



**CLEARWATER FISH HATCHERY**  
**ANNUAL REPORT**  
**2004 CHINOOK AND 2005 STEELHEAD**

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## 2004 CHINOOK BROOD YEAR REPORT

### ABSTRACT

#### Clearwater

Spring Chinook salmon *Oncorhynchus tshawytscha* are reared at Clearwater Fish Hatchery (CFH) and typically brought on station as either green or eyed eggs. Chinook were reared on station and released as pre-smolts and smolts.

#### Powell

Two adult traps were operated in the Lochsa basin. The Crooked Fork trap was installed on June 22, 2004 and the trap was taken out of operation on September 30, 2004.

The Walton Creek weir was installed on May 26, 2004 and taken out of operation on September 20, 2004. The run total for both traps was 1,779 fish of which there were 54 jacks and 1,725 adults. A total of 317 fish were released, 120 were transferred to Clearwater (South Fork stock), 421 were transferred to the Nez Perce Tribal Hatchery, and 921 were held for production. A total of 492 females were spawned of which 17 were culled at spawning, 395 were kept for production, 15 were culled due to high BKD levels, and 65 were culled to a full hatchery, producing 1,605,432 green eggs.

A total of 347,299 Powell stock pre-smolts and 423,633 Powell stock full-term smolts were released from Powell Pond on September 16-18, 2005 and March 22 through April 6, 2006.

#### South Fork (Red River / Crooked River)

Adults returning to Crooked River and Red River weirs were combined into one South Fork stock starting in 1997. Starting with BY-98, Chinook stocks from Powell were used to backfill the South Fork populations.

The Red River weir was installed on March 22, 2004 and taken out of operation September 7, 2004. The run total of 575 fish were combined with the returning adults from Crooked River. Of the total, 28 Chinook were released above the weir, and 178 were released below the weir and sport fishery.

The Crooked River weir was installed on March 18, 2004 and taken out of operation September 7, 2004. The run total of 657 fish were combined with returning adults from Red River. Of the total, 112 Chinook were released above the weir, and 64 were released below the weir and sport fishery.

The South Fork had a run total of 1,232 fish. A total of 382 fish were released. All remaining fish were held for spawning plus the 120 Chinook transferred from the Powell trap. A total of 436 females were spawned of which 11 were culled at spawning, 343 were kept for production, 38 were culled due to high BKD levels, and 44 were culled to a full hatchery, producing 1,309,624 green eggs.

A total of 423,603 full-term smolts were released from the Red River pond on March 30 through April 3, 2006.

A total of 140,989 South Fork stock smolts were released from Crooked River raceways on April 3 and April 5, 2006; and 608,472 South Fork stock smolts were released below the Crooked River weir on March 27 through March 30, 2006.

### **Selway Program**

A total of 301,528 Powell stock parr with an oxytetracycline mark were released in the upper Selway River during June 21, 23, 27, and 29, 2005.

A total of 317,382 Powell stock smolts (214,562 ad clipped, 102,820 cwt only) were released in the lower Selway April 3-4, 2006.

### **Nez Perce Tribal Programs**

A total of 570 adult Chinook (260 males, 310 females) were transferred to the Nez Perce Tribal Hatchery personnel from Powell (421 Chinook) and the South Fork (149 Chinook).

## **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 Corps, National Marine Fisheries Service (NMFS), and the U.S. Fish and Wildlife Service (USFWS) settled the question of O&M funding in 1977 with the signing of an interagency agreement. The agreements stated that the USFWS 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**

Clearwater Fish Hatchery is on the north bank of the North Fork of the Clearwater River, 1.5 miles downstream from Dworshak Dam, 72.5 river miles upstream from Lower Granite Dam, and 504 river 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 river miles upstream from Lower Granite Dam and 604 river miles upstream from the mouth of the Columbia River.

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

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

## **OBJECTIVES**

### **Mitigation Goals**

The annual LSRCP goal of CFH and its satellite facilities is to return 12,000 adult Chinook salmon and 14,000 "B" steelhead above Lower Granite Dam.

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

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

## **FACILITY DESCRIPTION**

### **General Hatchery Description**

#### Clearwater Hatchery

Clearwater Fish Hatchery is the final facility built by the U.S. Army Corps of Engineers under the LSRCP. This facility is also the largest of the LSRCP hatcheries built.

The hatchery office building consists of two parts. The dormitory section includes four bunkrooms with maximum capacity of 15 people, a living room, dining room, kitchen, shower rooms, and laundry room. The administration portion consists of office space with a visitor center and entry lobby.

The shop area includes a vehicle maintenance shop, a smaller mechanical repair shop, wood shop, and locker room.

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 hatchery grounds. Each residence also has a storage building.

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

Two 1.8-mile long pipelines run upstream to the Dworshak Dam. The pipelines go up the face of the dam to an elevation of 1,357 feet, then through the dam into the reservoir. The 18-inch pipe (secondary supply) is stationary at an elevation of 1,357 feet with a screened inlet to keep out debris. This pipe supplies cool water to the hatchery. The 48-inch flexible plastic pipe (primary supply) is suspended from a floating platform with a winch attached to the platform. A winch raises and lowers the intake of the pipe to the level of desired water temperature. This pipe supplies warm water (50 to 58° F) to the hatchery during the summer and fall.

Approximately 200 yards upstream from the hatchery is a distribution structure designed to reduce the 286-psi of the high-pressure supply lines to the gravity flow of 7 psi to the hatchery. The structure consists of a primary and secondary chamber. The primary and secondary pipelines have each been outfitted with a hydroelectric generator and put into operation June 2000. The two generators will produce approximately 2400 KW of electricity.

A 73,600 cubic foot cleaning sedimentation pond is used to settle out the solids produced by the hatchery. A 414,000 cubic foot final sedimentation pond settles waste from the total flow of hatchery operation and the out flow of the cleaning sediment.

In 2000, a new 2,040 square foot structure was constructed. The sides of the new building are four military transport containers, two on each side, welded end to end. They support a roof spanning a 51 x 40 foot area creating a new covered storage area.

### 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. 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 for summer rearing and spring acclimation of smolts. There is a cleaning waste pond and final settling pond to meet EPA water quality standards. Additional facilities include a garage, shop, walk-in freezer, and a support cabin.

### Powell

The Powell facility is at the confluence of Crooked Fork Creek and Colt Killed Creek (White Sands), which form the Lochsa River. There is one rearing pond for summer rearing and spring acclimation of smolts. A water supply diversion and intake screen structure are on Walton Creek, and a pump house is on Colt Killed Creek. A weir diverts fish that come up into Walton Creek into the fish ladder and fish trap. The fish trap is connected to two adult holding ponds and a covered spawning area. A floating weir that spans across the Lochsa River is stored at the facility for use when needed. Also on site are a formalin storage building and a support cabin with a walk-in freezer.

### Red River

The Red River facility consists of four structures: freezer/storage building, a work shop/garage area, a formalin storage building, and a support cabin.

The adult holding facility consists of two raceways with a holding capacity of 350 adult fish. A removable tripod and panel weir blocks fish passage across Red River and diverts them into the fish ladder. There is one rearing pond for summer rearing and spring acclimation of smolts.

## Production Capacities by Unit

### Clearwater 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 each. A total rearing space of 24 raceways is 216,000 cubic feet. This area will rear a maximum capacity of 2.4 million steelhead smolts with 0.3-density index (DI) (Piper 1986). A flow of approximately 1.67 cubic feet per second (cfs) is available for each raceway, but 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 and then into the head raceway. These raceways are supplied with water from both intakes.

Chinook raceways are 200 ft x 10 ft x 3 ft deep. Eleven raceways have a total rearing space of 66,000 cubic feet. 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.

The adult holding facility consists of two ponds with a combined capacity of 8,000 cubic feet 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 48 double stack Heath incubators with a total of 768 trays available for egg incubation. 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 to 6 gpm per stack.

Isolation incubation consists of 15 double stack Heath Incubators with a total of 240 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 to 6 gpm per stack.

Early rearing consists of sixty concrete vats. Each measures 40-ft x 4-ft x 3 ft deep and contains 480 cubic feet 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 is 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. Each vat is equipped with automatic feeders controlled by adjustable time clocks.

### Crooked River

The Crooked River acclimation facility has two raceways, measuring 145 ft x 20 ft x 4 ft deep, for a total of 23,200 cubic feet. These raceways have a capacity of 700,000 juvenile Chinook with a DI of 0.29. Water flow per raceway is 6 cfs. 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 cubic feet. Water flow for the adult facility is 10 cfs. 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 cubic feet of rearing space. 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 two adult ponds, measuring 100 ft x 20 ft x 4 ft 8 in. deep, have a volume of 9,500 cubic feet 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 cubic feet 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. One half of the weir consists of floating panels and the other half is removable tripods and panels. Water flow through the ponds is 4.09 cfs.

The rearing pond measures 170 ft x 70 ft x 4 ft 6 in. deep and has 53,550 cubic feet of rearing space. The maximum design capacity is 500,000 fish with a DI of 0.092. 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 SUPPLY

### Clearwater

Clearwater Fish Hatchery receives water through two supply pipelines from Dworshak Reservoir. The warm water intake is attached to a floating platform and can be adjusted from five feet to fifty feet below the surface. The cool water intake is stationary at 245 feet below the top of the dam. An estimated 9 cfs of water is provided by the cool water supply and 70 cfs of water from the warm water supply. The cool water supply has remained fairly constant between 38° and 45°F. The warm water 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 (Appendix A1 and A2). All water is gravity flow to the hatchery.

### Crooked River

Crooked River rearing raceways are supplied by an intake 200 yards upstream of the raceways. The water rights stipulate 10 cfs from April 1 to June 30 and 6 cfs from July 1 to Oct. 1 at the rearing facility. Temperatures ranged from 48° to 68°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 rights for the gravity intake are 6.24 cfs from gravity flow system on Walton Creek and 2.5 cfs from a supply pumped out of Colt Killed Creek. Two 7.5 horsepower pumps can be used to supply Walton Creek with water from Colt Killed Creek during periods of low water. Water temperatures ranged from 44° to 57°F from Walton Creek (Appendix B3).

## **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 5 cfs is available to the hatchery. Temperatures ranged from 50° to 68°F (Appendix B2).

## **Water Quality Analysis**

The water quality analysis at CFH was done by the State of Idaho, Department of Health and Welfare in Boise; Anatek Labs in Moscow, Idaho, did the satellite facilities.

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

Clearwater Hatchery water supply has a total alkalinity (as CaCO<sub>3</sub>) of 16 mg/l, which is very low regarding fish culture.

Water quality analysis was taken at Crooked River, Powell, and Red River rearing facilities from the intake in 1998 (Appendices C2, C3 and C4).

## **STAFFING**

Clearwater Fish Hatchery has eight permanent staff employees; this includes one Hatchery Manager, two Assistant Hatchery Managers, one Utility Craftsman, three Fish Culturists, and one Office Specialist II. The rest of the crew consists of temporary employees with positions of Fishery Technicians, Maintenance Craftsmen, Biological Aides, Grounds Maintenance Workers, and Clearwater River Youth Program students. Under the supervision of CFH, each satellite facility (Red River, Crooked River, and Powell) is manned by one temporary worker.

## **ADULT CHINOOK COLLECTION**

### **South Fork of the Clearwater River**

The Crooked River and Red River production populations were combined in 1997. Trapping protocols for the South Fork traps are as follows:

Trapping protocols for the South Fork traps included ponding ad-clipped adult Chinook for CFH and opercle punching and releasing all ventral clipped and unmarked fish above the weirs.

The Crooked River weir and trap were in operation between March 18, 2004 and September 7, 2004. A total of 657 fish were trapped.

The Red River trap was installed on March 22, 2004 and taken out of operation on September 7, 2004. A total of 575 fish were trapped.

Age class breakdown of this run included: 57 I-ocean males; 9 I-ocean females (<64 cm); 440 II-ocean males, 690 II-ocean females (64-82 cm); 32 III-ocean males, 4 III-ocean females (83+ cm) (Appendices D1, D1a, D2, D2a, E1, E1a, E2, F1 and F2).

## **Powell**

During 2004, two adult traps were installed in the Lochsa basin. A picket weir was installed on Crooked Fork Creek approximately one mile upstream of twin bridges. This was an effort to reduce hatchery straying in that basin.

The trap on Walton Creek was installed on May 26, 2004 and taken out of operation September 20, 2004. The Crooked Fork trap was installed June 22, 2004 and taken out of operation September 30, 2004. A total of 1,779 fish (54 jacks and 1,725 adults) were trapped at Powell and Crooked Fork.

Trapping protocols for the Powell trap included ponding for broodstock only ad-clipped fish for CFH and recycling into the sport fishery all ad-clipped fish and opercle punching and releasing all unmarked fish into the Lochsa. All opercle-punched fish that returned to the trap were ponded for production. Trapping protocols for the Crooked Fork trap included transporting and ponding ad-clipped fish for CFH to Powell for production or recycling ad-clipped fish into the sport fishery. All naturals/ wild fish were released upstream.

Age class breakdown of this run included: 45 I-ocean males, 9 I-ocean females (<64 cm); 581 II-ocean males, 905 II-ocean females (64-82 cm); 198 III-ocean males, 41 III-ocean females (83+ cm) (Appendices G1, G1a, G2, G2a, G3, and H).

## **ADULT HOLDING**

All South Fork production fish were temporarily held at Red River and then transported to Clearwater Hatchery for final holding and spawning.

All fish were injected with Erythromycin 200 at a rate of 20 mg/kg at trapping to inhibit BKD. Fish were treated with a formalin drip for one hour every other day to prevent fungal growth. Fish held at Clearwater were treated at 150 ppm, and fish at Powell were treated at 140 ppm. After sorting, fish were treated daily at the same concentration and duration until all females were spawned.

## **SPAWNING AND EGG TRANSPORT**

A 1:1 male/female spawning ratio was used (CFH genetics protocol for more than 100 females) at both facilities during 2004. A second male was added after one minute as a backup in case the first was not fertile.

At Powell, eggs were placed in egg tubes and coolers with 100-ppm iodine solution for one hour. After water hardening, water was drained and green eggs were placed in fresh water and transported to CFH for incubation. The transport vehicle was met at the front gate where egg tubes were removed from transport coolers and placed in clean egg coolers containing tempered 100-ppm Argentyne solution for 10 minutes. Then eggs, at one female per tray, were placed in individual Heath egg trays in the incubation room. At Clearwater, eggs were placed in individual buckets and water hardened with 100-ppm iodine solution for one hour. After water hardening, the eggs were placed in incubators at one female per tray.

Tissue and ovarian samples were collected at the time of spawning. These samples were mailed overnight to Eagle Fish Health Lab for BKD and virus testing (Appendix I).

### **South Fork of the Clearwater**

Chinook were sorted twice per week for ripeness. The first fish was spawned August 6, 2004 and the last August 27, 2004. A total of 436 females were spawned. Pre-spawn mortality for the South Fork stock was 87 fish (8.0% pre-spawning mortality). A total of 120 Chinook carcasses were given to the Wildlife Rehabilitation Center at Waha, and all other carcasses not showing clinical signs of BKD were returned to either Crooked River or Red River to add nutrients to the system (Appendix E2).

### **Powell**

Fish were checked twice per week for ripeness. The first fish was spawned on August 9, 2004 and the last August 23, 2004. A total of 492 females were spawned. Fish carcasses not showing clinical signs of BKD were placed in the Lochsa and tributaries to add nutrients to the stream (Appendix G3). Pre-spawn mortality was 35 fish (2.1% pre-spawn mortality).

### **Nez Perce Tribal Programs**

A total of 570 adult Chinook (260 males, 310 females) were transferred to the Nez Perce Tribal Hatchery personnel from Powell (180 males, 241 females) and the South Fork (80 males, 69 females) Chinook.

## **INCUBATION**

### **Clearwater Hatchery**

Green eggs were placed into Heath egg trays with one female's eggs per tray. All Heath stacks were operated at approximately 5.5 gallons per minute.

Females were screened for BKD using Elisa techniques. Females with optical density (O.D.) over 0.18 on the South Fork stock and 0.25 on the Powell stock were culled. The BKD tests resulted in culling of 24 females at Powell and 46 females from the South Fork. Using an average fecundity of 4,000 eggs per fish, these culled females accounted for 280,000 green eggs.

A total of 2,915,056 green eggs were incubated from BY04 spring Chinook salmon. Overall development from green eggs to eyed-eggs was 2,739,433 for a total eye-up percentage of 93.9%. The South Fork stock achieved 97% eye-up and Powell 91.5% eye-up (Appendices I1, I2).

Beginning on the third or 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 reached 800 temperature units (TUs).

Eye-up occurred at approximately 500 TUs at which time all egg lots were shocked, then picked and enumerated by an electronic egg picker. Prior to hatching, all eyed-eggs were picked twice weekly. Hatching occurred at approximately 1,000 TUs. Swim-up fry were transferred to the early rearing vats at approximately 1,750 TUs.

Prior to ponding, an additional 100,000 eggs were culled (80K South Fork stock and 20K Powell stock) to a full hatchery.

## **EARLY REARING**

Swim up fry were ponded in hatchery vats at approximately 34,000 to 54,000 fish per vat. A total of 2,582,994 fry (readjusted as a result of marking) were segregated by stock and release strategies in 52 vats over a seven-month period. This gave us a survival of 97.8% from eyed egg to ponding.

Fish were started on feed within 24 to 48 hours of ponding in a full-length vat with baffles in place. Initial water flows were set at 46 gallons per minute (gpm) for approximately 10 days to initiate feeding, and then increased to 92 gpm on day eleven. A final increase to 120 gpm occurred after several months where it remained until the fish were moved outside. Flow indices were held at or below 1.2 while the density index never exceeded .30 during the entire early rearing period. Water temperatures during early rearing were between 41° and 55° F (Appendices A1 & A2).

All of the Chinook were moved outside during the marking process. The inventory number was adjusted to 2,582,994 after the marking program as a result of the hand count. The resulting hand count number revealed a discrepancy of 12,788 more fish.

## FINAL REARING

At marking, Powell stock was used to fill all Lochsa River and Selway River programs. South Fork programs were filled with South Fork stock and Powell stock. All CFH Chinook were marked between April 28, 2005 and June 30, 2005.

Most full-term smolts from the BY03 Chinook were fed two 28-day Erythromycin prophylactic treatments. All 22 raceways were fed once and all but 9 raceways received a second medicated feeding. Bio Oregon Biodiet grower feed was used throughout the final rearing period. The pre-smolts were fed full rations until release. The full term smolts were fed full rations through marking every other day during medicated feed treatments and were fed five days on feed and two days off feed the remainder of the time. Total feed used in early and final rearing was 180,620 pounds yielding 146,741 pounds of fish reared for a final conversion of 1.23 (Appendix J). Total cost was \$192,248.38.

The goal was to keep water temperatures below 55° F to reduce growth rates; temperatures varied from 41° to 56° F during the final rearing period with an estimated 2.1 cfs of water supplied to each raceway.

A total of 301,528 parr were released in the upper Selway River between June 21 and June 29, 2005. A total of 347,299 pre-smolts were released between September 16 and September 18, 2005. Chinook pre-smolts to be released at Powell were reared at the satellite throughout the summer. A total of 1,914,079 smolts were released in March and April of 2006 at five different locations. CFH production released 2,562,906 fish.

## FISH HEALTH

The BY04 spring Chinook reared at CFH were from low BKD parentage with O.D. below 0.18 on the South Fork and 0.25 on the Lochsa. All Chinook eggs above this O.D. were culled.

All parr and pre-smolts received one 28-day Erythromycin prophylactic feed treatment, and all but nine raceways received two 28-day Erythromycin prophylactic feed treatments. This was done to evaluate the necessity of two 28-day Erythromycin prophylactic feed treatments and was the second year of this study.

No significant fish health problems occurred on the spring Chinook reared at Clearwater Hatchery.

## PATHOLOGIST REPORT

### POWELL

**Diseases Encountered and Treatments.** Diseases were not encountered during the rearing of the BY'2004 Powell spring Chinook salmon at Powell satellite facility. Preliberation samples did not detect pathogens in spring releases. Adult fish were given an intra-peritoneal injection of erythromycin to lessen pre-spawning mortality from *Renibacterium* as they were trapped. Bacterial Kidney Disease (BKD) and Infectious Hematopoietic Necrosis (IHN) were found in

routine brood sampling. The IHN isolations were reported to the APHIS veterinarian-in-charge. Eggs were culled from females with ELISA titers for *Renibacterium* greater than 0.25. Since this facility had more than enough low optical density eggs which lowered the culling point to 0.15. Pre-spawning mortality of adult Chinook salmon decreased from 18% in 2003 to 2% in 2004.

**Organosomatic Index.** See attachments.

**Acute Losses.** Neither acute nor chronic losses were experienced at this facility during BY'04 rearing.

**Other Assessments.** Prespawning mortality should continue to be a concern at this facility. In years with low adult returns, a pro-active or aggressive strategy to limit pre-spawning mortality will insure the acquisition of more quality eggs.

## SOUTH FORK

**Diseases Encountered and Treatments.** Since fish are only acclimated at this facility prior to release, diseases have not been a problem. Adult fish are given an intraperitoneal injection of erythromycin (at 200 mg/kg) to reduce prespawning mortality to *Renibacterium*.

**Organosomatic Index.** See attachments.

**Acute Losses.** Neither acute nor chronic losses were experienced at this facility during the reporting period.

**Other Assessments.** Adult Chinook salmon are trapped at Crooked River and held at Red River with other South Fork of the Clearwater Chinook salmon before final transport to Clearwater Hatchery. During holding, the Clearwater staff should implement frequent formalin treatments to lessen prespawning mortality due to mycotic infections. The hatchery staff will want to review transport procedures to ensure all precautionary steps have been implemented to lessen transport stress. Frequent formalin treatments should also help lessen the risk of introducing *Ichthyophthirius multifiliis* into the raceways at Clearwater Hatchery.

## FISH MARKING

A total of 1,985,906 spring Chinook were marked. Marks included 1,985,906. Adipose (Ad) clipped and 267,910 ad-clipped/coded wire tagged (ad/cwt) (Appendix L).

Chinook were marked from early rearing vats (inside) into final rearing raceways (outside). Spring marking started on May 3, 2004 and was completed on May 7, 2004. Summer marking started on July 6, 2004 and was completed on July 23, 2004. Fish averaged 100 fpp in size. A total of 1,597 were Passive Integrated Transponder (PIT) tagged.

## FISH DISTRIBUTION

Releases from CFH occurred in three different life stages:

Parr	301,528
Pre-smolt	347,299
Full term smolt	<u>1,914,079</u>
Total	<u>2,562,906</u>

### Selway Parr

A total of 301,528 (32.8 fpp) Powell stock parr were released into the upper Selway River by the Nez Perce Tribe on June 21, 23, 27 and 29, 2005. All parr were given a 250 mg/kg feeding of oxytetracycline for four days as a fish mark (Appendix L).

### Powell Pre-smolts

A total of 347,299 (17.38 fpp) Powell stock pre-smolts were released into Walton Creek on September 16-18, 2005. All pre-smolts were ad-clipped and 694 were PIT tagged (Appendix L).

### Crooked River Full term smolts

A total of 749,461 smolts (16.77 fpp) were released into Crooked River. Twenty percent of the smolts were transported to upper Crooked River and 80% were transported to lower Crooked River on March 27 through April 5, 2006 and released daily. All smolts were ad-clipped, 42,670 were coded wire tagged, and 15,579 fish carried PIT tags (Appendix L).

### Powell Full term smolts

A total of 423,633 smolts (16.0 fpp) were released into Walton Creek. Smolts were transported to Powell on March 22 through March 24, 2006. A volitional release was started on March 22, 2006 and continued until the remaining fish were forced out of the pond on April 6, 2006. All smolts were ad-clipped, 84,077 were coded wire tagged, and 15,272 fish carried PIT tags (Appendix L).

### Red River Full term smolts

A total of 423,603 smolts (16.46 fpp) were released into Red River. Smolts were transported to Red River on March 27 through March 28, 2006. On April 3, 2006, the pond was drained and all remaining smolts were released. All smolts were ad-clipped, 42,931 were coded wire tagged, and 15,275 fish carried PIT tags (Appendix L).

## Selway River Full term smolts

A total of 317,382 smolts (15.31 fpp) were direct released into the lower Selway River at the race track by the Nez Perce Tribe on April 3 through April 4, 2006. A total of 214,562 Chinook were ad clipped and coded wire tagged, and 102,820 were coded wire tagged only (Appendix L).

## **BROOD YEAR 2005 STEELHEAD REPORT**

### **ABSTRACT**

Clearwater Hatchery received 979,864 eyed brood year 2005 North Fork B-run steelhead eggs from Dworshak National Fish Hatchery (DNFH). A total of 853,846 smolts from the North Fork stock were released from April 11, 2006 through April 26, 2006; 289,508 at Red House hole; 239,154 at Red River; 225,256 at Crooked River; 50,020 at Lolo Creek; 24,954 at Meadow Creek; and 24,954 at Mill Creek. The average size of fish was 4.67 fpp for a total of 182,796 pounds, and the average length was 208 mm.

A total of 201,986 pounds of feed was fed with a cost of \$116,264.96 to produce 182,796 pounds of fish at Clearwater Hatchery. The conversion rate was 1.10. Survival from eyed egg to release was 87%.

Clearwater Hatchery received 1,614,075 green brood year 2005 North Fork B-run steelhead eggs from Dworshak National Fish Hatchery for the southern Idaho steelhead hatcheries. After culling and picking, 1,171,000 eyed eggs were shipped to Magic Valley Hatchery and Hagerman National Hatchery.

### **SYNOPTIC HISTORY**

#### **Clearwater Hatchery**

##### **Brood Source**

Dworshak National Fish Hatchery was the source for North Fork stock B-run steelhead eggs.

##### **Disease History**

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

##### **Spawning**

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

### **INCUBATION**

Unpicked eyed steelhead eggs were received from Dworshak Hatchery in two shipments on March 23, 2005 and March 30, 2005 (Appendix M). The eggs from DNFH lots five and six were incubated approximately 15 days at Dworshak until the eggs eyed-up. All eggs from negative IHNV females were disinfected and transported to Clearwater Fish Hatchery. The

transport vehicle was met at the front gate, and egg baskets were removed from egg coolers and placed in clean egg coolers containing tempered 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 5,000 eggs per basket, and water flows through each stack were set at six gallons per minute. A total of 1,257,201 unpicked eyed eggs were received and after picking netted 979,864 eggs for an eye-up of 77.9% (Appendix M). During incubation, steelhead eggs were on secondary water until Chinook marking in early May, and then changed to the primary pipeline.

A total of 1,614,075 green eggs were collected from Dworshak National Fish Hatchery for the Magic Valley Hatchery and Hagerman National Fish Hatchery. These eggs were incubated in cold water at CFH until the eyed stage. 950,000 eyed eggs were shipped to Magic Valley, and 221,000 were shipped to Hagerman National. Total eye-up on these eggs was 72.54%.

### **EARLY REARING**

A total of 897,501 fish (after adjustment for new marking inventories) were ponded in early rearing. Survival from green egg to eyed egg was 77.9%, and from eyed egg to ponding was 91.6%. At swim-up, unfed fry from Dworshak stock B-run steelhead were moved to vats. All fry were divided as evenly as possible into 21 vats (41,000 per vat). Two (2) raceways in the steelhead bank (4E and 4W) had fry directly ponded into them from incubation to evaluate a direct outside-ponding strategy. The initial DI was .06 and FI was .32. Fish were held in the hatchery vats until July when they were marked and moved to 16 steelhead raceways (5-12 east and 5-12 west). Average length of the fish at the end of early rearing was 3.2 inches (81 mm). The fish averaged 76 fpp.

The DI of the Dworshak steelhead ranged from 0.15 to 0.27, and the FI ranged from .60 to 1.5.

Bio Oregon's Biodiet Grower was used for the first 3 weeks of feeding. Then Bio Oregon's Biovita was used for the remainder of early rearing.

Water temperatures for the early rearing period ranged from 50° to 57° F (Appendix A2).

### **FINAL REARING**

The juvenile Dworshak stock B-run steelhead were moved to outside steelhead raceways 5-12 east and 5-12 west. During July and August, the move was done in conjunction with fin clipping and CWT tagging to avoid double stressing the fish. Fin clipping was done in 8-hour shifts per day. Baffles were removed from vats; fish were then moved to the clipping trailers using the transfer tanks. All production fish were marked by IDFG personnel, and the marked supplementation fish were marked by the USFWS as part of an ongoing study.

The DI of the Dworshak steelhead ranged from 0.17 to 0.28, and the FI ranged from 0.35 to 1.45. These indexes were recalculated monthly and were never allowed to exceed DI of 0.30 or FI of 1.70.

Water temperatures during final rearing period were maintained to keep temperatures as close to 57°F as possible (Appendix A2). Estimated water flows per raceway were 2.2 cfs.

Fish were fed Bio Oregon's Biodry 1000 dry feed until fall, switched to Biodry 3000 until mid-March, and then fed Biodry 1000 laced with an EIBS vitamin pack until release. A total of 180,125 pounds of feed was used during final rearing producing 170,854 pounds of gain. A total of 201,986 pounds of feed was used throughout the entire rearing period to produce 182,796 pounds of fish at a cost of \$116,264.96. The overall conversion rate from fry to smolt was 1.10. Percent body weight fed ranged from .41% to 5.14% (Appendix J).

This was the third year of steelhead production in which Clearwater Fish Hatchery has successfully met production goals using the new Bio-Oregon diet. In 2002, a feed study was conducted on the Brood year 2002 steelhead. This feed study concluded that a Bio-Oregon dry diet for early rearing and final rearing could achieve the desired production goals. In previous years, the Idaho Fish and Game had fixed contracts with two feed companies and this limited the ability to explore new diets for achieving production goals. In 2003, the Idaho Fish and Game went to an open contract system that allowed Clearwater Fish Hatchery to begin using the new Bio-Oregon diet evaluated in the Brood Year 2002 steelhead feed study. Since the implementation of the open contract system, Clearwater Fish Hatchery has changed to the Bio-Oregon diet and has met required size parameters at release, maintained great fish survival, and improved feed conversions over the last two production years.

### **FISH HEALTH PATHOLOGIST REPORT**

Ovarian samples were taken from each female spawned at Dworshak NFH, whose eggs were destined for rearing at Clearwater Hatchery, were sent Eagle Fish Health Laboratory for viral analysis. Three samples were positive for IHNV out of the 187 fish tested (1.6%). The eggs from the positive females were culled from production. Diagnostic samples were taken from BY'05 North Fork of the Clearwater STB in September 2006. *Flavobacterium psychrophilum*, the etiological agent of cold water disease was isolated in 7/7 fish sampled and *Aeromonas hydrophila* was isolated in 3/7 fish sampled. These fish were placed on INAD 9332-05-45 that allowed these fish to be treated with a 10 g/100 lbs dose of oxytetracycline medicated feed for 14 days. No further problems were noticed in this group of fish.

Neither acute nor chronic mortalities were experienced in steelhead during the rearing cycle. Preliberation sampling showed significant improvements in fitness, with higher stored energy and much larger fish. This was attributed to a new steelhead ration and adjustments in husbandry practices at this facility.

Future advancements in ELISA technologies may allow an ELISA-based culling program for cold water disease to be implemented in the future to limit mortalities associated with *Flavobacterium psychrophilum* in much the same way BKD is controlled.

## FISH MARKING

The steelhead production at Clearwater was split this year between production and supplementation.

The production fish are all marked for sport harvest with an adipose fin clip, and they are as follows:

Release site	Release size	Adipose clips	CWT/AD/LV	Pit tags
Red House Hole	Smolt	224,532	64,976	296
Red River	Smolt	99,472	0	2,283
Crooked River	Smolt	83,239	65,413	299
TOTAL		407,243	103,389	2,878

The supplementation fish are not marked for harvest, and many don't have any marking at all. They are as follows:

Release site	Release size	Non Clipped	Non Clipped/CWT	CWT/Elastomer	Pit tags
Red River (acclimated)	Smolt	47,360	0	45,293	2,476
Red River (nonacclimated)	Smolt	0	0	47,029	2,485
Crooked River	Smolt	56,898	19,706	0	300
Meadow Creek	Smolt	0	0	24,954	1,297
Mill Creek	Smolt	0	0	24,954	1,291
Lolo Creek	Smolt	50,020	0	0	300
TOTAL		154,278	19,706	142,230	8,149

## FISH DISTRIBUTION

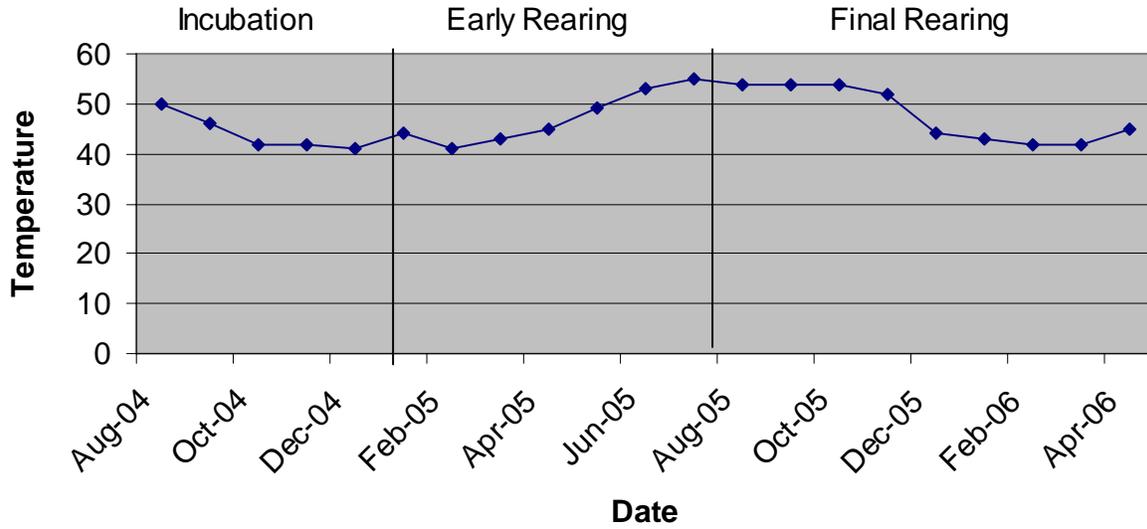
On April 17-19, 2006 a total of 289,508 (4.52 fpp) Dworshak B-run steelhead were direct released at the Red House Hole plant site (approximately 3.5 miles upstream of Highway 13 and 14 junctions) on the lower South Fork of Clearwater River. There were 239,154 fish, which averaged 4.84 fpp, released at Red River between April 14 and April 24, 2006. There were 225,256 fish, which averaged 4.59 fpp, released at Crooked River between April 11 and April 20, 2006. The 50,020 fish, which averaged 5.1 fpp, released at Lolo Creek were transported by NPTH on April 26, 2006. A total of 24,954 fish, which averaged 4.7 fpp, and 24,954 fish, which averaged 4.7 fpp, were released on April 25, 2006 at Meadow and Mill Creeks on the South Fork of the Clearwater. There was very little crowding and hauling mortality from the fish transportation to the release sites (Appendix O).

## **ACKNOWLEDGEMENTS**

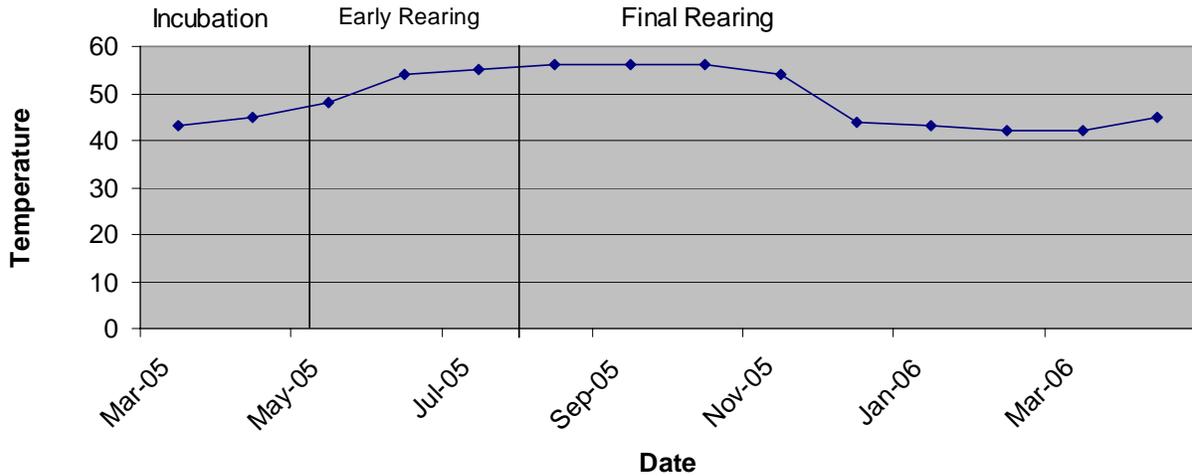
Clearwater Fish Hatchery acknowledges 48 people who contributed to the success of these programs. The hatchery crew consists of: Jerry McGehee - Hatchery Manager; Brad George and Randy Hutzenbiler - Assistant Hatchery Managers; Jeff Houck, Chris Shockman, Ron Hopper, Pat Moore, Cassie Rohrbacher, and Tim Klucken - Fish Culturists; Ernie Yost - Utility Craftsman; Walter Boore - Office Specialist II; Chad Henson, Lacey Alberts, and Don West - Fish Technicians; Theresa Elliott, Gary Duke, Bob Schloss, Daryn Call, Mike Hamilton, Tim Lee, Britney Hicks, John Daly, Tanner Hicks, Chris Stamper, Max Bausch, Jami Bahader, Mike Tetwiler, Todd Millsap, Becky Haag, Jenny Hole, Steve Duty, Nichole Madrid, Bridgette Gallo, Carrie Licht, Dan Green, Steve Moore, Steve Green, and Bob Miller - Bio-aides; Charles Ball, Kim West, and Joe Calaprice - Grounds Maintenance Workers; Fred Hough- Maintenance Craftsman; J Z Savage, Eric Morin, Whitney Snyder, Amanda McGehee, Rebekah Waltmann, and Sonny Telecky – Summer Youth Program Students.

## **APPENDICES**

### Appendix A1. Brood Year 2004 Chinook Water Temperatures, August 2004-April 2006

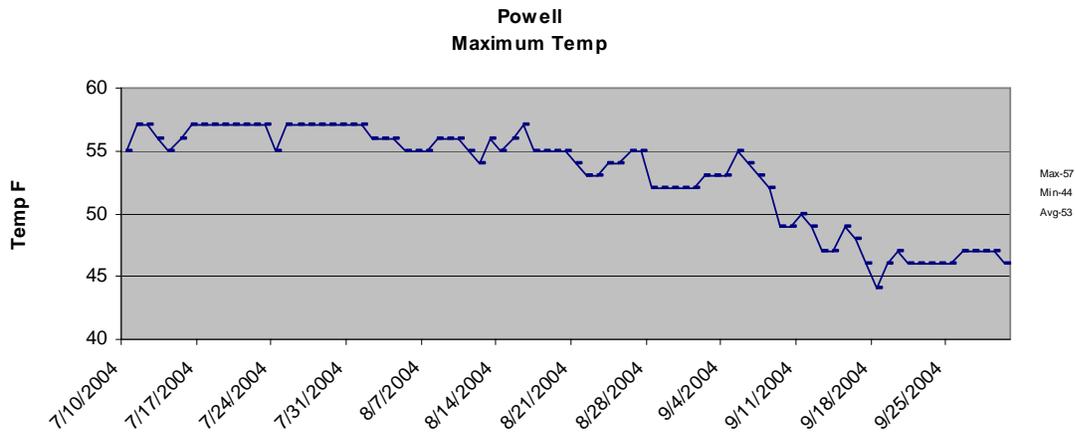
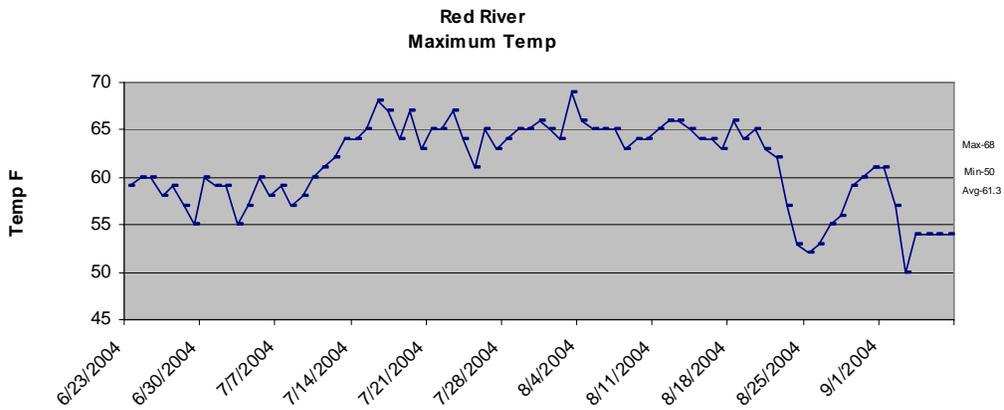
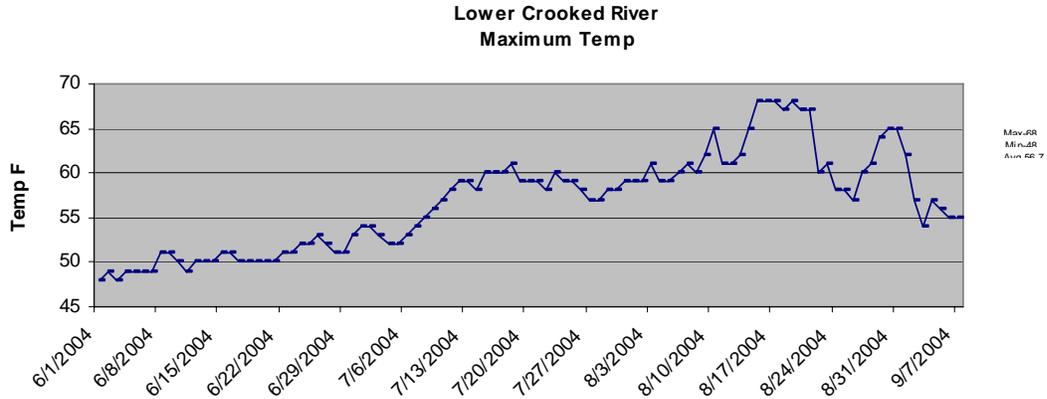


### Appendix A2. Brood Year 2005 Steelhead Water Temperatures, March 2005-April 2006



**Appendix B1, B2, B3.**

**Water temperatures at Crooked River, Red River and Powell trap facilities 2004.**



**Appendix C1. Clearwater Hatchery water quality analysis taken from the hatchery rearing facility on August 4, 1994.**

ANALYSIS	RESULTS (mg/l)	DATE ANALYZED	REARING LEVELS
Alkalinity	16.0	08/04/94	120 - 400 mg/l
Ammonia (as N)	<0.005	08/04/94	0.0125
Arsenic	<0.01	08/04/94	N/A
Barium	<0.1	08/04/94	N/A
Cadmium	<0.001	08/04/94	<.0004 mg/l
Calcium	3.8	08/12/94	N/A
Chloride	0.9	08/12/94	N/A
Chromium	<0.01	08/04/94	0.1
Color (C.U.)	15	08/12/94	N/A
Copper	<0.02	08/04/94	<.006 mg/l
Cyanide	<0.005	08/12/94	N/A
Detergents (surfactant)	<0.08	08/9/94	N/A
Fluoride	<0.1	08/30/94	N/A
Hardness	14.0	08/04/94	120 - 400 mg/l
Hydrogen Sulfide	<0.01	08/15/94	N/A
Iron	<0.02	08/11/94	N/A
Lead	<0.005	08/04/94	<0. 03 mg/l
Magnesium	<0.8	08/11/94	N/A
Manganese	<0.01	08/11/94	N/A
Mercury	<0.0005	08/11/94	<.002 mg/l
Nitrogen Nitrate	<0.013	08/18/94	0.2 mg/l
Potassium	0.5	08/12/94	N/A
Selenium	<0.005	08/10/94	N/A
Silica	11	08/30/94	N/A
Silver	<0.001	08/17/94	N/A
Sodium	1.5	08/17/94	N/A
Sulfate	<1	08/26/94	N/A
Total Dissolved Solids	28	08/11/94	80 mg /l
Zinc	<0.005	08/10/94	0.03 mg/l
pH (pH units)	7.20	08/09/94	6.5 - 8.0

**Appendix C2. Upper Crooked River rearing pond water quality analysis report.**

PRIMARY CONTAMINANTS ANALYSIS				
Contaminant	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				
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 B0	7/02/97
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 contaminant level

Appendix C3. Powell adult holding pond water quality analysis report.

PRIMARY CONTAMINANTS ANALYSIS

Contaminant	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)	0.009	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

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 contaminant level

**Appendix C4. Red River adult holding pond water quality analysis report.**

PRIMARY CONTAMINANTS ANALYSIS					
Contaminant	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					
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

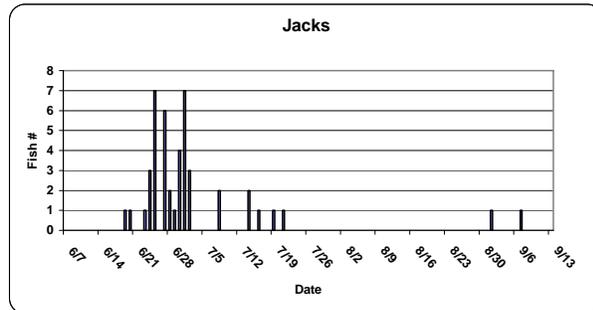
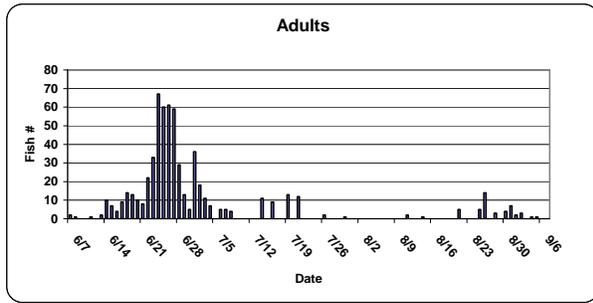
--- = No analysis performed for this contaminant

Numerical Entry = Detection at level indicated

MCL (numbers in parenthesis)= EPA maximum contaminant level

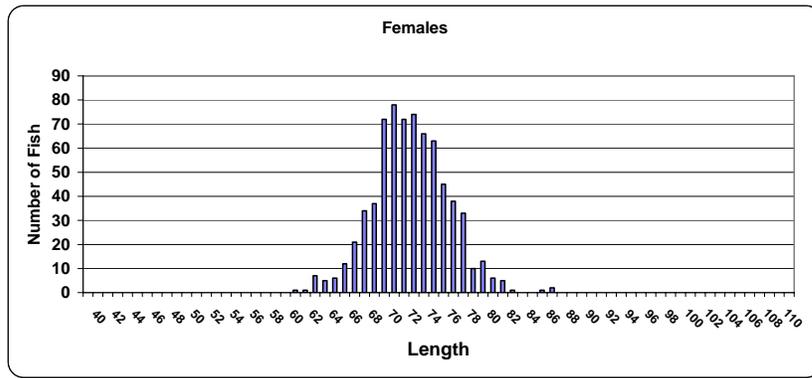
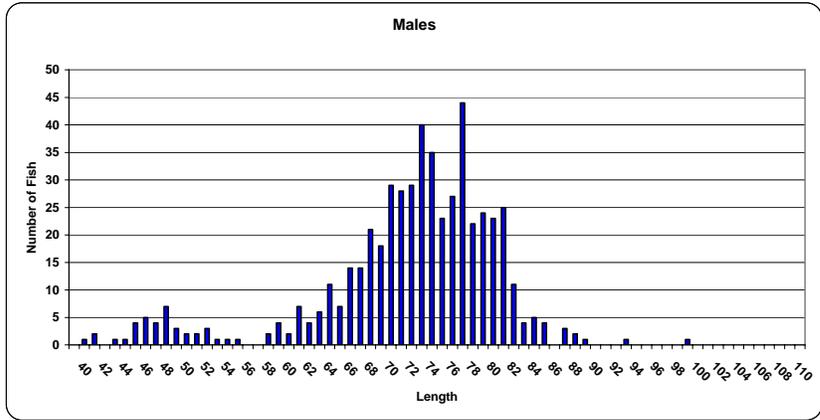
Appendix D1. Crooked River chinook Run Timing 2004

Date	Adult	Jack	Total	Date	Adult	Jack	Total
6/7	2	0	2	7/28	0	0	0
6/8	1	0	1	7/29	0	0	0
6/9	0	0	0	7/30	1	0	1
6/10	0	0	0	7/31	0	0	0
6/11	1	0	1	8/1	0	0	0
6/12	0	0	0	8/2	0	0	0
6/13	2	0	2	8/3	0	0	0
6/14	10	0	10	8/4	0	0	0
6/15	7	0	7	8/5	0	0	0
6/16	4	0	4	8/6	0	0	0
6/17	9	0	9	8/7	0	0	0
6/18	14	0	14	8/8	0	0	0
6/19	13	1	14	8/9	0	0	0
6/20	10	1	11	8/10	0	0	0
6/21	8	0	8	8/11	2	0	2
6/22	22	0	22	8/12	0	0	0
6/23	33	1	34	8/13	0	0	0
6/24	67	3	70	8/14	1	0	1
6/25	60	7	67	8/15	0	0	0
6/26	61	0	61	8/16	0	0	0
6/27	59	6	65	8/17	0	0	0
6/28	29	2	31	8/18	0	0	0
6/29	13	1	14	8/19	0	0	0
6/30	5	4	9	8/20	0	0	0
7/1	36	7	43	8/21	5	0	5
7/2	18	3	21	8/22	0	0	0
7/3	11	0	11	8/23	0	0	0
7/4	7	0	7	8/24	0	0	0
7/5	0	0	0	8/25	5	0	5
7/6	5	0	5	8/26	14	0	14
7/7	5	0	5	8/27	0	0	0
7/8	4	2	6	8/28	3	0	3
7/9	0	0	0	8/29	0	0	0
7/10	0	0	0	8/30	4	0	4
7/11	0	0	0	8/31	7	0	7
7/12	0	0	0	9/1	2	1	3
7/13	0	0	0	9/2	3	0	3
7/14	11	2	13	9/3	0	0	0
7/15	0	0	0	9/4	1	0	1
7/16	9	1	10	9/5	1	0	1
7/17	0	0	0	9/6	0	0	0
7/18	0	0	0	9/7	0	1	1
7/19	13	1	14	<b>TOTAL</b>	<b>612</b>	<b>45</b>	<b>657</b>
7/20	0	0	0				
7/21	12	1	13				
7/22	0	0	0				
7/23	0	0	0				
7/24	0	0	0				
7/25	0	0	0				
7/26	2	0	2				
7/27	0	0	0				



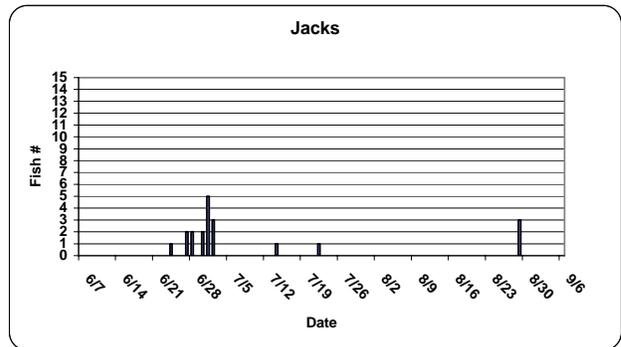
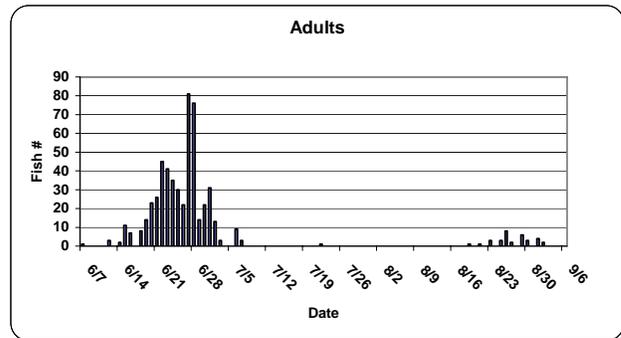
**Appendix D2. South Fork length frequency 2004**  
(Red River and Crooked River)

Length	Males	Females	Unk	Total
40	0	0	0	0
41	1	0	0	1
42	2	0	0	2
43	0	0	0	0
44	1	0	0	1
45	1	0	0	1
46	4	0	0	4
47	5	0	0	5
48	4	0	0	4
49	7	0	0	7
50	3	0	0	3
51	2	0	0	2
52	2	0	0	2
53	3	0	0	3
54	1	0	0	1
55	1	0	0	1
56	1	0	0	1
57	0	0	0	0
58	0	0	0	0
59	2	0	0	2
60	4	0	0	4
61	2	1	0	3
62	7	1	0	8
63	4	7	0	11
64	6	5	0	11
65	11	6	0	17
66	7	12	0	19
67	14	21	0	35
68	14	34	0	48
69	21	37	0	58
70	18	72	0	90
71	29	78	0	107
72	28	72	0	100
73	29	74	0	103
74	40	66	0	106
75	35	63	0	98
76	23	45	0	68
77	27	38	0	65
78	44	33	0	77
79	22	10	0	32
80	24	13	0	37
81	23	6	0	29
82	25	5	0	30
83	11	1	0	12
84	4	0	0	4
85	5	0	0	5
86	4	1	0	5
87	0	2	0	2
88	3	0	0	3
89	2	0	0	2
90	1	0	0	1
91	0	0	0	0
92	0	0	0	0
93	0	0	0	0
94	1	0	0	1
95	0	0	0	0
96	0	0	0	0
97	0	0	0	0
98	0	0	0	0
99	0	0	0	0
100	1	0	0	1
101	0	0	0	0
102	0	0	0	0
103	0	0	0	0
104	0	0	0	0
105	0	0	0	0
106	0	0	0	0
107	0	0	0	0
108	0	0	0	0
109	0	0	0	0
110	0	0	0	0
111	0	0	0	0
<b>TOTAL</b>	<b>529</b>	<b>703</b>	<b>0</b>	<b>1232</b>



Appendix E1. Red River chinook Run Timing 2004

Date	Adult	Jack	Total	Date	Adult	Jack	Total
6/7	1	0	1	7/21	0	0	0
6/8	0	0	0	7/22	1	1	2
6/9	0	0	0	7/23	0	0	0
6/10	0	0	0	7/24	0	0	0
6/11	0	0	0	7/25	0	0	0
6/12	3	0	3	7/26	0	0	0
6/13	0	0	0	7/27	0	0	0
6/14	2	0	2	7/28	0	0	0
6/15	11	0	11	7/29	0	0	0
6/16	7	0	7	7/30	0	0	0
6/17	0	0	0	7/31	0	0	0
6/18	8	0	8	8/1	0	0	0
6/19	14	0	14	8/2	0	0	0
6/20	23	0	23	8/3	0	0	0
6/21	26	0	26	8/4	0	0	0
6/22	45	0	45	8/5	0	0	0
6/23	41	0	41	8/6	0	0	0
6/24	35	1	36	8/7	0	0	0
6/25	30	0	30	8/8	0	0	0
6/26	22	0	22	8/9	0	0	0
6/27	81	2	83	8/10	0	0	0
6/28	76	2	78	8/11	0	0	0
6/29	14	0	14	8/12	0	0	0
6/30	22	2	24	8/13	0	0	0
7/1	31	5	36	8/14	0	0	0
7/2	13	3	16	8/15	0	0	0
7/3	3	0	3	8/16	0	0	0
7/4	0	0	0	8/17	0	0	0
7/5	0	0	0	8/18	0	0	0
7/6	9	0	9	8/19	1	0	1
7/7	3	0	3	8/20	0	0	0
7/8	0	0	0	8/21	1	0	1
7/9	0	0	0	8/22	0	0	0
7/10	0	0	0	8/23	3	0	3
7/11	0	0	0	8/24	0	0	0
7/12	0	0	0	8/25	3	0	3
7/13	0	0	0	8/26	8	0	8
7/14	0	1	1	8/27	2	0	2
7/15	0	0	0	8/28	0	0	0
7/16	0	0	0	8/29	6	3	9
7/17	0	0	0	8/30	3	0	3
7/18	0	0	0	8/31	0	0	0
7/19	0	0	0	9/1	4	1	5
7/20	0	0	0	9/2	2	0	2
<b>TOTAL</b>				<b>554</b>	<b>21</b>	<b>575</b>	



Appendix E2. South Fork Chinook summary of fish trapped, released, spawned and disposition of carcasses, Brood Year 2004.

**TOTAL SOUTH FORK FISH TRAPPED:**

Crooked River	657
Red River	575

AGE CLASSES	TOTAL			1232
	FEMALES	MALES	UNK	TOTAL
3 Years = (<64 cm)	9	57	0	66
4 Years = (64 - 82 cm)	690	440	0	1130
5 Years = (> 82 cm)	4	32	0	36
	<b>703</b>	<b>529</b>	<b>0</b>	<b>1232</b>

Additional 120 Chinook (included in disposition) transferred from Powell.

**FISH DISPOSITION**

**FEMALES:**

Crooked River		Red River		CFH		TXFR from Powell	TOTAL
MORTALITY	0	MORTALITY	8	SPAWNED	383	53	436
				MORTALITY	50	1	59
				KILLED/CULLED @ SPAWN	17	0	17
RELEASED	71	RELEASED	38	RELEASED	66	0	175
				TXFR TO NPTH	70	1	71
<b>TOTAL</b>	<b>71</b>	<b>TOTAL</b>	<b>46</b>	<b>TOTAL</b>	<b>586</b>	<b>55</b>	<b>758</b>

**FISH DISPOSITION MALES:**

Crooked River		Red River		CFH		TXFR from Powell	TOTAL
MORTALITY	1	MORTALITY	2	SPAWNED	194	38	232
				MORTALITY	26	1	30
RELEASED	105	RELEASED	47	SPAWN/RELEASE	74	19	245
				SPAWN/ TXFR NPTH	80	7	87
<b>TOTAL</b>	<b>106</b>	<b>TOTAL</b>	<b>49</b>	<b>TOTAL</b>	<b>374</b>	<b>65</b>	<b>594</b>

<b>TOTAL TRAP</b>	1232
<b>TOTAL TRANSFER</b>	120
<b>TOTAL DISPOSITION</b>	1352

120 Chinook were given to the Wildlife Rehabilitation Center at Waha.

All remaining low BKD carcasses were scatter planted throughout the river system for nutrient enhancement.

Appendix F1. Summary of spring Chinook salmon 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 (a)	199,700	2	1990	13	1991	7	1992	22	0.011%
1988	Spr 1990 (b)	300,407	2	1991	208	1992	276	1993	486	0.162%
1989	Fall 1990 (c)	339,087	13	1992	119	1993	10	1994	142	0.042%
1990	Fall 1991 (a)	320,400	7	1993	15	1994	0	1995	22	0.002%
1991	-----	-----	1*	1994	0	1995	1	1996	1	0.000%
1992	Spr 1994 (d)	273,766	6	1995	241 (g)	1996	59	1997	306	0.112%
1993	Fall 1994	199,255								
	Fall 1994 (e)	216,280	94 (g)	1996	935	1997	213	1998	1274	0.134%
	Spr 1995	258,293								
	Spr 1995 (f)	279,615								
		953,443								
1994	Spr 1996	37,071	2	1997	22	1998	3	1999	27	0.073%
1995	Spr 1997	0	0	1998	0	1999	0	2000	0	0.00%
1996	Spr 1998	205,906	122	1999	637	2000	101	2001	860**	0.417%
1997	Fall 1998	162,119	454	2000	1878**	2001	276**	2002	2608**	0.340%
	Spr 1999	600,981								
		763,100								
1998	Fall 1999	89,299	34**	2001	1023**	2002	870**	2003	1927**	0.395%
	Spr 2000	399,060								
		488,359								
1999	Fall 2000	105,507	37**	2002	334**	2003	27**	2004	398**	0.209%
	Spr 2001	84,649								
		190,156								
2000	Fall 2001	155,887	156**	2003	479**	2004	14**	2005	649**	0.074%
	Spr 2002	726,489								
2001	Fall 2002	169,768	35**	2004	98**	2005		2006		
	Spr 2003	629,687								
2002	Fall 2003	234,361	28**	2005		2006		2007		
	Spr 2004	750,317								
2003	Fall 2004	64,263								
	Spr 2005	700,387		2006						

(a) Transferred from Dworshak Hatchery

(b) Direct released from Kooskia Fish Hatchery

(c) Transferred from Dworshak and Rapid River hatcheries

(d) Eggs from Lookingglass Hatchery (Rapid River stock) reared at Clearwater Hatchery

(e) Eggs from Rapid River hatchery reared at Clearwater Hatchery

(f) Non-acclimated release

(g) These numbers do not match run report numbers. Each one has been corrected to reflect straying from other stocks.

\* Natural Fish

\*\*Does not include fish caught in fishery or left in river

**Appendix F2. Summary of spring Chinook returns to Red River by Brood Year.**

Brood	Year	Number	Year	Year	Year	Year	Year	Total by	% return	
Year	Released	Released	3-yr-olds	Returned	4-yr-olds	Returned	5-yr-olds	Returned	return	from plant
1982	Fall 1983	260,000	2	1985	(a)	1986	107	1987	109	0.036%
	Spr 1984	40,000								
1983	Spr 1985 (b)	80,000	(a)	1986	377	1987	259	1988	636	0.795%
1984	Spr 1986 (b)	136,800	35	1987	132	1988	74	1989	241	0.176%
1985	Fall 1986 (c)	96,400	3	1988	25	1989	13	1990	41	0.021%
	Spr 1987 (c)	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 (d)	63,000								
	Spr 1991 (e)	124,000								
		460,800								
1990	Fall 1991	354,700	1	1993	18	1994	1	1995	20	0.004%
	Spr 1992 (f)	207,500								
		562,200								
1991	Fall 1992	6,000		1994	0	1995	0	1996	0	0.000%
1992	Fall 1993	22,246	3	1995	4 (g)	1996	45	1997	52	0.234%
1993	Fall 1994	320,755	5	1996	191	1997	42	1998	238	0.074%
1994	Spr 1996	24,002	2	1997	25	1998	2	1999	29	0.121%
1995	Spr 1997	2,983	1	1998	6	1999	22	2000	29	0.972%
1996	Spr 1998	51,208	15	1999	81	2000	66**	2001	162	0.316%
1997	Fall 1998	66,114	1	2000		2001		2002		
	Spr 1999	360,983	178	2000	1244**	2001	122**	2002	1545**	0.360%
1998	Fall 1999	74,981	23**	2001	494**	2002	222**	2003	739**	0.316%
	Spr 2000	159,051								
		234,032								
1999	Fall 2000	68,684	7**	2002	40**	2003	0	2004	47**	0.068%
2000	Fall 2001	84,238	36**	2003	527**	2004	18**	2005	581**	0.134%
	Spr 2002	350,318								
2001	Fall 2002	85,064	18**	2004	102**	2005		2006		
	Spr 2003	351,066								
2002	Fall 2003	108,323	22	2005		2006		2007		
	Spr 2004	354,868								
2003	Spr 2005	401,362								

(a) Trap was not installed in 1986 due to construction

(b) These fish wintered in the rearing pond

(c) These fish were Rapid River stock reared at Sawtooth and released directly into Red River with no acclimation

(d) Planted off bridge at ranger station, reared at Dworshak Hatchery, Clearwater Stock

(e) Planted off bridge at ranger station, reared at Kooskia, Clearwater Stock

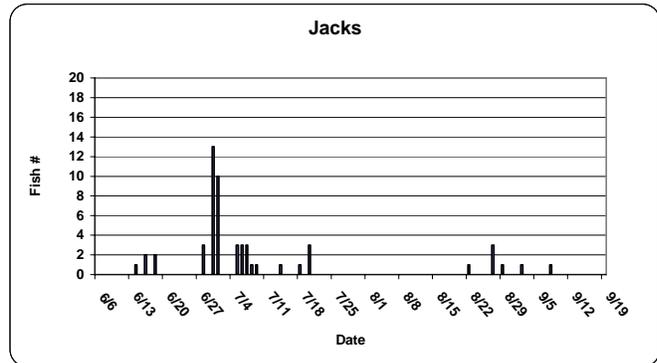
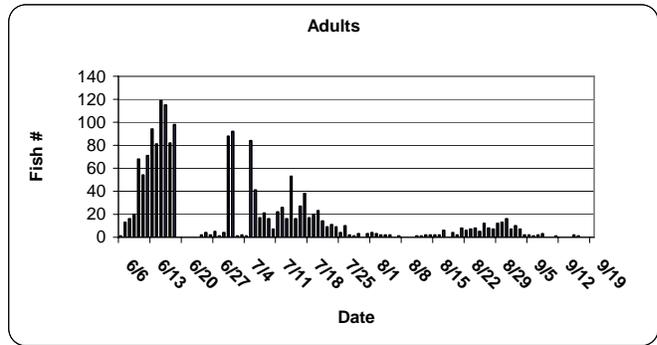
(f) Acclimated in rearing pond for 21 days, transferred from Dworshak

(g) These numbers do not match run report numbers. Each one has been corrected to reflect straying from other stocks.

\*\*Does not include fish caught in fishery or left in river.

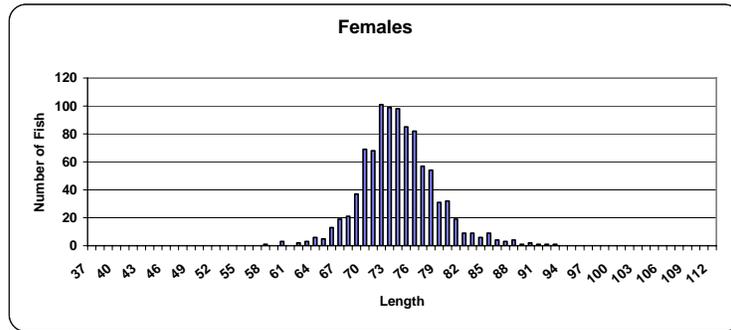
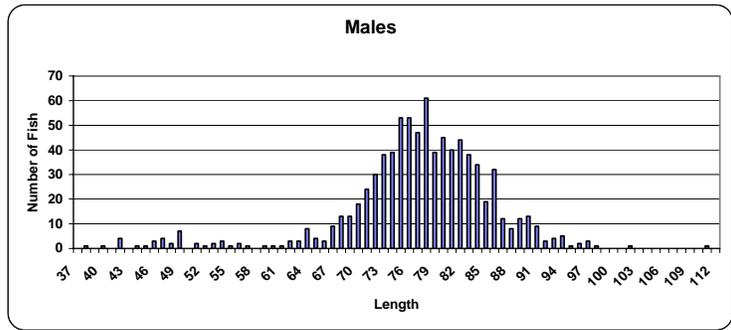
Appendix G1. Powell / Crooked Fork Creek chinook Run Timing 2004

Date	Adult	Jack	Total	Date	Adult	Jack	Total
6/6	1	0	1	7/28	1	0	1
6/7	13	0	13	7/29	3	0	3
6/8	16	0	16	7/30	0	0	0
6/9	20	0	20	7/31	3	0	3
6/10	68	0	68	8/1	4	0	4
6/11	54	0	54	8/2	3	0	3
6/12	71	0	71	8/3	2	0	2
6/13	94	0	94	8/4	2	0	2
6/14	81	1	82	8/5	2	0	2
6/15	119	0	119	8/6	0	0	0
6/16	115	2	117	8/7	1	0	1
6/17	82	0	82	8/8	0	0	0
6/18	98	2	100	8/9	0	0	0
6/19	0	0	0	8/10	0	0	0
6/20	0	0	0	8/11	1	0	1
6/21	0	0	0	8/12	1	0	1
6/22	0	0	0	8/13	2	0	2
6/23	0	0	0	8/14	2	0	2
6/24	2	0	2	8/15	2	0	2
6/25	4	0	4	8/16	2	0	2
6/26	2	0	2	8/17	6	0	6
6/27	5	0	5	8/18	0	0	0
6/28	1	3	4	8/19	4	0	4
6/29	4	0	4	8/20	2	0	2
6/30	88	13	101	8/21	8	0	8
7/1	92	10	102	8/22	6	1	7
7/2	1	0	1	8/23	7	0	7
7/3	2	0	2	8/24	8	0	8
7/4	1	0	1	8/25	5	0	5
7/5	84	3	87	8/26	12	0	12
7/6	41	3	44	8/27	8	3	11
7/7	17	3	20	8/28	7	0	7
7/8	21	1	22	8/29	12	1	13
7/9	16	1	17	8/30	13	0	13
7/10	7	0	7	8/31	16	0	16
7/11	22	0	22	9/1	7	0	7
7/12	26	0	26	9/2	10	1	11
7/13	16	0	16	9/3	7	0	7
7/14	53	1	54	9/4	2	0	2
7/15	16	0	16	9/5	2	0	2
7/16	27	0	27	9/6	1	0	1
7/17	38	0	38	9/7	2	0	2
7/18	17	1	18	9/8	3	1	4
7/19	20	0	20	9/9	0	0	0
7/20	23	3	26	9/10	0	0	0
7/21	14	0	14	9/11	1	0	1
7/22	9	0	9	9/12	1	0	1
7/23	11	0	11	9/13	1	0	1
7/24	9	0	9	9/14	3	0	3
7/25	4	0	4	9/15	2	0	2
7/26	10	0	10	9/16	1	0	1
7/27	2	0	2	<b>TOTAL</b>	<b>1725</b>	<b>54</b>	<b>1779</b>



Appendix G2. Powell / Crooked Fork Creek chinook length frequency 2004

Length	Males	Females	Unk	Total
37	0	0	0	0
38	1	0	0	1
39	0	0	0	0
40	1	0	0	1
41	0	0	0	0
42	4	0	0	4
43	0	0	0	0
44	1	0	0	1
45	1	0	0	1
46	3	0	0	3
47	4	0	0	4
48	2	0	0	2
49	7	0	0	7
50	0	0	0	0
51	2	0	0	2
52	1	0	0	1
53	2	0	0	2
54	3	0	0	3
55	1	0	0	1
56	2	0	0	2
57	1	0	0	1
58	0	1	0	1
59	1	0	0	1
60	1	3	0	4
61	1	0	0	1
62	3	2	0	5
63	3	3	0	6
64	8	6	0	14
65	4	5	0	9
66	3	13	0	16
67	9	19	0	28
68	13	21	0	34
69	13	37	0	50
70	18	69	0	87
71	24	68	0	92
72	30	101	0	131
73	38	99	0	137
74	39	98	0	137
75	53	85	0	138
76	53	82	0	135
77	47	57	0	104
78	61	54	0	115
79	39	31	0	70
80	45	32	0	77
81	40	19	0	59
82	44	9	0	53
83	38	9	0	47
84	34	6	0	40
85	19	9	0	28
86	32	4	0	36
87	12	3	0	15
88	8	4	0	12
89	12	1	0	13
90	13	2	0	15
91	9	1	0	10
92	3	1	0	4
93	4	1	0	5
94	5	0	0	5
95	1	0	0	1
96	2	0	0	2
97	3	0	0	3
98	1	0	0	1
99	0	0	0	0
100	0	0	0	0
101	0	0	0	0
102	1	0	0	1
103	0	0	0	0
104	0	0	0	0
105	0	0	0	0
106	0	0	0	0
107	0	0	0	0
108	0	0	0	0
109	0	0	0	0
110	0	0	0	0
111	1	0	0	1
112	0	0	0	0
<b>TOTAL</b>	<b>824</b>	<b>955</b>	<b>0</b>	<b>1779</b>



Appendix G3. Powell Chinook summary of fish trapped, released, spawned and disposition of carcasses for Powell and Crooked Fork adult traps, Brood Year 2004.

<b>TOTAL FISH TRAPPED:</b>	
Powell	1635
Crooked Fork Creek	144
<b>TOTAL</b>	<b>1779</b>

AGE CLASSES	<b>FEMALES</b>	<b>MALES</b>	<b>UNK</b>	<b>TOTAL</b>
3 Years = (<64 cm)	9	45	0	54
4 Years = (64 - 82 cm)	905	581	0	1486
5 Years = (> 82 cm)	41	198	0	239
<b>TOTAL</b>	<b>955</b>	<b>824</b>	<b>0</b>	<b>1779</b>

**FISH DISPOSITION FEMALES:**

SPAWNED	460
MORTALITY	29
KILLED/CULLED @ SPAWN	16
RELEASED	154
TRANSFER TO CRH	55
TRANSFER TO NPTH	241
<b>TOTAL</b>	<b>955</b>

**FISH DISPOSITION MALES:**

SPAWNED	410
SPAWNED/ TXFR TO NPTH	180
MORTALITY	6
RELEASED	163
TXFR TO CFH	65
<b>TOTAL</b>	<b>824</b>

**TOTAL DISPOSITION** 1779

All low BKD carcasses were scatter planted throughout the river system for nutrient enhancement.

## Appendix H. 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	-----		1987		1988	16	1989	16	
1985	Spr 1987	-----		1988	111	1989	20	1990	131	
1986	Spr 1988 (a)	200,100	27	1989	157	1990	10	1991	194	0.097%
1987	Spr 1989 (b)	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 (c)	180,764								
1990	Fall 1991	358,400	8	1993	28	1994	1	1995	37	0.007%
	Spr 1992 (d)	150,800								
	Spr 1992 (e)	53,500								
		562,700								
1991	Fall 1992 (f)	500	1	1994	1	1995	0	1996	2	0.400%
	Fall 1992 (g)									
1992	Spr 1994 (h)	144,823	12	1995	141	1996	129	1997	268	0.102%
	Spr 1994 (i)	61,060								
	Spr 1994 (j)	55,745								
		261,628								
1993	Fall 1994	311,690	45	1996	587	1997	310	1998	942	0.156%
	Spr 1995	290,417								
		602,107								
1994	Spr 1996	232,731	2	1997	177	1998	53	1999	232	0.099%
1995	Spr 1997	3,549	1	1998	8	1999	88 (k)	2000	97	2.73%
1996	Spr 1998	244,847	119	1999	877	2000	56**	2001	1052	0.430%
1997	Fall 1998	330,555	300	2000	2210**	2001	202**	2002	2712**	0.410%
	Spr 1999	334,482								
		665,037								
1998	Spr 2000	293,522	78**	2001	1156**	2002	661**	2003	1895**	0.650%
1999	Spr 2001	212,648	36**	2002	788**	2003	215**	2004	1039**	0.489%
2000	Fall 2001	559,630	129**	2003	1364**	2004	42**	2005	1535**	0.169%
	Spr 2002	349,890								
2001	Fall 2002	526,733	48**	2004	131*	2005		2006		
	Spr 2003	350,665								
2002	Fall 2003	385,292	27**	2005		2006		2007		
	Spr 2004	376,797								
2003	Fall 2004	410,117								
	Spr 2005	403,917								

(a) Rapid River stock reared at Dworshak

(b) Clearwater stock reared at Kooskia and Dworshak

(c) Clearwater reared at Kooskia; acclimated in rearing pond

(d) Acclimated 21 days in rearing pond before release into Walton Cr, transferred from Dworshak

(e) Not acclimated, transferred to rearing pond and immediately released

(f) These smolts were released from the rearing pond to Walk Creek

(g) Released at headwaters of Crooked Fork Creek

(h) Acclimated 17 days, volitional release 5 days, released in Walton Cr.

(i) Non-acclimated, transferred to rearing pond and immediately released

(j) Released directly into Walton Cr.

(k) Most of these five-year-olds were large four-year-olds

\*\* Does not include fish caught in fishery or left in river.

APPENDIX I1. 2004 Chinook egg take and eye-up South Fork

SOUTH FORK (Red River / Crooked River).

Lot	Spawn Date	Total Females	BKD Females Culled		Other Females Culled		Females Kept	Green Eggs	Eyed Eggs	Percent Eye Up	Fecundity
			Table	Incubation	Table	Incubation	Production	Production	Production	Production	Production
1	08.06.04	25	1	1	0	1	22	86,415	77,411	89.6%	3,928
2	08.10.04	26	0	3	0	7	16	63,126	61,333	97.1%	3,945
3	08.13.04	55	2	5	0	9	39	160,735	157,400	97.9%	4,121
4	08.17.04	86	0	6	0	3	77	303,183	296,098	97.7%	3,937
5	08.20.04	127	3	19	1	18	86	320,260	313,170	97.8%	3,724
6	08.24.04	85	2	2	2	2	77	279,111	270,275	96.8%	3,625
7	08.27.04	32	0	2	0	4	26	96,794	95,063	98.2%	3,723
<b>Sub-Total</b>		436	<b>8</b>	<b>38</b>	<b>3</b>	<b>44</b>	<b>343</b>	<b>1,309,624</b>	<b>1,270,750</b>	<b>97.0%</b>	<b>3,818</b>
<b>Total</b>			<b>46</b>	<b>47</b>		<b>343</b>		<b>1,309,624</b>	<b>1,270,750</b>		

APPENDIX I2. 2004 Chinook egg take and eye-up Powell.

**POWELL**

Lot	Spawn Date	Total Females	BKD Females Culled		Other Females Culled		Females Kept	Green Eggs	Eyed Eggs	Percent Eye Up	Fecundity
			Table	Incubation	Table	Incubation	Production	Production	Production	Production	Production
1	08.09.04	126	1	3	3	16	103	431,856	399,875	92.6%	4,407
2	08.12.04	86	2	4	0	14	66	279,709	259,903	92.9%	4,238
3	08.16.04	172	5	5	2	11	149	593,610	532,327	89.7%	3,984
4	08.19.04	86	1	2	3	24	56	208,383	191,291	91.8%	3,721
5	08.23.04	22	0	1	0	0	21	91,874	85,287	92.8%	4,375
<b>Sub-Total</b>		492	<b>9</b>	<b>15</b>	<b>8</b>	<b>65</b>	<b>395</b>	<b>1,605,432</b>	<b>1,468,683</b>	<b>91.5%</b>	<b>4,064</b>
<b>Total</b>			<b>24</b>	<b>73</b>	<b>395</b>	<b>1,605,432</b>	<b>1,468,683</b>				

**Appendix J. Production cost for BY-04 Chinook and BY-05 North Fork Steelhead.**

REARING TO RELEASE:

	<b>CHINOOK BY-04</b>	<b>North Fork Steelhead BY-05</b>
Number Produced	1,914,079	853,846
Weight	117,566	182,796
% Mortality (From eyed eggs)	2.91%	12.9%
Conversion Rate	1.23	1.10

FOOD FED AND WEIGHT GAINED

	<b>Chinook (BY-04)</b>	<b>North Fork Steelhead (BY-05)</b>
Period Fed	November 2003-March 2005	April 2004-April 2005
Feed Used lbs.	180,620	180,125
Weight Gain	146,741	170,854
<b>Feed Cost</b>	<b><u>\$192,248.38</u></b>	<b><u>\$116,264.96</u></b>

Total Feed Cost: **\$308,513.34**

Average Feed Cost per pound  
Weight Gain Only:

Chinook: **\$1.31**  
Steelhead: **\$0.68**

Cost Per 1,000 fish using entire budget (-) C.O.

Chinook **\$242.13**  
Steelhead **\$567.90**

Total BY04 Chinook Rearing Cost **\$463,437**

Total BY05 Steelhead Rearing Cost **\$484,877**

BY04 Chinook & BY05 Steelhead  
Combined Rearing Cost

Total Budget (-) C.O.: **\$948,314**

Cost per pound for Rearing

Total Budget (-) C.O.

Chinook **\$3.94**  
Steelhead **\$2.65**

Appendix K1. Crooked River BY-04 Chinook summary of fish autopsy, Spring 2006 release.

**Summary of Fish Autopsy**

ACCESSION NO:	06-092	LOCATION:	CLW
SPECIES:	sc	AUTOPSY DATE:	3/26/2006
STRAIN:	SFCLW	AGE:	juv
UNIT:		SAMPLE SIZE:	20
RIVER FOR AUTOPSY:	Prelib.		
INVESTIGATOR(S):	Munson		
REMARKS:			

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
LENGTH	0.00	0.00	0.00
WEIGHT	0.00	0.00	0.00
KTL*	0.00	0.00	0.00
CTL*	0.00	0.00	0.00
HEMATOCRIT	50.00	3.21	0.06
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN	8.60	0.80	0.09

\*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	0	0	12
B1	0	F	0	S	0	1	0	1	0	R	20	1	0	S	0	B	9	1	6
B2	0	C	0	L	0	2	0	2	2	G	0	2	0	M	0	C	11	2	2
E1	0	M	0	S&L	0			3	7	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0	Mean=0.00		4	11	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0		Mean=.5
H2	0			O	0			Mean=3.45								OT	0		
M1	0																		
OT	0																		

**SUMMARY OF NORMALS**

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

**GENERAL REMARKS:**

FINS:

GONADS:

SKIN:

OTHER:

Appendix K2. Powell BY-04 Chinook summary of fish autopsy, Fall 2005 release.

**Summary of Fish Autopsy**

ACCESSION NO:	05-368	LOCATION:	Powell
SPECIES:	sc	AUTOPSY DATE:	9/10/2005
STRAIN:	Powell	AGE:	juv
UNIT:	pond	SAMPLE SIZE:	20
RIVER FOR AUTOPSY:	Prelib.		
INVESTIGATOR(S):	Munson		
REMARKS:			

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
LENGTH	0.00	0.00	0.00
WEIGHT	0.00	0.00	0.00
KTL*	0.00	0.00	0.00
CTL*	0.00	0.00	0.00
HEMATOCRIT	43.91	3.65	0.05
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN	6.77	1.11	0.15

\*EXPRESSED AT KTL TIMES 10 TO THE FIFTH POWER

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

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		FAT		MESEN. SPLEEN		GUT		HIND KIDNEY		LIVER		BILE	
N	20	N	20	N	20	0	20	0	0	B	20	0	20	N	20	A	20	0	9
B1	0	F	0	S	0	1	0	1	2	R	0	1	0	S	0	B	0	1	7
B2	0	C	0	L	0	2	0	2	3	G	0	2	0	M	0	C	0	2	4
E1	0	M	0	S&L	0			3	7	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0	Mean=0.00		4	8	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0	Mean=.75	
H2	0			O	0			Mean=3.05								OT	0		
M1	0																		
OT	0																		

**SUMMARY OF NORMALS**

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

**GENERAL REMARKS:**

FINS:

GONADS:

SKIN:

OTHER:

Appendix K3. Powell BY-04 Chinook summary of fish autopsy, Spring 2006 release.

**Summary of Fish Autopsy**

ACCESSION NO:	06-091	LOCATION:	POW
SPECIES:	SC	AUTOPSY DATE:	3/26/2006
STRAIN:	POW	AGE:	juv
UNIT:		SAMPLE SIZE:	20
RIVER FOR AUTOPSY:	Prelib.		
INVESTIGATOR(S):	Munson		
REMARKS:			

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
LENGTH	0.00	0.00	0.00
WEIGHT	0.00	0.00	0.00
KTL*	0.00	0.00	0.00
CTL*	0.00	0.00	0.00
HEMATOCRIT	50.22	2.44	0.04
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN	8.11	0.66	0.09

\*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	2	0	20	N	20	A	0	0	10
B1	0	F	0	S	0	1	0	1	0	R	18	1	0	S	0	B	18	1	6
B2	0	C	0	L	0	2	0	2	5	G	0	2	0	M	0	C	2	2	4
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	11	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0		Mean=.7
H2	0			O	0			Mean=3.3								OT	0		
M1	0																		
OT	0																		

**SUMMARY OF NORMALS**

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

**GENERAL REMARKS:**

FINS:

GONADS:

SKIN:

OTHER:

Appendix L. Clearwater Fish Hatchery BY-04 spring Chinook fish marking and distribution summary.

RELEASE BY04 CH parr.									
<u>Date</u>	<u>Site</u>	<u>Number Released</u>	<u>Stock</u>	<u>Length</u>	<u>FPP</u>	<u>Pounds</u>	<u>Marks</u>	<u>Raceway</u>	<u>Comments</u>
6/21,23,27,29/05	Selway R	301,528 <b>301,528</b>	Powell	4.30 <b>4.30</b>	32.8 <b>32.8</b>	9,193 <b>9,193</b>	Oxytetracycline; No fin clip	5W-6W	NPT plant
RELEASE BY04 CH pre-smolts									
9/16-9-9/18/2005	Walton Cr	347,299 <b>347,299</b>	Powell	5.33 <b>5.33</b>	17.38 <b>17.38</b>	19,982 <b>19,982</b>	100% ad clip; 694 PIT	5E-6E	Powell Pond
RELEASE BY04 CH full-term smolts									
4/3 + 4/5/2006	Upper Crooked R	140,989	South Fork	5.40	15.85	8,898	140,689 ad; 300 ad/pit	9 A&B	Released nightly
3/27-3/30/2006	Lower Crooked R	608,472	South Fork	5.40	17.00	35,783	565,802 ad; 42,670 ad/cwt, (15,279 ad/pit)	7,8,10,11+v56,57,59,60	Direct release
3/22-3/30/2006	Walton Cr	423,633	Powell	5.40	16.00	26,418	339,556 ad; 64,077 ad/cwt, (15,272 ad/pit)	1-3A&B	Volitional release
3/30-4/3/2006	Red R	423,603	South Fork	5.40	16.46	25,733	380,672 ad; 42,931 ad/cwt, (15,275 ad/pit)	4-6 A&B	Volitional release
4/3-4/4/2006	Lower Selway R	317,382	Powell	5.40	15.31	20,734	214,562 ad/cwt; 102,820 cwt	2-3 E&W	Direct release; hauled by NPT.
	<b>TOTAL/AVERAGE</b>	<b>1,914,079</b>		<b>5.40</b>	<b>16.28</b>	<b>117,566</b>			

**Appendix M. Brood Year 2005 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 OF EYED EGGS</b>	<b>TEMPERATURE UNITS</b>
5	3/8/2005	3/23/2005	576,740	330
6	3/15/2005	3/30/2005	423,293	330
<b>TOTAL</b>			<b>1,000,033</b>	

<b>STOCK</b>	<b>NUMBER OF EYED EGGS KEPT</b>	<b>RELEASED SMOLTS</b>	<b>PERCENT SURVIVAL</b>
Dworshak	979,864	853,846	87.1%

Appendix N. Steelhead BY-05 summary of autopsy report, Spring 2006 release.

**Summary of Fish Autopsy**

ACCESSION NO: 06-093 LOCATION: CLW  
 SPECIES: STB AUTOPSY DATE: 3/26/2006  
 STRAIN: NF CLW AGE: juv  
 UNIT: SAMPLE SIZE: 20  
 RIVER FOR AUTOPSY: Prelib.  
 INVESTIGATOR(S): Munson  
 REMARKS:

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
LENGTH	0.00	0.00	0.00
WEIGHT	0.00	0.00	0.00
KTL*	0.00	0.00	0.00
CTL*	0.00	0.00	0.00
HEMATOCRIT	42.02	1.80	0.05
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN	7.40	0.71	0.11

\*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	2	0	20	N	20	A	20	0	11
B1	0	F	0	S	0	1	0	1	0	R	18	1	0	S	0	B	0	1	8
B2	0	C	0	L	0	2	0	2	0	G	0	2	0	M	0	C	0	2	1
E1	0	M	0	S&L	0			3	5	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0	Mean=0.00		4	15	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0		Mean=0.5
H2	0			O	0			Mean=3.75								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	20
SEX		M: 0				F: 0													U: 0

**GENERAL REMARKS:**

FINS: GONADS:  
 SKIN: OTHER: Nice looking fish.

Appendix O. Brood Year 2005 North Fork steelhead marking and distribution.

RELEASE BY05 SH full-term smolts									
<u>Date</u>	<u>Site</u>	<u>Number</u>		<u>Length</u>	<u>FPP</u>	<u>Pounds</u>	<u>Marks</u>	<u>Raceway</u>	<u>Comments</u>
		<u>Released</u>	<u>Stock</u>						
4/14-4/24/2006	Red River	99,472	Dworshak B	8.30	4.604.50	21,699	Ad clip (2293 PIT)	6+7E	Volitional
4/24/2006	Red River	47,029	Dworshak B	8.40	5.50	10,455	Orange/VIE,BlankCWT(2485PIT)	5W	Volitional
4/14-4/24/2006	Red River	47,360	Dworshak B	7.80	5.27	8,595	None	4E	Volitional
4/14-4/24/2006	Red River	45,293	Dworshak B	7.93	4.66	8,594	Blue/VIE,BlankCWT(2476PIT)	5E	Volitional
4/11-4/20/2006	Crooked R (Upper)	76,604	Dworshak B	8.20	4.53	16,441	Unmark 56,898;UnmarkCWT19,706(300PIT)	8E-9E	Volitional
4/13-4/17/2006	Crooked R (Lower)	148,652	Dworshak B	8.40	4.52	32,578	Ad clip 83,239;Ad/CWT/LV65,413(299Ad/PIT)	10-12E	Direct
4/17-4/19/2006	Red House Hole	289,508	Dworshak B	8.40	4.70	64,009	Ad224,532;Ad/CWT/LV64,976(296 Ad/PIT)	7-12W	Direct
4/25/2006	Meadow Cr	24,954	Dworshak B	8.20	4.70	5,309	Orange/VIE,BlankCWT(1297PIT)	6W	Direct
4/25/2006	Mill Cr	24,954	Dworshak B	8.20	4.70	5,309	Orange/VIE,BlankCWT(1291 PIT)	6W	Direct
4/26/2006	Lolo Cr	50,020	Dworshak B	8.00	5.10	9,807	No Marks (300 PIT)	4W	Direct by NPTH
	<b>TOTAL/AVERAGE</b>	<b>853,846</b>		<b>8.18</b>	<b>4.67</b>	<b>182,796</b>			

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