CLEARWATER FISH HATCHERY

ANNUAL REPORT

2008 CHINOOK AND 2009 STEELHEAD

Prepared by:
Brad George, Assistant Hatchery Manager
Jerry McGehee, Hatchery Manager
Chris Shockman, Fish Culturist
Douglas Munson, Anadromous Fish Pathologist
Millie Brookshier, Office Specialist

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2008 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 are reared on station and released as parr, presmolts, and smolts.

Powell

Two adult traps were operated in the Lochsa Basin. The Crooked Fork trap was installed on July 10, 2008 and the trap was taken out of operation on September 18, 2008. The Walton Creek weir was installed on May 22, 2008 and taken out of operation on September 15, 2008. The run total for both traps was 1,310 fish of which there were 178 jacks and 1,132 adults. A total of 147 fish were released and 1,163 were held for production. A total of 451 females were spawned, two of which were culled at spawning; 51 were culled due to high BKD levels and five were culled for bad eggs leaving 395 for production producing 1,703,428 green eggs.

A total of 413,158 full-term smolts were released from Powell Pond on April 2, 5-6, 2010.

A total of 315,252 parr were released on the Upper Selway River on June 22, 24 and 29, 2009 by the Nez Perce Tribe.

A total of 402,160 full-term smolts were released on the Lower Selway River on March 24-26, 2010 by Clearwater Fish Hatchery staff.

A total of 129,735 full-term smolts were released in Clear Creek on March 25-26, 2010.

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 South Fork populations.

The Red River weir was installed on April 1, 2008 and taken out of operation September 14, 2008. The run total of 919 fish was combined with the returning adults from Crooked River. Of the total, 45 Chinook were released above the weir.

The Crooked River weir was installed on March 27, 2008 and taken out of operation September 13, 2008. The run total of 728 fish was combined with returning adults from Red River. Of the total, 61 Chinook were released above the weir.

A total of 210 fish of South Fork origin were released below the weirs to spawn naturally.

The South Fork had a run total of 1,647 fish. A total of 316 fish were released. All remaining fish were held for spawning. A total of 561 females were spawned, 3 of which were culled at spawning, 52 were culled due to high BKD levels and 21 for dead eggs and 488 were kept for production producing 2,122,052 green eggs.

A total of 1,206,110 full-term smolts were released into Red River on March 29-31 and April 1, 7-8. 2010.

No Chinook smolts were released from Crooked River in 2010. This was due to the creation of a Summer Chinook run at this location.

A total of 201,291 presmolts were transferred to the Nez Perce Tribal Hatchery on September 16, 2009.

A total of 99,870 full-term smolts were released in Clear Creek on March 25-26, 2010.

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 with the Corps).

The size and complexity of the overall facility has significantly increased from the beginning from 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 $6.3 million of additional improvements to the facility bringing the estimated value to $67.953 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 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 Fish 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, woodshop, 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 and is raised to 15 feet for winter and spring months.

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 2,400 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 outflow 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 the 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 and a facility perimeter fence was also installed.

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 Fish Hatchery

The steelhead raceways consist of 300’ x 10’ x 4.5’ 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. The water for these raceways flows through degassing towers and then into the head raceway. These raceways are supplied with water from both intakes.

Chinook raceways are 200’ x 10’ x 3’ 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 cubic feet per second (cfs).

The adult holding facility are 100’ x 10’ x 4’ deep, and 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 gallons per minute (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 60 concrete vats. Each measures 40’ x 4’ x 3’ 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. Each vat is equipped with automatic feeders controlled by adjustable time clocks.

Crooked River

The Crooked River acclimation facility has two raceways, measuring 145’ x 20’ x 4’ 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’ x 12’ x 4’ 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’ x 65’ x 5’ 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’ x 20’ x 4’8” deep, have a volume of 9,500 cubic feet and a holding capacity of 960 adult Chinook. The adult trap measures 12’ x 6’ x 4’ deep and is supplies with 6.24 cfs of water.

Red River

The adult holding facility consists of two ponds, measuring 10’ x 45’ x 4’ deep, with a total of 3,400 cubic feet of holding space and a trap area 8’ x 16’ x 4’ 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 measure 170’ x 70’ x 4’6” 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 60 feet below the surface. The cool water intake is stationary at 245 below the top of the dam. An estimated 18 cfs of water is provided by the cool water supply and 70 cfs of water from the warm water supply a portion of this water will not pass through the constriction in the pipeline at the North Fork River Crossing. 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 56^0F 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 July 1 to October 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 an additional 2.5 cfs is available from a supply pumped out of Colt Killed Creek. Two 7.5 horsepower pumps can be used to supply Walton Creek distribution box 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 Fish 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 Craftsmen, Biological Aides, Grounds Maintenance Workers, and Clearwater River Youth Programs 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 unmarked fish above the weirs.

The Crooked River weir and trap were in operation between March 27, 2008 and September 13, 2008. A total of 728 fish were trapped.

The Red River trap was installed on April 1, 2008 and taken out of operation on September 14, 2008. A total of 919 fish were trapped.

Age class breakdown of this run included: 284 one-ocean males; 3 one-ocean; 3 one-ocean unknowns (<64 cm); 489 two-ocean males; 663 two-ocean females; 18 two-ocean unknowns (64-82 cm); 129 three-ocean males; 55 three-ocean females; 3 three-ocean unknowns (83+ cm) (Appendices D1, D2, E1, E2, F1 and F2).

Powell

During 2008, 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 22, 2008 and taken out of operation September 15, 2008. A total of 1,310 fish (178 jacks and 1,132 adults) were trapped at Powell and Crooked Fork.

Trapping protocols for the Powell tap 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: 178 one-ocean males; 0 one-ocean females (<64 cm); 379 two-ocean males; 549 two-ocean females; 0 two-ocean unknowns; 161 three-ocean males; 43 three-ocean females; and 0 three-ocean unknowns (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 Fish Hatchery for final holding and spawning.

All fish were injected with Erythromycin 200 at a rate of 10 mg/kg at trapping to inhibit Bacterial Kidney Disease (BKD). Fish were treated with a formalin drip for one hour every day to prevent fungal growth. Fish held at Clearwater were treated at 140 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 2008. 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 2008. 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 parts per million (ppm) Argentyne solutions for 10 minutes. Then eggs, at one

female per tray, were placed in individual Heath egg trays in the incubation room. At Clearwater, eggs from females spawned 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.

All broodstock fish 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 6, 2008 and the last September 2, 2008. A total of 561 females were spawned. Prespawn mortality for the South Fork Stock was 46 fish (2.8% prespawning 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

Chinook were sorted twice per week for ripeness. The first fish was spawned August 7, 2008 and the last September 2, 2008. A total of 451 females were spawned. Prespawn mortality was 19 fish (1.5% prespawn mortality). Fish carcasses not showing clinical signs of BKD were placed in the Lochsa and tributaries to add nutrients to the stream (Appendix G3).

INCUBATION

Clearwater Fish 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 51 females at Powell and 70 females from the South Fork. Using an average fecundity of 4,344 eggs per fish, these culled females accounted for 525,624 green eggs.

A total of 3,825,480 green eggs were incubated from BY08 spring Chinook salmon. Overall development from green eggs to eyed-eggs was 3,574,039 for a total eye-up percentage 93.43%. The South Fork stock achieved 96.19% eye-up and Powell 89.98% eye-up (Appendix I1).

Beginning on the third 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 shocking.

Eye-up occurred at approximately 500 temperature units (TU), 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 TU. Swim up fry were transferred to the early rearing vats at approximately 1,750 TU.

Eggs Transferred from Other Facilities

No Chinook eggs were needed or received from other facilities for the BY08 Chinook program.

EARLY REARING

Swim up fry were ponded in hatchery vats at approximately 42,000 to 54,000 fish per vat. A total of 2,845,198 fry were ponded. 197,091 Powell stock and 527,198 South Fork stock were culled to lower BKD rates to reduce the fish number to a full hatchery. A survival rate of 99.8% 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 GPM for approximately 30 days to help prevent dropouts and help initiate feeding. After one month, flows were turned up to 92 GPM and by month four, turned up to 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 41-56°F (Appendix A2).

During early rearing the Chinook were fed a 50:50 mix of BioDiet grower and BioDiet starter. This was done in an effort to reduce “pin-heading” and to promote a more uniform fish size. The feed conversion for early rearing was 0.92 lbs per pound gain.

All Chinook except the Selway parr were moved outside during the marking process. Marking took place at two different times, the first being May 4 thru May 8, 2009 for the Clear Creek full-term smolts, Selway full-term smolts, and the surplus Chinook to be transferred to Nez Perce Tribal Hatchery. A total of 841,438 fish were marked at this time.

The second round of Chinook marking took place between May 26 and June 5, 2009. At this time, a total of 1,624,014 fish were moved outside for the Powell, Red River, and Crooked River full-term smolt programs.

A total of 317,000 Selway parr were moved outside by May 8, 2009. During the time period of May 26-29, 2009, 100% of the Selway parr were marked with a four day Oxytetracycline feeding.

The inventory number was adjusted to 2,778,964 Chinook after the marking program as a result of the machine count. The resulting machine count revealed a discrepancy of 18,652 more fish.

FINAL REARING

At marking, Powell stock was used to fill the Powell full-term smolts program, Selway full-term smolts, Selway parr, and more than half of the Clear Creek full-term smolts. South Fork stock was used to fill the Red River full-term smolts, Nez Perce presmolt transfer, and almost half of the Clear Creek full-term smolts.

This was the first year no Chinook at Clearwater Fish Hatchery were fed erythromycin prophylactic treatment. This was monitored by the Eagle Fish Health Lab. Bio-Oregon BioDiet grower feed was used throughout the final rearing period. The full-term smolts were fed full rations prior to marking and were fed four days on feed and three days off feed for several months, then three on and four off after the water temperatures started to cool off the remainder of the time. Total feed used in early and final rearing was 152,518 pounds yielding 156,219 pounds of fish reared for a final conversion of 0.98 (Appendix J). Total cost was $203,318.19.

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 2.0 cfs of water supplied to each raceway.

A total of 315,252 parr were released in June of 2009 at one location (Appendix L).

A total of 201,291 presmolt sized fish were transferred to the Nez Perce Tribal Hatchery in September 2009 (Appendix L).

A total of 2,251,033 smolts were released in March and April of 2010 at four different locations (Appendix L).

FISH HEALTH

The BY08 Chinook reared at CFH were from low BKD parentage with Optical Densities (OD) below 0.25 from both the South Fork and the Powell stocks. All Chinook eggs at or above this OD were culled.

None of the Chinook were erythromycin prophylactic feed treatment this year. After three years of trials comparing the treated versus nontreated raceways, it was determined that this was no longer necessary. The state pathologist has been collecting samples periodically thru the rearing cycle.

FISH HEALTH SECTION – CLEARWATER FISH HATCHERY

Diseases Encountered and Treatments

Brood Powell Spring Chinook Salmon (Collected 2008)

These adult fish received an intraperitoneal injection of erythromycin at a dose rate 20 mg/kg to limit prespawning mortality. Prespawning mortality was limited to 1.5% this year. Clearwater staff implemented a daily treatment of formalin at 167 mg/l for one hr that allowed fish with severe head burn to not only survive but to heal the wound.

IHNV was detected in zero of 90 females examined (both ovarian fluids and tissues). Three hundred three females were spawned at Powell; 30 (10%) females had high ELISA optical densities. The eggs from females with optical densities above 0.249) was culled. *Myxobolus cerebralis* was not detected in the 20 fish sampled for this pathogen.

Juvenile Powell Spring Chinook Salmon BY08

Disease problems were not encountered in the BY08 Powell spring Chinook salmon. These fish did not receive medicated feed treatments for prophylactic control of *Renibacterium.* Disease agents were not detected during inspection or preliberation inspection sampling.

Brood South Fork of the Clearwater Spring Chinook Salmon (collected 2008)

These adult fish received an intraperitoneal injection of erythromycin at a dose rate of 20 mg/kg to limit prespawning mortality. Prespawning mortality was at 2.8% this year.

IHNV was not detected in zero of 90 females examined. Nine percent of the spawned females (50/558) 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 BY08

Disease problems were not encountered in the BY08 South Fork of the Clearwater spring Chinook salmon. These fish did not receive erythromycin medicated feed treatments for prophylactic control of *Renibacterium.* Disease agents were not detected during inspection or preliberation inspection sampling.

Juvenile Selway Spring Chinook Salmon BY08

Disease problems were not encountered in the BY08 fish destined for the Selway River. 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/Chronic 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 2,460,609 Chinook were mechanically marked. Marks included 1,635,233 Adipose (Ad) clipped, 557,046, Ad clipped/coded-wire-tagged (Ad/CWT), and 268,330 no clip/coded-wire-tagged (no/CWT) fish. In addition, 317,000 Chinook were fed Oxytetracycline medicated feed in late May, for skeletal marking (Appendix L).

Chinook were marked from early rearing vats (inside) into final rearing raceways (outside). Marking started on May 4, 2009 and was completed on June 5, 2009. Fish averaged 90 fish per pound (fpp) in size. A total of 72,705 were passive integrated transponder (PIT) tagged.

FISH DISTRIBUTION

Releases from CFH occurred in three life stages:

	CFH
Parr	315,252
Presmolt	0
Transfers	201,291
Full-Term Smolts	2,251,033
TOTAL	**2,767,576**

Upper Selway River Parr Release

A total of 315,252 parr (85 fpp) were released by Nez Perce Tribal personnel in the McGruder Corridor on June 22, 24, and 29, 2009. All parr were skeletal marked with Oxytetracycline. No PIT tags were put in this group (Appendix L).

Nez Perce Tribal Fish Transfer

A total of 201,291 presmolt sized fish (42 fpp) were transferred to the Nez Perce tribal Hatchery on September 16, 2009. A total of 66,000 fish were Ad/CWT and 135,291 were CWT only (Appendix L).

Red River/Crooked River Presmolt Release

No presmolts were released from Red River or Crooked River in 2009.

Powell Pond Presmolt Release

No presmolts were released from Powell in 2009.

Lower Crooked River Full Term Smolts

No full term smolts were released from Crooked River in 2010. The spring Chinook run was moved to Red River preparing for the summer Chinook program.

Selway Full-Term Smolts

A total of 402,160 smolts (15.13 fpp) were direct released into the Lower Selway River on March 24 thru March 26, 2010. A total of 150,844 were Ad only, 119,088 were Ad/CWT, 129,493 were CWT only, 2,735 were unmarked, and 18,186 were PIT tagged (Appendix L).

Clear Creek Full-Term Smolts

A total of 229,605 smolts (14.23 fpp) were direct released into Lower Clear Creek on March 25 thru March 26, 2010. A total of 111,989 were Ad only, 117,616 were Ad/CWT, and 18,178 were PIT tagged (Appendix L).

Red River Full-Term Smolts

A total of 1,206,110 smolts (15.55 fpp) were acclimated and direct released into Red River on March 29 thru April 8, 2010. A total of 1,088,841 were Ad only, 117,269 were Ad/ CWT, and 18,165 were PIT tagged (Appendix L).

Powell Full Term Smolts

A total of 413,158 smolts (15.07 fpp) were acclimated and released into Walton Creek on April 2, 5-6, 2010. A total of 288,504 were Ad only, 124,654 were Ad/CWT, and 18,176 were PIT tagged (Appendix L).

YEAR 2009 STEELHEAD REPORT

ABSTRACT

Clearwater Fish Hatchery received 994,863 eyed BY09 North Fork B-run steelhead eggs from Dworshak National Fish Hatchery (DNFH). A total of 854,960 smolts from the North Fork stock were released from April 12 thru April 21, 2010: 186,133 at Red House Hole, 176,194 at Peasley Creek, 153,644 at Red River, 86,743 at Upper Crooked River, 170,312 at Newsome Creek, and 144,934 at Clear Creek. The average size of fish was 4.5 fpp for a total of 190,458 pounds, and the average length was 219 mm.

A total of 176,948 pounds of feed was fed with a cost of $227,735.86 to produce 190,458 pounds of fish at Clearwater Fish Hatchery. The conversion rate was 0.93. Survival from eyed egg after culling to release was 87.8%.

Clearwater Fish Hatchery received 1,608,000 green BY09 North Fork B-run steelhead eggs from Dworshak National Fish Hatchery for the southern Idaho steelhead hatcheries. After culling and picking, 1,000,000 eyed eggs were shipped to Magic Valley Hatchery.

SYNOPTIC HISTORY

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

Spawning

When eggs are being collected for CFH at DNFH, one of our crew assists with their spawning operation. We collect, package, and ship 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 18, 2009 and March 25, 2009 (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 CFH. 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, eggs were placed into Heath egg trays with approximately 5,000 eggs per basket, and water flows through each stack were set at six GPM.

A total of 1,031,613 unpicked eyed eggs were received and after picking, netted 994,863 eggs for an eye-up of 96.4% (Appendix M). This number was culled down to 973,593 to reduce surplus. During incubation, steelhead eggs were on primary water only.

A total of 1,608,000 green eggs were brought to CFH and after culling and picking, yielding 1,212,256 eyed eggs were collected from DNFH for the Magic Valley Fish Hatchery. These eggs were incubated in cold water at CFH until the eyed stage. A total of 1,000,000 eyed eggs were shipped to Magic Valley Fish Hatchery. Total eye up on these eggs was 92.7%.

Early Rearing

A total of 916,146 fish were ponded in early rearing. Survival from eyed egg to ponding was 94.1%. At swim up, unfed fry from Dworshak stock B-run steelhead were moved to vats. This was the third year of using dry starter feed on steelhead. Fry were divided as evenly as possible into 22 vats (42,000 per vat). The initial DI was .17 and FI was 0.69. The fish were held in the hatchery vats until the end of July when they were marked and moved to 12 steelhead raceways (7-12 east and 7-12 west). Average length of the fish at the end of early rearing was 3.4 inches. The fish averaged 72.4 fpp.

The DI of the Dworshak steelhead ranged from 0.42 to 0.49, and the FI ranged from 1.2 to 1.4.

Bio-Oregon's BioVita Fry/BioDiet Grower was used for the duration of feeding.

Water temperatures for the early rearing period ranged from 47° to 58°F (Appendix A1).

Final Rearing

The juvenile Dworshak stock B-run steelhead were moved to outside steelhead raceways 7-12 east and 7-12 west. During late 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, and Meadow Creek (SF) supplementation fish were not clipped but were inventoried during the move outside.

The DI of the Dworshak steelhead ranged from .20 to .29. These indexes were recalculated monthly and were never allowed to exceed DI of 0.30 for 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 flows were measured at 2.0 cfs per raceway.

Fish were fed Bio-Oregon's BioVita dry feed through release. A total of 176,948 pounds of feed was used throughout the entire rearing period to produce 190,458 pounds of fish at a cost of $227,735.86. The overall feed conversion rate from fry to smolt was 0.93 (Appendix J).

FISH HEALTH SECTION – CLEARWATER FISH HATCHERY

Diseases Encountered and Treatments

Brood North Fork of the Clearwater Steelhead B Group (collected 2009)

IHNV was detected in brood females sampled at DNFH whose eggs were destined to be reared at CFH. Twenty-six fish of the 190 brood fish sampled (14%) were found to be carriers of IHNV. The eggs from IHNV positive fish were culled from the CFH Steelhead program.

Juvenile North Fork of the Clearwater Steelhead B Group BY09

Pathogens were not detected during routine inspections or during preliberation inspection prior.

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

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	Ad/CWT	PIT tags
Red House Hole	Smolt	187,100*	72,900	5,299
Peasley Creek	Smolt	202,297*	48,004	4,980
Clear Creek		*		4,092
TOTAL		389,397	120,904	14,371

* After marking, one raceway of Peasley Creek Adipose clipped only fish and one raceway of Red House Hole Adipose clipped only fish, were moved to Clear Creek.

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

Release Site	Release Size	No-clip	Ad/CWT	PIT tags
Red River	Smolt	154,732	0	4,194
U Crooked River	Smolt	87,378	0	2,396
Newsome Creek	Smolt	108,666	0	2,784
TOTAL		350,776	0	9,374

FISH DISTRIBUTION

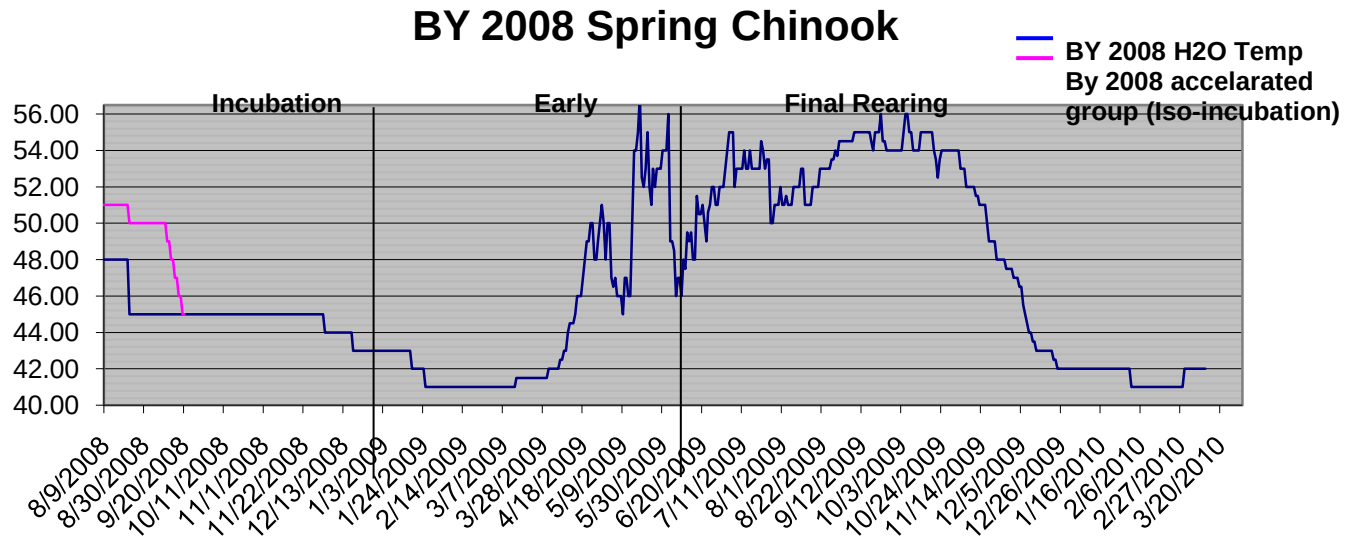
On April 19 through April 20, 2010 a total of 186,133 Dworshak B run steelhead, which averaged 4.5 fpp, were direct released at the Red House Hole plant site (approximately 3.5 miles upstream of Highway 13 and 14 junctions) on the Lower South Fork of the Clearwater River. There were 153,644 fish, which averaged 4.5 fpp, released at Red River between April 12 and April 14, 2010. There were 86,743 fish, which averaged 4.5 fpp, released at Upper Crooked River between April 14 and April 15, 2010. There were 107,312 fish, which averaged 4.5 fpp, released at Newsome Creek between April 15 and April 16, 2010. There were 176,194 fish, which averaged 4.5 fpp, released at Peasley Creek between April 19 and April 20, 2010. There were 144,434 fish, which averaged 4.5 fpp, released at Clear Creek between April 20 and April 21, 2010. There was very little crowding and hauling mortality from the fish transportation to release sites (Appendix O).

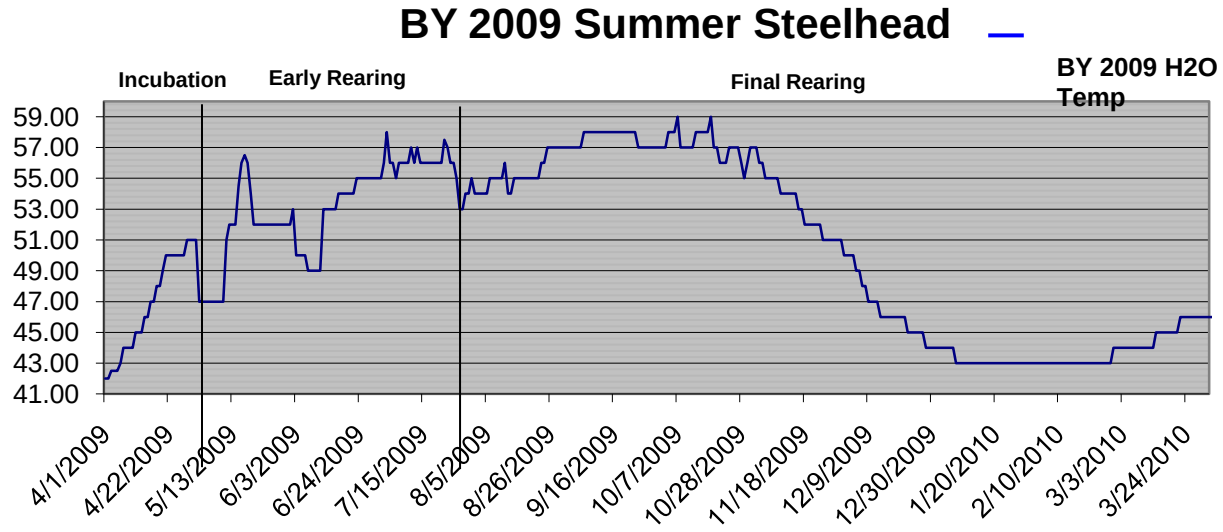
ACKNOWLEDGEMENTS

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 Cassie Sundquist – Assistant Hatchery Managers; Chris Shockman, Chad Henson, and Jordan Rider – Fish Culturists; Ernie Yost – Utility Craftsman; Millie Brookshier – Office Specialist; Holly Stanton Smith - Fish Technician; Theresa Elliott, Jenny Hole, Steve Moore, Steve Duty, Jeff Jenni, Jesse Willmott, Jerry Thayer, Steven Lee, Kevin Miller, Phil Willumsen, Rebekah Waltmann, Chip Roth, Jerod Morris, Sarah Nemeth, Jim McCarthy, Sue Roth , Max Bausch, Leanna Meeker, Melissa Hicks, Bob Alberts – Bio Aides; Jesse Zick and Megan Phillips – Summer Youth; Eric Pease – Grounds Maintenance – Fred Hough, Charles Ball, Tim Lee – Maintenance Craftsmen; Pam Rowsell – Custodian; Dick Bittick, Gary Ady, Ted Brown, Keith Hedrick, and Orville Foster – Driver

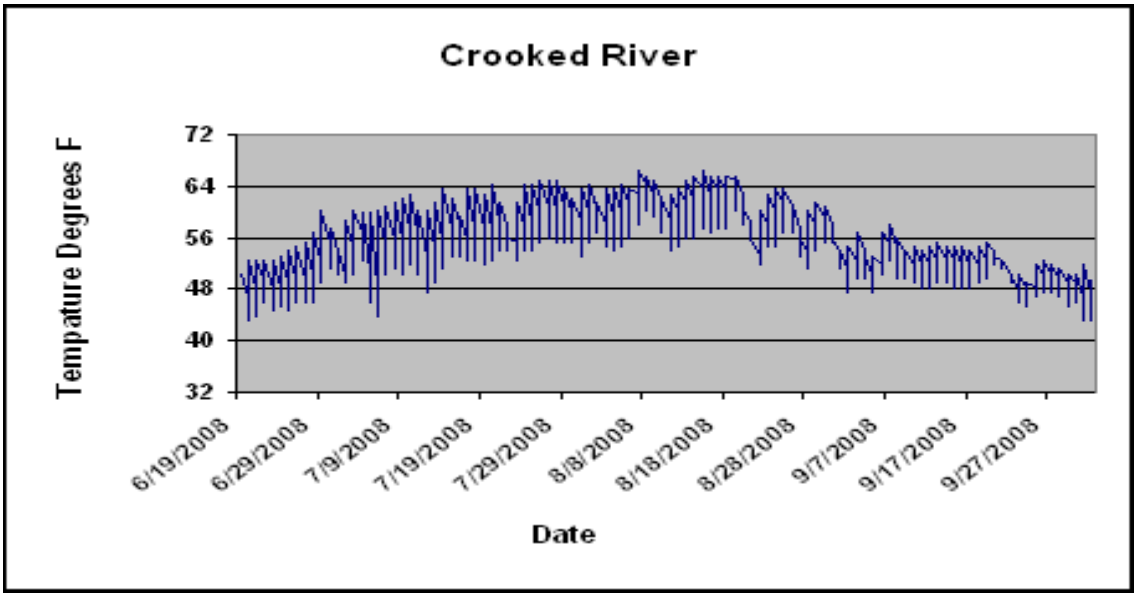
APPENDICES

Appendix A. Rearing Temperatures

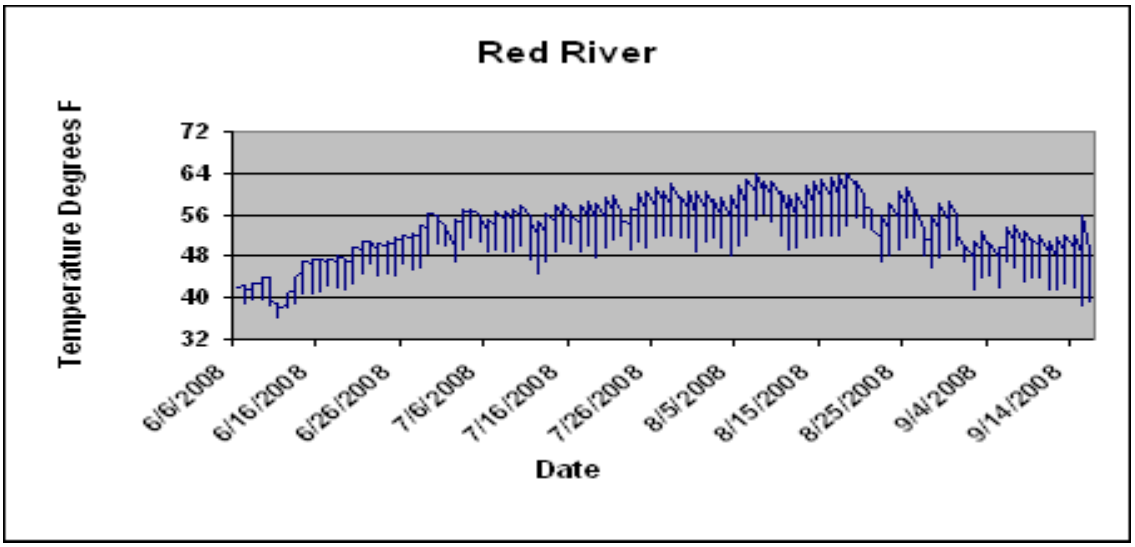




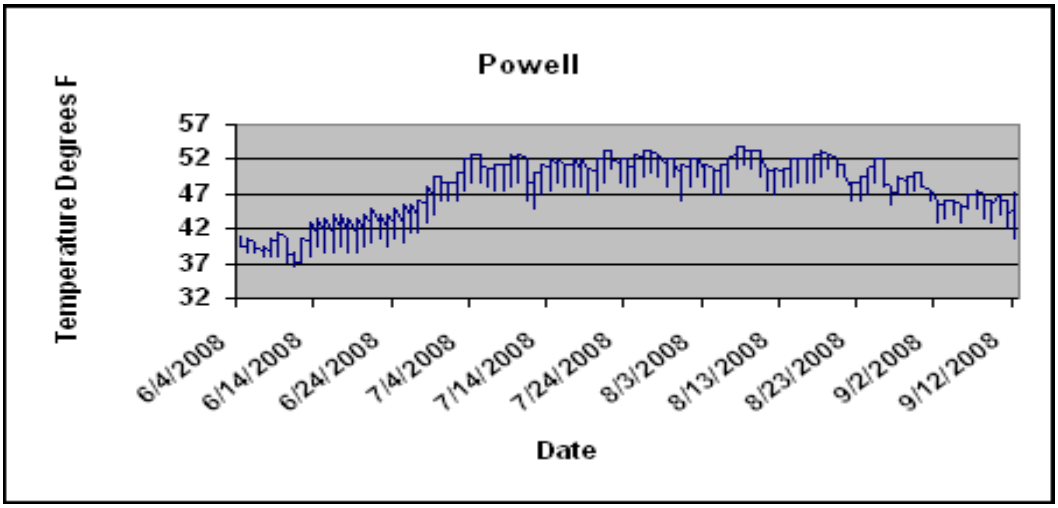
Appendix B1 Satellite Water Temperatures 2008



Appendix B2 Satellite Water Temperatures 2008



Appendix B3 Satellite Water Temperatures 2008



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

Appendix C2. Upper Crooked River Rearing Pond Water Quality Analysis Report 1994

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	07/02/97
Iron	0.26	0.05	EPA 236.1	07/02/97
Magnesium	0.6	1	EPA 200.8	07/02/97
Manganese	0.01	0.001	EPA 200.8	07/02/97
pH	6.9	EPA 150.1	07/02/97	
Odor	- - -	1	EPA 140.1	
Potassium	0.15	1	EPA 200.8	06/27/97
Surfactants	ND	0.05	SM5540C	06/27/97
Silica(SIO3)	6.8	1	EPA 200.8	07/02/97
TDS	18	1	EPA 160.1	06/27/97
Lead	0.002	0.001	EPA 200.8	07/02/97
Zinc	0.012	0.001	EPA 200.8	07/02/97
Copper	0.016	0.001	EPA 200.8	07/02/97
Sulfate	ND	1	EPA 300.0	06/27/97
Conductivity(uS/cm)	25	10	EPA 120.1	06/27/97
Aluminum	- - -	0.001	EPA 200.8	07/02/97
Langlier Index	- - -			
Alkalinity	12	5	EPA 310.1	06/27/97
Silver	ND	0.01	EPA 200.8	07/02/97
Turbidity(NTU)	- - -	0.5	EPA 180.1	

Laboratory Reporting Codes:
Results are mg/L (ppm) unless otherwise noted
ND - Not detected within the sensitivity of the instrument
- - - = No analysis performed for this contaminant
Numerical Entry = Detection at level indicated
MCL (numbers in parenthesis)= EPA maximum 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.

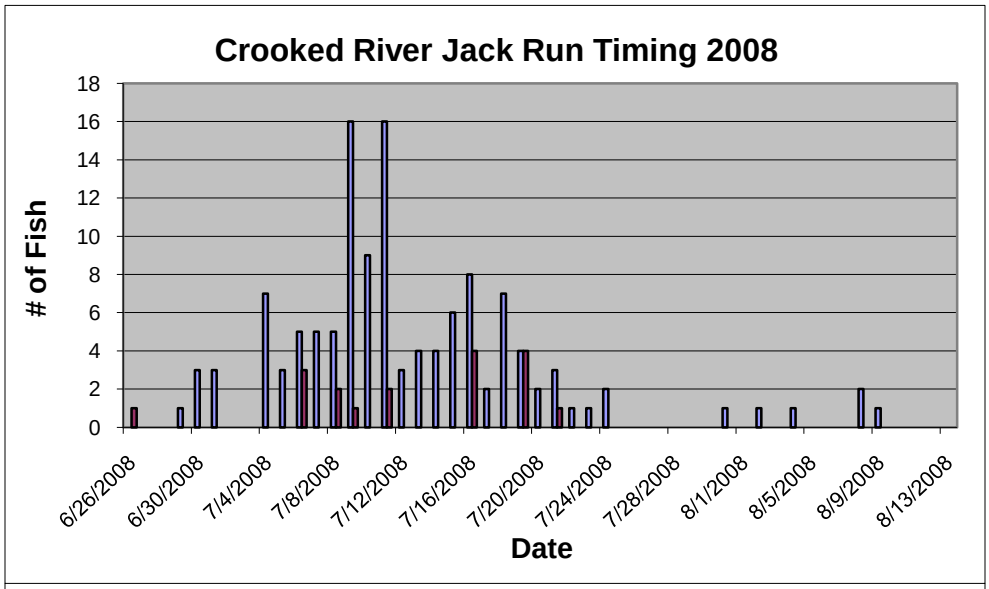
PRIMARY CONTAMINANTS ANALYSIS				
Contaminant	Result	MDL	Method	Date
Antimony (0.006)	- - -	0.001	EPA 200.8	07/16/97
Nickel	- - -	0.001	EPA 200.8	07/16/97
Arsenic (0.05)	ND	0.005	EPA 200.8	07/16/97
Selenium(0.05)	ND	0.005	EPA 200.8	07/16/97
Barium (2)	0.03	0.01	EPA 200.8	07/16/97
Sodium	3.2	1	EPA 200.8	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

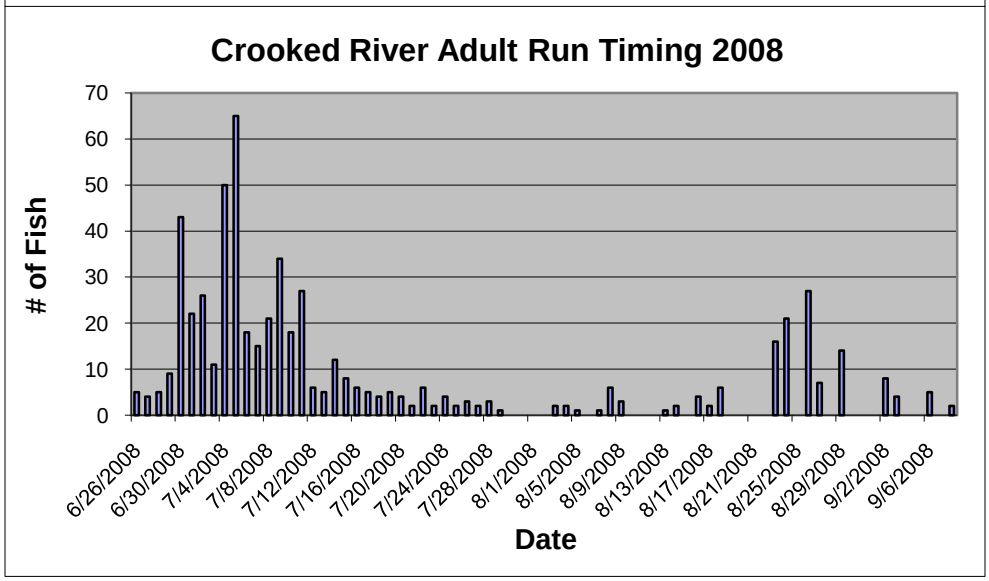
Laboratory Reporting Codes:
Results are mg/L (ppm) unless otherwise noted
ND - Not detected within the sensitivity of the instrument
- - - = No analysis performed for this contaminant
Numerical Entry = Detection at level indicated
MCL (numbers in parenthesis)= EPA maximum contaminant level

Appendix D1. Crooked River Chinook Run Timing 2008

DATE	JACK	ADULT	TOTAL
6/26/2008	0	5	5
6/27/2008	0	4	4
6/28/2008	0	5	5
6/29/2008	1	9	10
6/30/2008	3	43	46
7/1/2008	3	22	25
7/2/2008	0	26	26
7/3/2008	0	11	11
7/4/2008	7	50	57
7/5/2008	3	65	68
7/6/2008	5	18	23
7/7/2008	5	15	20
7/8/2008	5	21	26
7/9/2008	16	34	50
7/10/2008	9	18	27
7/11/2008	16	27	43
7/12/2008	3	6	9
7/13/2008	4	5	9
7/14/2008	4	12	16
7/15/2008	6	8	14
7/16/2008	8	6	14
7/17/2008	2	5	7
7/18/2008	7	4	11
7/19/2008	4	5	9
7/20/2008	2	4	6
7/21/2008	3	2	5
7/22/2008	1	6	7
7/23/2008	1	2	3
7/24/2008	2	4	6
7/25/2008	0	2	2
7/26/2008	0	3	3
7/27/2008	0	2	2
7/28/2008	0	3	3
7/29/2008	0	1	1
7/30/2008	0	0	0
7/31/2008	1	0	1
8/1/2008	0	0	0
8/2/2008	1	0	1
8/3/2008	0	2	2
8/4/2008	1	2	3
8/5/2008	0	1	1
8/6/2008	0	0	0
8/7/2008	0	1	1
8/8/2008	2	6	8
8/9/2008	1	3	4
8/10/2008	0	0	0
8/11/2008	0	0	0
8/12/2008	0	0	0
8/13/2008	0	1	1
8/14/2008	1	2	3
8/15/2008	0	0	0
8/16/2008	0	4	4
8/17/2008	0	2	2
8/18/2008	0	6	6
8/19/2008	0	0	0
8/20/2008	0	0	0
8/21/2008	0	0	0
8/22/2008	0	0	0
8/23/2008	0	16	16
8/24/2008	3	21	21
8/25/2008	0	0	0
8/26/2008	2	27	29
8/27/2008	1	7	8
8/28/2008	0	0	0
8/29/2008	2	14	16
8/30/2008	0	0	0
8/31/2008	0	0	0
9/1/2008	0	0	0
9/2/2008	0	8	8
9/3/2008	4	4	8
9/4/2008	0	0	0
9/5/2008	0	0	0
9/6/2008	4	5	9
9/7/2008	0	0	0
9/8/2008	1	2	3
TOTAL	144	587	728

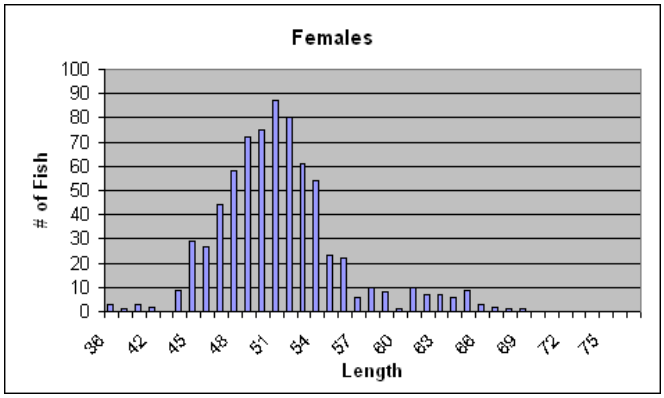
Appendix D1. Crooked River Chinook Run Timing 2008 Charts

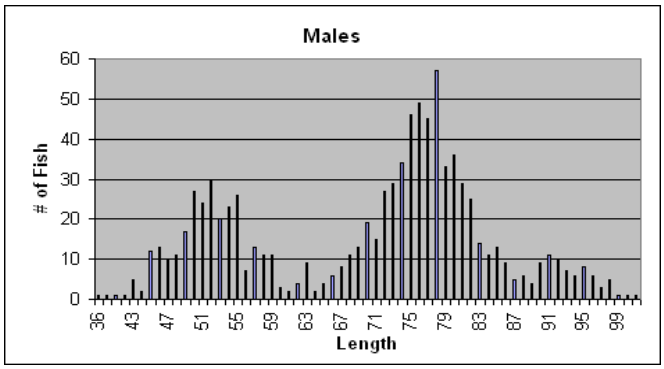


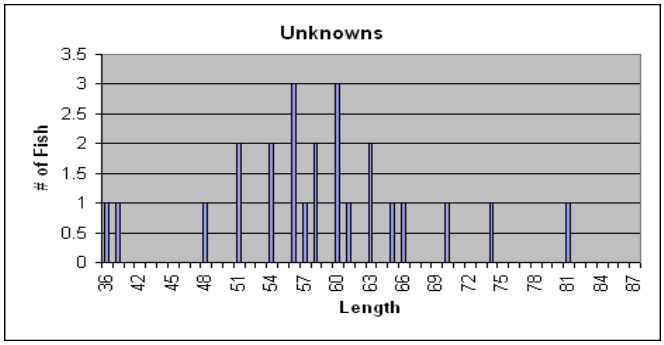


Appendix D2. South Fork Chinook Length Frequency 2008

Length	F	M	U	Total
36		1		1
39		1		1
41		1		1
42		1		1
43		5		5
44		2		2
45		12		12
46		13		13
47		10		10
48		11		11
49		17		17
50		27		27
51		24		24
52		30		30
53		20	1	21
54		23	1	24
55		26		26
56		7		7
57		13		13
58		11		11
59		11		11
60		3		3
61		2		2
62		4	1	5
63	3	9		12
64	1	2		3
65	3	4	2	9
66	2	6		8
67		8		8
68	9	11	2	22
69	29	13		42
70	27	19	3	49
71	44	15	1	60
72	58	27	2	87
73	72	29		101
74	75	34	3	112
75	87	46	1	134
76	80	49		129
77	61	45	2	108
78	54	57		111
79	23	33	1	57
80	22	36	1	59
81	6	29		35
82	10	25		35
83	8	14		22
84	1	11	1	13
85	10	13		23
86	7	9		16
87	7	5		12
88	6	6	1	13
89	9	4		13
90	3	9		12
91	2	11		13
92	1	10		11
93	1	7		8
94		6		6
95		8	1	9
96		6		6
97		3		3
98		5		5
99		1		1
100		1		1
102		1		1
Total	721	902	24	1647



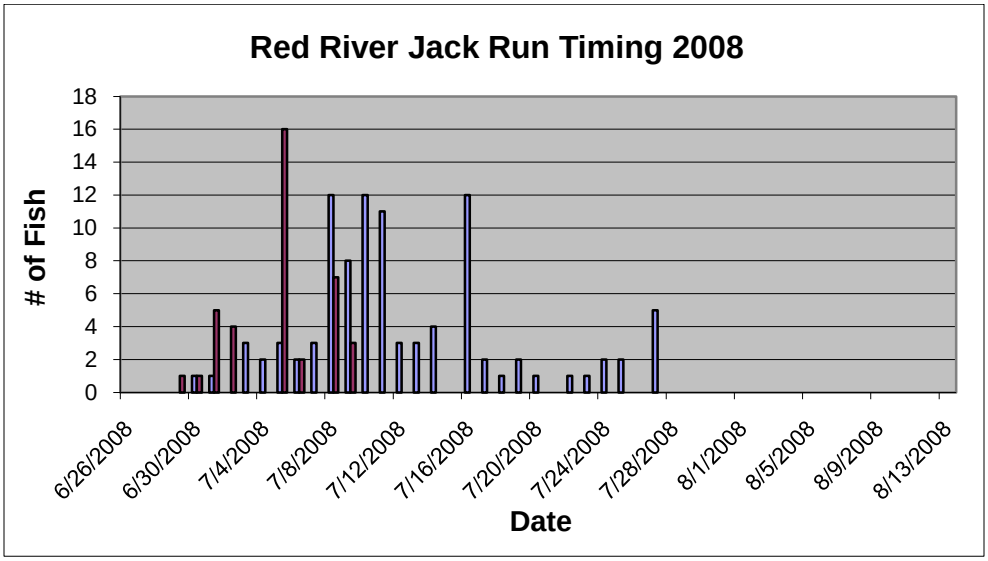


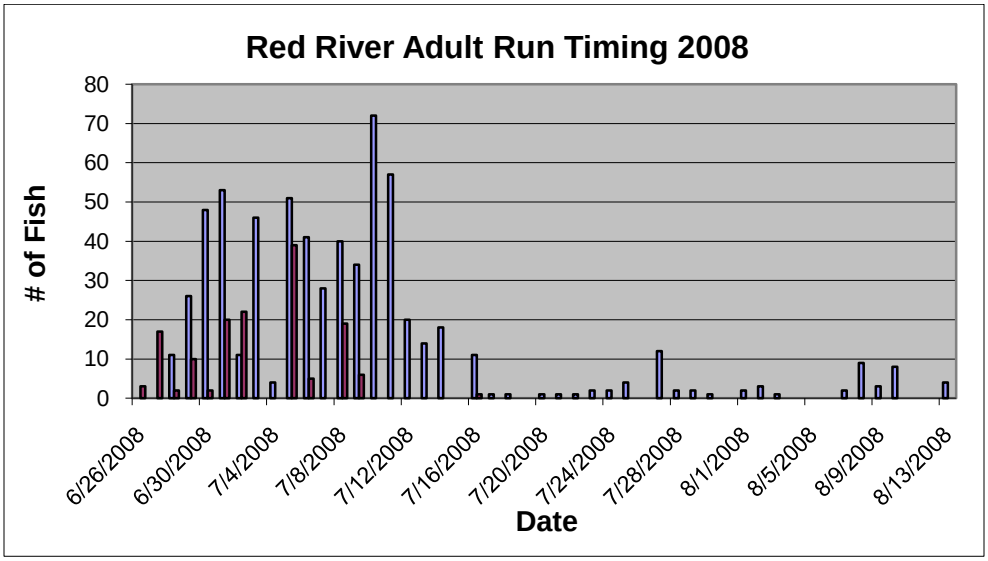


Appendix E1 Red River Chinook Run Timing 2008

DATE	JACK	ADULT	TOTAL		DATE	JACK	ADULT	TOTAL
6/26/2008	0	0	0		8/3/2008	0	1	1
6/27/2008	0	0	0		8/4/2008	0	0	0
6/28/2008	0	11	11		8/5/2008	0	0	0
6/29/2008	0	26	26		8/6/2008	0	0	0
6/30/2008	1	48	49		8/7/2008	0	2	2
7/1/2008	1	53	54		8/8/2008	0	9	9
7/2/2008	0	11	11		8/9/2008	0	3	3
7/3/2008	3	46	49		8/10/2008	0	8	8
7/4/2008	2	4	6		8/11/2008	0	0	0
7/5/2008	3	51	54		8/12/2008	0	0	0
7/6/2008	2	41	43		8/13/2008	0	4	4
7/7/2008	3	28	31		8/14/2008	0	3	3
7/8/2008	12	40	52		8/15/2008	0	17	17
7/9/2008	8	34	42		8/16/2008	0	2	2
7/10/2008	12	72	84		8/17/2008	1	10	11
7/11/2008	11	57	68		8/18/2008	1	2	3
7/12/2008	3	20	23		8/19/2008	5	20	25
7/13/2008	3	14	17		8/20/2008	4	22	26
7/14/2008	4	18	22		8/21/2008	0	0	0
7/15/2008	0	0	0		8/22/2008	0	0	0
7/16/2008	12	11	23		8/23/2008	16	39	45
7/17/2008	2	1	3		8/24/2008	2	5	7
7/18/2008	1	1	2		8/25/2008	0	0	0
7/19/2008	2	0	2		8/26/2008	7	19	26
7/20/2008	1	1	2		8/27/2008	3	6	9
7/21/2008	0	1	1		8/28/2008	0	0	0
7/22/2008	1	1	2		8/29/2008	0	0	0
7/23/2008	1	2	3		8/30/2008	0	0	0
7/24/2008	2	2	4		8/31/2008	0	0	0
7/25/2008	2	4	6		9/1/2008	0	0	0
7/26/2008	0	0	0		9/2/2008	0	0	0
7/27/2008	5	12	17		9/3/2008	0	1	1
7/28/2008	0	2	2		9/4/2008			
7/29/2008	0	2	2		9/5/2008			
7/30/2008	0	1	1		9/6/2008			
7/31/2008	0	0	0		9/7/2008			
8/1/2008	0	2	2		9/8/2008			
8/2/2008	0	3	3		TOTAL	136	783	919

Appendix E1 Red River Chinook Run Timing 2008 Charts





Appendix E2. South Fork Chinook Summary of Fish Trapped, Released, Spawned and Disposition of Carcasses Brood Year 2008

TOTAL SOUTH FORK FISH TRAPPED:

Crooked River	728
Red River	919
TOTAL	1647

AGE CLASSES	FEMALES	MALES	UNK	TOTAL
3 Years = (<64 cm)	3	284	3	290
4 Years = (64 - 82 cm)	663	489	18	1170
5 Years = (> 82 cm)	55	129	3	187
	721	902	24	1647

FISH DISPOSITION FEMALES:

Crooked River		Red River		CFH		TOTAL
				SPAWNED	576	576
MORTALITY	0	MORTALITY	0	MORTALITY	40	40
				KILLED/CWT	1	1
RELEASED	17	RELEASED	5	RELEASED	82	104
TOTAL	17	TOTAL	5	TOTAL	699	721

FISH DISPOSITION MALES:

Crooked River		Red River		CFH		TOTAL
				SPAWNED	644	644
MORTALITY	0	MORTALITY	0	MORTALITY	16	16
RELEASED	34	RELEASED	26	RELEASE	128	128
				FOOD BANK	28	28
				TRANSFER NPTH	15	15
				KILLED/CWT	11	11
TOTAL	34	TOTAL	26	TOTAL	842	902

FISH DISPOSITION UNKNOWNS:

Crooked River		Red River		CFH		TOTAL
				SPAWNED	0	0
MORTALITY	0	MORTALITY	0	MORTALITY	0	0
RELEASED	10	RELEASED	14	SPAWN/RELEASE	0	24
TOTAL	10	TOTAL	14	TOTAL	0	24

TOTAL TRAP	1647

Appendix F1 Summary of Spring Chinook Salmon returns to Crooked River by Brood Year

Brood Year	Year Released	Number Released	3-yr-olds	Year Released	4-yr-olds	Year Returned	5-yr-olds	Year Returned	Total by Return	%return from plant
1985	n/a	n/a		1988		1989	4	1990	4	
1986	n/a	n/a		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	n/a	n/a	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								
	Spr 1995	258,293								
	Spr 1995(f)	279,615								
	TOTAL	953,443	94(g)	1996	935	1997	213	1998	1274	0.134%
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	0.000%
1996	Spr 1998	205,906	122	1999	637	2000	101	2001	860**	0.417%
1997	Fall 1998	162,119								
	Spr 1999	600,981								
	TOTAL	763,100	454	2000	1878**	2001	276**	2002	2608**	0.340%
1998	Fall 1999	89,299								
	Spr 2000	399,060								
	TOTAL	488,359	34**	2001	1023**	2002	870**	2003	1927**	0.395%
1999	Fall 2000	105,507								
	Spr 2001	84,649								
	TOTAL	190,156	37**	2002	334**	2003	27**	2004	389**	0.209%
2000	Fall 2001	155,887								
	Spr 2002	726,489								
	TOTAL	882,376	156**	2003	479**	2004	144**	2005	649**	0.074%
2001	Fall 2002	169,768								
	Spr 2003	629,687								
	TOTAL	799,455	35**	2004	98**	2005	8**	2006	141**	0.017%
2002	Fall 2003	234,361								
	Spr 2004	750,317								
	TOTAL	984,678	28**	2005	405**	2006	84**	2007	517**	0.052%

Appendix F1 Summary of Spring Chinook Salmon returns to Crooked River by Brood Year

Brood Year	Year Released	Number Released	3-yr-olds	Year Released	4-yr-olds	Year Returned	5-yr-olds	Year Returned	Total by Return	%return from plant
2003	Fall 2004	64,263								
	Spr 2005	700,387								
	TOTAL	764,650	28**	2006	144**	2007	78**	2008	250**	0.033%
2004	Spr 2006	749,461	138**	2007	451**	2008	33**	2009	622**	0.082%
2005	Spr 2007	650,921	135**	2008	296**	2009		2010		
2006	Spr 2008	708,496	148**	2009		2010		2011		
2007	Spr 2009	703,101		2010		2011		2012		

(a) Transerred 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

Broodyear	Year Released	Number Released	3-yr-olds	Year Released	4-yr-olds	Year Returned	5-yr-olds	Year Returned	Total by Return	% return from plant
1982	Fall 1983	260,000								
	Spr 1984	40,000								
	TOTAL	300,000	2	1985	(a)	1986	107	1987	109	0.036%
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								
	Spr 1987(c)	96,800								
	TOTAL	193,200	3	1988	25	1989	13	1990	41	0.021%
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								
	Spr 1991(d)	63,000								
	Spr 1991(e)	124,000								
	TOTAL	460,800	5	1992	99	1993	13	1994	117	0.025%
1990	Fall 1991	354,700								
	Spr 1992(f)	207,500								
	TOTAL	562,200	1	1993	18	1994	1	1995	20	0.004%
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**	
	TOTAL	427,097	179		1244**		122**		1545**	0.360%
1998	Fall 1999	74,981								
	Spr 2000	159,051								
	TOTAL	234,032	23**	2001	494**	2002	222**	2003	739**	0.316%
1999	Fall 2000	68,684	7**	2002	40**	2003	0	2004	47**	0.069%

Appendix F2 Summary of Spring Chinook Returns to Red River by Brood Year

Broodyear	Year Released	Number Released	3-yr-olds	Year Released	4-yr-olds	Year Returned	5-yr-olds	Year Returned	Total by Return	% return from plant
2000	Fall 2001	84,238								
	Spr 2002	350,318								
	TOTAL	434,556	36**	2003	527**	2004	18**	2005	581**	0.134%
2001	Fall 2002	85,064								
	Spr 2003	351,066								
	TOTAL	436,130	18**	2004	102**	2005	14**	2006	134**	0.031%
2002	Fall 2003	108,323	22	2005	644**	2006	77**	2007	743**	0.160%
2002	Spr 2004	354,868								
2003	Spr 2005	401,362	21**	2006	249**	2007	103**	2008	373**	0.093%
2004	Spr 2006	423,603	219**	2007	623**	2008	34**	2009	876**	0.206%
2005	Spr 2007	375,759	136**	2008	347**	2009		2010		
2006	Fall 2007	122,215								
	Spr 2008	424,725								
	TOTAL	546,940	190**	2009		2010		2011		
2007	Spr 2009	404,856								

(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 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

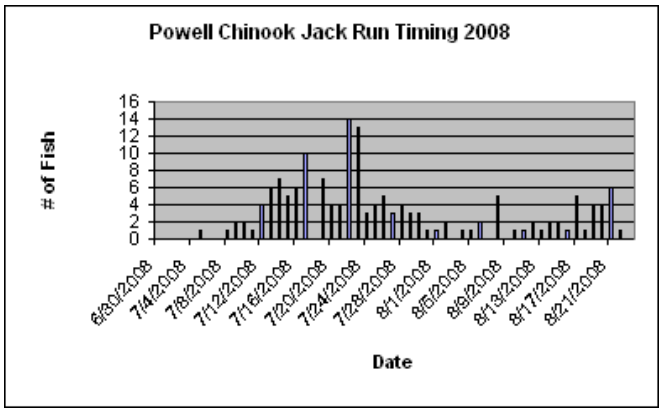
(f) Acclimated in rearing pond for 21 days, transferred from Dworshak

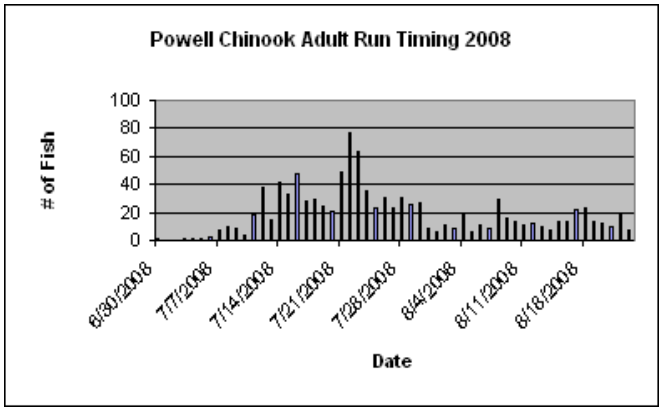
(g) These numbers do not match run report numbers, each one has been corrected to reflect straying from other stocks

**Does not included fish caught in fishery or left in river

Appendix G1 Powell/Crooked Fork Chinook Run Timing 2008

DATE	JACK	ADULT	TOTAL
6/30/2008	0	1	1
7/1/2008	0	0	0
7/2/2008	0	0	0
7/3/2008	0	1	1
7/4/2008	0	1	1
7/5/2008	1	1	2
7/6/2008	0	3	3
7/7/2008	0	7	7
7/8/2008	1	10	11
7/9/2008	2	8	10
7/10/2008	2	4	6
7/11/2008	1	18	19
7/12/2008	4	38	42
7/13/2008	6	15	21
7/14/2008	7	41	48
7/15/2008	5	33	38
7/16/2008	6	48	52
7/17/2008	10	28	38
7/18/2008	0	29	29
7/19/2008	7	25	32
7/20/2008	4	21	25
7/21/2008	4	49	53
8/15/2008	2	14	16
8/16/2008	1	13	14
8/17/2008	5	22	27
8/18/2008	1	23	24
8/19/2008	4	14	18
8/20/2008	4	12	16
8/21/2008	6	10	16
8/22/2008	1	20	21
8/23/2008	0	7	7
8/23/2008	0	7	7
8/24/2008	2	4	6
8/25/2008	3	10	13
8/26/2008	3	14	17
8/27/2008	5	6	11
8/28/2008	2	10	12
8/29/2008	1	3	4
8/30/2008	1	3	4
8/31/2008	1	2	3
9/1/2008	2	6	8
9/2/2008	1	3	4
9/3/2008	1	2	3
9/4/2008	1	0	1

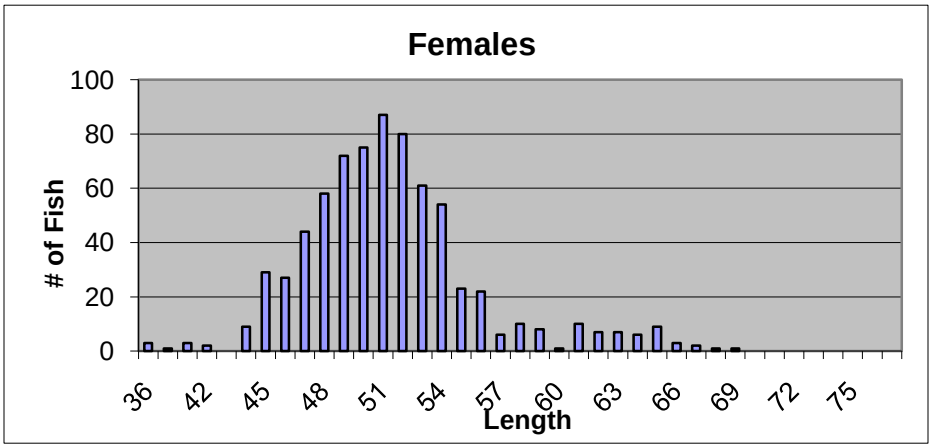


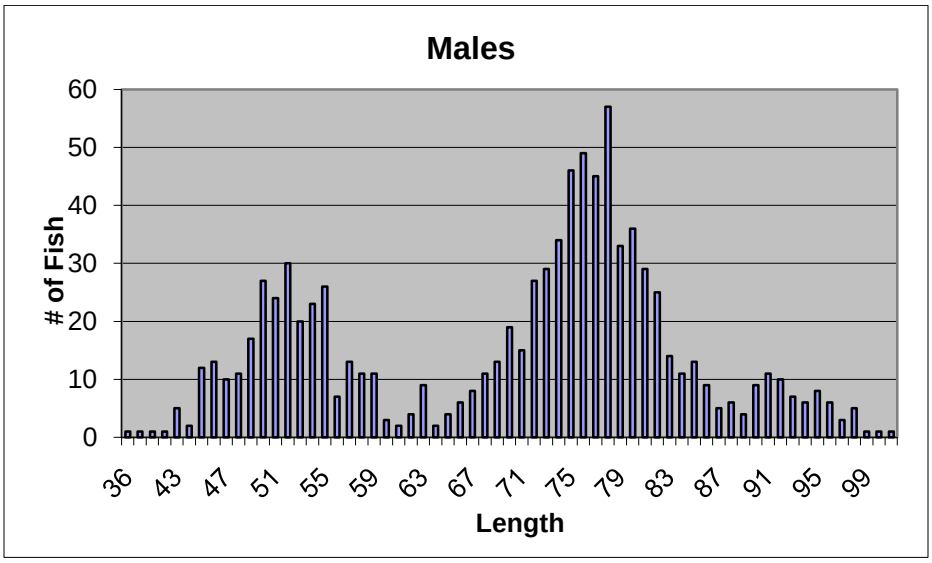


Appendix G2 Powell/Crooked Fork Chinook Length Frequency 2008

Length	F	M	Total		Length	F	M	Total
42		1	1		73	42	21	63
43		1	1		74	70	20	90
44		1	1		75	64	27	91
45		2	2		76	60	23	83
46		2	2		77	58	28	86
47		3	3		78	45	38	83
48		6	6		79	31	37	68
49		9	9		80	23	33	56
50		20	20		81	10	35	45
51		12	12		82	8	78	86
52		14	14		83	6	1	7
53		18	18		84	8	31	39
54		18	18		85	8	19	27
55		19	19		86	5	17	22
56		10	10		87	6	13	19
57		13	13		88	1	9	10
58		8	8		89	2	9	11
59		6	6		90	6	8	14
60		6	6		91		8	8
61		6	6		92	1	6	7
62		3	3		93		7	7
64	1		1		94		4	4
65		3	3		95		6	6
66	3	1	4		96		2	2
67	3	1	4		97		8	8
68	5	3	8		98		5	5
69	20	3	23		99		3	3
70	23	8	31		100		2	2
71	39	10	49		102		2	2
72	44	10	54		104		1	1
					Grand Total	592	718	1310

Appendix G2 Powell/Crooked Fork Chinook Length Frequency 2008 Charts





Appendix G3. Powell Chinook Summary of Fish Trapped, Released, Spawned and Disposition of Carcasses for Powell and Crooked Fork Adult Traps, Brood Year 2008.

TOTAL FISH TRAPPED:

Powell	1150
Crooked Fork Creek	160
TOTAL	**1310**

AGE CLASSES	FEMALES	MALES	UNK	TOTAL
3 Years = (<64 cm)	0	178	0	178
4 Years = (64 - 82 cm)	549	379	0	928
5 Years = (> 82 cm)	43	161	0	204
	592	**718**	**0**	**1310**

FISH DISPOSITION FEMALES:		
SPAWNED	489	
MORTALITY		15
KILLED/CULLED @ SPAWN	14	
RELEASED	15	
Outplant	35	
Transfer NPTH	20	
Killed/CWT	4	
TOTAL	**592**	

FISH DISPOSITION MALES:		
SPAWNED	574	
MORTALITY		4
Released	35	
Outplant	62	
Transfer NPTH	20	
Killed/CWT	23	
TOTAL	**718**	

FISH DISPOSITION UNKNOWNS:		
SPAWNED	0	
MORTALITY		0
SPAWN/RELEASE	0	
TOTAL	**0**	
TOTAL DISPOSITION	1310	

Appendix H Summary of Spring Chinook Returns to Powell by Brood Year

Broodyear	Year Released	Number Released	3-yr-olds	Year Released	4-yr-olds	Year Released	5-yr-olds	Year Released	Total by Return	% Return from plant
1984	Spr 1986	n/a		1987		1988	16	1989	16	
1985	Spr 1987	n/a		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								
	Spr 1991(c)	180,764								
	TOTAL	621,600	6	1992	204	1993	57	1994	267	0.054%
1990	Fall 1991	358,400								
	Spr 1992(d)	150,800								
	Spr 1992(e)	53,500								
	TOTAL	562,700	8	1993	28	1994	1	1995	37	0.007%
1991	Fall 1992(f)	500								
	Fall 1992(g)	-								
	TOTAL	500	1	1994	1	1995	0	1996	2	0.400%
1992	Spr 1994(h)	144,832								
	Spr 1994(i)	61,060								
	Spr 1994(j)	55,745								
	TOTAL	261,628	12	1995	141	1996	129	1997	268	0.102%
1993	Fall 1994	311,690								
	Spr 1995	290,417								
	TOTAL	602,107	45	1996	587	1997	310	1998	942	0.156%
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	2.730%
1996	Spr 1998	244,847	119	1999	877	2000	56**	2001	1052	0.430%
1997	Fall 1998	330,555								
	Spr 1999	334,482								
	TOTAL	665,037	300	2000	2210**	2001	202**	2002	2712**	0.410%
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								
	Spr 2002	349,890								
	TOTAL	909,520	129**	2003	1364**	2004	42**	2005	1535**	0.169%
2001	Fall 2002	526,733								
	Spr 2003	350,665								
	TOTAL	887,398	48**	2004	131*	2005	14**	2006	193**	0.022%

2002	Fall 2003	385,292								
	Spr 2004	376,797								
	TOTAL	762,089	27**	2005	422**	2006	156**	2007	605**	0.079%
2003	Fall 2004	343,967								
	Spr 2005	403,917								
	TOTAL	747,884	78**	2006	815**	2007	204**	2008	1097**	0.141%
2004	Fall 2005	347,299								
	Spr 2006	423,633								
	TOTAL	770,932	279**	2007	928**	2008	105**	2009	1312**	0.170%
2005	Spr 2007	373,977	178**	2008	638**	2009		2010		
2006	Fall 2007	384,520								
	Spr 2008	223,714								
	TOTAL	608,234	197**	2009		2010		2011		
2007	Spr 2009	404,115		2010		2011		2012		
2008	Spr 2010	413,158		2011		2012		2013		

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 Creek, 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 Creek
(i) Non-acclimated, transferred to rearing pond and immediately released
(j) Released directly into Walton Creek
(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 2008 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	8/6/2008	**16**	0	0	0	0	**16**	69,278	67,592	97.56%	4,330
2	8/12/2008	**70**	0	10	2	0	**58**	255,365	246,564	96.56%	4,403
3	8/15/2008	**75**	0	8	0	0	**67**	299,481	287,372	95.95%	4,469
4	8/19/2008	**125**	0	16	0	16	**93**	417,611	395,678	94.75%	4,490
5	8/22/2008	**117**	0	8	1	1	**107**	460,473	441,853	95.95%	4,303
6	8/25/2008	**61**	0	4	0	0	**57**	243,849	236,544	97.00%	4,278
7	8/28/2008	**70**	0	3	0	1	**66**	271,122	262,963	97.00%	4,108
8	9/2/2008	**27**	0	3	0	0	**24**	104,873	102,732	98.00%	4,370
Total/Average		**561**	***0***	***52***	***3***	***18***	***488***	***2,122,052***	***2,041,298***	***96.19%***	***4,375***

Appendix I2. Chinook Spawning Record 2008 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	8/7/2008	**114**	1	12	0	2	99	422,332	373,230	88.37%	4,266
2	8/11/2008	**112**	0	15	0	0	97	434,379	390,246	89.83%	4,478
3	8/14/2008	**79**	1	4	0	1	73	311,092	283,119	91.08%	4,262
4	8/18/2008	**131**	0	16	0	1	114	485,304	441,363	90.90%	4,257
5	8/21/2008	**15**	0	2	0	1	12	50,321	44,783	88.99%	4,193
Total/Average		***451***	***2***	***49***	***0***	***5***	***395***	***1,703,428***	***1,532,741***	***89.98%***	***4,312***

Appendix J. Production cost for BY08 Chinook and BY09 North Fork Steelhead

.

Rearing to Release:

	CHINOOK BY-08	**North Fork Steelhead BY-09**
Number Produced	2,767,576	854,960
Weight	156,216	190,458
% Mortality (From eyed eggs)	2.9%	12.2%
Conversion Rate	0.98	0.93

FOOD FED AND WEIGHT GAINED

	Chinook (BY-08)	**North Fork Steelhead (BY-09)**
Period Fed	December 2008-March 2010	May 2009-April 2010
Feed Used lbs.	152,518	176,948
Weight Gain	156,219	190,458
Feed Cost	**$203,318.19**	**$227,735.86**

Total Feed Cost: **$431.054.05**

Average Feed Cost per pound Weight Gain Only:

Chinook: **$1.30**

Steelhead: **$1.20**

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

Chinook **$226.53**

Steelhead **$692.25**

Total BY08 Chinook Rearing Cost **$626,944.00**

Total BY09 Steelhead Rearing Cost **$591,847.00**

BY08 Chinook & BY09 Steelhead Combined Rearing Cost

Total Budget (-) C.O.: **$1,218,791.00**

Cost per pound for Rearing Total Budget (-) C.O.

Chinook **$4.01**

Steelhead **$3.10**

Appendix K1 Summary of Fish Autopsy South Fork Clearwater

Summary of Fish Autopsy

ACCESSION NO:	10-064	LOCATION:	CLW
SPECIES:	sc	AUTOPSY DATE:	3/19/2010
STRAIN:	SFCLW	AGE:	juv
UNIT:		SAMPLE SIZE:	60
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	60	N	60	N	60	0	60	0	0	B	3	0	60	N	60	A	0	0	35
B1	0	F	0	S	0	1	0	1	0	R	17	1	0	S	0	B	20	1	25
B2	0	C	0	L	0	2	0	2	2	G	0	2	0	M	0	C	0	2	0
E1	0	M	0	S&L	0			3	3	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0	Mean=0.00		4	55	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0	Mean=0.4	
H2	0			O	0			Mean=3.88								OT	0		
M1	0																		
OT	0																		

SUMMARY OF NORMALS

	60	60	60	60	60	60	60	60	60	60
		M:		F:		U:				
SEX		0		0		0				

GENERAL REMARKS:

FINS:

GONADS:

SKIN:

OTHER: No difference in ELISA values between medicated and non-medicated.

Appendix K2. Summary of Fish Autopsy Powell

Summary of Fish Autopsy

ACCESSION NO:	10-063	LOCATION:	CLW
SPECIES:	SC	AUTOPSY DATE:	3/19/2010
STRAIN:	POW	AGE:	juv
UNIT:		SAMPLE SIZE:	60
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	60	N	60	N	60	0	60	0	0	B	2	0	60	N	60	A	0	0	55
B1	0	F	0	S	0	1	0	1	0	R	58	1	0	S	0	B	60	1	2
B2	0	C	0	L	0	2	0	2	0	G	0	2	0	M	0	C	9	2	3
E1	0	M	0	S&L	0			3	3	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0	Mean=0.00		4	57	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0	Mean=0.1	
H2	0			O	0			Mean=3.95								OT	0		
M1	0																		
OT	0																		

SUMMARY OF NORMALS

	60	60	60	60	60	60	60	60	60	60
		M:		F:						
SEX		0		0		U: 0				

GENERAL REMARKS:

FINS: GONADS:
SKIN: OTHER:

Appendix L. F129 Spring Chinook BY08 Distribution and Marking

Release BY08 Chinook Full Term Smolts

Date	Site	Number Released	Stock	Length	FPP	Pounds	Marks	Raceways	Comments
3/24-26/10	Lower Selway	402,160	Powell	5.74	15.13	26,486	144,149 Ad; 113,492 Ad/CWT; 123,598 CWT; 2,735 unmarked; 6,695 Ad/PIT; 5,596 Ad/CWT/PIT; 5,895 CWT/PIT	2E A&B; 3E A&B; 2W A; 3W A	Direct Release
3/25-26/10	Clear Creek	129,735	Powell	5.8	14.73	8,759	61,345 Ad; 58,505 Ad/CWT; 9,885 Ad/CWT/PIT	4W A; 4W B	Direct Release
3/25-26/10	Clear Creek	99,870	South Fork	5.95	14.14	7,372	42,351 Ad; 49,226 Ad/CWT; 8,293 Ad/PIT	2W B; 3W B	Direct Release
4/2,5,6/10	Powell	413,158	Powell	5.75	15.07	27,436	275,719 Ad; 119,263 Ad/CWT; 5,391 Ad/CWT/PIT; 12,785 Ad/PIT	1-3 A; 1-3 B	Acclimated in Pond~5 Hours Forced Release
3/29-31/10; 4/1,7,8/10	Red River	1,206,110	South Fork	5.69	15.55	77,661	1,073,671 Ad; 114,274 Ad/CWT; 2,995 Ad/CWT/PIT; 15,170 Ad/PIT	4-11A; 4-11B; 5W	Acclimated in Pond~5 Hours Forced Release(3 days); Acclimated in trucks (3 days)
	TOTAL	**2,251,033**				**147,714**			
	AVERAGE				**15.24**				

Release BY08 Chinook Parr

Date	Site	Number Released	Stock	Length	FPP	Pounds	Marks	Raceways	Comments
6/22,24,29/09	Upper Selway	315,252	Powell	3.23	84.9	3,713	Oxy-tet & No Clip	1E	Hauled by NPTH

Transfer BY08 Chinook Pre Smolt

Date	Site	Number Released	Stock	Length	FPP	Pounds	Marks	Raceways	Comments
9/16/2009	None	Transfer	South Fork	4.08	42	4,792	135,291 CWT; 66,000 Ad/CWT	1W	NPTH

Appendix M. BY09 Steelhead (B) Eggs Received From Dworshak National Fish Hatchery

EGG TAKE NUMBER	SPAWN DATE	EYED EGG DELIVER DATE	NUMBER OF EYED EGGS	TEMPERATURE UNITS
5	3/3/2009	3/18/2009	621,040	330
6	3/10/2009	3/25/2009	373,823	330
TOTAL			994,863	

STOCK	NUMBER OF EYED EGGS KEPT	RELEASED SMOLTS	PERCENT SURVIVAL
Dworshak	973,593	854,960	87.8

Appendix N. Steelhead BY09 Summary of Autopsy Report, Spring 2007 Release

Summary of Fish Autopsy

ACCESSION NO:	10-030	LOCATION:	CLW
SPECIES:	STB	AUTOPSY DATE:	2/18/2010
STRAIN:	NF CLW	AGE:	juv
UNIT:		SAMPLE SIZE:	60
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	60	N	60	N	60	0	60	0	0	B	60	0	60	N	60	A	60	0	40
B1	0	F	0	S	0	1	0	1	1	R	0	1	0	S	0	B	0	1	11
B2	0	C	0	L	0	2	0	2	2	G	0	2	0	M	0	C	0	2	9
E1	0	M	0	S&L	0		Mean=0.00	3	25	NO	0		Mean=0.00	G	0	D	0	3	0
E2	0	POT	0	I	0			4	5	E	0			U	0	E	0		Mean=.48
H1	0		0	OT	0			Mean=3.85		OT	0			T	0	FOT	0		
H2	0			O	0														
M1	0																		
OT	0																		

SUMMARY OF NORMALS

	60	60	60	60	60	60	60	60	60	60
SEX		M: 0		F: 0		U: 0				

GENERAL REMARKS:

FINS:
GONADS:
SKIN:
OTHER: One precocial male found.

Appendix 0. F129 BY09 Steelhead Distribution and Marking

Release BY09 Steelhead Full Term

Date	Site	Number Released	Stock	Length	FPP	Pounds	Marks	Raceway	Comments
4/12-14/10	Red River	153,644	Dwor B	8.59	4.5	34,143	149,473 No clip; 4,171 No clip/PIT	10-11E; 11W	Acclimated in pond 5-6 hours
4/19-20/10	Peasley Creek/SF CLW	176,194	Dwor B	8.59	4.5	39,154	126,206 Ad only; 45,020 Ad/CWT; 1,982 Ad/CWT/PIT; 2,986 Ad/PIT	8-9E; 10W	Direct release
4/14-15/10	Upper Crooked River	86,743	Dwor B	8.59	4.5	19,743	84,351 No clip; 2,392 No clip/PIT	11W; 12E	Direct release
4/19-20/10	Red House Hole	186,133	Dwor B	8.59	4.5	41,363	111,315 Ad; 69,581 Ad/CWT; 3,239 Ad/PIT; 1,998 Ad/CWT/PIT	8-10 W	Direct release
4/15-16/10	Newsome Creek	107,312	Dwor B	8.59	4.5	23,847	104,557 No clip; 2,755 No clip/PIT	11-12W	Direct release
4/20-21/10	Clear Creek	144,934	Dwor B	8.59	4.5	32,208	140,855 Ad; 4,079 Ad/PIT	7E-7W	Direct release
	TOTAL	**854,960**				**190,458**			