113 adult males and 91 adult females. A total of 43 males and 20 females were released to spawn naturally. A total of 73 females were spawned, producing 274,332 green eggs.

Crooked River trap does not have an adult holding facility. Poned fish were removed from the trap and transported 28 miles to the Red River facility. All Crooked River chinook were segregated from the Red River chinook.

A total of 205,906 full-term smolts were released from Crooked River pond on April 7 through April 9, 1998.

### **Powell**

The Walton Creek weir was installed on June 3 and taken out of operation on September 8, 1996. The run total was 186 fish, of which there were 45 jacks, 1 one-ocean female, 71 adult males and 69 adult females. A total of five fish were released to spawn naturally. All remaining fish were held for spawning. A total of 66 females were spawned, producing 275,883 green eggs.

A total of 244,847 full-term smolts from Powell stock chinook were released from Powell pond on April 6 to April 8, 1998.

### **Red River**

Red River weir was installed on June 11 and taken out of operation on September 19, 1996. The run total was 62 fish, which were 9 jacks, 39 adult males and 14 adult females. A total of 17 chinook, 16 males and one female were released to spawn naturally. Of these, 10 females were spawned, producing 40,156 green eggs.

A total of 21,623 spring low bacterial kidney disease (BKD) chinook and 29,585 high BKD South Fork (Red River and Crooked River mixed) full-term smolts were released from the Red River pond on April 7 to April 9 and April 13, 1998.

### **Rapid River/Lookingglass**

During the 1996 spawning season, eggs from 53 females from Rapid River and eggs from 44 females from Lookingglass (Rapid River stock) were transferred to CFH. A total of 169,697 Rapid River and 159,175 Lookingglass eggs were received, all high BKD parentage. These eggs were segregated from all other fish for the entire rearing cycle.

A total of 159,739 Rapid River and 144,357 Lookingglass chinook full-term smolts were released at Hells Canyon on March 16 and 18, 1998.

### **Selway Captive Brood**

A total of 12 Selway captive brood females were spawned at CFH. A total of 16,698 green eggs were collected.

A total of 8,892 chinook full-term smolts were helicopter released in the McGruder Corridor on the Selway River on April 21 and 22, 1998.

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## INTRODUCTION

### Funding Source

Construction responsibility for the Lower Snake River Compensation Plan (LSRCP) was assigned to the Walla Walla District, Army Corps of Engineers (Corps), while responsibility for fish hatchery Operation and Maintenance (O&M) funding was to be accomplished by "one of the Federal fishery agencies." The question of O&M funding was settled in 1977 with the signing of an interagency agreement by the Corps, National Marine Fisheries Service (NMFS), and the U.S. Fish and Wildlife Service (FWS). The agreement stated that the FWS would budget for and administer O&M funding for LSRCP fish hatchery programs (responsibility for administration and O&M for fish passage and wildlife programs remains with the Corps).

The Corps estimated cost for construction of CFH and three satellite facilities was to be \$43,153,000 (Joe McMichael's report, December 1991).

### Location

The CFH is on the north bank of the North Fork of the Clearwater River, 1.5 miles downstream from Dworshak Dam, 72.5 miles upstream from Lower Granite Dam and 504 miles upstream from the mouth of the Columbia River.

Crooked River satellite facility is 20 miles downstream of Red River. The trap is one-half mile upstream of the mouth of Crooked River, a tributary of the South Fork of the Clearwater River. The juvenile rearing ponds are ten miles upstream from the Crooked River adult trap. Crooked River is 172.5 miles upstream from Lower Granite Dam and 604 miles upstream from the mouth of the Columbia River.

Powell satellite facility is 122 miles east of the CFH at the headwaters of the Lochsa River. Missoula, Montana is the closest town, which is 45 miles east. Powell is 192.5 miles upstream from Lower Granite Dam and 624 miles upstream from the mouth of the Columbia River.

Red River satellite facility is 15 miles east of Elk City, Idaho, 186 miles upstream from Lower Granite Dam and 618 miles from the mouth of the Columbia River.

## OBJECTIVES

### Mitigation Goals

The goal of CFH and satellite facilities is to return 12,000 adult chinook salmon *Oncorhynchus tshawytscha* and 14,000 adult steelhead *Oncorhynchus mykiss* over Lower Granite Dam.

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

The objectives of Idaho Department of Fish and Game (Department) for the CFH are to reestablish historic fish runs into the upper Clearwater River tributaries, to enhance the wild spawning population, and increase sport and tribal fish opportunities.

### **FACILITY DESCRIPTION**

#### **General Hatchery Description**

##### **Clearwater Hatchery**

The CFH is the final facility built by the U.S. Army Corps of Engineers under the Lower Snake River Compensation Plan. This facility is also the largest of the LSRCP hatcheries built.

Support buildings include the administration/dormitory building. The dormitory section includes four bunkrooms with maximum capacity of 16 people, a living room, dining room, a kitchen, shower rooms for men and women, and a laundry room. The administration portion consists of office space with a visitor center and entry lobby.

The shop area includes a vehicle maintenance shop and a smaller mechanical repair shop. A screen storage room has been altered for use as a carpentry shop.

The hatchery building also houses an incubation room and walk-in freezer. A screen and equipment storage building is on the west end of the hatchery.

There are seven residences on the CFH grounds. Each residence also has a storage building.

There is an isolation incubation building for receiving eggs with unknown disease status and a chemical storage building for storing barrels of formalin and chlorine.

A 1.8 mile long pipeline runs upstream to the Dworshak Dam. The pipeline goes up the face of the dam to an elevation of 1,357 feet then through the dam into the reservoir. The 18-inch pipe is stationary at an elevation of 1,357 feet with a screened inlet to keep out debris. This pipe supplies cool water to the CFH. The 48-inch flexible plastic pipe suspended from a floating platform with a winch attached to the platform raises and lowers the intake of the pipe to the level of desired water temperature. This pipe supplies warmwater to the CFH.

Approximately 200 yards upstream from the CFH is a distribution structure designed to reduce the 286 psi of the high pressure supply lines to the gravity flow of seven psi to the hatchery. The structure consists of a primary and secondary chamber. Each chamber has two-ported sleeve valves used to reduce the pressure. One valve is in operation while the other is on standby for emergencies.

A 73,600 cubic foot cleaning sedimentation pond is used during cleaning to settle out the settleable solids produced by the CFH. A final sedimentation pond (414,000 cubic feet [cf]) settles waste from the total flow of hatchery operation and the out flow of the cleaning sediment.

### **Crooked River**

There are two separate sites to this facility. The first is the adult trap and a support cabin located one-half mile upstream of the mouth of Crooked River. The weir at this location consists of removable posts and panels supported by an iron bridge across Crooked River. The trap is a 9 ft x 13 ft x 4 ft deep holding container. There are no holding ponds at the site, and all fish are either released directly from the trap or transported to Red River holding ponds.

Ten miles upstream from the adult trap are two raceways measuring 145 ft x 20 ft x 4 ft deep with 23,200 cf of rearing space. There is a cleaning waste pond and final settling pond to meet Environmental Protection Agency (EPA) water quality standards. Additional facilities include a garage, shop, a walk-in freezer to store fish food, and a support cabin with kitchen, dining room, living room, bathroom, and bedroom.

### **Powell**

The Powell facility is at the confluence of Crooked Fork and White Sands Creek, which form the Lochsa River. There is one rearing pond that measures 165 ft x 65 ft x 5 ft deep. A diversion and intake screen structure are on Walton Creek, and a pump house on White Sands Creek. There are two adult ponds that measure 100 ft x 12 ft x 4 ft deep. A weir diverts fish that come up into Walton Creek into the fish ladder and fish trap. A floating weir that spans across the Lochsa River is stored at the facility for use when needed. An open bay spawning shelter at the head of the adult pond provides workspace. Also, on site is a support cabin with a kitchen, dining room, living room, bedroom, bathroom, and walk-in freezer to store fish feed. During the summer of 1994 the Corps of Engineers constructed a 16-ft x 14-ft formalin storage building.

### **Red River**

The Red River site consists of four structures built on 6.29 acres. A freezer/storage building which houses a walk-in freezer, a work shop/garage, a formalin storage building, and a support cabin.

## **Production Capacities by Unit**

### **Clearwater Fish Hatchery**

The steelhead raceways consist of 300 ft x 10 ft x 6 ft deep raceways supplied by a center head raceway with an east and west bank of 12 raceways. A total rearing space of 24 raceways is 216,000 cf. This area will rear a maximum capacity of 2.4 million steelhead smolts with 0.3

density index (DI) (Piper). A flow of approximately 1.67 cfs is available for each raceway, but it is suspected that this flow will only allow 1.7 million steelhead to be reared in these raceways without exceeding the flow index (FI) of 1.2 (Piper). All water for these raceways flow through degassing towers then into the head raceway. These raceways are supplied with water from the surface intake only.

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

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

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

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

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

## **Crooked River**

The Crooked River facility has two raceways, measuring 145 ft x 20 ft x 4 ft deep, for a total of 23,200 cf. These raceways have a capacity of 700,000 juvenile chinook with a DI of 0.29. Maximum water flow for both raceways is 10 cfs March 1 to July 31 and eight cfs August 1 to October 20. Each raceway is outfitted with three automatic Nielson feeders. The adult trapping facility measures 10 ft x 12 ft x 4 ft deep with a total of 480 cf. Maximum water flow for the adult facility is 10 cfs from April 1 to June 30 and 6 cfs July 1 to October 1. This facility has no provision for adult holding.

## **Powell**

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

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

## **Red River**

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

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

## **WATER SUPPLY**

### **Source**

#### **Clearwater**

The CFH receives water through two supply pipelines from Dworshak Reservoir. The warmwater intake is attached to a floating platform and can be adjusted from five feet to forty feet below the surface. The cool water intake is stationary at 245 feet below the top of the dam. An estimated 10 cfs of water is provided by the cool water supply and 70 cfs of water from the warmwater supply. The cool water supply has remained fairly constant between 38° and 45°F. The warmwater can reach 80°F but is adjusted regularly to maintain 56°F for as long as possible throughout the year. When water temperatures drop in the fall the intake will be moved to the warmest water available until water temperatures rise in the spring (Appendices A1 and A2). All water is gravity flow to the CFH.

## **Crooked River**

Crooked River rearing raceways are supplied by an intake 200 yards upstream of the raceways at Crooked River. The water rights stipulate 10 cfs from April 1 to July 31 and eight cfs from August 1 to October 20 at the rearing facility. Maximum water flow for the adult facility is 10 cfs from April 1 to June 30 and six cfs July 1 to October 1. Temperatures ranged from 43 to 62°F (Appendix B1). All temperatures were taken at the adult trap. All water supplied to both facilities is gravity flow.

## **Powell**

The intake is 100 yards upstream from the facility. Powell's water right for the gravity intake is 6.24 cfs from a gravity flow system on Walton Creek, and 2.5 cfs from a supply pumped out of White Sands Creek. Two 7.5 horsepower pumps can be used to supply Walton Creek with water from White Sands Creek during periods of low water. Water temperatures ranged from 42°to 53°F from Walton Creek (Appendix B2).

## **Red River**

Red River is supplied by gravity flow from an intake at the bottom of the South Fork of Red River, 225 yards upstream from the facility. The water right for the facility is 8.18 cfs. During low flow in the summer, about five cfs is available to the CFH. Temperatures ranged from 44°to 62°F (Appendix B3).

## **Water Quality Analysis**

The water quality analysis for CFH was performed by the Health and Welfare in Boise and the satellite facilities was performed by Anatek Labs in Moscow, Idaho.

## **Clearwater**

The samples were taken from the CFH incubation supply line June 1994 (Appendix C1).

The CFH's water supply has a total alkalinity (as CaCO<sub>3</sub>) of 16 mg/1, which is very low regarding fish culture.

## **Crooked River**

Water quality analysis was taken at the rearing facility intake on June 26, 1997 (Appendix C2).

## **Powell**

Water quality analysis was taken at the rearing facility intake on June 26, 1997 (Appendix C3).

## **Red River**

Water quality analysis was taken at the rearing facility intake on July 2, 1997 (Appendix C4).

## **STAFFING**

The CFH has eight permanent staff employees; one Hatchery Manager, two Assistant Hatchery Managers, one Utility Craftsman, three Fish Culturists, and Office Secretary. The rest of the crew consists of temporary employees with the positions as Fishery Technicians, Biological Aides, Laborers, and Mechanics Assistant, Grounds Maintenance Worker, and Clearwater Youth Program enrollees. One temporary person mans the Red River, Crooked River, and Powell facilities each, which are supervised from the CFH.

## **ADULT CHINOOK COLLECTION**

### **Crooked River**

The weir and trap were put into operation on June 1 and taken out of operation on September 18, 1996. A total of 299 fish were trapped, 113 adult males, 91 adult females, 92 jacks and 3 one-ocean females (Appendices D1, D2, and D3). Flow through the trap for adult attraction was 10 cfs from April 1 to June 30 and six cfs from July 1 to October 1.

Age-class breakdown of this run was 92 one-ocean males, 3 one-ocean females, 112 two-ocean males, 91 two-ocean females, and one three-ocean male. The age-class breakdown was as follows: less than 25 inches (64cm) were jacks or one-ocean females, more than 25 inches (64cm) to 32 inches (82cm) were four-year-olds, and 32 inches and over were five-year-olds. The breakdown is from limited historic CWT data (Appendices D3, E, and F).

## **Holding and Spawning**

There is no adult holding at this site. Fish trapped from this facility are transported 28 miles to the Red River facility. These adults were held separate from the Red River stock.

All fish were injected with Erythromycin 200 at a rate of 20 mg/kg to inhibit BKD. Fish being held were also treated every other day with a 100-ppm formalin drip for one hour to prevent the growth of fungus. After the first sort these fish were treated every day with 100 ppm formalin drip for one hour. All mortalities not showing clinical signs of BKD were returned to Crooked River to add nutrients to the system. (Appendix G for individual egg-take numbers).

Ponded fish were sorted twice per week for ripeness. The first fish was spawned August 15 and the last on September 17. Pre-spawn mortality for Crooked River was five fish (2.1% pre-spawning mortality) (Appendix E).

### **Powell**

The weir and trap on Walton Creek were installed on June 3 and taken out of operation on September 8, 1996. A total of 186 fish were trapped, 71 adult males, 69 adult females 45 jacks, and one one-ocean female (Appendices H1, H2, and H3).

The floating weir across the Lochsa River was not installed this year. Adipose fin (AD) clipped fish returning to the Powell trap was considered hatchery stock and were ponded for spawning. Flow through the trap and ponds was 6.2 cfs.

Age-class breakdown of this run was 45 one-ocean males, one one-ocean female, 71 two-ocean males, and 69 two-ocean females. The age-class breakdown was as follows: less than 25 inches (64cm) were jacks or one-ocean females, more than 25 inches (64 cm) to 32 inches (82cm) were four-year-old, and 32 inches (82cm) and over were five-year-olds. Our breakdown is from limited historic CWT data from Region 2 Fisheries Biologist (Appendices H3, J, and I).

### **Holding and Spawning**

Ponded fish were injected with Erythromycin 200 at a rate of 20 mg/kg to inhibit BKD. Fish being held for spawning were also treated every other day with 100 ppm formalin drip for one hour. After the first sorting, all fish were treated every day with 100 ppm formalin drip for one hour.

Ponded fish were sorted twice per week for ripeness. The first fish was spawned on August 5 and the last on August 27. Fish carcasses not showing clinical signs of BKD were placed in the Lochsa and tributaries to add nutrients to the stream. Pre-spawning mortality was 2.2%, with a total of four fish (Appendix I).

Eggs were water hardened in a 100-ppm Argentyne solution for one hour in egg tubes, drained and transported in fresh water to CFH for incubation. Tissue and ovarian samples were collected at the time of spawning. These samples were air mailed the next day to Eagle Fish Health Lab for BKD and virus testing. (Appendix G for individual egg take numbers).

### **Egg Transport**

After water hardening at the adult facility green eggs were transported to CFH. The transport vehicle was met at the front gate and egg tubes were removed from an egg cooler and placed in a clean egg cooler containing 100 ppm Argentyne solution for 10 minutes. The clean egg cooler was then taken to the incubation room and eggs from each female were divided into two equal groups and placed in individual Heath egg trays.

## **Red River**

The weir and trap were put into operation on June 11 and taken out of operation September 19, 1996. A total of 62 fish were trapped, 39 adult males, 14 adult females, and 9 jacks (Appendices K1, K2, and K3). Water flow through the trap for adult attraction and adult holding pond was 5 cfs.

Age-class breakdown of this run was 9 one-ocean males, 39 two-ocean males, and 14 two-ocean females. The age-class breakdown was as follows: less than 25 inches (64cm) were jacks, more than 25 inches (64cm) to 32 inches (82cm) were four-year-olds, and 32 inches (82cm) and over were five-year-olds. The breakdown is from limited historic CWT data from Ron Lindlund and Rodney Duke (Appendices K3, L, and M).

### **Holding and Spawning**

All spring chinook salmon adults were injected with Erythromycin 200 at a rate of 20 mg/kg to inhibit BKD.

Fish being held for spawning were treated every other day with 100 ppm formalin drip for one hour. After the first sort, all fish were treated every day with 100 ppm formalin drip until spawning was complete.

Ponded fish were sorted twice per week for ripeness. The first fish was spawned on August 29 and the last on September 23. Fish carcasses not showing clinical BKD were placed in Red River to add nutrients to the stream. Pre-spawn mortality was 8.8%, with a total of four fish (Appendix L).

Eggs were water hardened in a 100-ppm Argentyne solution for one hour in egg tubes, drained and transported in fresh water to CFH for incubation. Tissue and ovarian samples were collected at the time of spawning. These samples were air mailed the next day to Eagle Fish Health Lab for BKD and virus testing. (Appendix G for individual egg take numbers).

### **Egg Transport**

After water hardening at the adult facility green eggs were transported to CFH. The transport vehicle was met at the front gate and egg tubes were removed from egg cooler and placed in a clean egg cooler containing 100 ppm Argentyne solution for 10 minutes. The clean egg cooler was then taken to the incubation room and eggs from each female were placed in individual Heath egg trays.

## **RAPID RIVER STOCK**

### **Egg Receiving**

During the 1996 spawning seasons, eyed eggs from high BKD parentage were received from Rapid River Fish Hatchery in Riggins, Idaho and Lookingglass Fish Hatchery in Oregon. The CFH received a total of 169,697 eyed eggs from 53 females from Rapid River and 159,175 eyed eggs from 44 females from Lookingglass (Appendix G).

## **SELWAY CAPTIVE BROOD**

A total of 12 Brood Year 1992 Selway captive brood females were spawned at CFH. The same protocol was followed as the fish spawned at satellites.

## **CLEARWATER FISH HATCHERY**

### **Incubation**

Fertilized eggs from spring chinook salmon spawned at Powell, Red River and Crooked River, along with eggs from Rapid River (Rapid River stock) were transported to CFH for incubation. Selway chinook were spawned at the CFH. All fertilized eggs were transported in individual egg tubes to CFH. The transport vehicle was met at the front gate and egg tubes were removed from egg coolers and placed in clean egg coolers containing 100 ppm Argentyne solution for 10 minutes. The clean egg coolers were then taken to the incubation room and eggs were placed into Heath egg trays with one female per tray. All Heath stacks were operated at approximately 5.5 gpm.

A total of 274,332 green eggs were incubated from Crooked River stock, 275,883 green eggs from Powell stock, 40,156 green eggs from Red River stock, and 16,698 from Selway captive brood. In addition, 169,697 eyed eggs were received from Rapid River and 159,175 eyed eggs from Lookingglass (Rapid River stock) from High BKD parentage (Appendix G).

A total of 607,069 green eggs were incubated from BY96 spring chinook salmon. Overall eyed-eggs numbered 548,485 for a total eye-up percentage of 90.3%. Crooked River achieved a 89.9% eye-up, Powell 92.6% eye-up, Red River 89.1% eye-up, and the Selway captive brood had 63.8% eye-up.

Beginning on the fourth day of incubation, all egg lots were treated with formalin to reduce fungal development. Treatments were administered three times per week at a 1:600 concentration (1667 ppm) for 15 minutes and continued until each egg lot accumulated 800 thermal units (T.U.'s).

Eye-up occurred at approximately 500 T.U.'s at which time all egg lots were shocked, picked and enumerated by hand. All egg trays and screens were pressure washed clean before any eyed-eggs were placed back in them for final incubating.

Prior to hatching all eyed-eggs were picked a second time. The second pick occurred at approximately 700 T.U.'s. Hatching occurred at approximately 1,000 T.U.'s at which time all egg lots were picked a third time. All trays received a fourth and final pick at 1,700 T.U.'s to remove any dead yolk-sac fry. Swim-up fry were transferred to the early rearing vats at approximately 1,750 T.U.'s. Survival of green eggs to swim-up fry for Crooked River, Red River, and Powell averaged 88.8%. Survival of green eggs to swim-up fry for Selway chinook averaged 57.8%, and eyed-egg survival to swim-up for Rapid River/Lookingglass chinook averaged 99.0%.

### **Early Rearing Procedures**

At swim-up, fry were moved to hatchery vats. Vat loading was approximately 37,500 to 42,000 fish per vat. A total of 859,879 swim-up fry were ponded in 24 vats. Fish were segregated by stock and by BKD status. Fish were started in a full vat with baffles in place. Initial water flows were set at 46 gpm for approximately 10 days to start the fry on feed. Water flows were increased to 92 gpm on day 11 and remained set at that rate until the fish were moved outside. Flow indices were held at or below 1.5 while DI never exceeded 0.3 during the entire early rearing period.

A total of 549,386 spring chinook were AD-clipped, 224,358 AD-clipped and coded-wire tag (CWT) tagged, 32,974 were right ventral (RV) clipped and 21,701 left ventral (LV) clipped. All the chinook were AD-clipped then moved to the chinook raceways for final rearing during marking. All chinook were between 68 and 93 fish/lb when marked on July 7 through 17, 1997.

Only one significant fish mortality occurred during early rearing. The Rapid River High BKD chinook had a *Pseudomonas* outbreak in March. They were fed Oxytetracycline for ten days and mortality dropped quickly. A total of 3,000 mortalities occurred from this epizootic. There were some normal drop-off of cripples and "pinheads" during the first few months, but mortality remained at or below normal for the remainder of the fish.

Water temperatures for the early rearing period ranged from 38° to 48° F (Appendix A1).

Bioproduct starter and Bio-Diet grower formula were used to feed all lots of fish during early rearing. A total of 10,247 pounds of food was used at a cost of \$10,964. The conversion rate of this period was 1.38 pounds of feed for one pound of gain.

### **Final Rearing Procedures**

All spring chinook salmon were reared to full-term smolts at CFH and received two 28 days Erythromycin medicated feed treatments, one during early rearing and one during final rearing. These feedings occurred in June and October. All high BKD chinook received a third medicated feeding in January and February with an every other day feeding for 28 days total fed. The fish were fed Bioproducts feed with 2.25% Aquamycin-100. The fish were fed Erythromycin between 75 and 150 mg/kg of fish weight to comply with Investigational New Animal Drug (INAD) specifications.

Bioproducts' Bio-Diet grower feed was the diet used throughout the final rearing period. A total of 88,879 pounds of fish food was used during final rearing at a cost of \$77,985. Total feed used in early and final rearing was 99,126 pounds at a cost of \$88,950 (a conversion rate of 1.73). Percent body weights fed ranged from 1.2 to 6.0 percent (Appendix N).

Chinook were fed full rations until July. At that time, most chinook salmon were fed week-on, week-off feeding programs in August through December. Fish were fed continuously during the weeks of medicated feed treatments in June and October. This feed regime was done to slow growth, yet maintain fin quality and fat reserves. Fin quality and fat reserves remained excellent. This program worked well at minimizing fish size but caused poor feed conversions as a result. Three raceways of Powell chinook were fed throughout the entire rearing cycle. This was done as part of a size-at-release study. The two size groups were normal size smolts (15-20/lb) and large smolts (9 to 14/lb).

All the rearing raceways were set up with jump screens and floating shade structures (4 to 5 per pond) to reduce stress and increase available shade to fish. Shade was available over approximately forty percent of the pond surface.

Water temperatures during the final rearing period were kept as cool as possible to reduce growth rates. Every effort was made to stay below 54°F (Appendix A1 and A2). Hatchery water temperatures varied from 40°F to 58°F during the final rearing period. An estimated 2 cfs of water supplied each raceway.

## Fish Health

### **Diseases Encountered and Treatment**

The CFH applied two 28-day prophylactic feed treatments to all chinook stocks, target dose of Erythromycin 100 mg/kg of fish per day using 2.25% Aquamycin 100 antibiotic. The CFH experienced their first epizootic of Bacterial Kidney Disease (BKD). The 1996 Rapid River spring chinook from Lookingglass Hatchery broke with BKD in September 1997, which spread, horizontally to the 1996 Rapid River spring chinook from Rapid River Fish Hatchery. A third prophylactic treatment of 4.5% Erythromycin antibiotic at a rate of 100 mg/kg of fish weight per day was given to High BKD segregation groups every other day for 56 days. The off day, feed was not given to the fish, to enhance absorption of Erythromycin in the gut. These fish were initially destined for release at Rapid River Fish Hatchery. Because of the risk of horizontal transmission of *Renibacterium* to low BKD production fish at Rapid River Fish Hatchery was too great, these high BKD groups were released at Hells Canyon. Before release, a standard oxytetracycline (OTC)-treatment was applied to clear the fish of secondary infection of *Pseudomonas spp.* found during diagnostic necropsy.

**Organosomatic Index** (Appendices O1, O2, and O3).

### **Acute Losses**

Acute losses were limited to the Rapid River high BKD groups during the BKD epizootic. Chronic losses were realized in these groups once Erythromycin treatments were applied to the epizootic. The steelhead program did not experience acute or chronic losses.

### **Other Assessments**

Selway spring chinook captive brood program experienced losses to BKD. Since there are so few fish, to label the losses as chronic or acute is difficult. The CFH staff treated the fish with injectable Erythromycin (20 mg/kg) utilizing intraperitoneal injection of the antibiotic. Medicated feed was not used because these fish did not favor artificial diets and would not obtain minimum inhibitory concentration of Erythromycin. Rapid River high BKD chinook final inspection was on February 26, 1998. The ELISA and FAT tests were performed on 30 fish. Fat results were 8/30 positive, Elisa were 6/6, two pools high (3.365 and 3.2330 optical density).

### **Fish Marking**

All the chinook were marked between July 7 and 17, 1997. The six stocks of chinook on station were marked and placed into 19 chinook raceways with seven different segregation areas. The low BKD Powell group was divided into six raceways of which, three were for large smolts, and three were for "normal" sized smolts. All the Powell chinook were AD-clipped and 223K received CWTs. There were 2,000 Passive Integrated Transponder (PIT) tags put in this group (1,000 in each rearing group). The Powell chinook from high BKD parentage was placed in segregated raceways, and received an AD clip only (Appendix P).

The Low BKD Crooked River chinook received an AD clip only, and 500 PIT tags (Appendix P).

The Low BKD Red River stock received a LV clip only and 500 PIT tags. The high BKD Red River/Crooked River chinook were mixed to form a South Fork stock. These fish were RV clipped only and 500 PIT tags (Appendix P). This stock was released from Red River ponds.

The High BKD Rapid River/Lookingglass chinook full-term smolts were given an AD clip only. There were no PIT tags in this group (Appendix P).

The High BKD Selway captive brood progeny were AD-clipped only and 300 PIT tags (Appendix P).

### **Fish Distribution**

A total of 814,949 full-term BY96 chinook smolts were transported from CFH (Appendix Q).

On March 16 and 18, 1998, 304,096 Rapid River/Lookingglass chinook were transported and direct released below Hells Canyon Dam.

On April 6, 1998 the 238,928 Powell low BKD chinook were volitionally released after an eight-day acclimation. The fish were force released on April 8.

The 5,919 high BKD Powell chinook were direct released in Walton Creek on April 8, 1998.

On April 7, 1998 the 205,906 Crooked River chinook were volitionally released after a seven-day acclimation. The fish were force released on April 9.

On April 7, 1998 the 21,623 Red River chinook were volitionally released after a seven-day acclimation. The fish were force released on April 9. The 29,585 South Fork stock chinook were positive released after a four-day acclimation.

The 8,892 Selway chinook were helicopter direct released in the Megrudor Corridor of the Selway River on April 21 and 22, 1998.

All volitional and force releases from the satellite rearing ponds were completed after dark to reduce predation.

## BROOD YEAR 1997 STEELHEAD REPORT

### ABSTRACT

The Clearwater Fish Hatchery (CFH) received 828,458 eyed BY97 North Fork B-run steelhead *Oncorhynchus mykiss* eggs from Dworshak National Fish Hatchery (DNFH). A total of 702,288 smolts from the North Fork stock were released from April 20 through 29, 1998; 487,792 at Red House hole, 209,999 at Kooskia Fish Hatchery on Clear Creek, and 4,497 at Red River near Soda Creek. The size of fish at release for the one year rearing cycle was 5.98 fish per pound, for a total of 117,307 pounds and average length was 193 mm.

A total of 211,696 pounds of feed was fed (188,191 Rangen, 23,505 BioProducts) with a cost of \$80,928 to produce 117,307 pounds of fish at CFH. The conversion rate was 1.91.

Author:

Jerry McGehee  
Hatchery Manager II

Brad George  
Assistant Fish Hatchery Manager

## CLEARWATER

### Synoptic History

#### **Brood Source**

The DNFH was the source for North Fork stock B-run steelhead *Oncorhynchus mykiss* eggs.

#### **Disease History**

Dworshak Fish Hatchery has a long history of Infectious Hematopoietic Necrosis Virus (IHNV). Therefore, CFH only accepts steelhead eggs from IHNV-negative females and follows a strict disinfection protocol when transporting them onto the station.

#### **Spawning**

##### **Dworshak BY96 North Fork Stock**

When eggs were being collected for CFH at DNFH, two of our crew assisted with their spawning operation. We collected and packaged all the disease samples to ship by airmail to Eagle Fish Health Lab.

#### **Incubation**

##### **Dworshak BY96 North Fork stock**

Eyed steelhead eggs were received from DNFH on March 31 through April 25, 1998 in five weekly shipments (Appendix R). The eggs from DNFH lots six (March 11) through 10 (April 8) were incubated approximately 17 days at Dworshak until the eggs eyed-up. All eggs from negative IHNV females were disinfected and transported to CFH. The transport vehicle was met at the front gate and egg baskets were removed from egg coolers and placed in clean and tempered egg coolers containing 100 ppm Argentyne solution for 10 minutes. The clean egg coolers were then taken to the incubation room and eggs were placed into Heath egg trays with approximately 7,000 eggs per basket, and water flows through each stack were set at six gallons per minute (gpm). A total of 828,458 eggs were received (Appendix R).

During incubation of the steelhead eggs, the primary pipeline was shut off for the clean-up contractor. During this time, the eggs were on secondary pipeline water (42°F). Approximately two weeks growth was lost during this time.

## **Early Rearing Procedures**

### **Dworshak BY- 97 North Fork stock**

At swim-up, unfed fry from Dworshak stock B-run steelhead were moved to vats 17 and 18, and 31 through 60 and were divided as evenly as possible (23,000 fish/vat to 27,000). The initial density index (DI) was 0.05 and flow index (FI) was 0.25. Fish were held in the CFH vats until September and October when they were marked and moved to twelve steelhead raceways (1-east, 2-6 east and west, and 7-west). Average length of the fish at the end of early rearing was 4.04-in. The fish averaged 38 fish/lb.

Water temperatures for the early rearing period ranged from 42°F to 57°F (Appendix A2). Whenever the temperatures exceeded 58°F for more than two days, the water was cooled back down by either blending in more secondary water or by lowering the primary intake in Dworshak Reservoir. Gaining clearance to lower the intake requires 24-hour prior notice to the control room at the dam. This created some lag-time in making the adjustment. There were also times during the year when we couldn't get clearance to enter the log boom because the dam was spilling water, on these days water temperature may have exceeded 58°F.

Bioproduct's starter and Bio-Diet grower were used to feed these fish during the early rearing period, in which 23,505 pounds of feed was used to achieve a feed conversion of 1.24 for a cost of \$16,567.

## **Final Rearing Procedures**

### **Dworshak BY96 North Fork Stock**

The juvenile Dworshak stock B-run steelhead were moved to outside steelhead raceways 1-east, 2 through 6-east and west, and 7-west. The move outside was done from September 8 through October 8. The move was done in conjunction with fin-clipping and coded-wire tag (CWT) tagging to avoid double stressing the fish. All fin-clipping was done in eight hour shifts. Baffles were removed from vats, fish were then moved to the clipping trailers using the transfer tanks (Appendix S).

The DI of the Dworshak steelhead ranged from 0.18 to 0.28, and the FI ranged from 0.57 to 1.20. These indexes were recalculated biweekly and were never allowed to exceed DI of 0.30 or FI of 1.5.

Water temperatures during final rearing period were maintained to keep temperatures as close to 57°F as possible (Appendix A2). Reservoir water temperatures began to drop in late October and bottomed out in January at 42°F. Temperatures began to slowly increase in mid March and had reached 50°F by late April when the steelhead smolts were being stocked out. Estimated water flows per raceway was 3.2 cf per second (cfs).

Fish were fed dry feed until released. A total of 188,191 pounds of feed was used during final rearing to produce 98,127 pounds of fish at a cost of \$64,361. A total of 211,696 pounds of feed was used throughout the entire rearing period to produce 117,307 pounds of fish at a cost of \$80,928. The overall conversion rate from fry to smolt was 1.80. Percent body weight fed ranged from 0.75 to 12% (Appendix N).

## **Fish Health**

The steelhead program did not experience significant epizootic (Appendix T).

## **Fish Marking**

### **Dworshak BY96 North Fork Stock**

North Fork stock steelhead released into the south fork of the Clearwater River and Clear Creek were all marked with Adiposed fin (AD) clips.

Each of these groups contained a number of Passive Integrated Transponder's (PIT) and CWT's (Appendix S). Another group of 4,497 fish with PIT's was released in Red River in the spring of 1998.

## **Fish Distribution**

### **Dworshak BY96 North Fork stock**

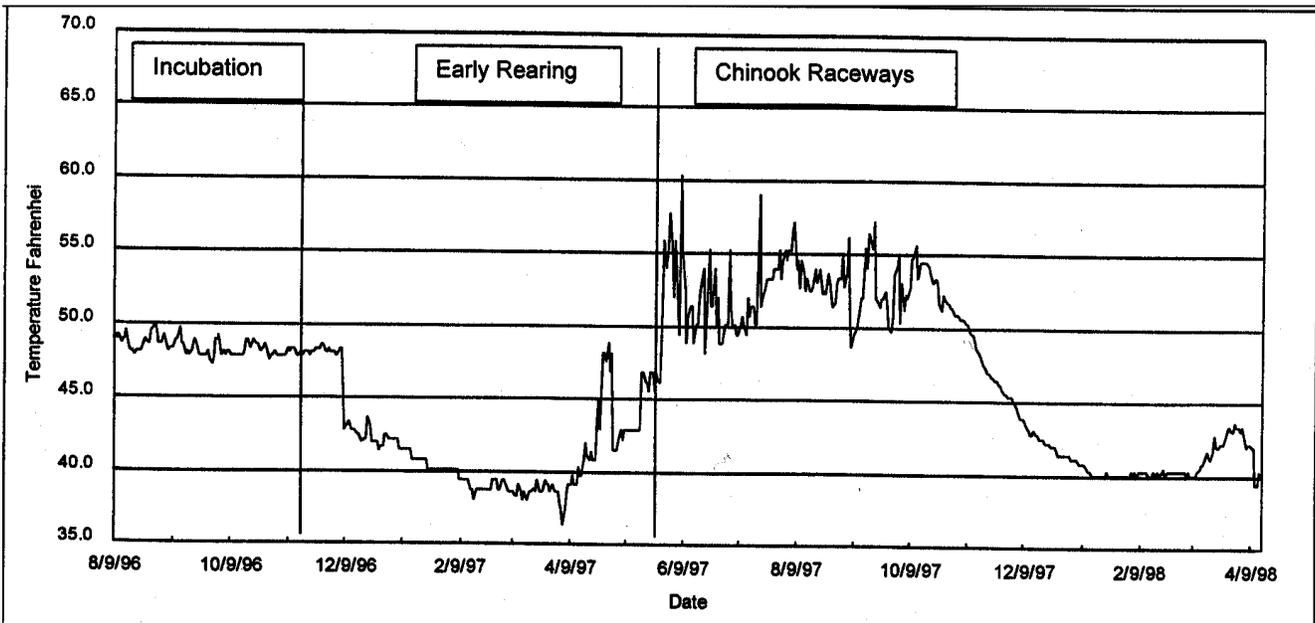
Between April 20 and 29, 1998 a total of 487,792 Dworshak B-run steelhead were direct released at the Red House hole plant site (approximately 3.5 miles upstream of Highway 13 and 14 junction) on the lower South Fork of Clearwater River. These fish were 5.9 per pound. The remaining 209,999 (6.0 per pound) Dworshak B-run steelhead was direct released into Clear Creek at Kooskia Hatchery on the Middle Fork of the Clearwater River. There were 4,497 fish released at Red River, which averaged 6.1 fish/lb. There were very little crowding and hauling mortality from the fish transportation to the release sites (Appendix S).

## **ACKNOWLEDGEMENTS**

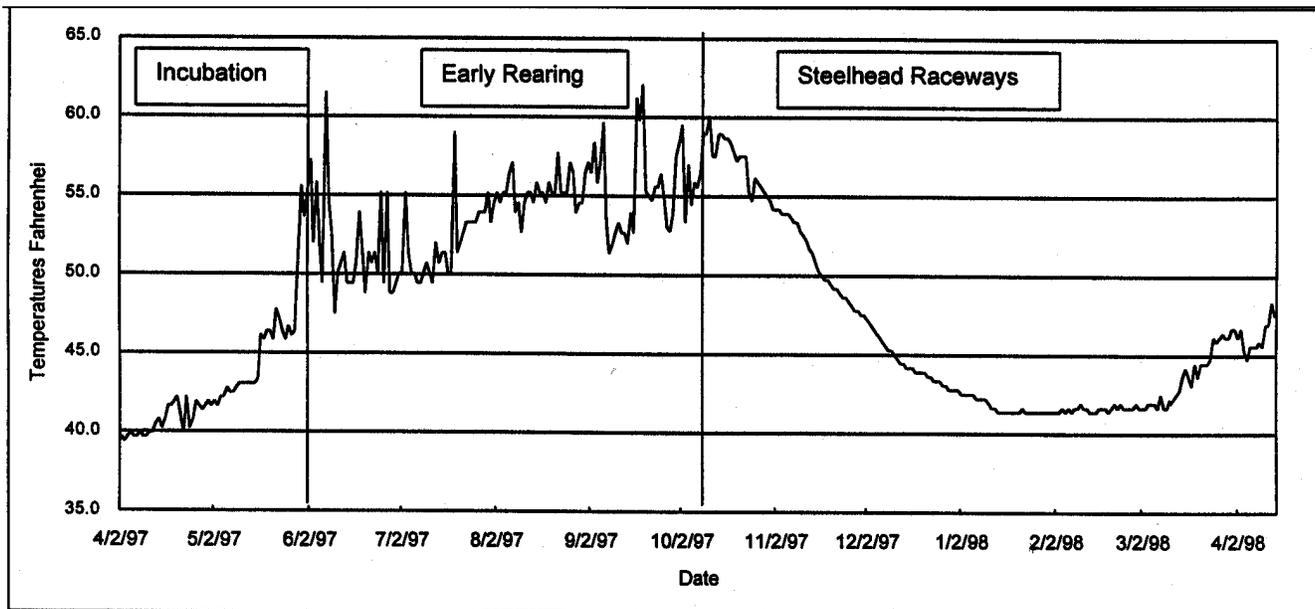
The CFH has a crew of 27 people and are all assigned a wide variety of responsibilities. Everyone on station has contributed to the success of the program. The hatchery crew consists of; Jerry McGehee (Fish Hatchery Manager II), Brad George, Scott Patterson (Assistant Fish Hatchery Manager's), John Rankin, CalLee Davenport, Marc Arms (Fish Culturists), Ernie Yost (Utility Craftsman), Rene'e Hedrick (Office Secretary), Jim Niles, Ric Downing, Chris Shockman (Fish Technicians), Art Butts, Theresa Elliott, Jeff Houck, Josh Jones, Damon Keen, Elizabeth Miller, Nathan Miller, Stacey Osborn, Jared Yost, John Zakrajsek, David Zimmerman (Bio-aides), Dave Rising (Grounds Maintenance Worker), Tony Dmitter, Bernard O Donnell (Laborers), and Chris Estrada (Assistant Mechanic).

## APPENDICES

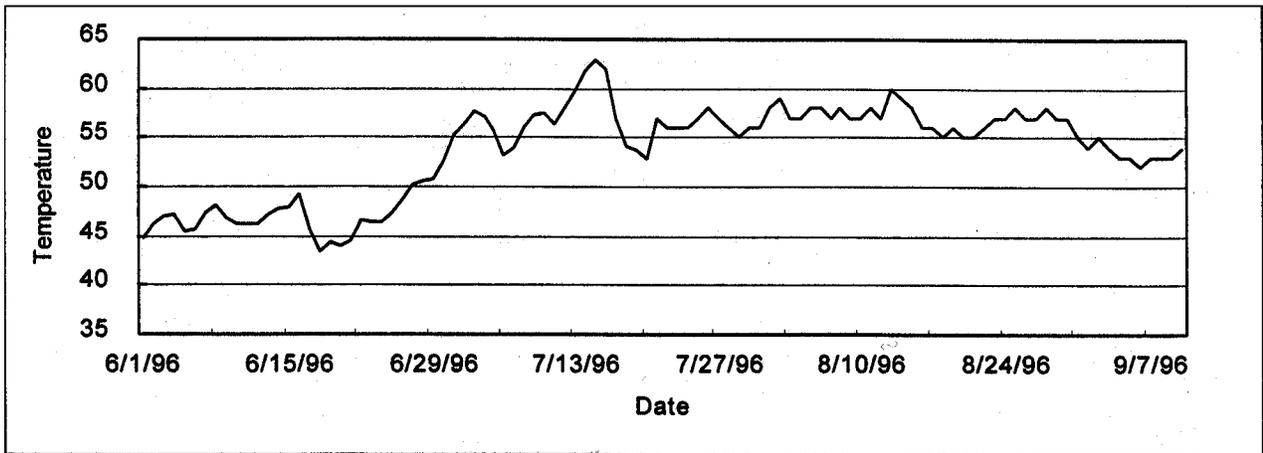
Appendix A1. Water temperatures, Brood Year 1996 chinook.



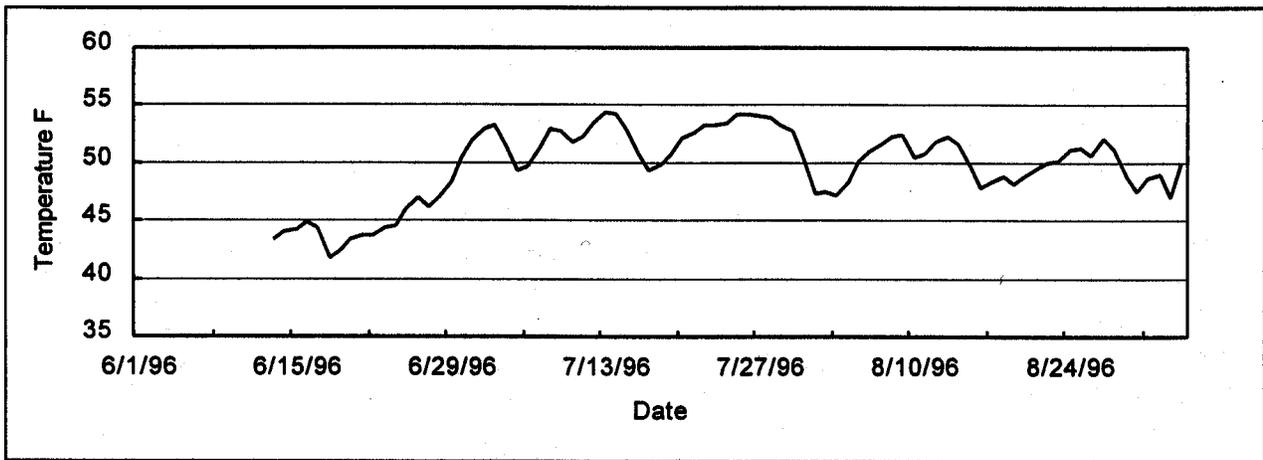
Appendix A2. Water temperatures, Brood Year 1997 steelhead



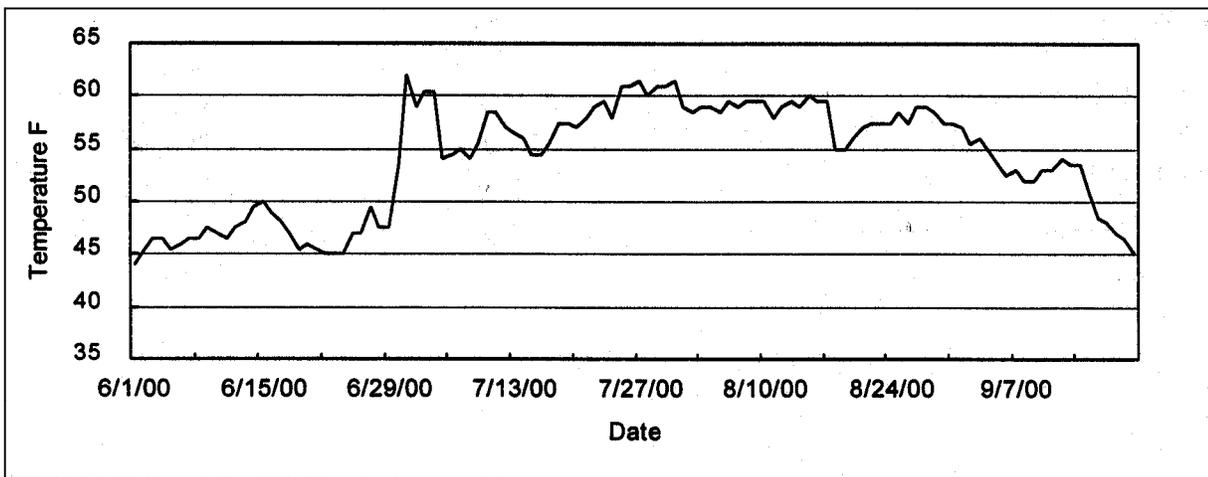
Appendix B1. Crooked River water temperatures 1996.



Appendix B2. Powell water temperatures 1996.



Appendix B3. Red River water temperatures 1996.



Appendix C1. Water quality analysis – Clearwater Fish Hatchery analysis provide by Eagle Lab, Eagle, Idaho

<b>Analysis</b>	<b>Results (mg/l)</b>	<b>Date Analyzed</b>	<b>Optimal Rearing Levels</b>
Alkalinity	16	8/04/1994	120 - 400 mg/l
Ammonia (as N)	<0.005	8/04/1994	0.0125
Arsenic	<0.01	8/04/1994	N/A
Barium	<0.1	8/04/1994	N/A
Cadmium	<0.001	8/04/1994	<.0004 mg/l
Calcium	3.8	8/12/1994	N/A
Chloride	0.9	8/12/1994	N/A
Chromium	<0.01	8/04/1994	0.1
Color (C.U.)	15	8/12/1994	N/A
Copper	<0.02	8/04/1994	<.006 mg/l
Cyanide	<0.005	8/12/1994	N/A
Detergents(surfactant)	<0.08	8/09/1994	N/A
Fluoride	<0.1	8/30/1994	N/A
Hardness	14	8/04/1994	120 - 400 mg/l
Hydrogen Sulfide	<0.01	8/15/1994	N/A
Iron	<0.02	8/11/1994	N/A
Lead	<0.005	8/04/1994	<.03 mg/l
Magnesium	<0.8	8/11/1994	N/A
Manganese	<0.01	8/11/1994	N/A
Mercury	<0.0005	8/11/1994	<.002 mg/l
Nitrogen Nitrate	<0.013	8/18/1994	0.2 mg/l
Potassium	0.5	8/12/1994	N/A
Selenium	<0.005	8/10/1994	N/A
Silica	11	8/30/1994	N/A
Silver	<0.001	8/17/1994	N/A
Sodium	1.5	8/17/1994	N/A
Sulfate	<1	8/26/1994	N/A
Total Dissolved Solids	28	8/11/1994	80 mg /l
Zinc	<0.005	8/10/1994	0.03 mg/l
pH (pH units)	7.2	8/09/1994	6.5 - 8.0

Appendix C2. Water quality analysis – Crooked River satellite, analysis provided by Anatek Labs, Inc., Moscow, Idaho

**PRIMARY CONTAMINANTS**

Contaminant	Analysis				Contaminant	Analysis			
	Result	MDL	Method	Date		Result	MDL	Method	Date
Antimony (0.006)	---	0.001	EPA 200.8	07/02/97	Nickel	---	0.001	EPA 200.8	07/02/97
Arsenic (0.05)	ND	0.005	EPA 200.8	07/02/97	Selenium(0.05)	ND	0.005	EPA 200.8	07/02/97
Barium (2)	0.029	0.01	EPA 200.8	07/02/97	Sodium	2.9	1	EPA 200.8	07/02/97
Beryllium (0.004)	---	0.001	EPA 200.8	07/02/97	Thallium(0.02)	---	0.001	EPA 200.8	07/02/97
Cadmium(0.005)	ND	0.001	EPA 200.8	07/02/97	Cyanide(0.2)	ND	0.01	EPA 200.8	07/02/97
Chromium (0.1)	0.002	0.005	EPA 200.8	07/02/97	Fluoride(4.0)	ND	0.1	EPA 300.0	06/27/97
Mercury (0.002)	ND	0.001	EPA 200.8	07/02/97					

**SECONDARY CONTAMINANTS**

Contaminant	Analysis				Contaminant	Analysis			
	Result	MDL	Method	Date		Result	MDL	Method	Date
Chloride	ND	0.001	EPA 300.0	06/27/97	Ammonia/N	ND	0.1	EPA 350.2	07/01/97
Color	2	0.005	EPA110.2	06/27/97	Calcium	3.6	1	EPA 200.8	07/02/97
Sulfide(HS)	ND	0.01	EPA 376.1	06/27/97	Hardness(CaCO3)	12	5	2340 B	07/02/97
Iron	0.26	0.05	EPA 236.1	07/02/97	Magnesium	0.6	1	EPA 200.8	07/02/97
Manganese	0.01	0.001	EPA 200.8	07/02/97	pH	6.9		EPA 150.1	07/02/97
Odor	---	1	EPA 140.1		Potassium	0.15	1	EPA 200.8	06/27/97
Surfactants	ND	0.05	SM5540C	06/27/97	Silica(SiO3)	6.8	1	EPA 200.8	07/02/97
TDS	18	1	EPA 160.1	06/27/97	Lead	0.002	0.001	EPA 200.8	07/02/97
Zinc	0.012	0.001	EPA 200.8	07/02/97	Copper	0.016	0.001	EPA 200.8	07/02/97
Sulfate	ND	1	EPA 300.0	06/27/97	Conductivity(uS/cm)	25	10	EPA 120.1	06/27/97
Aluminum	---	0.001	EPA 200.8	07/02/97	Langlier Index	---			
Alkalinity	12	5	EPA 310.1	06/27/97	Silver	ND	0.01	EPA 200.8	07/02/97
Turbidity(NTU)	---	0.5	EPA 180.1						

Laboratory Reporting Codes:  
 Results are mg/L (ppm) unless otherwise noted  
 ND - Not detected within the sensitivity of the instrument  
 - - - = No analysis performed for this contaminant

Numerical Entry = Detection at level indicated  
 MCL (numbers in parenthesis)= EPA maximum level

Appendix C3. Water quality analysis – Powell satellite, analysis completed provide by Anateck Labs, Inc., Moscow, Idaho

**PRIMARY CONTAMINANTS**

<b>Contaminant</b>	<b>Result</b>	<b>MDL</b>	<b>Method</b>	<b>Analysis Date</b>	<b>Contaminant</b>	<b>Result</b>	<b>MDL</b>	<b>Method</b>	<b>Analysis Date</b>
Antimony (0.006)	---	0.001	EPA 200.8	07/02/97	Nickel	---	0.001	EPA 200.8	07/02/97
Arsenic (0.05)	ND	0.005	EPA 200.8	07/02/97	Selenium(0.05)	ND	0.005	EPA 200.8	07/02/97
Barium (2)	0.009	0.01	EPA 200.8	07/02/97	Sodium	1.9	1	EPA 200.8	07/02/97
Beryllium (0.004)	---	0.001	EPA 200.8	07/02/97	Thallium(0.02)	---	0.001	EPA 200.8	07/02/97
Cadmium(0.005)	ND	0.001	EPA 200.8	07/02/97	Cyanide(0.2)	ND	0.01	EPA 200.8	07/02/97
Chromium (0.1)	0.002	0.005	EPA 200.8	07/02/97	Fluoride(4.0)	ND	0.1	EPA 300.0	06/27/97
Mercury (0.002)	ND	0.001	EPA 200.8	07/02/97					

**SECONDARY CONTAMINANTS**

<b>Contaminant</b>	<b>Result</b>	<b>MDL</b>	<b>Method</b>	<b>Analysis Date</b>	<b>Contaminant</b>	<b>Result</b>	<b>MDL</b>	<b>Method</b>	<b>Analysis Date</b>
Chloride	ND	0.001	EPA 300.0	06/26/97	Ammonia/N	ND	0.1	EPA 350.2	07/01/97
Color	4	0.005	EPA110.2	06/26/97	Calcium	4.2	1	EPA 200.8	07/02/97
Sulfide(HS)	ND	0.01	EPA 376.1	06/26/97	Hardness(CaCO3)	14	5	2340 B	07/02/97
Iron	0.15	0.05	EPA 236.1	07/02/97	Magnesium	0.7	1	EPA 200.8	07/02/97
Manganese	0.009	0.001	EPA 200.8	07/02/97	pH	---		EPA 150.1	
Odor	---	1	EPA 140.1		Potassium	0.07	1	EPA 200.8	07/02/97
Surfactants	ND	0.05	SM5540C	06/26/97	Silica(SiO3)	5	1	EPA 200.8	07/02/97
TDS	15	1	EPA 160.1	06/26/97	Lead	0.002	0.001	EPA 200.8	07/02/97
Zinc	0.006	0.001	EPA 200.8	07/02/97	Copper	0.016	0.001	EPA 200.8	07/02/97
Sulfate	ND	1	EPA 300.0	06/26/97	Conductivity(uS/cm)	27.2	10	EPA 120.1	06/25/97
Aluminum	---	0.001	EPA 200.8	07/02/97	Langlier Index	---			
Alkalinity	---	5	EPA 310.1		Silver	ND	0.01	EPA 200.8	07/02/97
Turbidity(NTU)	---	0.5	EPA 180.1						

Laboratory Reporting Codes:

Results are mg/L (ppm) unless otherwise noted

ND - Not detected within the sensitivity of the instrument

--- = No analysis performed for this contaminant

Numerical Entry = Detection at level indicated

MCL (numbers in parenthesis)= EPA maximum level

Appendix C4. Water quality analysis – Red River satellite, analysis done by Anateck Labs Inc.,  
Moscow, Idaho.

**PRIMARY CONTAMINANTS**

Contaminant	Analysis				Contaminant	Analysis			
	Result	MDL	Method	Date		Result	MDL	Method	Date
Antimony (0.006)	---	0.001	EPA 200.8	07/16/97	Nickel	---	0.001	EPA 200.8	07/16/97
Arsenic (0.05)	ND	0.005	EPA 200.8	07/16/97	Selenium(0.05)	ND	0.005	EPA 200.8	07/16/97
Barium (2)	0.03	0.01	EPA 200.8	07/16/97	Sodium	3.2	1	EPA 200.8	07/16/97
Beryllium (0.004)	---	0.001	EPA 200.8	07/16/97	Thallium(0.02)	---	0.001	EPA 200.8	07/16/97
Cadmium(0.005)	ND	0.001	EPA 200.8	07/16/97	Cyanide(0.2)	ND	0.01	EPA 200.8	07/16/97
Chromium (0.1)	0.001	0.005	EPA 200.8	07/16/97	Fluoride(4.0)	ND	0.1	EPA 300.0	07/03/97
Mercury (0.002)	ND	0.001	EPA 200.8	07/16/97	Nitrate /N	ND	0.5	EPA 300.0	07/03/97

**SECONDARY CONTAMINANTS**

Contaminant	Analysis				Contaminant	Analysis			
	Result	MDL	Method	Date		Result	MDL	Method	Date
Chloride	ND	0.001	EPA 300.0	07/03/97	Ammonia/N	ND	0.1	EPA 350.2	07/01/97
Color	15	0.005	EPA110.2	07/03/97	Calcium	3.92	1	EPA 200.8	07/16/97
Sulfide(HS)	ND	0.01	EPA 376.1		Hardness(CaCO3)	13	5	2340 B	07/16/97
Iron	0.37	0.05	EPA 236.1	07/16/97	Magnesium	0.76	1	EPA 200.8	07/16/97
Manganese	0.014	0.001	EPA 200.8	07/16/97	pH	7.06		EPA 150.1	07/03/97
Odor	---	1	EPA 140.1		Potassium	0.53	1	EPA 200.8	07/16/97
Surfactants	---	0.05	SM5540C		Silica(SiO3)	7.9	1	EPA 200.8	07/16/97
TDS	21	1	EPA 160.1	07/03/97	Lead	0.002	0.001	EPA 200.8	07/16/97
Zinc	0.016	0.001	EPA 200.8	07/16/97	Copper	0.016	0.001	EPA 200.8	07/16/97
Sulfate	ND	1	EPA 300.0	07/03/97	Conductivity(uS/cm)	32	10	EPA 120.1	07/03/97
Aluminum	---	0.001	EPA 200.8	07/16/97	Langlier Index	---			
Alkalinity	---	5	EPA 310.1		Silver	ND	0.01	EPA 200.8	07/16/97
Turbidity(NTU)	1.4	0.5	EPA 180.1	07/03/97					

Laboratory Reporting Codes:

Results are mg/L (ppm) unless otherwise noted

ND - Not detected within the sensitivity of the instrument

--- = No analysis performed for this contaminant

Numerical Entry = Detection at level indicated

MCL (numbers in parenthesis)= EPA maximum level

Appendix D1. Crooked River Chinook run timing 1996.

Date	Male	Female	Total Trapped
06/18	2	1	3
06/19	0	0	0
06/20	0	0	0
06/21	1	1	2
06/22	1	0	1
06/23	3	0	3
06/24	0	1	1
06/25	1	3	4
06/26	5	3	8
06/27	4	4	8
06/28	3	1	4
06/29	7	4	11
06/30	7	2	9
07/01	16	7	23
07/02	11	2	13
07/03	16	16	32
07/04	13	6	19
07/05	15	5	20
07/06	5	1	6
07/07	10	4	14
07/08	5	1	6
07/09	3	3	6
07/10	8	3	11
07/11	4	0	4
07/12	6	2	8
07/13	1	2	3
07/14	4	1	5
07/15	3	2	5
07/16	4	2	6
07/17	2	1	3
07/18	0	0	0
07/19	0	0	0
07/20	0	0	0
07/21	0	0	0
07/22	1	1	2
07/23	1	1	2
07/24	1	0	1
07/25	1	0	1
07/26	0	1	1
07/27	1	0	1
07/28	1	0	1
07/29	0	1	1
07/30	2	0	2
07/31	0	0	0

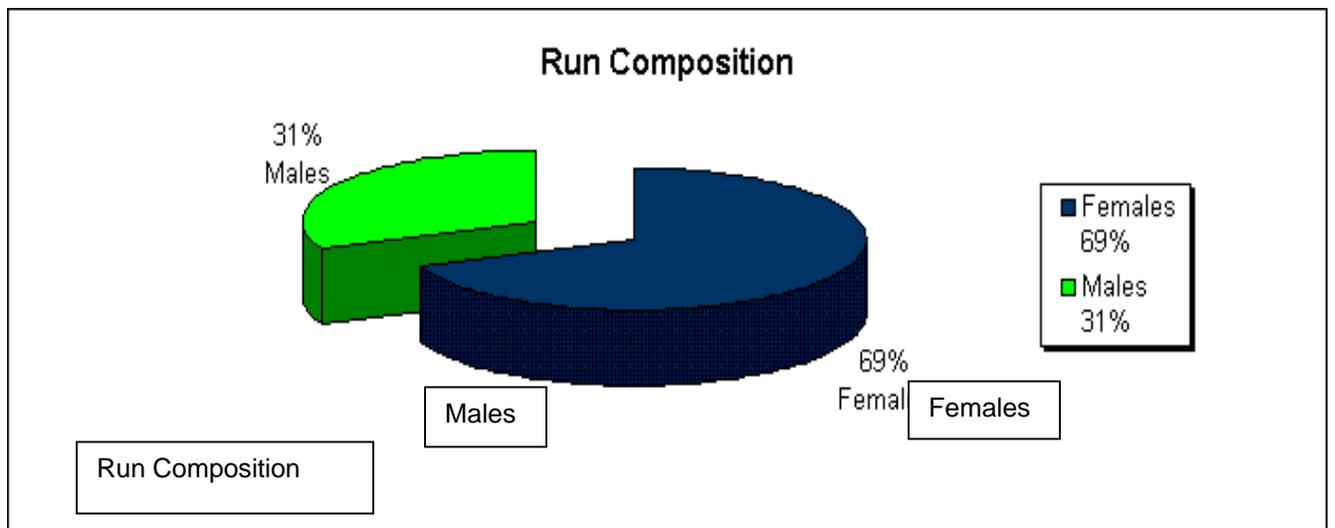
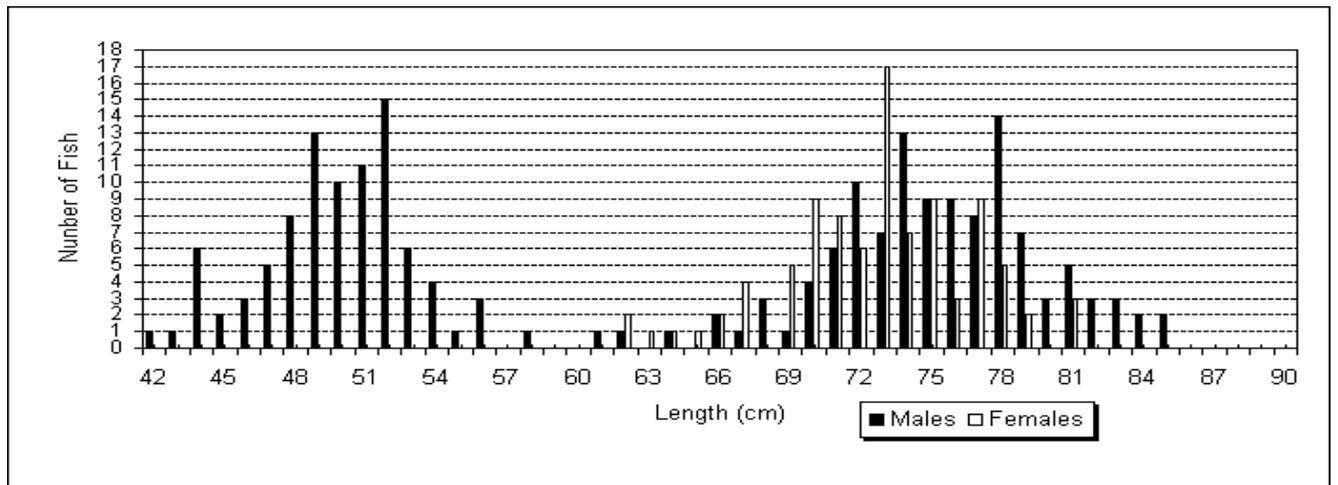
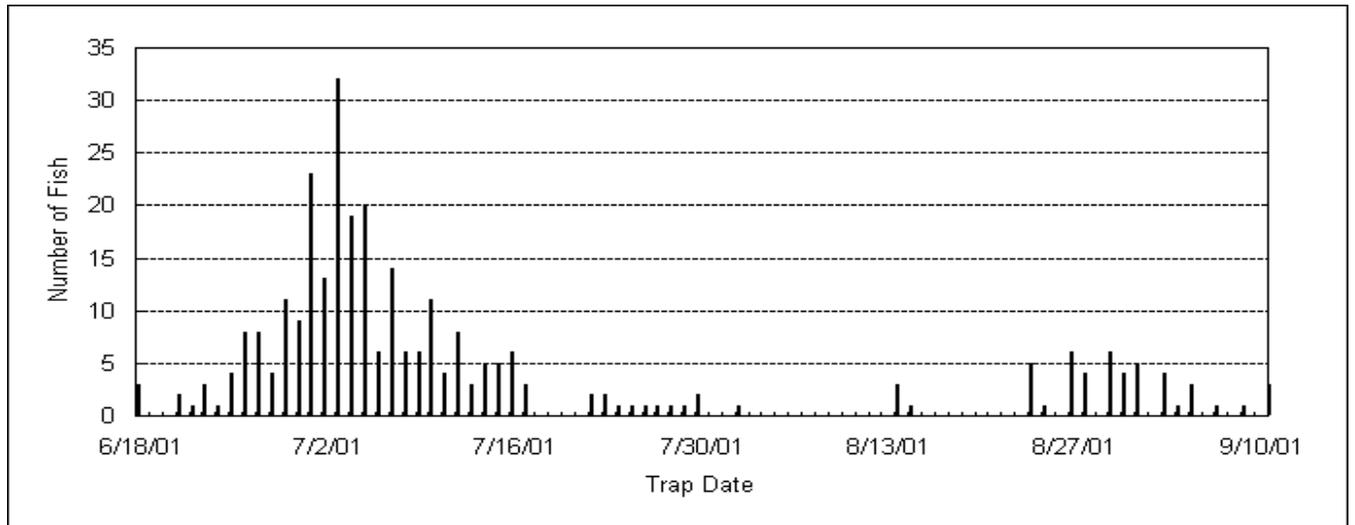
Date	Male	Female	Total Trapped
08/01	0	0	0
08/02	0	1	1
08/03	0	0	0
08/04	0	0	0
08/05	0	0	0
08/06	0	0	0
08/07	0	0	0
08/08	0	0	0
08/09	0	0	0
08/10	0	0	0
08/11	0	0	0
08/12	0	0	0
08/13	0	0	0
08/14	3	0	3
08/15	0	1	1
08/16	0	0	0
08/17	0	0	0
08/18	0	0	0
08/19	0	0	0
08/20	0	0	0
08/21	0	0	0
08/22	0	0	0
08/23	0	0	0
08/24	4	1	5
08/25	0	1	1
08/26	0	0	0
08/27	6	0	6
08/28	4	0	4
08/29	0	0	0
08/30	5	1	6
08/31	4	0	4
09/01	3	2	5
09/02	0	0	0
09/03	2	2	4
09/04	1	0	1
09/05	1	2	3
09/06	0	0	0
09/07	1	0	1
09/08	0	0	0
09/09	1	0	1
09/10	0	0	0
09/11	2	1	3
09/12	0	0	0
09/13	0	0	0
<b>Total</b>	<b>2057</b>	<b>94</b>	<b>299</b>

Appendix D2. Crooked River chinook length frequency 1996.

Size (cm)	Male	Female	Total Trapped
42	1	0	1
43	1	0	1
44	6	0	6
45	2	0	2
46	3	0	3
47	5	0	5
48	8	0	8
49	13	0	13
50	10	0	10
51	11	0	11
52	15	0	15
53	6	0	6
54	4	0	4
55	1	0	1
56	3	0	3
57	0	0	0
58	1	0	1
59	0	0	0
60	0	0	0
61	1	0	1
62	1	2	3
63	0	1	1
64	1	1	2
65	0	1	1
66	2	2	4

Size (cm)	Male	Female	Total Trapped
67	1	4	5
68	3	0	3
69	1	5	6
70	4	9	13
71	6	8	14
72	10	6	16
73	7	17	24
74	13	7	20
75	9	9	18
76	9	3	12
77	8	9	17
78	14	5	19
79	7	2	9
80	3	0	3
81	5	3	8
82	3	0	3
83	3	0	3
84	2	0	2
85	2	0	2
86	0	0	0
87	0	0	0
88	0	0	0
89	0	0	0
90	0	0	0
<b>Total</b>	<b>205</b>	<b>94</b>	<b>299</b>

Appendix D3. Crooked River chinook length frequency, run timing, and run composition graph.



Appendix E. Crooked River chinook summary of fish trapped, released, spawned, and disposition of carcasses, Brood Year 1996.

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**Crooked River**

<b>Age Classes</b>	<b>Females</b>	<b>Males</b>
3 Years = (<64 cm)	3	92
4 Years = (64 - 82 cm)	91	106
5 Years = (> 83 cm)	0	7
	94	205

**FISH DISPOSITION FEMALES:**

SPAWNED	73	Adult
MORT	20	Adult
RELEASED	1	Adult
TOTAL	94	

**FISH DISPOSITION MALES:**

SPAWNED	158	Adult
MORT	43	Adult
RELEASED	4	Adult
TOTAL	1030	

**TOTAL FISH TRAPPED:** **299**

\*Includes jacks not utilized in spawn take.

All spawning carcasses were hauled to local landfill as per INAD protocol

Appendix F. Summary of spring chinook returns to Crooked River by brood year.

Brood Year	Year Released	Number Released	3-yr-olds	Year Returned	4-yr-olds	Year Returned	5-yr-olds	Year Returned	Total by return	% return from plant
1985	-----	-----		1988	-----	1989	4	1990	4	
1986	-----	-----		1989	23	1990	5	1991	28	
1987	Spr 1989 <sup>a</sup>	199,700	2	1990	13	1991	7	1992	22	0.011%
1988	Spr 1990 <sup>b</sup>	300,407	2	1991	208	1992	276	1993	486	0.162%
1989	Fall 1990 <sup>c</sup>	339,087	13	1992	119	1993	10	1994	142	0.042%
1990	Fall 1991 <sup>a</sup>	320,400	7	1993	15	1994	0	1995	22	0.002%
1991	-----	-----	1*	1994	0	1995	1	1996	1	0.000%
1992	Spr 1994 <sup>d</sup>	273,766	6	1995	241 <sup>g</sup>	1996	59	1997		0.002%
1993	Fall 1994	199,255								
	Fall 1994 <sup>e</sup>	216,280	94 <sup>g</sup>	1996	935	1997		1998		0.000%
	Spr 1995	258,293								
	Spr 1995 <sup>f</sup>	279,615								
		953,443								
1994	Spr 1996	37,071	2	1997		1998		1999		
1994	Spr 1997		0	1998		1999		2000		

<sup>a</sup>Transferred from Dworshak Hatchery

<sup>b</sup>Direct released from Kooskia Fish Hatchery

<sup>c</sup>Transferred from Dworshak and Rapid River hatcheries

<sup>d</sup>Eggs from Lookingglass Hatchery (Rapid River stock) reared at Clearwater Hatchery

<sup>e</sup>Eggs from Rapid River hatchery reared at Clearwater Hatchery

<sup>f</sup>Non-acclimated release

<sup>g</sup>These numbers do not match run report numbers. Each one has been corrected to reflect straying from other stocks.

\*Natural Fish.

Appendix G. Clearwater Fish Hatchery spring chinook egg inventory Brood Year 1996,

**Crooked River**

Lot Number	Date Spawned	Number of Females	Net Egg Numbers	Eggs Per Female	Number Eyed Eggs	Percent Eye-up
1		1	3,543	3,543	3,515	99.2
2		3	11,522	3,841	9,791	85.0
3		6	23,964	3,994	19,652	82.0
4		4	15,329	3,832	10,319	67.3
5		15	59,348	3,957	50,746	85.5
6		13	49,775	3,829	48,512	97.5
7		16	63,093	3,943	57,924	91.8
8		10	35,817	3,582	34,714	96.9
9		5	11,941	2,388	11,432	95.7
<b>TOTALS</b>		<b>73</b>	<b>274,332</b>	<b>3,758</b>	<b>246,605</b>	<b>89.9</b>

**Powell**

Lot Number	Date Spawned	Number of Females	Net Egg Numbers	Eggs Per Female	Number Eyed Eggs	Percent Eye-up
1		7	27,649	3,950	25,810	93.3
2		5	22,313	4,463	21,382	95.8
3		24	103,768	4,324	97,556	94.0
4		10	40,479	4,048	35,862	88.6
5		14	55,480	3,963	50,607	91.2
6		3	10,653	3,551	9,675	90.8
7		3	15,541	5,180	14,558	93.7
<b>TOTALS</b>		<b>66</b>	<b>275,883</b>	<b>4,180</b>	<b>255,450</b>	<b>92.6</b>

**Red River**

Lot Number	Date Spawned	Number of Females	Net Egg Numbers	Eggs Per Female	Number Eyed Eggs	Percent Eye-up
1		1	3,506	3,506	2,070	59.0
2		1	3,904	3,904	3,781	96.8
3		1	4,934	4,934	4,744	96.1
4		4	16,884	4,221	16,345	96.8
5		2	7,767	3,884	6,437	82.9
6		1	3,161	3,161	2,396	75.8
<b>TOTALS</b>		<b>10</b>	<b>40,156</b>	<b>4,016</b>	<b>35,773</b>	<b>89.1</b>

**Rapid River**

**Lookingglass**

Date Received	Number of Females	Number Eyed Eggs	Date Received	Number of Females	Number Eyed Eggs
09/13/96	1	2,885	10/31/96	44	159,175
09/19/96	2	4,448			
09/26/98	1	4,645	<b>TOTALS</b>	<b>44</b>	<b>159,175</b>
10/03/96	10	34,650			
10/11/96	30	96,307			
10/22/96	8	23,262			
11/15/96	1	3,500			
<b>TOTALS</b>	<b>53</b>	<b>169,697</b>			

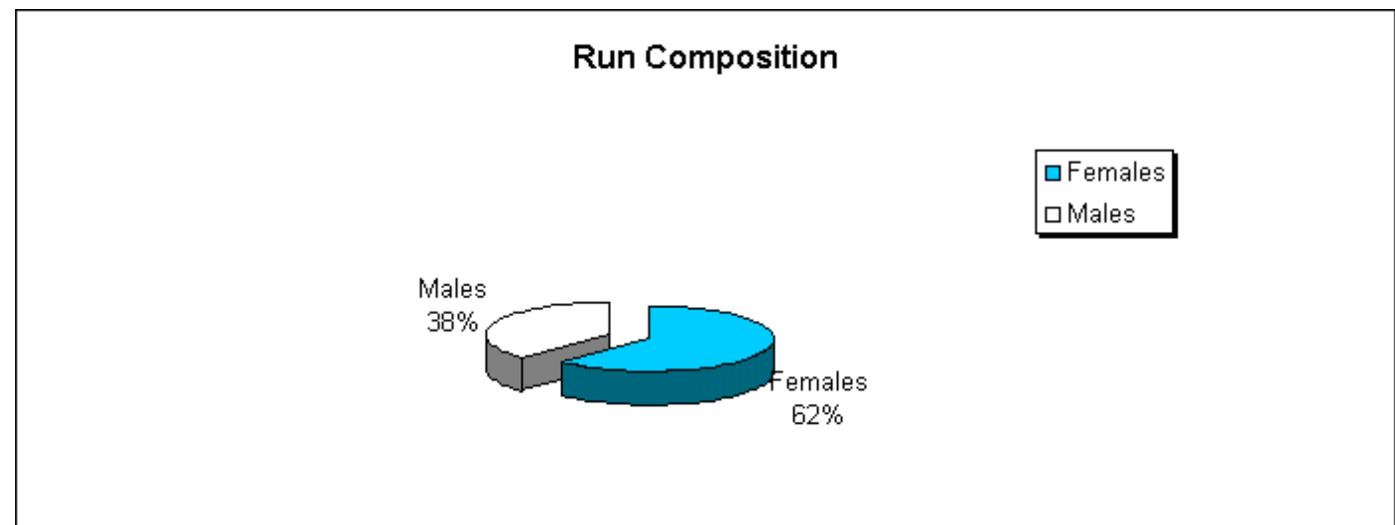
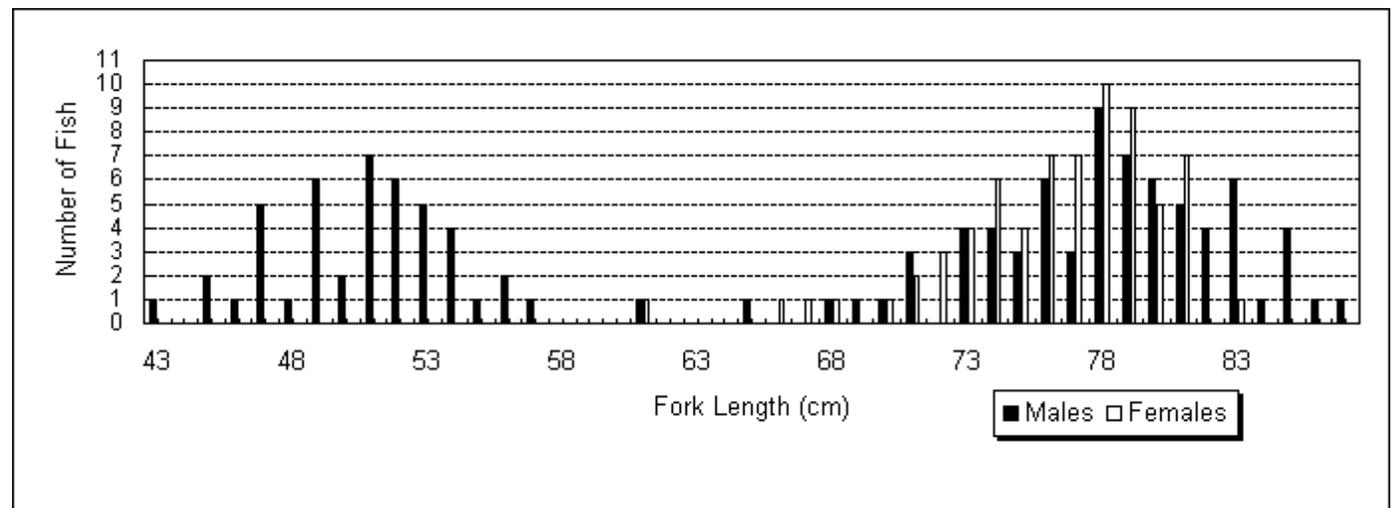
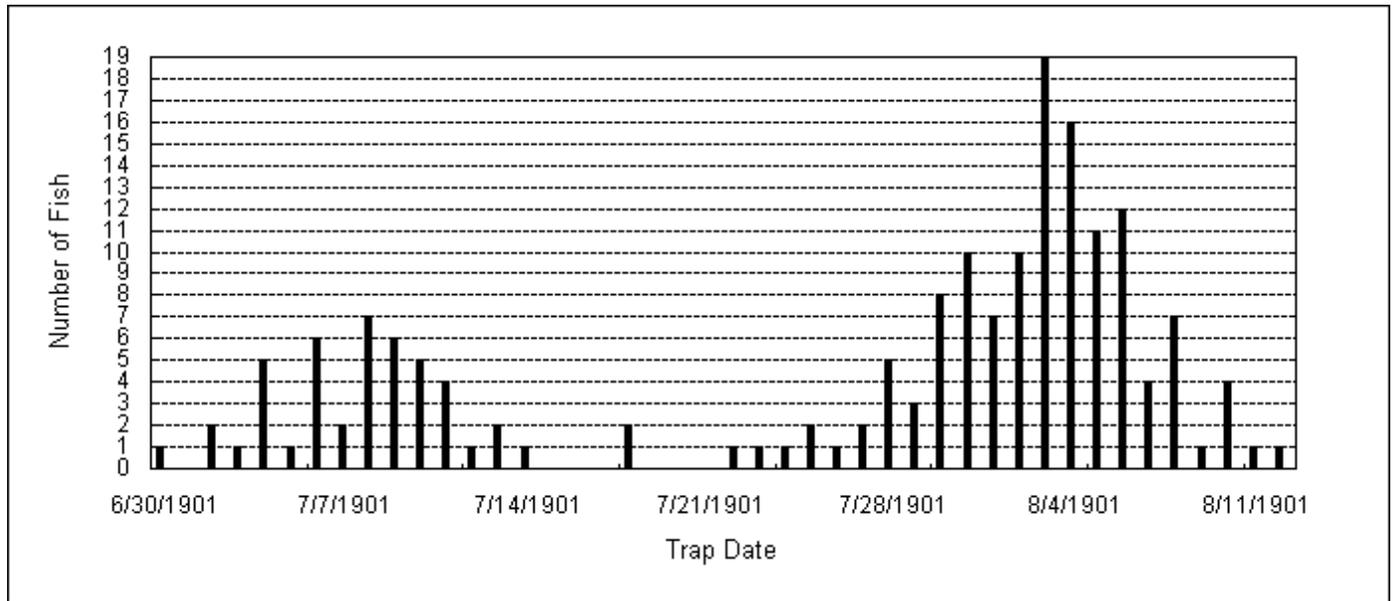
Appendix H1. Powell Chinook run timing 1996

Date	Male	Female	Total Trapped	Date	Male	Female	Total Trapped
06/30	1	0	1	08/01	0	0	0
07/01	0	1	1	08/02	1	1	2
07/02	0	0	0	08/03	0	0	0
07/03	0	0	0	08/04	1	0	1
07/04	0	1	1	08/05	0	0	0
07/05	4	3	7	08/06	0	0	0
07/06	2	2	4	08/07	7	0	7
07/07	1	0	1	08/08	0	1	1
07/08	1	1	2	08/09	5	0	5
07/09	5	2	7	08/10	2	1	3
07/10	3	3	6	08/11	2	1	3
07/11	2	1	3	08/12	1	0	1
07/12	1	5	6	08/13	1	0	1
07/13	1	5	6	08/14	2	0	2
07/14	5	3	8	08/15	0	1	1
07/15	6	1	7	08/16	0	0	0
07/16	1	5	6	08/17	1	0	1
07/17	2	2	4	08/18	0	0	0
07/18	2	4	6	08/19	1	0	1
07/19	1	1	2	08/20	1	0	1
07/20	0	0	0	08/21	0	0	0
07/21	4	2	6	08/22	1	0	1
07/22	5	0	5	08/23	3	0	3
07/23	3	4	7	08/24	1	0	1
07/24	3	2	5	08/25	1	0	1
07/25	5	6	11	08/26	0	0	0
07/26	9	2	11	08/27	2	0	2
07/27	5	1	6	08/28	0	0	0
07/28	2	1	3	08/29	1	0	1
07/29	1	3	4	08/30	0	0	0
07/30	4	1	5	08/31	0	0	0
07/31	0	2	2	09/01	1	0	1
08/01	1	1	2	09/02	1	0	1
				<b>TOTAL</b>	<b>116</b>	<b>70</b>	<b>186</b>

Appendix H2. Powell chinook length frequency 1996

<b>Size (cm)</b>	<b>Male</b>	<b>Female</b>	<b>Total Trapped</b>
43	1	0	1
44	0	0	0
45	2	0	2
46	1	0	1
47	5	0	5
48	1	0	1
49	6	0	6
50	2	0	2
51	7	0	7
52	6	0	6
53	5	0	5
54	4	0	4
55	1	0	1
56	2	0	2
57	1	0	1
58	0	0	0
59	0	0	0
60	0	0	0
61	1	1	2
62	0	0	0
63	0	0	0
64	0	0	0
65	1	0	1
66	0	1	1
67	0	1	1
68	1	1	2
69	1	0	1
70	1	1	2
71	3	2	5
72	0	3	3
73	4	4	8
74	4	6	10
75	3	4	7
76	6	7	13
77	3	7	10
78	9	10	19
79	7	9	16
80	6	5	11
81	5	7	12
82	4	0	4
83	6	1	7
84	1	0	1
85	4	0	4
86	1	0	1
87	1	0	1
<b>Total</b>	<b>116</b>	<b>70</b>	<b>186</b>

Appendix H3. Powell chinook trapping 1996.



Appendix I. Powell chinook summary of fish trapped, released, spawned, and disposition of carcasses Brood Year 1996.

<b>Powell</b>		
<u>Age Classes</u>	<u>Females</u>	<u>Males</u>
<b>3 Years = (&lt;64 cm)</b>	<b>1</b>	<b>45</b>
<b>4 Years = (64 - 82 cm)</b>	<b>68</b>	<b>71</b>
<b>5 Years = (&gt; 83 cm)</b>	<b>1</b>	<b>1</b>
	<hr/> <b>70</b>	<hr/> <b>116</b>
 <b>FISH DISPOSITION FEMALES:</b>		
<b>Spawned</b>	<b>66</b>	
<b>Mort</b>	<b>0</b>	
<b>Released</b>	<b>4</b>	
<b>Total</b>	<hr/> <b>94</b>	
 <b>FISH DISPOSITION MALES:</b>		
<b>Spawned</b>	<b>111</b>	<b>*</b>
<b>Mort</b>	<b>5</b>	
<b>Released</b>	<b>0</b>	
<b>Total</b>	<hr/> <b>116</b>	
 <b>TOTAL FISH TRAPPED:</b>	 <b>186</b>	

All spawning carcasses were hauled to local landfill as per INAD protocol.

Appendix J. Summary of spring chinook returns to Powell by brood year.

Brood Year	Year Released	Number Released	3-yr-olds	Year Returned	4-yr-olds	Year Returned	5-yr-olds	Year Returned	Total by return	% return from plant
1984	Spr 1986	-----				1988	16	1989	16	
1985	Spr 1987	-----		1988	111	1989	20	1990	131	
1986	Spr 1988 <sup>a</sup>	200,100	27	1989	157	1990	10	1991	194	0.097%
1987	Spr 1989 <sup>b</sup>	200,639	2	1990	16	1991	15	1992	33	0.016%
1988	Fall 1989	314,500	7	1991	249	1992	288	1993	544	0.173%
1989	Fall 1990	307,100	6	1992	204	1993	57	1994	267	0.054%
	Spr 1991 <sup>c</sup>	180,764								
1990	Fall 1991	358,400	8	1993	28	1994	1	1995	37	0.007%
	Spr 1992 <sup>d</sup>	150,800								
	Spr 1992 <sup>e</sup>	53,500								
		<u>562,700</u>								
1991	Fall 1992 <sup>f</sup>	500	1	1994	1	1995	0	1996	2	
	Fall 1992 <sup>g</sup>									
1992	Spr 1994 <sup>h</sup>	144,823	12	1995	141	1996	115	1997	268	0.102%
	Spr 1994 <sup>i</sup>	61,060								
	Spr 1994 <sup>j</sup>	55,745								
		<u>261,628</u>								
1993	Fall 1994	311,690	45	1996	501	1997		1998		
	Spr 1995	290,417								
1994	Spr 1996	232,731	2	1997		1998		1999		
1995	Spr 1997	3,549		1998		1999		2000		
1996										
1997										
1998										

<sup>a</sup> Rapid River stock reared at Dworshak

<sup>b</sup> Clearwater stock reared at Kooskia and Dworshak

<sup>c</sup> Clearwater stock reared at Kooskia; acclimated in rearing pond

<sup>d</sup> Acclimated 21 days in rearing pond before release into Walton Creek, transferred from Dworshak

<sup>e</sup> Not acclimated, transferred to rearing pond and immediately released

<sup>f</sup> These smolts were released from the rearing pond to Walton Creek

<sup>g</sup> Released at headwaters of Crooked Fork Creek

<sup>h</sup> Acclimated 17 days, volitional release 5 days, released in Walton Cr.

<sup>i</sup> Non-acclimated, transferred to rearing pond and immediately released.

<sup>j</sup> Released directly into Walton Creek

Appendix K1. Red River chinook run timing, 1996

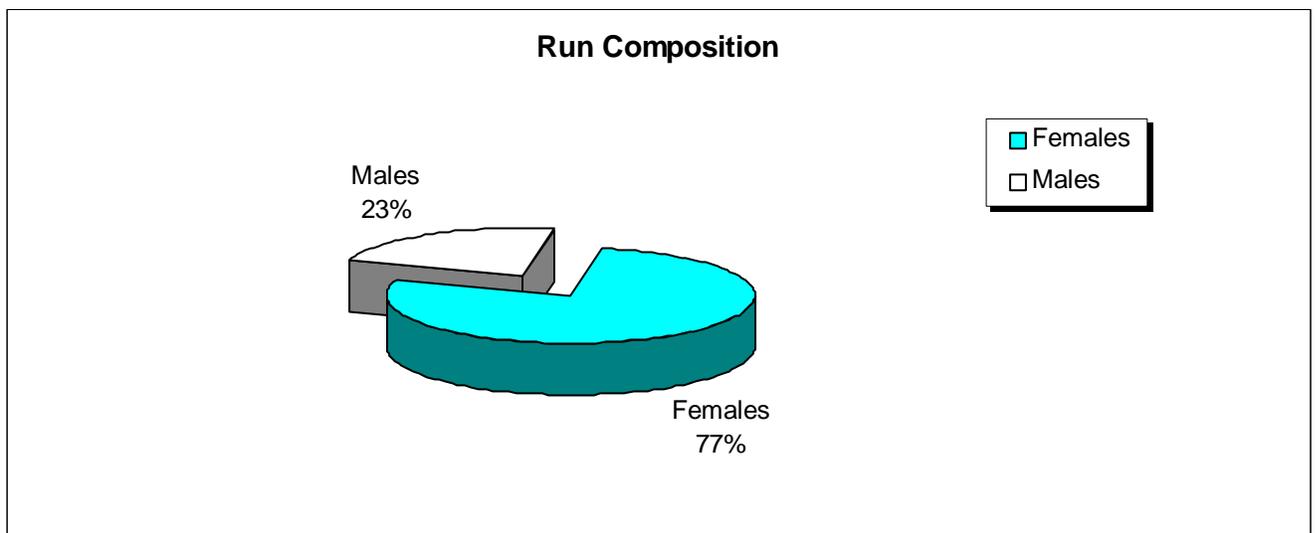
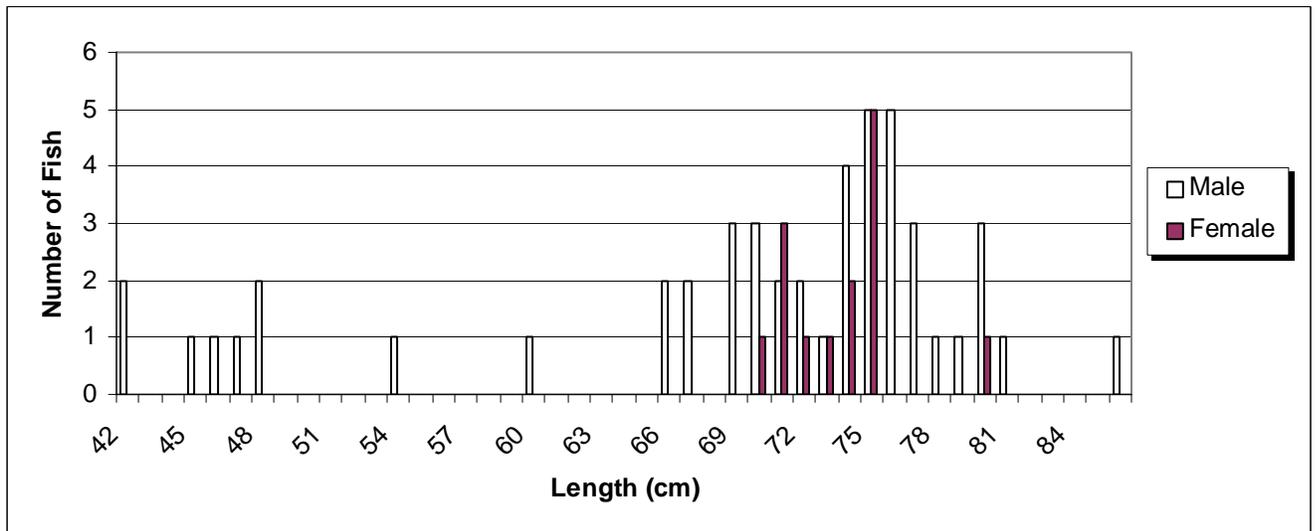
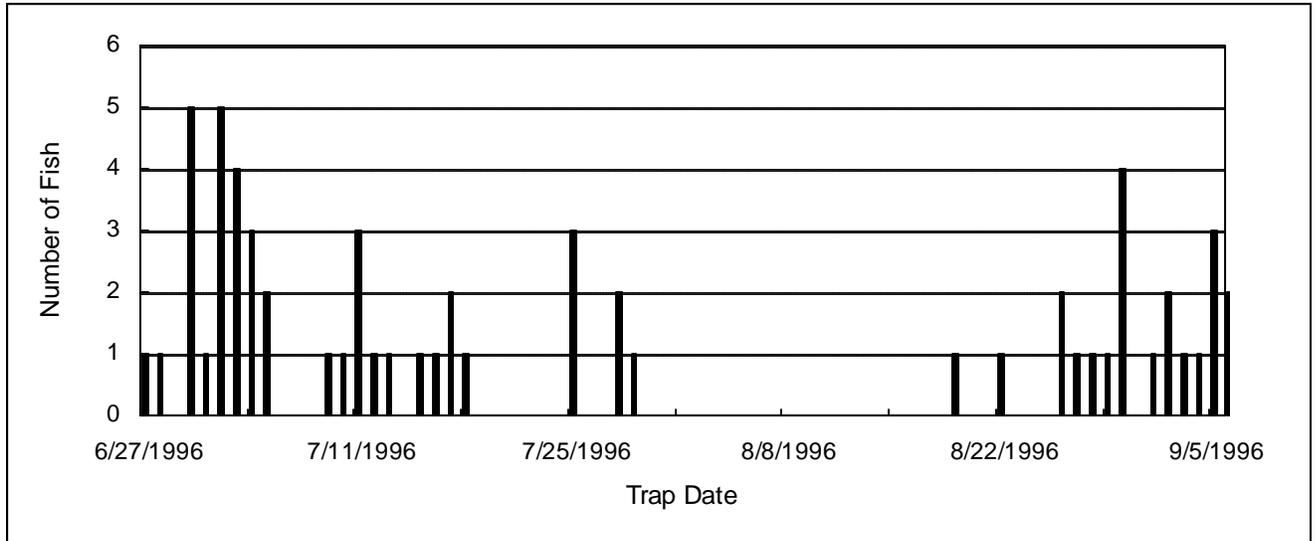
Date	Male	Female	Total Trapped
06/27	1	0	1
06/28	1	0	1
06/29	0	0	0
06/30	1	4	5
07/01	1	0	1
07/02	4	1	5
07/03	2	2	4
07/04	1	2	3
07/05	2	0	2
07/06	0	0	0
07/07	0	0	0
07/08	0	0	0
07/09	1	0	1
07/10	0	1	1
07/11	1	2	3
07/12	1	0	1
07/13	1	0	1
07/14	0	0	0
07/15	1	0	1
07/16	1	0	1
07/17	2	0	2
07/18	1	0	1
07/19	0	0	0
07/20	0	0	0
07/21	0	0	0
07/22	0	0	0
07/23	0	0	0
07/24	0	0	0
07/25	1	2	3
07/26	0	0	0
07/27	0	0	0
07/28	2	0	2
07/29	1	0	1
07/30	0	0	0
07/31	0	0	0
08/01	0	0	0
08/02	0	0	0
08/03	0	0	0

Date	Male	Female	Total Trapped
08/03	0	0	0
08/04	0	0	0
08/05	0	0	0
08/06	0	0	0
08/07	0	0	0
08/08	0	0	0
08/09	0	0	0
08/10	0	0	0
08/11	0	0	0
08/12	0	0	0
08/13	0	0	0
08/14	0	0	0
08/15	0	0	0
08/16	0	0	0
08/17	0	0	0
08/18	0	0	0
08/19	1	0	1
08/20	0	0	0
08/21	0	0	0
08/22	1	0	1
08/23	0	0	0
08/24	0	0	0
08/25	0	0	0
08/26	2	0	2
08/27	1	0	1
08/28	1	0	1
08/29	1	0	1
08/30	4	0	4
08/31	0	0	0
09/01	1	0	1
09/02	2	0	2
09/03	1	0	1
09/04	1	0	1
09/05	3	0	3
09/06	2	0	2
09/07	1	0	1
09/08	2	0	2
09/09	1	0	1
<b>Total</b>	<b>48</b>	<b>14</b>	<b>62</b>

Appendix K2. Red River chinook length frequency 1996

<b>Size (cm)</b>	<b>Male</b>	<b>Female</b>	<b>Total Trapped</b>
42	2	0	2
43	0	0	0
44	0	0	0
45	1	0	1
46	1	0	1
47	1	0	1
48	2	0	2
49	0	0	0
50	0	0	0
51	0	0	0
52	0	0	0
53	0	0	0
54	1	0	1
55	0	0	0
56	0	0	0
57	0	0	0
58	0	0	0
59	0	0	0
60	1	0	1
61	0	0	0
62	0	0	0
63	0	0	0
64	0	0	0
65	0	0	0
66	2	0	2
67	2	0	2
68	0	0	0
69	3	0	3
70	3	1	4
71	2	3	5
72	2	1	3
73	1	1	2
74	4	2	6
75	5	5	10
76	5	0	5
77	3	0	3
78	1	0	1
79	1	0	1
80	3	1	4
81	1	0	1
82	0	0	0
83	0	0	0
84	0	0	0
85	0	0	0
86	1	0	1
<b>Total</b>	<b>48</b>	<b>14</b>	<b>62</b>

Appendix K3. Red River chinook run timing, length frequency, and run composition graph.



Appendix L. Red River chinook summary of fish trapped, released, spawned, and disposition of carcasses, Brood Year 1996.

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<b>Red River</b>			
<b>Age Class</b>	<b>Females</b>	<b>Males</b>	
3 Years = (<64 cm)		0	9
4 Years = (64 - 82 cm)		14	39
5 Years = (> 83 cm)		0	0
		14	48

**Fish Disposition Females:**

Spawned	10
Released	1
Mortality	3
Total	14

**Fish Disposition Males:**

Spawned	31
Released	16
Mortality	1
Total	48

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**TOTAL FISH TRAPPED: 62**

All spawning carcasses were hauled to local landfill as per INAD protocol.

Appendix M. Summary of spring chinook returns to Red River by brood year.

Brood Year	Year Released	Number Released	3-yr-olds	Year Returned	4-yr-olds	Year Returned	5-yr-olds	Year Returned	Total by Return	% Return from plant
1982	Fall 1983	260,000	2	1985	<sup>a</sup>	1986	107	1987	109	0.036%
	Spr 1984	40,000								
1983	Spr 1985 <sup>b</sup>	80,000	a	1986	377	1987	259	1988	636	0.795%
1984	Spr 1986 <sup>b</sup>	136,800	35	1987	132	1988	74	1989	241	0.176%
1985	Fall 1986 <sup>c</sup>	96,400	3	1988	25	1989	13	1990	41	0.021%
	Spr 1987 <sup>c</sup>	96,800								
1986	Fall 1987	233,100	5	1989	38	1990	8	1991	51	0.022%
1987	Fall 1988	291,200	2	1990	9	1991	3	1992	14	0.005%
1988	Fall 1989	240,500	1	1991	31	1992	39	1993	71	0.029%
1989	Fall 1990	273,800	5	1992	99	1993	13	1994	117	0.025%
	Spr 1991 <sup>d</sup>	63,000								
	Spr 1991 <sup>e</sup>	<u>124,000</u>								
	Subtotal	460,800								
1990	Fall 1991	354,700	1	1993	18	1994	1	1995	20	0.004%
	Spr 1992 <sup>f</sup>	<u>207,500</u>								
	Subtotal	562,200								
1991	Fall 1992	6,000		1994	0	1995	0	1996	0	0.000%
1992	Fall 1993	22,246	3	1995	4 <sup>g</sup>	1996	45	1997	56	0.013%
1993	Fall 1994	320,755	5	1996	191	1997		1998		
1994	Spr 1996	24,002	2	1997		1998		1999		
1995	Spr 1997	2,983		1998		1999		2000		
1996										

<sup>a</sup>Trap was not installed in 1986 due to construction

<sup>b</sup>These fish wintered in the rearing pond.

<sup>c</sup>These fish were Rapid River stock reared at Sawtooth and released directly into Red River with no acclimation.

<sup>d</sup>Planted off bridge at ranger station, reared at Dworshak National Fish Hatchery, Clearwater Stock

<sup>e</sup>Planted off bridge at ranger station, reared at Kooskia, Clearwater stock.

<sup>f</sup>Acclimated in rearing pond for 21 days, transferred from Dworshak

<sup>g</sup>These numbers do not match run report numbers. Each one has been corrected to reflect straying from other stocks.

Appendix N. Production cost for BY-96 chinook, Selway, and North Fork steelhead

<b>Rearing to Release</b>		
	<b>Chinook (BY-96)</b>	<b>North Fork Steelhead (BY-97)</b>
<b>No. Produced</b>	806,057	702,288
<b>Weight</b>	56,278	117,307
<b>% Mortality</b>	13.9% <sup>1</sup>	16.0% <sup>2</sup>
<b>Conversion Rate</b>	1.73	1.8

\* week on - week off feeding

<b>Food Feed and Weight Gained</b>		
	<b>Chinook (BY-96)</b>	<b>North Fork Steelhead (BY-97)</b>
<b>Period Fed</b>	1/24/97 - 4/15/98	5/13/96 - 4/25/98
<b>Feed Used Lbs.</b>	99,126	211,696
<b>Weight Gain</b>	56,278	117,307
<b>Feed Cost</b>	<u>\$88,950.00</u>	<u>\$80,928.00</u>
<b>Total Feed Cost</b>		\$169,878.00
<b>Cost/lb Steelhead and Chinook</b>		<u>\$0.097</u>

<sup>1</sup>Mortality from green egg on Powell, Crooked River, Red River, Selway Captive Brood and eyed-egg on Lookingglass and Rapid River eggs to release.

<sup>2</sup>From eyed-egg to release

Appendix O1. Summary of fish autopsy, Crooked River

**Summary of Fish Autopsy**

ACCESSION NO:	98-111	LOCATION:	Crooked River
SPECIES:	Chinook Spring	AUTOPSY DATE:	4/9/98
STRAIN:	South Fork CLW	AGE:	Juv
UNIT:	So. Pond	SAMPLE SIZE:	20
REASON FOR AUTOPSY:	prelib		
INVESTIGATOR(S):	Munson		
REMARKS:	Blood parameters not assayed. Centrifuge down.		

	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	0.00	0.00	0.00
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN	0.00	0.00	0.00

\*EXPRESSED AT KTL TIMES 10 TO THE FIFTH POWER

\*\*CONVERTED FROM KTL; EXPRESSED AS CTL TIMES 10 TO FOURTH POWER

VALUES AS PERCENTS OF TOTAL SAMPLE

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		MESEN. FAT		SPLEEN		HIND GUT		KIDNEY		LIVER		BILE	
N	20	N	20	N	20	0	20	0	0	B	0	0	20	N	20	A	0	0	0
B1	0	F	0	S	0	1	0	1	0	R	20	1	0	S	0	B	0	1	0
B2	0	C	0	L	0	2	0	2	1	G	0	2	0	M	0	C	0	2	0
E1	0	M	0	S&L	0			3	4	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0	Mean=0.00		4	5	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0	Mean=0.00	
H2	0			O	0			Mean=3.40								OT	0		
M1	0																		
OT	0																		

SUMMARY OF NORMALS

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

GENERAL REMARKS:

FINS:

GONADS:

SKIN:

OTHER:

Appendix O2. Summary of fish autopsy, Powell

**Summary of Fish Autopsy**

ACCESSION NO:	98-110	LOCATION:	Powell
SPECIES:	Chinook Spring	AUTOPSY DATE:	4/8/98
STRAIN:	Powell	AGE:	Juv
UNIT:	Pond	SAMPLE SIZE:	20
REASON FOR AUTOPSY:	prelib		
INVESTIGATOR(S):	Munson		
REMARKS:	Blood parameters not assayed. Centrifuge down.		

	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	0.00	0.00	0.00
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN	0.00	0.00	0.00

\*EXPRESSED AT KTL TIMES 10 TO THE FIFTH POWER

\*\*CONVERTED FROM KTL; EXPRESSED AS CTL TIMES 10 TO FOURTH POWER

VALUES AS PERCENTS OF TOTAL SAMPLE

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		MESEN. FAT		SPLEEN		HIND GUT		KIDNEY		LIVER		BILE	
N	20	N	20	N	20	0	20	0	0	B	0	0	20	N	20	A	0	0	0
B1	0	F	0	S	0	1	0	1	0	R	20	1	0	S	0	B	20	1	0
B2	0	C	0	L	0	2	0	2	5	G	0	2	0	M	0	C	0	2	0
E1	0	M	0	S&L	0			3	12	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0	Mean=0.00		4	2	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0	Mean=0.00	
H2	0			O	0			Mean=2.75								OT	0		
M1	0																		
OT	0																		

SUMMARY OF NORMALS

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

GENERAL REMARKS:

FINS: GONADS:  
 SKIN: OTHER:

Appendix O3. Summary of fish autopsy, Red River.

**Summary of Fish Autopsy**

ACCESSION NO:	98-112	LOCATION:	Red River
SPECIES:	Chinook Spring	AUTOPSY DATE:	4/9/98
STRAIN:	South Fork CLW	AGE:	Juv
UNIT:	Pond	SAMPLE SIZE:	20
REASON FOR AUTOPSY:	prelib		
INVESTIGATOR(S):	Munson		
REMARKS:	Blood parameters not assayed. Centrifuge down.		

	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	0.00	0.00	0.00
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN	0.00	0.00	0.00

\*EXPRESSED AT KTL TIMES 10 TO THE FIFTH POWER

\*\*CONVERTED FROM KTL; EXPRESSED AS CTL TIMES 10 TO FOURTH POWER

VALUES AS PERCENTS OF TOTAL SAMPLE

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		MESEN. FAT		SPLEEN		HIND GUT		KIDNEY		LIVER		BILE	
N	20	N	20	N	20	0	20	0	0	B	0	0	20	N	20	A	0	0	0
B1	0	F	0	S	0	1	0	1	0	R	20	1	0	S	0	B	20	1	0
B2	0	C	0	L	0	2	0	2	5	G	0	2	0	M	0	C	0	2	0
E1	0	M	0	S&L	0			3	11	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0	Mean=0.00		4	4	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0	Mean=0.00	
H2	0			O	0			Mean=3.00								OT	0		
M1	0																		
OT	0																		

SUMMARY OF NORMALS

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

GENERAL REMARKS:

FINS: GONADS:  
 SKIN: OTHER:

Appendix P. Clearwater Fish Hatchery BY96 spring chinook fish marking summary.

**Full Term Smolts**

Site	Date	Mark	CWT	PIT	Number	Fpp	Length (mm)
Rapid River	03/16/98	AD only			106,541	17.26	130
Lookingglass	03/16/98	AD only			51,195	17.26	130
Rapid River	03/18/98	AD only			53,198	17.26	130
Lookingglass	03/18/98	AD only			93,162	17.26	130
Powell	4/6 - 8/98	AD only	CWT 223K	2,000	238,928	10.77	153
Powell	4/08/98	AD only			5,919	14.0	143
Crooked River	4/7-4/9/98	AD only		500	205,906	16.0	137
Red River	4/7-4/9/98	LV only		500	21,623	15.0	140
South Fork	04/13/98	RV only		300	29,585	17	134
Magrudor Cor.	04/21- 22/98	Ad only			8,892	15	135
<b>Total</b>					<b>814,949</b>		

Appendix Q. Anadromous Stocking Report, Brood Year 1996.

Species	Stock	Brood Year	Release Site	Release Date	Number Released	Size No./lb	Length (T.L.)	Pounds
Spring Chinook	Rapid River	96	Hells Canyon	03/16/98	106,541	17.26	130	6,173
Spring Chinook	Lookingglass	96	Hells Canyon	03/16/98	51,195	17.26	130	2,966
Spring Chinook	Rapid River	96	Hells Canyon	03/18/98	53,198	17.26	130	3,082
Spring Chinook	Lookingglass	96	Hells Canyon	03/18/98	93,162	17.26	130	5,398
Spring Chinook	Powell	96	Powell Pond	4/6-5/8/98	238,928	10.77	153	22,185
Spring Chinook	Powell	96	Walton Creek	4/08/98	5,919	14.00	143	423
Spring Chinook	Crooked River	96	Crooked R Pond	4/7-4/9/98	205,906	16.00	137	12,869
Spring Chinook	Red River	96	Red River Pond	4/7-4/9/98	21,623	15.00	140	1,442
Spring Chinook	South Fork	96	Red River Pond	04/13/98	29,585	17.00	134	1,740
Spring Chinook	Selway	96	Magrudor Cor.	04/21 - 22/98	8,892	15.00	135	593
			<b>Total Released</b>		<b>814,949</b>			<b>56,871</b>

Appendix R. Brood Year 1997 steelhead (B) eggs received from Dworshak National Fish Hatchery.

<b>Egg Take Number</b>	<b>Spawn Date</b>	<b>Eyed Egg Deliver Date</b>	<b>Number Eyed Eggs</b>	<b>Temperature Units</b>
6	03/11/97	03/31/97	99,909	421
7	03/18/97	04/07/97	129,044	421
8	03/25/97	04/11/97	207,883	409
9	04/01/97	04/18/97	249,257	409
10	04/08/97	04/25/97	142,365	409
<b>TOTAL</b>			<b>828,458</b>	

Machine enumeration done at Dworshak National Fish Hatchery.

**Brood Year 97 Steelhead Survival from Eggs to Released Smolts.**

<b>Stock</b>	<b>#Eyed Eggs</b>	<b>Released Smolts</b>	<b>Percent Survival</b>
North Fork- Clearwater	828,458	702,288	84
<b>Total</b>		<b>702,288</b>	

Appendix S. Brood Year 1997, North Fork steelhead marking and distribution.

Stock	Brood		Date	Mark	Ad / LV	Number			Length	
	Year	Site				PIT	Released	Fpp	(mm)	Pounds
North Fork (DW)	97	Clear Creek	4/20 - 21/98	Ad	21,509	300	209,999	6.0	192	35,000
North Fork (DW)	97	Red River	4/24/98	None	None	4,497	4,497	6.1	187	737
North Fork (DW)	97	Red House Hole (S.F. Clearwater)	4/27 -29/98	Ad	67,000	300	487,792	6.0	193	81,570
<b>TOTAL</b>					<b>88,509</b>	<b>5,097</b>	<b>702,288</b>			<b>117,307</b>

\* PIT done in March 1997

Appendix T. Summary of fish autopsy, steelhead

**Summary of Fish Autopsy**

ACCESSION NO: 98-130 LOCATION: Clearwater Hatchery  
 SPECIES: Steelhead B AUTOPSY DATE: 4/24/1998  
 STRAIN: North Fork Clearwater AGE: juv  
 UNIT: Steelhead Rcwys SAMPLE SIZE: 20  
 RIVER FOR AUTOPSY: preliberation  
 INVESTIGATOR(S): Munson  
 REMARKS: Blood parameters not assayed, centrifuge down.

	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	0.00	0.00	0.00
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN	0.00	0.00	0.00

\*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	0	0	20	N	20	A	6	0	0
B1	0	F	0	S	0	1	0	1	0	R	20	1	0	S	0	B	14	1	0
B2	0	C	0	L	0	2	0	2	5	G	0	2	0	M	0	C	0	2	0
E1	0	M	0	S&L	0			3	9	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0	Mean=0.00		4	5	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0		Mean=0.00
H2	0			O	0			Mean=2.90								OT	0		
M1	0																		
OT	0																		

**SUMMARY OF NORMALS**

	20	20	20	20	20	20	20	20	17	20	0
SEX		M: 0		F: 0		U: 0					

**GENERAL REMARKS:**

FINS: GONADS:  
 SKIN: OTHER:

Submitted by:

Approved by:

Jerry McGehee  
Fish Hatchery Manager II

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Virgil K. Moore, Chief  
Bureau of Fisheries

Brad George  
Assistant Fish Hatchery Manager

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Tom Rogers  
Fish Hatcheries Supervisor