CLEARWATER FISH HATCHERY

ANNUAL REPORT

2006 CHINOOK AND 2007 STEELHEAD

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LOWER SNAKE RIVER
COMPENSATION PLAN
Hatchery Program

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2006 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 parr, pre-smolts, and smolts.

Powell

Two adult traps were operated in the Lochsa basin. The Crooked Fork trap was installed on June 20, 2006 and the trap was taken out of operation on September 15, 2006.

The Walton Creek weir was installed on June 6, 2006 and taken out of operation on September 11, 2006. The run total for both traps was 553 fish of which there were 79 jacks and 474 adults. A total of 38 fish were released and 515 were held for production. A total of 242 females were spawned 2 of which was culled at spawning, 4 were culled due to high BKD levels, and 236 were kept for production producing 824,580 green eggs.

A total of 384,520 pre-smolts were released from Powell Pond September 24 through September 27, 2007.

A total of 223,714 full-term smolts were released from Powell Pond on March 19 through March 28, 2008.

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 April 4, 2006 and taken out of operation September 13, 2006. The run total of 719 fish was combined with the returning adults from Crooked River. Of the total, 42 Chinook were released.

The Crooked River weir was installed on April 4, 2006 and taken out of operation September 8, 2006. The run total of 452 fish was combined with returning adults from Red River. Of the total, 9 Chinook were released.

The South Fork had a run total of 1,171 fish. A total of 51 fish were released. All remaining fish were held for spawning. A total of 607 females were spawned 5 of which were culled at spawning, 35 were culled due to high BKD levels, and 567 were kept for production producing 1,983,316 green eggs.

A total of 122,215 pre-smolts were released from the Red River Pond September 17 through September 20, 2007.

A total of 424,725 full-term smolts were released from the Red River pond on March 26 through March 28, 2008.

A total of 566,764 full-term smolts were released from Crooked River raceways March 26, 2008; and 141,732 full-term smolts were released below the Crooked River weir March 26 through March 27, 2008.

A total of 304,026 parr were released on the Upper Selway River on June 25, June 28, and July 2, 2007 by the Nez Perce Tribe.

A total of 309,380 full-term smolts were released on the lower Selway River on April 3 through April 4, 2008 by the Nez Perce Tribe.

A total of 126,855 pre-smolts were transferred to the Nez Perce Tribal Hatchery on September 11, 2007.

Eggs Received from Other Facilities

A total of 349,875 eyed-eggs were transferred from Rapid River Fish Hatchery on September 25, 2006 to assist Clearwater Fish Hatchery in egg needs.

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 Marines 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 size and complexity of the overall facility has significantly increased from the beginning with three remote satellites to four with an initial construction value of $8.5 million. There has also been the land acquisition and construction of the main hatchery valued at $43.153 million and the completion of the hydroelectric plant on the hatchery water intake valued at $10 million. Several completion contracts by the Army Corps of Engineers and construction by our staff have added $4.5 million of additional improvements to the facility bringing the estimated value to $66.153 million.

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 produce approximately 2400 KW of electricity.

A 198,940 cubic foot (27,600 sq ft) off line sedimentation pond is used to settle out the solids produced by the hatchery. A 814,650 cubic foot (103,500 sq ft) full flow sedimentation pond settles waste from the total flow of hatchery operation and the out flow of the off line sedimentation pond.

In 2000, a 2,040 square foot storage 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 covered storage area for equipment and hatchery supplies.

In 2004, a 2,100 square foot truck shed was constructed. This building is used for winter storage of hatchery trucks and other miscellaneous equipment.

In 2006, a 420 square foot ground maintenance shed was constructed. This building is used for chemical storage and grounds maintenance equipment storage.

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.

In 2008, a 10' x 12' storage shed was constructed near the trap at the lower facility.

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 4.5-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 324,000 cubic feet. The maximum flow available to the steelhead raceways is 40 cfs. 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 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. 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 ten feet to sixty 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 46.8° to 71°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 45.2° to 55°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 43.2° to 72°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 $CaCO_3$) 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 (Appendix C2, C3 and C4).

STAFFING

Clearwater Fish Hatchery has eight permanent staff employees; this includes one Hatchery Manager 2, two Assistant Hatchery Managers, one Utility Craftsman, three Fish Culturists, and an Office Specialist II. The rest of the crew consists of temporary employees with positions of Fishery Technicians, Maintenance Craftsman, 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 all Ad-clipped fish 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 April 4, 2006 and September 8, 2006. A total of 452 fish were trapped.

The Red River trap was installed on April 4, 2006 and taken out of operation on September 13, 2006. A total of 719 fish were trapped.

Age class breakdown of this run included: 35 I-ocean males; 15 I-ocean females (<64 cm); 434 II-ocean males, 649 II-ocean females, 10 II-ocean unknowns (64-82 cm); 19 III-ocean males, 6 III-ocean females, and 3 III-ocean unknowns (83+ cm) (D1, D2, E1, E2, F1 and F2).

Powell

During 2006, 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 June 6, 2006 and taken out of operation September 11, 2006. The Crooked Fork trap was installed June 20, 2006 and taken out of operation September 15, 2006. A total of 553 fish (79 jacks and 474 adults) were trapped at Powell and Crooked Fork.

Trapping protocols for the Powell trap included ponding for broodstock all ad-clipped fish for CFH 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 all ad-clipped fish for CFH to Powell for production. All naturals/ wild fish were released upstream.

Age class breakdown of this run included: 77 I-ocean males, 2 I-ocean females (<64 cm); 181 II-ocean males, 267 II-ocean females, 8 II-ocean unknown (64 – 82 cm); 11 III-ocean males, and 7 III-ocean females (83+ cm) (Appendices G1, G2, G3, and H).

ADULT HOLDING

All Powell production fish were held at Powell for spawning.

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 10 mg/kg at trapping to inhibit BKD. Fish were treated with a formalin drip for one hour every day to prevent fungal growth. Fish held at Clearwater were treated at 150 ppm, and fish at Powell were treated at 120 ppm.

SPAWNING AND EGG TRANSPORT

Powell utilized a 1:1 spawning ratio for males and females in 2006. This was done in accordance to the genetic protocol for a brood year with more than 100 females.

South Fork stock utilized a 1:1 spawning ratio for males and females in 2006. This was done in accordance to the genetic protocol for a brood year with more than 100 females.

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.

A total of 479 broodstock fish (229 South Fork, 250 Powell) were sampled for genetics. All samples were shipped to the Eagle Genetics Lab for analysis.

South Fork of the Clearwater

Chinook were sorted twice per week for ripeness. The first fish was spawned, August 8, 2006 and the last September 15, 2006. A total of 607 females were spawned. Pre-spawn mortality for the South Fork stock was 50 fish (4.5% pre-spawning mortality). All 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 7, 2006 and the last August 31, 2006. A total of 242 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 27 fish (5.25% pre-spawn mortality).

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 an optical density (O.D.) of 0.25 or higher were culled. The BKD tests resulted in culling of 3 females at Powell and 33 females from the South Fork. Using an average fecundity of 3,450 eggs per fish, these culled females accounted for 122,400 green eggs.

A total of 2,807,896 green eggs were incubated from BY06 spring Chinook salmon. Overall development from green eggs to eyed-eggs was 2,689,849 for a total eye-up percentage of 95.80%. The South Fork stock achieved 97.26% eye-up and Powell 92.28% eye-up (Appendix I1).

Beginning on the third or fourth day of incubation, all egg lots were treated with formalin to reduce fungal development. Treatments were administered every other day

at a 1:600 concentration (1667-ppm) for 15 minutes and continued until each egg lot reached 800 temperature units (T.U.'s).

Eye-up occurred at approximately 500 T.U.'s 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 T.U.'s. Swim-up fry were transferred to the early rearing vats at approximately 1,750 T.U.'s.

Eggs Transferred from other facilities

In 2006, a total of 349,875 Rapid River stock eyed eggs were transferred to Clearwater Hatchery.

EARLY REARING

Swim up fry were ponded in hatchery vats at approximately 38,000 to 54,000 fish per vat. A total of 2,867,429 fry were ponded after additional culling to a full hatchery and they were segregated by stock and release strategies in 60 vats over an eight month period. A survival rate of 97.54% from eyed egg to ponding was achieved.

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 30 days to help prevent drop outs and help initiate feeding. After one month flows were turned up to 92 gpm and by month four, turned up 120 gpm which remained until the fish were moved outside. Flow indices were held below 1.50 while the density index never exceeded 0.3 during the entire early rearing period. Water temperatures during early rearing were between 40.6 – 56.0°F (Appendices A2).

Starting with this Brood year, the feed supplier that produced the starter feeds the hatchery personnel had been using was discontinued and a replacement needed to be found. A feed study was initiated, and several feeds were tested as a replacement.

The study compared EWOS micro and Skrettings Bio-Vita starter feeds. Although, the study was designed to carry into final rearing, a decision was made to discontinue the study after 42 days because the EWOS fed fish had nearly double the mortality (2.0% vs 0.95%), grew significantly slower and had a worse conversion (0.76 vs 0.55) than the Bio-Vita. Neither feed produced the results of the historical Bio-Oregon frozen feed.

All Chinook except the Selway parr were moved outside during the marking process. Marking took place at three different times which included April 30 thru May 3, 2007 for the pre-smolt program at Powell and Red River, and the surplus Chinook transferred to the Nez Perce Tribal Hatchery. A total of 635,691 fish were marked at this time.

The Selway parr were marked in early rearing with a four-day oxytetracycline feeding between April 2 and April 5, 2007. A total of 305,506 fish were moved outside on May 3, 2007

The second round of Chinook marking took place between May 30 and June 7, 2007. At this time, a total of 1,553,524 fish were moved outside for the Powell, Red River and Crooked River full term smolt programs.

The third round of Chinook marking took place on July 9-10, 2007. At this time, the remainder of the Chinook in early rearing, were moved outside. A total 310,052 fish were marked for the Selway Full term smolt program.

The inventory number was adjusted to 2,804,773 Chinook after the marking program as a result of the machine count. The resulting machine count revealed a discrepancy of 37,876 more fish.

FINAL REARING

At marking, Powell stock was used to fill the Powell full-term smolts (FTS) program; Powell and South Fork stocks were used to fill the Powell pre-smolt (PS) program; South Fork stock was used to fill the Red River and Crooked River FTS programs. Powell and South Fork stocks were used to fill the Red River PS program as well as the Chinook transferred to the Nez Perce Tribal Hatchery and South Fork and Rapid River stocks were used to fill the Selway parr program.

All parr, pre-smolts and all but three raceways (n=213,016) of full-term smolts from the BY06 Chinook were fed a 28-day erythromycin prophylactic treatment after marking. Bio-Oregon Biodiet grower feed was used throughout the final rearing period. The full term smolts were fed full rations through marking and were fed four day on feed and three days off feed the remainder of the time. Total feed used in early and final rearing was 137,862 pounds yielding 132,930 pounds of fish reared for a final conversion of 1.04 (Appendix J). Total cost was $155,451.

The goal was to keep water temperatures below 55° F to reduce growth rates; temperatures varied from 37° to 51° F during the final rearing period with an estimated 2.0 cfs of water supplied to each raceway.

A total of 304,026 parr were released in June and July of 2007 at one location.

A total of 506,735 pre-smolts were released in September 2007 at two locations.

A total of 126,855 pre-smolt sized fish were transferred to the Nez Perce Tribal Hatchery in September 2007.

A total of 1,666,315 smolts were released in March and April of 2008 at five different locations.

FISH HEALTH

The BY06 Chinook reared at CFH were from low BKD parentage with Optical Densities (OD) below 0.25 on the South Fork and the Lochsa. All Chinook eggs at or above this OD were culled.

All but three raceways (n=213,016) of Chinook received one 28-day Erythromycin prophylactic feed treatment following marking. The three raceways that were not fed a medicated feed treatment were part of a statewide study to determine what benefits this treatment might have. Samples were collected periodically by the State Pathologist.

FISH HEALTH SECTION CLEARWATER HATCHERY

Diseases Encountered and Treatments.

Brood Powell Spring Chinook Salmon (collected 2006): These adult fish received an intra-peritoneal injection of erythromycin at a dose rate of 20 mg/kg to limit pre-spawning mortality. Pre-spawning mortality was limited to 5% this year. Clearwater staff implemented a daily treatment of formalin at 167 mg/l for one hour that allowed fish with severe head burn to not only survive but to heal the wound.

IHNV was detected in 20 of 60 (33.3%) females examined (both ovarian fluids and tissues). These detections were reported to the APHIS veterinarian-in-charge. Two hundred forty-two females were spawned at Powell; three (1.24%) females had high ELISA optical densities. The eggs from females with optical densities above 0.249) were culled.

Juvenile Powell Spring Chinook Salmon Broodyear 2006: Disease problems were not encountered in the BY'06 Powell spring Chinook salmon. These fish received one erythromycin medicated feed treatments for pre-emptive control of *Renibacterium.* The target dose rate was 100 mg/kg/day for 28 days. Disease agents were not detected during inspection or preliberation inspection sampling.

Brood South Fork of the Clearwater Spring Chinook Salmon (collected 2006): These adult fish received an intra-peritoneal injection of erythromycin at a dose rate of 20 mg/kg to limit pre-spawning mortality. Pre-spawning mortality was 3.5% this year.

IHNV was not detected in 24 of 40 (60%) females examined. These detections were reported to the APHIS veterinarian-in-charge. Three percent of the spawned females (607) from the South Fork of the Clearwater spring Chinook stock of salmon had high ELISA optical densities. The eggs from these females were culled. *Myxobolus cerebralis* was not detected in a 20 fish sample.

Juvenile South Fork of the Clearwater Spring Chinook Salmon Broodyear 2006: Disease problems were not encountered in the BY'06 South Fork of the Clearwater spring Chinook salmon. These fish received one erythromycin medicated feed treatments for pre-emptive control of *Renibacterium.* The target dose rate was 100 mg/kg/day for 28 days. Disease agents were not detected during inspection or preliberation inspection sampling.

Juvenile Selway Spring Chinook Salmon Broodyear 2006: Disease problems were not encountered in the BY'06 fish destined for the Selway River. These fish received one erythromycin medicated feed treatments for metaphylactic control of *Renibacterium.* The target dose rate was 100 mg/kg/day for 28 days. Disease agents were not detected during inspection or preliberation inspection sampling. An additional application of oxytetracycline feed was applied to this group of fish for skeletal marking. The target dose for this application was 10 g/100 lbs biomass for 4 days.

Organosomatic Index. See attachments.

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

Other Assessments. An investigation has been initiated into limiting prophylactic feeding of erythromycin. Results of this investigation suggest that prophylactic applications of erythromycin medicated feed could be stopped without any deleterious effect. The prior investigations conducted at this facility have provided valuable insight into the reduction of medicated feed to Chinook salmon.

FISH MARKING

A total of 2,499,267 Chinook were externally marked. Marks included 1,886,881 Adipose (Ad) clipped, 426,794 ad-clipped/coded wire tagged (ad/cwt), and 185,592 no clip/coded wire tagged (no/cwt) fish. In addition, 304,026 Chinook were fed oxytetracycline medicated feed in early April for skeletal marking (Appendix L).

Chinook were marked from early rearing vats (inside) into final rearing raceways (outside). Marking started on April 30, 2007 and was completed on July 10, 2007. Fish averaged 100 fpp in size. A total of 68,777 were Passive Integrated Transponder (PIT) tagged.

FISH DISTRIBUTION

Releases from CFH occurred in three life stages:

	CFH
Parr	304,026
Pre-smolt	506,735
Transfers	126,855
Full term smolt	1,666,315
Total	**2,603,931**

Upper Selway River Parr Release

A total of 304,026 parr (56.56 fpp) were released by Nez Perce Tribal personnel in the McGruder Corridor on June 25-28, and July 2, 2007. All the parr were skeletal marked with oxytetracycline. No PIT Tags were put in this group (Appendix L).

Nez Perce Tribal Fish Transfer

A total of 126,855 pre-smolt sized fish (43.6 fpp) were transferred to the Nez Perce Tribal Hatchery on September 11, 2007. A total of 81,158 fish were CWT only marked and 45,697 were ad-clipped/CWT marked (Appendix L).

Red River Pre-Smolt Release

A total of 122,215 pre-smolts (23.0 fpp) were released from the Red River pond. Pre-smolts were transported on September 17-18, 2007 and a volitional release started on September 17, 2007 and continued until the remaining fish were forced out on September 20, 2007. All pre-smolts were ad-clipped. No PIT tags were put in this group (Appendix L).

Powell Pond Pre-Smolt Release

A total of 384,520 pre-smolts (19.25 fpp) were released into Walton Creek. Parr were transported to the Powell Pond between June 21-26, 2007 for final rearing. A volitional release was started on September 24, 2007 and continued until the remaining fish were forced out of the pond on September 27, 2007. All pre-smolts were ad-clipped and 998 carried PIT tags (Appendix L).

Lower Crooked River Full Term Smolts

A total of 566,764 smolts (17.00 fpp) were released below the Crooked River weir. Smolts were transported to lower Crooked River on March 26, 2008 and released daily. All smolts were ad-clipped, 43,310 were ad clipped and coded wire tagged and 11,976 fish carried PIT tags (Appendix L).

Upper Crooked River Full Term Smolts

A total of 141,732 smolts (17.00 fpp) were released at the Upper Crooked River facility. Smolts were transported to Upper Crooked River on March 26 and March 27, 2008 and released daily. All smolts were ad-clipped and 955 fish carried PIT tags (Appendix L).

Powell Full Term Smolts

A total of 415,867 chinook were transferred to the Powell rearing pond between March 19 thru March 24, 2008. Included in this release group was a 69K pit tag group for a migration study funded by the US Army Corp of Engineers. A volitional release was started on March 19, 2008 and continued until the intake froze on March 28, 2008. A total of 192,153 fish died during this event. Pit tags (47,206) from all mortalities were recovered during a 4 day clean up operation. One day included 51 people from Regions 2 and 3.

A total of 223,714 smolts (16.60 fpp) were released into Walton Creek. A total of 166,606 were Ad clipped only, 23,207 were Ad clipped and coded wire tagged, 18,941 were Ad clipped /CWt/PIT tagged, and 14,960 were Ad clipped/PIT tagged. (Appendix L).

Red River Full Term Smolts

A total of 424,725 smolts (17.00 fpp) were released into Red River. Smolts were transported to Red River on March 26 through March 28, 2008. On March 28, 2008, the pond was drained and all remaining smolts were released. All smolts were ad-clipped, 43,827 were ad clipped and coded wire tagged and 11,974 fish carried PIT tags (Appendix L).

Selway Full Term Smolts

A total of 309,380 smolts (16.10 fpp) were direct released into the lower Selway River by the Nez Perce Tribe on April 3 through April 4, 2008. A total of 196,592 were ad clipped and coded wire tagged, and 103,815 were coded wire tagged only Appendix L).

BROOD YEAR 2007 STEELHEAD REPORT

ABSTRACT

Clearwater Hatchery received 1,200,280 eyed brood year 2007 North Fork B-run steelhead eggs from Dworshak National Fish Hatchery (DNFH). A total of 819,264 smolts from the North Fork stock were released from April 7,2008 through April 21, 2008; 247,619 Red House Hole; 246,510 at Red River; 216,669 at Crooked River; 45,608 at Lolo Creek; 31,429 at Meadow Creek; and 31,429 at Mill Creek. The average size of fish was 4.57 fpp for a total of 178,997 pounds, and the average length was 215 mm.

A total of 141,064 pounds of feed was fed with a cost of $153,634 to produce 178,997 pounds of fish at Clearwater Hatchery. The conversion rate was 0.79. Survival from eyed egg, after culling, to release was 86.2%.

Clearwater Hatchery received 1,624,596 green brood year 2007 North Fork B-run steelhead eggs from Dworshak National Fish Hatchery for the southern Idaho steelhead hatcheries. After culling and picking, 1,080,788 eyed eggs were shipped to Magic Valley Hatchery and Hagerman National Fish Hatchery.

SYNOPTIC HISTORY

Clearwater Hatchery

Brood Source

Dworshak National Fish Hatchery has been the source for North Fork stock B-run steelhead eggs since April, 1992.

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 6, 2007 and March 13, 2007 (Appendix M). The eggs from DNFH lots four and five 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 1,270,371 unpicked eyed eggs were received and after picking netted 1,200,280 eggs for an eye-up of 94.48% (Appendix M). This number was culled down to 950,280 to reduce surplus. During incubation, steelhead eggs were on primary water only.

A total of 1,624,596 green eggs yielding 1,535,479 eyed-eggs were collected from Dworshak National Fish Hatchery for the Magic Valley and Hagerman National Fish Hatcheries. These eggs were incubated in cold water at CFH until the eyed stage. A total of 863,651 eyed eggs were shipped to Magic Valley, 217,137 were shipped to Hagerman National, and 20,000 were given to the Potlatch pulp and paper workers to be used in egg boxes for school educational purposes. Total eye-up on these eggs was 94.51%.

EARLY REARING

A total of 903,713 fish were ponded in early rearing. Survival from eyed egg to ponding was 95.1%. At swim-up, unfed fry from Dworshak stock B-run steelhead were moved to vats. This was the first year of using dry starter feed on Steelhead. All fry were divided as evenly as possible into 20 vats (45,000 per vat). The initial DI was .19 and FI was .37. Fish were held in the hatchery vats until July when they were marked and moved to 17 steelhead raceways (4-12 east and 5-12 west). Average length of the fish at the end of early rearing was 2.84 inches. The fish averaged 125 fpp.

The DI of the Dworshak steelhead ranged from 0.25 to 0.33, and the FI ranged from .47 to 0.64.

Bio Oregon's Biodiet Grower was used for the first 4 weeks of feeding. Bio Oregon's Biovita Fry used for the remainder of early rearing.

Water temperatures for the early rearing period ranged from 47° to 60° F (Appendix A1).

FINAL REARING

The juvenile Dworshak stock B-run steelhead were moved to outside steelhead raceways 4-12 east and 5-12 west. During July, the move was done in conjunction with fin clipping and CWT tagging to avoid double stressing the fish. Fin clipping was done in 16-hour shifts per day. Baffles were removed from vats; fish were then moved to the clipping trailers using the transfer tanks. The Red River, Crooked River, Mill Creek, and Meadow Creek (SF) supplementation fish were not clipped, but were inventoried during the move outside.

The DI of the Dworshak steelhead ranged from .15 to .28, and the FI ranged from .35 to 1.7. 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 56°F as possible (Appendix A2). Water temperatures in early rearing ranged from 42° to 58°F. Water flows were measured at 2.0 cfs per raceway .

Fish were fed Bio Oregon's BioVita dry feed through release. A total of 141,064 pounds of feed was used throughout the entire rearing period to produce 178,997 pounds of fish at a cost of $153,634. The overall feed conversion rate from fry to smolt was 0.78 (Appendix J).

FISH HEALTH

PATHOLOGIST REPORT

Diseases Encountered and Treatments.

Brood North Fork of the Clearwater Steelhead B Group (collected 2007): IHNV was not detected in brood females sampled at Dworshak NFH whose eggs were destined to be reared at Clearwater Hatchery.

Juvenile North Fork of the Clearwater Steelhead B Group Broodyear 2007: Pathogens were not detected during routine inspections or during preliberation inspection prior to release.

Other Assessments. Feeds that have been used in steelhead production have allowed Clearwater staff to produce these fish and get them to an appropriate size by release. The challenge in coming years, with shortages of fish protein and fish oils, will be to produce as high a quality fish.

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	177,087	70,532	5679
Red River	Smolt	48,965	33,965	2785
Crooked River	Smolt	76,461	68,096	3285
TOTAL		302,513	172,593	11,749

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	Pit tags
Red River	Smolt	163,580	----------	2890
Crooked River	Smolt	44,918	27,194	2596
Meadow Creek	Smolt	31,429	----------	897
Mill Creek	Smolt	31,429	----------	899
Lolo Creek	Smolt	45,608	----------	995
TOTAL		316,964	27,194	8,277

FISH DISTRIBUTION

On April 15 through April 16, 2008 a total of 247,619 Dworshak B-run steelhead, which averaged 4.48 fpp, 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 the Clearwater River. There were 246,510 fish, which averaged 4.53 fpp, released at Red River between April 11 and April 14, 2008. There were 216,669 fish, which averaged 4.7 fpp, released at Crooked River between April 9 and April 11, 2008. There were 45,608 fish, which averaged 4.3 fpp, released at Lolo Creek which were partially transported by NPTH on April 21, 2008. A total of 31,429 fish, which averaged 5.2 fpp, were released at Meadow Creek on April 18, 2008. A total of 31,429 fish, which averaged 5.2 fpp, were released on April 18, 2008 at Mill Creek. There was very little crowding and hauling mortality from the fish transportation to the release sites (Appendix O).

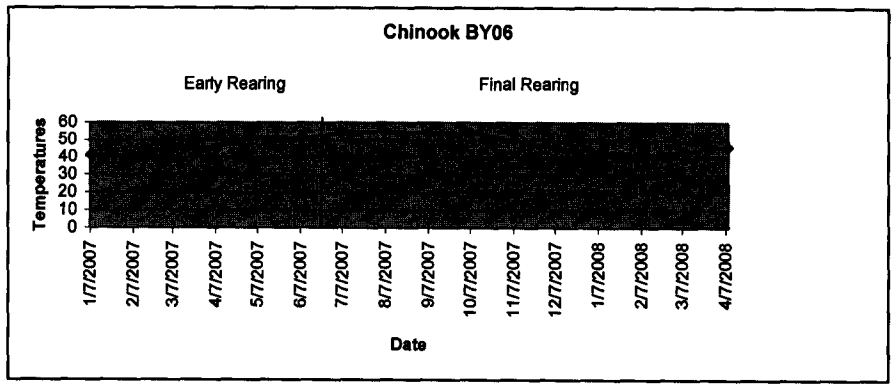
ACKNOWLEDGEMENTS

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, Randy Hutzenbiler, and Cassie Sundquist - Assistant Hatchery Managers; Chris Shockman, Tim Klucken, Chad Henson, and Jordan Rider - Fish Culturists; Ernie Yost - Utility Craftsman; Walter Boore and Millie Brookshier - Office Specialist II; Holly Stanton Smith - Fish Technician; Theresa Elliott, Jenny Hole, Steve Moore, Steve Duty, Jeff Jenni, Matt Wilson, Morgan Fife, Brandon Binder, Jessica Young, Jennifer Vafiades, Jesse Willmott, Josh Scott, Jerek Richardson, Nathan Kaufmann, Jason Sperber, Josh Danielson, Brandon Filloon, Steven Lee, Nichole Madrid, Kevin Miller, Phil Willumsen, Kelsi Leach, Rebekah Waltman, Chip Roth, and Steven Sengezer - Bio-aides; Kim West and Tim Lee - Grounds Maintenance Workers; Fred Hough, Charles Ball, Chris Clark, and Joe Calaprice - Maintenance Craftsman: Pam Rowsell – Custodian: Ted Brown, Keith Hedrick, and Orville Foster - Drivers.

Appendix A

Brood Year 2006 Chinook Water Temps

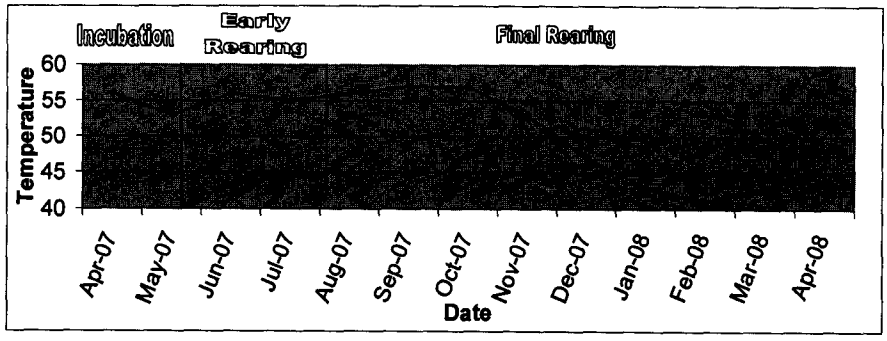
Month	Water Temps
Jan-07	41
Feb-07	40
Mar-07	46
Apr-07	45
May-07	52
Jun-07	51
Jul-07	54
Aug-07	55
Sep-07	54
Oct-07	54
Nov-07	50
Dec-07	45
Jan-08	43
Feb-08	41
Mar-08	43
Apr-08	46

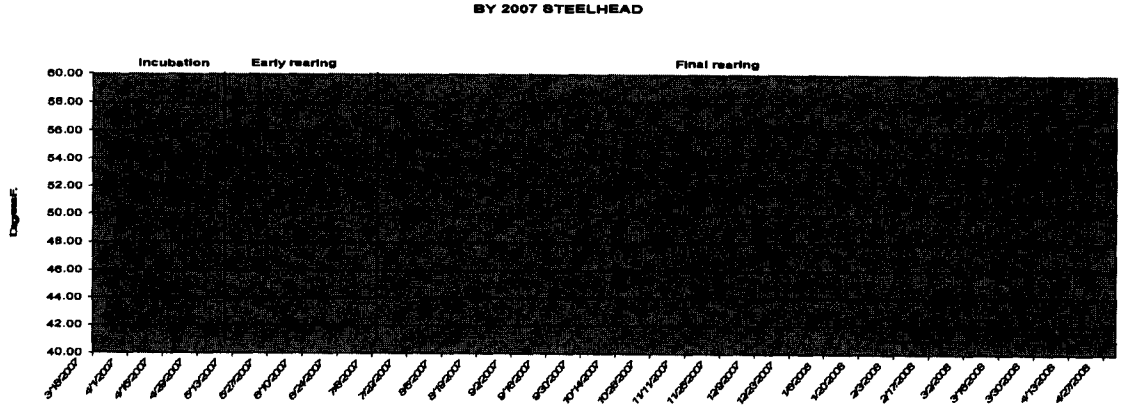


Appendix A

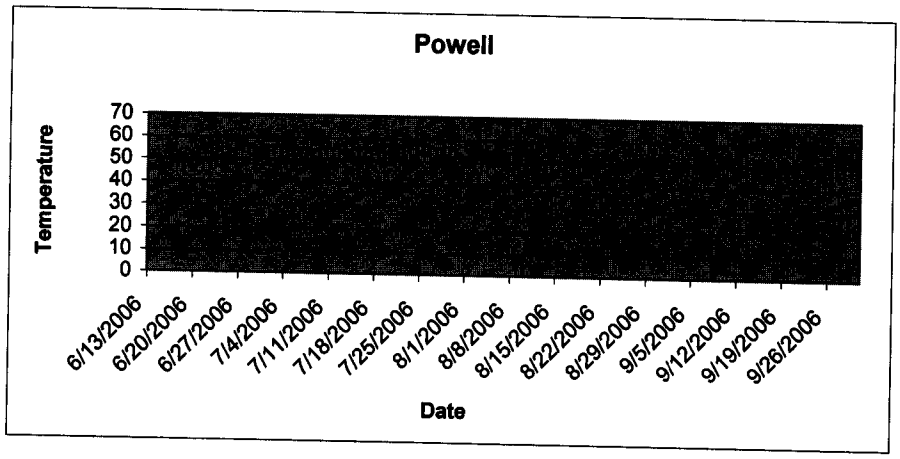
BY-07 Steelhead water temps

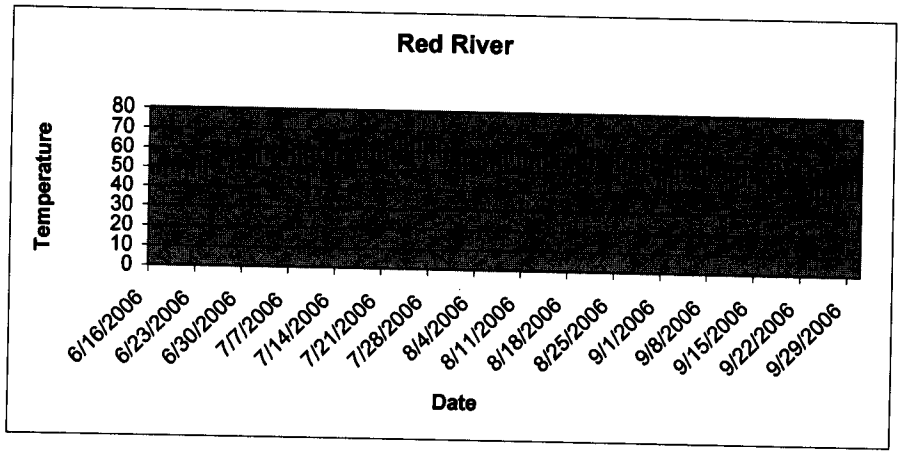
Month	Temp
Apr-07	56
May-07	53
Jun-07	56
Jul-07	55
Aug-07	56
Sep-07	57
Oct-07	57
Nov-07	53
Dec-07	47
Jan-08	43
Feb-08	41
Mar-08	43
Apr-08	46

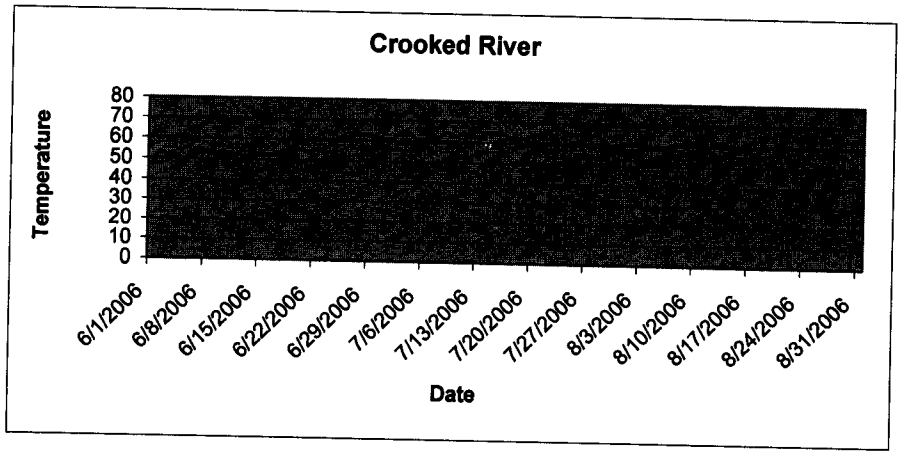




Appendix B1, B2, B3. Satellite Water Temperatures 2006







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

ANALYSIS LEVELS	RESULTS (mg/l)	DATE ANALYZED	REARING
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 B 0	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.

Contaminant	Result	MDL	Method	Date
	PRIMARY CONTAMINANTS		ANALYSIS	
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

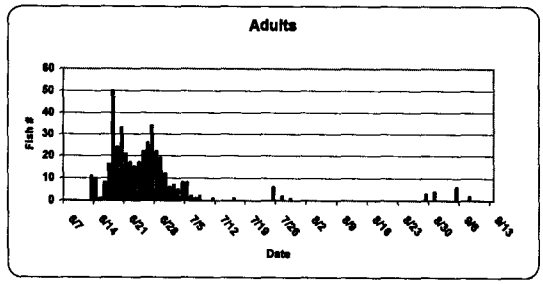
SECONDARY CONTAMINANTS

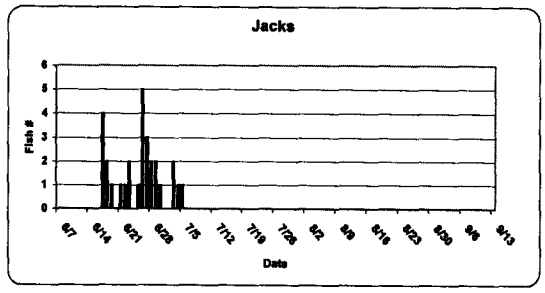
Chloride	ND	0.001	EPA 300.0	07/03/97
Ammonia/N	ND	0.1	EPA 350.2	07/01/97
Color	15	0.005	EPA110.2	07/03/97
Calcium	3.92	1	EPA 200.8	07/16/97
Sulfide(HS)	ND	0.01	EPA 376.1	
Hardness(CaCO3)	13	5	2340 B	07/16/97
Iron	0.37	0.05	EPA 236.1	07/16/97
Magnesium	0.76	1	EPA 200.8	07/16/97
Manganese	0.014	0.001	EPA 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 2006.

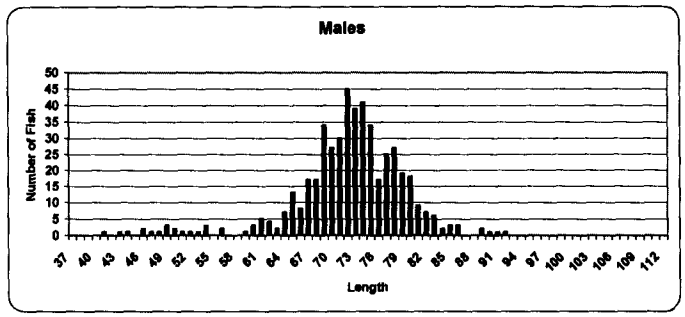
6/7	0	0	0	7/28	0	0	0
6/8	0	0	0	7/29	1	0	1
6/9	0	0	0	7/30	0	0	0
6/10	0	0	0	7/31	0	0	0
6/11	0	0	0	8/1	0	0	0
6/12	0	0	0	8/2	0	0	0
6/13	11	0	11	8/3	0	0	0
6/14	10	0	10	8/4	0	0	0
6/15	1	0	1	8/5	0	0	0
6/16	8	0	8	8/6	0	0	0
6/17	16	4	20	8/7	0	0	0
6/18	50	2	52	8/8	0	0	0
6/19	24	1	25	8/9	0	0	0
6/20	33	0	33	8/10	0	0	0
6/21	21	1	22	8/11	0	0	0
6/22	17	1	18	8/12	0	0	0
6/23	15	2	17	8/13	0	0	0
6/24	17	0	17	8/14	0	0	0
6/25	22	1	23	8/15	0	0	0
6/26	26	5	31	8/16	0	0	0
6/27	34	3	37	8/17	0	0	0
6/28	22	2	24	8/18	0	0	0
6/29	19	2	21	8/19	0	0	0
6/30	12	1	13	8/20	0	0	0
7/1	6	0	6	8/21	0	0	0
7/2	7	0	7	8/22	0	0	0
7/3	5	2	7	8/23	0	0	0
7/4	8	1	9	8/24	0	0	0
7/5	8	1	9	8/25	0	0	0
7/6	2	0	2	8/26	0	0	0
7/7	1	0	1	8/27	0	0	0
7/8	2	0	2	8/28	0	0	0
7/9	0	0	0	8/29	3	0	3
7/10	0	0	0	8/30	0	0	0
7/11	1	0	1	8/31	4	0	4
7/12	0	0	0	9/1	0	0	0
7/13	0	0	0	9/2	0	0	0
7/14	0	0	0	9/3	0	0	0
7/15	0	0	0	9/4	0	0	0
7/16	1	0	1	9/5	6	0	6

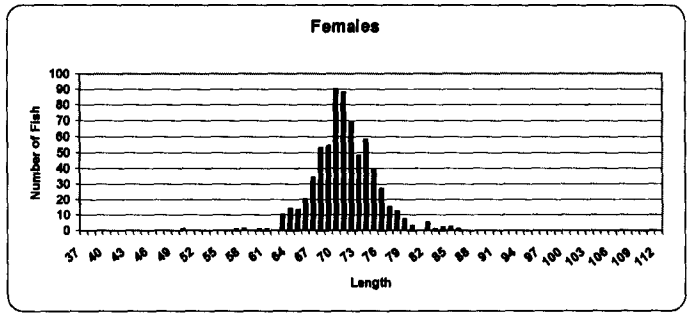


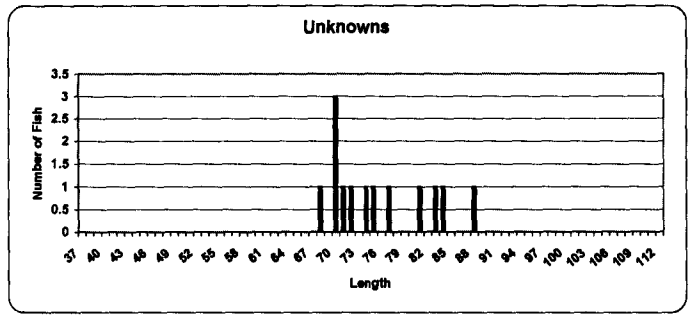


Appendix D2. South Fork Chinook length frequency 2006.

Length	Males	Females	Unk	Total
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	1	0	0	1
42	0	0	0	0
43	1	0	0	1
44	1	0	0	1
45	0	0	0	0
46	2	0	0	2
47	1	0	0	1
48	1	0	0	1
49	3	0	0	3
50	2	1	0	3
51	1	0	0	1
52	1	0	0	1
53	1	0	0	1
54	3	0	0	3
55	0	0	0	0
56	2	0	0	2
57	0	1	0	1
58	0	1	0	1
59	1	0	0	1
60	3	1	0	4
61	5	1	0	6
62	4	0	0	4
63	2	10	0	12
64	7	14	0	21
65	13	13	0	26
66	8	20	0	28
67	17	34	0	51
68	17	53	1	71
69	34	54	0	88
70	27	90	3	120
71	30	88	1	119
72	45	69	1	115
73	39	48	0	87
74	41	58	1	100
75	34	39	1	74
76	17	27	0	44
77	25	15	1	41
78	27	12	0	39
79	19	7	0	26
80	18	3	0	21
81	9	0	1	10
82	7	5	0	12
83	6	1	1	8
84	2	2	1	5
85	3	2	0	5
86	3	1	0	4
87	0	0	0	0
88	0	0	1	1
89	2	0	0	2
90	1	0	0	1
91	1	0	0	1
92	1	0	0	1
93	0	0	0	0
94	0	0	0	0
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	0	0	0	0
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
112	0	0	0	0
TOTAL	488	670	13	1171

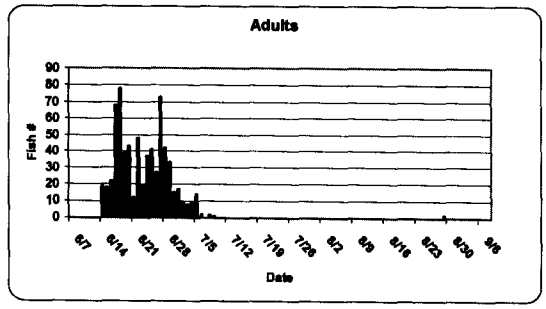


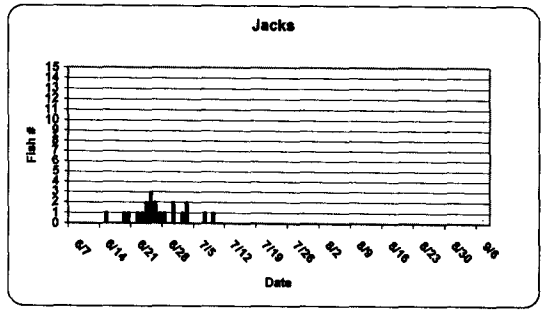




Appendix E1. Red River Chinook Run Timing 2006.

6/7	0	0	0	7/21	0	0	0
6/8	0	0	0	7/22	0	0	0
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	0	0	0	7/26	0	0	0
6/13	0	0	0	7/27	0	0	0
6/14	19	0	19	7/28	0	0	0
6/15	18	1	19	7/29	0	0	0
6/16	22	0	22	7/30	0	0	0
6/17	68	0	68	7/31	0	0	0
6/18	78	0	78	8/1	0	0	0
6/19	39	1	40	8/2	0	0	0
6/20	43	1	44	8/3	0	0	0
6/21	12	0	12	8/4	0	0	0
6/22	48	1	49	8/5	0	0	0
6/23	19	1	20	8/6	0	0	0
6/24	37	2	39	8/7	0	0	0
6/25	41	3	44	8/8	0	0	0
6/26	27	2	29	8/9	0	0	0
6/27	73	1	74	8/10	0	0	0
6/28	42	1	43	8/11	0	0	0
6/29	33	0	33	8/12	0	0	0
6/30	15	2	17	8/13	0	0	0
7/1	17	0	17	8/14	0	0	0
7/2	9	1	10	8/15	0	0	0
7/3	8	2	10	8/16	0	0	0
7/4	9	0	9	8/17	0	0	0
7/5	14	0	14	8/18	0	0	0
7/6	2	0	2	8/19	0	0	0
7/7	0	1	1	8/20	0	0	0
7/8	2	0	2	8/21	0	0	0
7/9	1	1	2	8/22	0	0	0
7/10	0	0	0	8/23	0	0	0
7/11	0	0	0	8/24	0	0	0
7/12	0	0	0	8/25	0	0	0
7/13	0	0	0	8/26	0	0	0
7/14	0	0	0	8/27	0	0	0
7/15	0	0	0	8/28	0	0	0
7/16	0	0	0	8/29	2	0	2
7/17	0	0	0	8/30	0	0	0
7/18	0	0	0	8/31	0	0	0
7/19	0	0	0	9/1	0	0	0
7/20	0	0	0	9/2	0	0	0
				TOTAL	698	21	719





Appendix E2. South Fork Chinook summary of fish trapped, released, spawned and disposition of carcasses, Brood Year 2006.

TOTAL SOUTH FORK FISH TRAPPED:

Crooked River	452
Red River	719
TOTAL	**1171**

AGE CLASSES	FEMALES	MALES	UNK	TOTAL
3 Years = (<64 cm)	15	35	0	50
4 Years = (64 - 82 cm)	649	434	10	1093
5 Years = (> 82 cm)	6	19	3	28
	670	**488**	**13**	**1171**

FISH DISPOSITION FEMALES:

Crooked River		Red River		CFH		TOTAL
				SPAWNED	604	**604**
MORTALITY	0	MORTALITY	0	MORTALITY	44	**44**
				KILLED/CULLED @ SPAWN	3	**3**
RELEASED	3	RELEASED	16	RELEASED	0	**19**
TOTAL	**3**	**TOTAL**	**16**	**TOTAL**	**651**	**670**

FISH DISPOSITION MALES:

Crooked River		Red River		CFH		TOTAL
				SPAWNED	463	**463**
MORTALITY	0	MORTALITY	0	MORTALITY	6	**6**
RELEASED	3	RELEASED	16	SPAWN/RELEASE	0	**19**
TOTAL	**3**	**TOTAL**	**16**	**TOTAL**	**469**	**488**

FISH DISPOSITION UNKNOWNS:

Crooked River		Red River		CFH		TOTAL
				SPAWNED	0	**0**
MORTALITY	0	MORTALITY	0	MORTALITY	0	**0**
RELEASED	3	RELEASED	10	SPAWN/RELEASE	0	**13**
TOTAL	**3**	**TOTAL**	**10**	**TOTAL**	**0**	**13**

TOTAL TRAP	1171

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	8**	2006	141**	0.017%
	Spr 2003	629,687								
2002	Fall 2003	234,361	28**	2005	405**	2006	84**	2007	517**	0.052%
	Spr 2004	750,317								
2003	Fall 2004	64,263								
	Spr 2005	700,387	28**	2006	144**	2007		2008		
2004	Spr 2006	749,461	138**	2007		2008		2009		
2005	Spr 2007	650,921		2008		2009		2010		
2006	Spr 2008	708,496		2009		2010		2011		

(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.

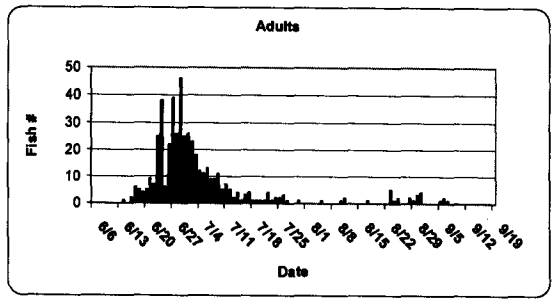
Brood Year	Year Released	Number Released	3-yr-olds	Year Returned	4-yr-olds	Year Returned	5-yr-olds	Year Returned	Total by return	% return from plant
1982	Fall 1983	260,000	2	1985	(a)	1986	107	1987	109	0.036%
	Spr 1984	40,000								
1983	Spr 1985 (b)	80,000	(a)	1986	377	1987	259	1988	636	0.795%
1984	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	14**	2006	134**	0.031%
	Spr 2003	351,066								
2002	Fall 2003	108,323	22	2005	644**	2006	77**	2007	743**	0.160%
	Spr 2004	354,868								
2003	Spr 2005	401,362	21**	2006	249**	2007		2008		
2004	Spr 2006	423,603	219**	2007		2008		2009		
2005	Spr 2007	375,759		2008		2009		2010		
2006	Fall 2007	122,215		2009		2010		2011		
	Spr 2008	424,725								

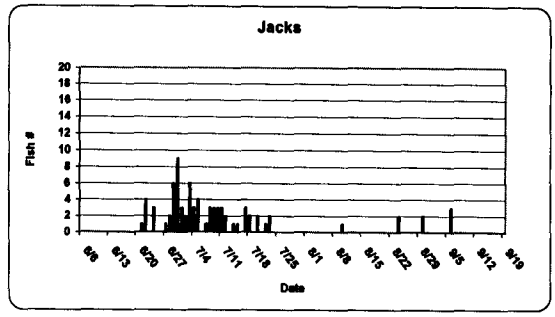
(a) Trap was not installed in 1986 due to construction
(b) These fish wintered in the rearing pond
(c) These fish were Rapid River stock reared at Sawtooth and released directly into Red River with no acclimation
(d) Planted off bridge at ranger station, reared at Dworshak Hatchery, Clearwater Stock
(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 2006

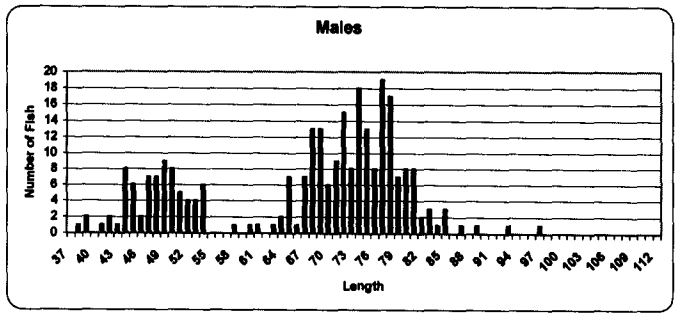
6/6	0	0	0	7/28	0	0	0
6/7	0	0	0	7/29	0	0	0
6/8	0	0	0	7/30	1	0	1
6/9	0	0	0	7/31	0	0	0
6/10	0	0	0	8/1	0	0	0
6/11	0	0	0	8/2	0	0	0
6/12	0	0	0	8/3	0	0	0
6/13	0	0	0	8/4	0	0	0
6/14	1	0	1	8/5	1	0	1
6/15	0	0	0	8/6	0	0	0
6/16	2	0	2	8/7	0	0	0
6/17	6	0	6	8/8	0	0	0
6/18	5	0	5	8/9	0	0	0
6/19	4	0	4	8/10	1	1	2
6/20	5	0	5	8/11	2	0	2
6/21	9	1	10	8/12	0	0	0
6/22	7	4	11	8/13	0	0	0
6/23	25	0	25	8/14	0	0	0
6/24	38	3	41	8/15	0	0	0
6/25	6	0	6	8/16	0	0	0
6/26	22	0	22	8/17	1	0	1
6/27	39	1	40	8/18	0	0	0
6/28	26	2	28	8/19	0	0	0
6/29	46	6	52	8/20	0	0	0
6/30	25	9	34	8/21	0	0	0
7/1	26	3	29	8/22	0	0	0
7/2	23	2	25	8/23	5	0	5
7/3	18	6	24	8/24	1	2	3
7/4	12	3	15	8/25	2	0	2
7/5	11	4	15	8/26	0	0	0
7/6	13	0	13	8/27	0	0	0
7/7	9	1	10	8/28	2	0	2
7/8	9	3	12	8/29	1	0	1
7/9	11	3	14	8/30	3	2	5
7/10	5	3	8	8/31	4	0	4
7/11	7	3	10	9/1	0	0	0
7/12	5	2	7	9/2	0	0	0
7/13	2	0	2	9/3	0	0	0
7/14	4	1	5	9/4	0	0	0
7/15	1	1	2	9/5	1	0	1
7/16	3	0	3	9/6	2	3	5
7/17	4	3	7	9/7	1	0	1
7/18	1	2	3	9/8	0	0	0
7/19	1	0	1	9/9	0	0	0
7/20	1	2	3	9/10	0	0	0
7/21	1	0	1	9/11	0	0	0
7/22	4	1	5	9/12	0	0	0
7/23	1	2	3	9/13	0	0	0
7/24	2	0	2	9/14	0	0	0
7/25	2	0	2	9/15	0	0	0
7/26	3	0	3	9/16	0	0	0
7/27	1	0	1	TOTAL	474	79	553

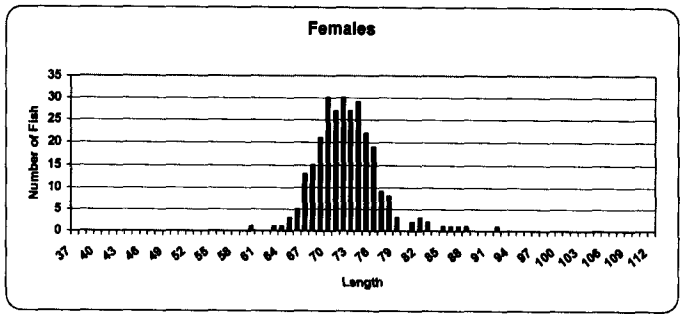


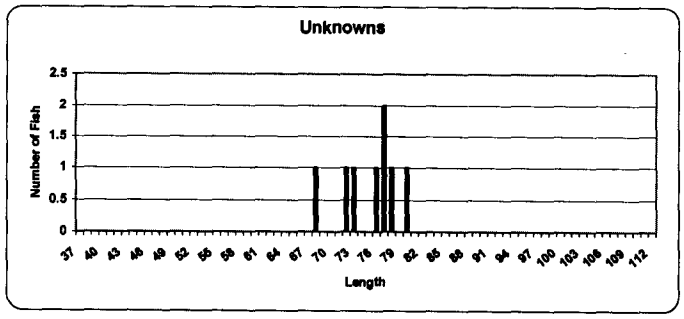


Appendix G2. Powell / Crooked Fork Creek Chinook length frequency 2006.

Length	Males	Females	Unk	Total
37	0	0	0	0
38	1	0	0	1
39	2	0	0	2
40	0	0	0	0
41	1	0	0	1
42	2	0	0	2
43	1	0	0	1
44	8	0	0	8
45	6	0	0	6
46	2	0	0	2
47	7	0	0	7
48	7	0	0	7
49	9	0	0	9
50	8	0	0	8
51	5	0	0	5
52	4	0	0	4
53	4	0	0	4
54	6	0	0	6
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	1	0	0	1
59	0	0	0	0
60	1	1	0	2
61	1	0	0	1
62	0	0	0	0
63	1	1	0	2
64	2	1	0	3
65	7	3	0	10
66	1	5	0	6
67	7	13	0	20
68	13	15	1	29
69	13	21	0	34
70	6	30	0	36
71	9	27	0	36
72	15	30	1	46
73	8	27	1	36
74	18	29	0	47
75	13	22	0	35
76	8	19	1	28
77	19	9	2	30
78	17	8	1	26
79	7	3	0	10
80	8	0	1	9
81	8	2	0	10
82	2	3	0	5
83	3	2	0	5
84	1	0	0	1
85	3	1	0	4
86	0	1	0	1
87	1	1	0	2
88	0	1	0	1
89	1	0	0	1
90	0	0	0	0
91	0	0	0	0
92	0	1	0	1
93	1	0	0	1
94	0	0	0	0
95	0	0	0	0
96	0	0	0	0
97	1	0	0	1
98	0	0	0	0
99	0	0	0	0
100	0	0	0	0
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
112	0	0	0	0
TOTAL	269	276	8	553







Appendix G3. Powell Chinook summary of fish trapped, released, spawned and disposition of carcasses for Powell and Crooked Fork adult traps, Brood Year 2006.

TOTAL FISH TRAPPED:	
Powell	436
Crooked Fork Creek	117
TOTAL	**553**

AGE CLASSES	FEMALES	MALES	UNK	TOTAL
3 Years = (<64 cm)	2	77	0	79
4 Years = (64 - 82 cm)	267	181	8	456
5 Years = (> 82 cm)	7	11	0	18
TOTAL	**276**	**269**	**8**	**553**

FISH DISPOSITION FEMALES:	
SPAWNED	240
MORTALITY	23
KILLED/CULLED @ SPAWN	2
RELEASED	11
TOTAL	**276**

FISH DISPOSITION MALES:	
SPAWNED	246
MORTALITY	4
RELEASED	19
TOTAL	**269**

FISH DISPOSITION UNKNOWNS:	
SPAWNED	0
MORTALITY	0
RELEASED	8
TOTAL	**8**

TOTAL DISPOSITION	553

All low BKD carcasses were scatter planted through 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	14**	2006		
	Spr 2003	350,665								
2002	Fall 2003	385,292	27**	2005	422**	2006	156**	2007	605**	0.079%
	Spr 2004	376,797								
2003	Fall 2004	343,967	78**	2006	815**	2007				
	Spr 2005	403,917								
2004	Fall 2005	347,299	279**	2007		2008		2009		
	Spr 2006	423,633								

Brood Year	Year Released	Number Released	3-yr-olds	Year Returned	4-yr-olds	Year Returned	5-yr-olds	Yeard Returned	Total by Return	%Return From Plant
2005	Spr 2007	373,977		2008		2009		2010		
2006	Fall 2007	384,520		2009		2010		2011		
	Spr 2008	223,714								
2007										

(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. Chinook spawning record 2006 for South Fork.

SOUTH FORK (Red River / Crooked River).

			BKD Females Culled		Other Females Culled						
Lot	Spawn Date	Total Females	Table	Incubation	Table	Incubation	Females Kept	Green Eggs	Eyed Eggs	Percent Eye Up	Fecundity
1	8/8/06	9	0	0	0	0	9	34,697	30,945	89.2	3,855
2	8/11/06	4	0	0	0	0	4	12,361	12,135	98.2	3,090
3	8/15/06	28	1	5	0	0	22	78,466	76,110	96.9	3,567
4	8/18/06	42	0	0	0	0	42	152,703	149,195	97.7	3,636
5	8/22/06	81	1	3	0	1	76	276,197	268,071	97.1	3,634
6	8/25/06	114	0	0	0	1	113	393,438	382,146	97.1	3,482
7	8/29/06	181	0	3	3	0	175	601,371	586,311	97.5	3,436
8	9/1/06	69	0	4	0	0	65	223,945	219,502	98.0	3,445
9	9/5/06	51	0	5	0	1	45	156,394	151,404	96.8	3,475
10	9/8/06	19	0	7	0	0	12	40,669	40,184	98.8	3,389
11	9/12/06	6	0	2	0	0	4	13,075	12,922	98.8	3,269
12	9/15/06	3	0	2	0	1	0	0	0	0.0	0
Total/Average		***607***	***2***	***31***	***3***	***4***	***567***	***1,983,316***	***1,928,925***	***97.26%***	***3479.8***

APPENDIX I2. Chinook spawning record 2006 for Powell.

POWELL

			BKD Females Culled		Other Females Culled						
Lot	Spawn Date	Total Females	Table	Incubation	Table	Incubation	Females Kept	Green Eggs	Eyed Eggs	Percent Eye Up	Fecundity
1	8/7/06	9	0	0	0	0	9	31,928	28,920	90.6	3,547
2	8/10/06	13	0	0	0	0	13	43,526	39,427	90.6	3,348
3	8/14/06	40	0	0	0	1	39	133,157	124,819	93.7	3,414
4	8/17/06	35	0	1	0	0	34	121,195	112,047	92.4	3,564
5	8/21/06	75	0	0	0	0	75	270,547	244,495	90.4	3,607
6	8/24/06	30	0	1	0	0	29	103,428	98,019	94.8	3,566
7	8/28/06	27	0	0	1	0	26	83,546	79,549	95.2	3,213
8	8/31/06	13	0	1	1	0	11	37,253	33,648	90.3	3,387
Total/Average		***242***	***0***	***3***	***2***	***1***	***236***	***824,580***	***760,924***	***92.28%***	***3,456***

Appendix J. Production cost for BY-06 Chinook and BY-07 North Fork Steelhead.

Rearing to Release:

	CHINOOK BY-06	North Fork Steelhead BY-07
Number Produced	2,603,931	819,264
Weight	132,930	178,997
% Mortality (From eyed eggs)	3.2%	13.8%
Conversion Rate	1.04	0.78

FOOD FED AND WEIGHT GAINED

	Chinook (BY-06)	North Fork Steelhead (BY-07)
Period Fed	December 2006-March 2007	May 2007-April 2008
Feed Used lbs.	137,862	141,064
Weight Gain	132,930	178,997
Feed Cost	**155,451**	**153,634**

Total Feed Cost: **$309,085**

Average Feed Cost per pound Weight Gain Only:
Chinook: **$1.17**
Steelhead: **$0.85**

Cost Per 1,000 fish using entire budget (-) C.O.
Chinook **$261.71**
Steelhead **$666.48**

Total BY06 Chinook Rearing Cost **$486,393**
Total BY07 Steelhead Rearing Cost **$546,021**
BY06 Chinook & BY07 Steelhead Combined Rearing Cost
Total Budget (-) C.O.: **$1,032,414**

Cost per pound for Rearing Total Budget (-) C.O.
Chinook **$4.39**
Steelhead **$3.05**

Appendix K1. Powell Brood Year 2006, Summary of Fish Autopsy, Fall 2007 Release

Summary of Fish Autopsy

ACCESSION NO:	07-335	LOCATION:	Powell
SPECIES:	sc	AUTOPSY DATE:	9/20/2007
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			
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN			

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

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		FAT		MESEN. SPLEEN		GUT		HIND KIDNEY		LIVER		BILE	
N	20	N	20	N	20	0	20	0	0	B	20	0	20	N	20	A	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	6	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0	Mean=0.00		4	9	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=3.1								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. Red River Brood Year 2006, Summary of Fish Autopsy, Fall 2007 Release

Summary of Fish Autopsy

ACCESSION NO:	07-334	LOCATION:	RdR
SPECIES:	sc	AUTOPSY DATE:	9/19/2007
STRAIN:	SF CLW	AGE:	juv
UNIT:		SAMPLE SIZE:	9
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			
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN			

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

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		FAT		MESEN. SPLEEN		GUT		HIND KIDNEY		LIVER		BILE	
N	9	N	9	N	9	0	9	0	0	B	9	0	9	N	9	A	9	0	0
B1	0	F	0	S	0	1	0	1	1	R	0	1	0	S	0	B	0	1	3
B2	0	C	0	L	0	2	0	2	1	G	0	2	0	M	0	C	0	2	6
E1	0	M	0	S&L	0			3	6	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0	Mean=0.00		4	1	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0	Mean=1.66	
H2	0			O	0			Mean=2.77								OT	0		
M1	0																		
OT	0																		

SUMMARY OF NORMALS

	9	9	9	9	9	9	9	9	9
SEX		M: 0		F: 0		U: 0			

GENERAL REMARKS:

FINS: GONADS:

SKIN: OTHER:

Appendix L1									
Date	Site	Number Released	Stock	Length	FPP	Pounds	Marks	Raceway	Comments
03/26-03/26/2008	Lower Crooked River	566,764	Spring Chinook	5.50	17.00	33,339	511,478 AD-43,310 AD/CWT-11,976 AD/PIT 7-10 A & B		acclimated in tanks before release
03/26-03/27/2008	Upper Crooked River	141,732	Spring Chinook	5.50	17.00	8,337	140,737 AD-955 AD/PIT	11 A & B	acclimated in tanks before release
03/26-03/28/2008	Red River	424,725	Spring Chinook	5.50	17.00	24,984	368,926 AD-43,827 AD/CWT-11,974 AD/PIT	4-6 A & B	Volitional/Forced release
04/03-04/04/2008	Lower Selway river	309,380	Spring Chinook	5.60	16.10	19,216	196,592 AD/CWT- 103,815 CWT- 8973 PIT/AD/CWT	2 & 3 E & W	Truck
03/19-03/28/2008	Powell Pond	223,714	Spring Chinook	5.50	16.60	13,477	166,606 AD-14,960 AD/PIT-18,941 AD/CWT/PIT-23,207 Ad/C	1-3 A & B	Volitional Release
	TOTAL	1,666,315				99,353			
06/25-28-07/02/2007	Selway(McGruder)	304,026	Powell	4.00	56.56	5,375	Oxytetracycline-No Fin Clip	2E & W	NPT plant
	TOTAL	304,026				5,375			
09/17-09/20/2007	Red River	122,215	South Fork	4.20	23	5,319	AD Clipped	1E	Volitional 9/17:Forced 9/20
09/24-09/27/2007	Walton Creek	384,520	South Fork	5.30	19.25	19,974	AD Clipped-998 PIT	Powell Pond	Direct Volitional
	TOTAL	506,735				25,293			
9/11/2007	NezPerce Trib Hatch	126,855	South Fork & Powell		44	2,909	45,697 AD/CWT-81,158 CWT Only	1W	CWT Codes 61-27-17 36% 61-27-13 64%
	TOTAL	126,855				2,909			

Appendix M. Brood Year 2007 steelhead (B) eggs received from Dworshak National Fish Hatchery.

EGG TAKE NUMBER	SPAWN DATE	EYED EGG DELIVER DATE	NUMBER OF EYED EGGS	TEMPERATURE UNITS
4	3/6/2007	3/21/2007	695,421	330
5	3/13/2007	3/28/2007	504,859	330
TOTAL			**1,200,280**	

STOCK	NUMBER OF EYED EGGS KEPT	RELEASED SMOLTS	PERCENT SURVIVAL
Dworshak	950,280	819,264	86.2%

Appendix N

Summary of Fish Autopsy

ACCESSION NO:	08-030	LOCATION:	CLW
SPECIES:	STB	AUTOPSY DATE:	2/21/2008
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			
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN			

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

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		FAT		MESEN. SPLEEN		GUT		HIND KIDNEY		LIVER		BILE	
N	20	N	20	N	20	0	20	0	0	B	20	0	20	N	20	A	20	0	13
B1	0	F	0	S	0	1	0	1	0	R	0	1	0	S	0	B	0	1	4
B2	0	C	0	L	0	2	0	2	0	G	0	2	0	M	0	C	0	2	3
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
SEX	M: 0		F: 0		U: 0				

GENERAL REMARKS:

FINS: GONADS:

SKIN: OTHEI Nice looking fish.

Appendix O									
Date	Site	Number Released	Stock	Length	FPP	Pounds	Marks	Raceway	Comments
04/10-11/2008	Red River	163,580	DWOR B	8.40	4.54	35,979	160,690 No Clip-2890 No Clip/PIT	4-6 East	direct release
04/11 & 04/14/2008	Red River	82,930	DWOR B	8.40	4.50	18,534	47,774 AD Only-32,371 Ad/CWT-1594 AD/CWT/PIT-1191 AD/PIT	7-8 East	acclimated in tanks-direct release
04/09 & 04/11/2008	Upper Crooked R	72,112	DWOR B	8.00	4.93	14,617	43,620 No Clip-25,896 No Clip/CWT-1298 NO Clip/PIT/CWT-1298 No Clip/PIT	12E & 12W	acclimated in tanks-direct release
04/7-09/2008	Lower Crooked R	144,557	DWOR B	8.40	4.53	31,884	73,176 AD Only-68,096,AD/CWT-3,285 AD/PIT	9-11 East	acclimated in trucks direct release
04/15-16/2008	Red House Hole	247,619	DWOR B	8.66	4.48	55,289	177,067 AD-64,853 AD/CWT-5679 AD/PIT	7W-11W	direct release
4/18/2008	Meadow Creek	31,429	DWOR B	8.20	5.20	6,044	30,532 No Clip-897 No Clip/PIT	6W & 4W	direct release
4/18/2008	Mill Creek	31,429	DWOR B	8.20	5.20	6,044	30,530 No Clip-899 No Clip/PIT	6W & 4W	direct release
4/21/2008	Lolo Creek	45,608	DWOR B	8.70	4.30	10,606	44,613 No Clip-995 No Clip/PIT	5W	mostly hauled by NPTH
	TOTAL	819,264				178,997			

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