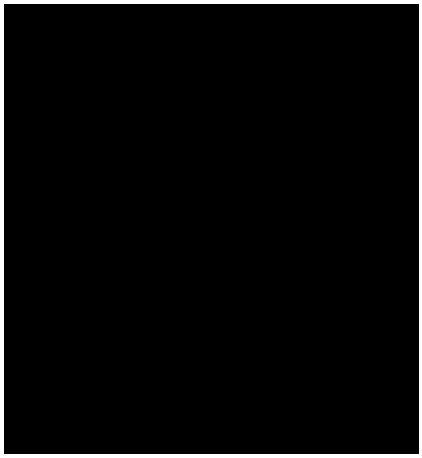

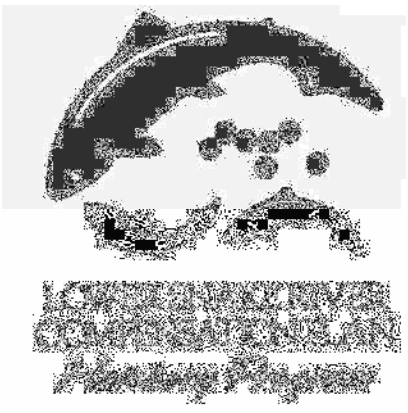

CLEARWATER FISH HATCHERY

BROOD YEAR REPORT

2003 CHINOOK AND 2004 STEELHEAD

Prepared by:

Jerry McGehee, Hatchery Manager
Randy Hutzenbiler, Assistant Hatchery Manager
Chris Shockman, Fish Culturist
Douglas Munson, Anadromous Fish Pathologist
Walter Boore, Office Specialist

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2003 CHINOOK BROOD YEAR REPORT

ABSTRACT

Clearwater

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

Powell

Two adult traps were operated in the Lochsa basin. The Crooked Fork trap was installed on June 28, 2003 and was taken out of operation on September 14, 2003.

The Walton Creek weir was installed on June 5, 2003 and taken out of operation on September 15, 2003. The run total for both traps was 1,578 fish consisting of 129 jacks and 1,449 adults. A total of 612 fish were released, 41 were stolen from holding, and 925 were held for production. A total of 369 females were spawned 18 of which were culled at spawning, 351 were kept for production, and 44 were culled due to high BKD levels, producing 1,255,390 green eggs.

A total of 343,967 Powell stock pre-smolts, 66,150 Dworshak stock pre-smolts, and 403,917 Powell stock full-term smolts were released from Powell Pond on September 26, 2004 and April 5, 2005.

South Fork (Red River/Crooked River)

Adults returning to the Crooked River and Red River weirs were combined into one South Fork stock starting in 1997. Starting with Brood Year 1998, Chinook stocks from Powell were used to backfill the South Fork populations.

The Red River weir was installed on March 17, 2003 and taken out of operation September 9, 2003. The run total of 298 fish was combined with the returning adults from Crooked River. Of the total, 124 Chinook were released.

The Crooked River weir was installed on April 4, 2003 and taken out of operation September 11, 2003. The run total of 1,360 fish was combined with returning adults from Red River. Of the total, 471 Chinook were released.

The South Fork had a run total of 1,658 fish. A total of 595 fish were released. All remaining fish were held for spawning. A total of 428 females were spawned 30 of which were culled at spawning, 398 were kept for production, and 79 were culled due to high BKD levels, producing 1,588,998 green eggs

A total of 401,362 full-term smolts were released from the Red River pond on April 4, 2005.

A total of 64,263 Dworshak stock pre-smolts were released below the Crooked River weir on September 23, 2004; 350,194 South Fork stock smolts were released from Crooked River raceways from March 29 through March 31, 2005; and 350,193 South Fork stock smolts were released below the Crooked River weir from March 29 through March 31, 2005.

Nez Perce Tribal Programs

A total of 139 females were spawned with the Nez Perce Tribal Hatchery personnel at Powell and the Clearwater Fish Hatchery to assist the NPTH in egg needs. A total of 176,895 green eggs from South Fork stock and 236,818 green eggs from Powell stock were taken to assist NPTH in egg needs.

Dworshak Spawning

A total of 177 females were spawned between August 27 and September 23, 2003 for a total of 5 egg takes. A total of 112 females were culled for IHN and BKD, and 65 females were kept for production yielding 310,167 green eggs.

INTRODUCTION

Funding Source

Construction responsibility for the Lower Snake River Compensation Plan (LSRCP) was assigned to the Walla Walla District, US Army Corps of Engineers (USACE), 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 US 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 USACE).

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

Location

The Clearwater Fish Hatchery (CFH) is located 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.

The Crooked River satellite facility is 20 miles downstream of Red River. The trap is one-half mile upstream of the mouth of the 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.

The 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 for 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 the Department 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 administrative 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 ft, then through the dam into the reservoir. The 18-inch pipe (secondary supply) is stationary at an elevation of 1,357 ft 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 (50ºF to 58ºF) 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 were put into operation June 2000. The two generators will produce approximately 2400 KW of electricity.

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

In 2000, a new 2,040 square foot (sqft) 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-ft x 40-ft area creating a new covered storage area.

Crooked River

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

Ten miles upstream from the adult trap are two raceways for summer rearing and spring acclimation of smolts. There is a cleaning waste pond and final settling pond to meet EPA water quality standards. Additional facilities include a garage, shop, walk-in freezer, and a support cabin.

Powell

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

Red River

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

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

Production Capacities by Unit

Clearwater Hatchery

The steelhead raceways consist of 300-ft x 10-ft x 6-ft deep raceways supplied by a center head raceway with an east and west bank of 12 raceways each. The total rearing space of 24 raceways is 216,000 cuft. This area will rear a maximum capacity of 2.4 million steelhead smolts with 0.3-density index (DI) (Piper 1986). A flow of approximately 1.67 cubic per second (cfs) is available for each raceway, but this flow will only allow 1.7 million steelhead to be reared in these raceways without exceeding the flow index (FI) of 1.2 (Piper). The 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 cuft. The raceways are supplied with water from both primary and secondary intakes and a mixing chamber, which allows for the control of water temperature to rear Chinook. The designed rearing capacity of these raceways is 1.5 million smolts at a 0.3 DI (Piper). The estimated flow per raceway is 2.4 cfs.

The adult holding facility consists of two ponds with a combined capacity of 8,000 cuft 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 sixty concrete vats. Each measures 40-ft x 4-ft x 3-ft deep and contains 480 cuft of rearing space. This part of the facility can rear 5.9 million fish to 287 fish per pound (fpp) at a 0.3 DI. The vats are supplied with water from each intake and have a flow of approximately 120 gpm per vat when all vats are in use. An incubation jar is plumbed directly into them. The 60 incubator jars have a total capacity of 2.6 million eggs with a flow of 15 gpm per jar. Each vat is equipped with automatic feeders controlled by adjustable time clocks.

Crooked River

The Crooked River acclimation facility has two raceways measuring 145-ft x 20-ft x 4-ft deep, for a total of 23,200 cuft. These raceways have a capacity of 700,000 juvenile Chinook with a DI of 0.29. Water flow per raceway is six 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 cuft. 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 cuft 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 cuft 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 cuft 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 cuft of rearing space. The maximum design capacity is 500,000 fish with a DI of 0.092. This pond has a hypalon plastic liner with eight to ten inch diameter cobblestones on the inclined banks. The bottom of the pond is a bare liner, which aids in pond vacuuming. A catwalk runs the entire length of the rearing pond and holds eight automatic Nielson feeders.

WATER SUPPLY

Clearwater

Clearwater Fish Hatchery receives water through two supply pipelines from Dworshak Reservoir. The warm water intake is attached to a floating platform and can be adjusted from five feet to fifty feet below the surface. The cool water intake is stationary at 245 ft 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°F 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 (Appendices 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 October 1 at the rearing facility. Temperatures ranged from 46.8°F 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°F 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, 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 for CFH and no clip/cwt fish for NPTH 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, 2003 and September 11, 2003. A total of 1,360 fish were trapped.

The Red River trap was installed on March 17, 2003 and taken out of operation on September 9, 2003. A total of 298 fish were trapped.

Age class breakdown of this run included: 192 I-ocean males; 0 I-ocean females (<64 cm); 93 II-ocean males, 281 II-ocean females, 0 II-ocean unknowns (64-82 cm); 590 III-ocean males, 502 III-ocean females, and 0 III-ocean unknowns (83+ cm) (Appendices D1, D1a, D2, D2a, E1, E1a, E2, F1 and F2).

Powell

During 2003, 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 5, 2003 and taken out of operation September 15, 2003. The Crooked Fork trap was installed June 28, 2003 and taken out of operation September 14, 2003. A total of 1,578 fish (129 jacks and 1,449 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 no clip/cwt fish for NPTH and recycling into the sport fishery all ad-clipped fish and opercle punching and releasing all unmarked fish into the Lochsa. All opercle-punched fish that returned to the trap were ponded for production. Trapping protocols for the Crooked Fork trap included transporting and ponding all ad-clipped fish for CFH and no clip/cwt fish for NPTH to Powell for production or recycling ad-clipped fish into the sport fishery. All naturals/ wild fish were released upstream.

Age class breakdown of this run included: 126 I-ocean males, 3 I-ocean females (<64 cm); 324 II-ocean males, 463 II-ocean females, 1 II-ocean unknown (64 – 82 cm); 395 III-ocean males, 264 III-ocean females, and 2 III-ocean unknowns (83+ cm) (Appendices G1, G1a, G2, G2a, G3, and H).

ADULT HOLDING

All Powell production fish were held at Powell for spawning. A total of 41 fish (15 adults and 26 jacks) were illegally taken from the Powell holding ponds throughout the summer. Several attempts were made to prevent this by notifying both Department enforcement agents and Idaho State Patrol enforcement agents. On several occasions, suspected theft from the holding ponds and trap was investigated by enforcement agents but no suspects were apprehended. To prevent future theft of fish and ensure employee safety at the Powell satellite facility, the entire complex has been enclosed with chain link fencing.

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 100 at a rate of 20 mg/kg at trapping to inhibit BKD. Fish were treated with a formalin drip for one hour every other day to prevent fungal growth. Fish held at Clearwater were treated at 150 ppm, and fish at Powell were treated at 120 ppm. After sorting, fish were treated daily at the same concentration and duration until all females were spawned.

SPAWNING AND EGG TRANSPORT

A 1:1 male/female spawning ratio was used (CFH genetics protocol for more than 100 females) at both facilities during 2003. A second male was added after one minute as a backup in case the first was not fertile.

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

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

South Fork of the Clearwater

Chinook were sorted twice per week for ripeness. The first fish was spawned August 8, 2003 and the last September 12, 2003. A total of 428 females were spawned. Pre-spawn mortality for the South Fork stock was 129 fish (12.2% 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, 2003 and the last September 15, 2003. A total of 369 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 173 fish (18.7% pre-spawn mortality).

Dworshak

A total of 177 females were spawned between August 27, 2003 and September 23, 2003 for a total of 5 egg takes. A total of 112 females were culled for IHN and BKD, and 65 females were kept for production. Twenty-seven females were used for Rapid River production, and 38 females were used for CFH production (Appendix I).

Nez Perce Tribal Programs

A total of 139 females (54 South Fork stock and 85 Powell stock) were spawned with Nez Perce Tribal Hatchery personnel at Powell and the Clearwater Fish Hatchery to assist NPTH in egg needs.

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 gpm.

Females were screened for BKD using ELISA techniques. Females with optical density (O.D.) over 0.25 on the South Fork stock and 0.25 on the Powell stock were culled. The BKD tests resulted in culling of 35 females at Powell and 75 females from the South Fork. Using an average fecundity of 4,000 eggs per fish, these culled females accounted for 492,000 green eggs.

A total of 2,740,842 green eggs were incubated from Brood Year 2003 spring Chinook salmon. Overall development from green eggs to eyed-eggs was 2,536,167, for a total eye-up percentage of 92.53%. The South Fork stock achieved 93.4% eye-up, Powell 90.6% eye-up, and Dworshak stock yielded 94.9% eye-up (Appendices I, Ia).

Beginning on the third or fourth day of incubation, all egg lots were treated with formalin to reduce fungal development. Treatments were administered three times per week at a 1:600 concentration (1,667-ppm) for 15 minutes and continued until each egg lot reached 800 temperature units (TUs).

A total of 477,123 eyed eggs (265,000 South Fork stock, 105,000 Powell stock, and 107,123 Dworshak stock) were shipped to Rapid River in October to assist in egg needs, reducing CFH eyed egg numbers to 2,059,044.

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

Nez Perce Tribe

The NPT had a total of 413,713 (236,818 Powell and 176,895 South Fork) green eggs from Brood year 2003 spring Chinook salmon. Overall development from green eggs to eyed-eggs was 385,878 for a total eye-up percentage of 93.27%. South Fork stock achieved a 94% eye-up, Powell a 92.7% eye-up. All the eggs were incubated at the NPT hatchery (Appendix I).

EARLY REARING

Swim up fry were ponded in hatchery vats at approximately 39,000 to 52,000 fish per vat. A total of 2,002,331 fry (readjusted as a result of marking) were segregated by stock and release strategies in 49 vats over a seven-month period. This gave us a survival of 97.25% from eyed egg to ponding.

Fish were started on feed within 24 to 48 hours of ponding in a full-length vat with baffles in place. Initial water flows were set at 46 gpm for approximately 10 days to initiate feeding and then increased to 92 gpm on day eleven. A final increase to 120 gpm occurred after several months where it remained until the fish were moved outside. Flow indices were held at or below 1.34 while the density index never exceeded .33 during the entire early rearing period. Water temperatures during early rearing were between 41°F and 55°F (Appendices A1 & A2).

All of the Chinook were moved outside during the marking process. The inventory number was adjusted to 1,985,906 after the marking program as a result of the hand count. The resulting hand count number revealed a discrepancy of 57,219 more fish, likely generated from egg picker problems encountered during the picking and enumeration of CFHs two largest egg takes.

FINAL REARING

At marking, Powell stock was used to fill all Lochsa River programs. South Fork programs were filled with South Fork stock. All CFH Chinook were marked between May 3, 2004 and July 23, 2004.

Most full-term smolts from the Brood Year 2003 Chinook were fed two 28-day Erythromycin prophylactic treatments. All 22 raceways were fed once and all but 9 raceways received a second medicated feeding. Bio Oregon BioDiet grower feed was used throughout the final rearing period. The pre-smolts were fed full rations until release. The full term smolts were fed full rations through marking every other day during medicated feed treatments and were fed five days on feed and two days off feed the remainder of the time. Total feed used in early and final rearing was 134,932 lbs yielding 121,155 lbs of fish reared for a final conversion of 1.11 (Appendix J). Total cost was $136,426.00.

The goal was to keep water temperatures below 55°F to reduce growth rates. Temperatures varied from 38°F to 57°F during the final rearing period with an estimated 2.1 cfs of water supplied to each raceway.

A total of 474,380 pre-smolts (343,967 Powell stock and 130,413 Dworshak stock surplus) were released between September 22, 2004 and September 26, 2004. Chinook pre-smolts to be released at Powell were reared at the satellite throughout the summer. A total of 1,505,666 smolts were released in March and April of 2005 at three different locations. CFH production released 1,980,046 fish.

FISH HEALTH

The Brood Year 2003 spring Chinook reared at CFH were from low BKD parentage with O.D. below 0.25 on the South Fork and 0.25 on the Lochsa. All Chinook eggs above this O.D. were culled.

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

All full-term smolts received a 167 ppm formalin treatment on September 11, 2004 for a Gyrodactylus and Ichtyobodo outbreak that occurred. The treatment was effective and no further fish health problems occurred.

PATHOLOGIST REPORT

Diseases Encountered and Treatments. No diseases were encountered and antibiotic treatments were limited to the one or two prophylactic erythromycin medicated treatments applied to limit *Renibacterium* in Chinook salmon, which is provided by INAD 6013. Infectious Hematopoietic Necrosis Virus (IHNV) and *Renibacterium salmoninarum* (RS) were found in brood Chinook during routine brood sampling. Female brood fish with ELISA titers higher than 0.25 were culled to limit vertical transmission of RS. A *Pseudomonas fluorescens* was cultured in 5/5 BY'03 South Fork of the Clearwater Chinook salmon when elevated mortalities were investigated in March 2004.

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 to one application. This should provide a substantial savings in feed cost if only one application of erythromycin is needed to control RS during rearing. This investigation should provide a comparison of the efficacy in one versus two prophylactic feedings of erythromycin in controlling these bacteria. Comparison should be done only on fish being reared to full term at the main facility. This year's sampling did not detect treatment differences between one and two applications using direct fluorescent antibody technique (DFAT) or enzyme linked immunosorbant assay (ELISA). Due to the water source, Clearwater Hatchery should be one of two facilities to investigate this change in protocol.

Powell Satellite

Diseases Encountered and Treatments. Diseases were not encountered during the rearing of the BY'2003 Powell spring Chinook salmon at Powell satellite facility. Preliberation samples did not detect pathogens in fall and spring releases. Adult fish were given an intraperitoneal injection of erythromycin to lessen prespawning mortality from *Renibacterium* as they were trapped. Bacterial Kidney Disease (BKD) and Infectious Hematopoietic Necrosis (IHN) were found in routine brood sampling. The IHN isolations were reported to the APHIS veterinarian-in-charge. Eggs were culled from females with ELISA titers for *Renibacterium* greater than 0.25.

Organosomatic Index. See attachments.

Acute Losses. Neither acute nor chronic losses were experienced at this facility during Brood Year 2003 rearing.

Other Assessments. Prespawning mortality should continue to be a concern at this facility. In the future, Powell may be used to backfill the South Fork of the Clearwater program, along with Rapid River Hatchery, Dworshak and Kooskia hatcheries, and the Nez Perce tribal hatchery. Thus it is important that resource partners are aware of the demand placed on Powell and the priorities for "off ramps" for surplus adult fish and eggs, as stated in the Clearwater AOP. The Clearwater Hatchery staff should be pro-active in dealing with prespawning mortality by recognizing the potential for early adult mortality and applying the correct measures to prevent excessive losses.

Red River Satellite

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

Organosomatic Index. See attachments.

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

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

FISH MARKING

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

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

FISH DISTRIBUTION

Releases from CFH occurred in two different life stages:

	CFH
Pre-smolt	474,380
Full term smolt	1,505,666
Total	1,980,046

Dworshak Stock Pre-smolts

A total of 64,263 fish (24.5 fpp) were released into Crooked River on September 23, 2004. A total of 66,150 (24.5 fpp) were released into Walton Creek on September 26, 2004. All pre-smolts were ad-clipped (Appendix L).

Powell Pre-smolts

A total of 343,967 (17.3 fpp) Powell stock pre-smolts were released into Walton Creek on September 26, 2004. All pre-smolts were ad-clipped and 700 were PIT tagged (Appendix L).

Crooked River Full term smolts

A total of 700,387 smolts (15.8 fpp) were released into Crooked River. Half of the smolts were transported to upper Crooked River and half were transported to lower Crooked River from March 29 through March 31, 2005 and released daily. All smolts were ad-clipped and 297 fish carried PIT tags (Appendix L).

Powell Full term smolts

A total of 403,917 smolts (15.7 fpp) were released into Walton Creek. Smolts were transported to Powell from March 24 through March 28, 2005. A volitional release was started on March 24, 2005 and continued until the remaining fish were forced out of the pond on April 5, 2005. All smolts were ad-clipped and 300 fish carried PIT tags (Appendix L).

Red River Full term smolts

A total of 401,362 smolts (15.5 fpp) were released into Red River. Smolts were transported to Red River from March 21 through March 23, 2005. On April 4, 2005, the pond was drained and all remaining smolts were released. All smolts were ad-clipped and 300 fish carried PIT tags (Appendix L).

BROOD YEAR 2004 STEELHEAD REPORT

ABSTRACT

Clearwater Hatchery received 1,161,957 eyed Brood Year 2004 North Fork B-run steelhead eggs from Dworshak National Fish Hatchery (DNFH). A total of 846,729 smolts from the North Fork stock were released from April 6, 2005 through April 20, 2005; 267,414 at Red House hole; 248,729 at Red River; 232,026 at Crooked River; 53,046 at Lolo Creek; 22,757 at Meadow Creek; and 22,757 at Mill Creek. The average size of fish was 4.57 fpp for a total of 199,414 pounds, and the average length was 216 mm.

A total of 210,996 lbs of feed was fed with a cost of $114,524.99 to produce 199,414 lbs of fish at Clearwater Hatchery. The conversion rate was 1.06. Survival from eyed egg to release was 86.1%.

Clearwater Hatchery received 1,515,024 green Brood Year 2004 North Fork B-run steelhead eggs from Dworshak National Fish Hatchery for the southern Idaho steelhead hatcheries. After culling and picking, 1,370,829 eyed eggs were shipped to Magic Valley Hatchery and Hagerman National Hatchery.

SYNOPTIC HISTORY

Clearwater Hatchery

Brood Source

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

Disease History

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

Spawning

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

INCUBATION

Unpicked eyed steelhead eggs were received from Dworshak Hatchery in two shipments on March 17, 2004 and March 24, 2004 (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 gpm. A total of 1,249,961 unpicked eyed eggs were received and after picking netted 1,161,957 eggs for an eye-up of 92.96% (Appendix M). This number was culled down to 983,878 to reduce surplus. During incubation, steelhead eggs were on primary water only.

A total of 1,515,024 green 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. 1,145,829 eyed eggs were shipped to Magic Valley, 210,000 were shipped to Hagerman National, and 15,000 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 90.5%.

EARLY REARING

A total of 889,351 fish were ponded in early rearing. Survival from green egg to eyed egg was 93%, and from eyed egg to ponding was 90.4%. At swim-up, unfed fry from Dworshak stock B-run steelhead were moved to vats. All fry were divided as evenly as possible into 11 vats (70,000 per vat) and later split into 20 vats to reduce density. Two raceways in the steelhead bank (4E and 4W) had fry directly ponded into them from incubation to evaluate a direct outside-ponding strategy. The initial DI was .15 and FI was .60. Fish were held in the hatchery vats until July when they were marked and moved to 16 steelhead raceways (5-12 east and 5-12 west). Average length of the fish at the end of early rearing was 3.68 inches (93.5 mm). The fish averaged 53 fpp.

The DI of the Dworshak steelhead ranged from 0.15 to 0.30, and the FI ranged from .60 to 1.69.

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

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

FINAL REARING

The juvenile Dworshak stock B-run steelhead were moved to outside steelhead raceways 5-12 east and 5-12 west. During July and August, the move was done in conjunction with fin clipping and CWT tagging to avoid double stressing the fish. Fin clipping was done in 8-hour shifts per day. Baffles were removed from vats; fish were then moved to the clipping trailers using the transfer tanks. 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 0.11 to 0.29, and the FI ranged from 0.46 to 1.67. These indexes were recalculated monthly and were never allowed to exceed DI of 0.30 or FI of 1.70.

Water temperatures during final rearing period were maintained to keep temperatures as close to 57^{o}F as possible (Appendix A2). Reservoir water temperatures climbed in mid-September to 60°F. Temperatures began to slowly increase in early April and reached 53^{o}F by late April. Estimated water flows per raceway were 2.2 cfs.

Fish were fed Bio Oregon's Biodry 1000 dry feed until March 15, 2005 and then fed Biodry 1000 laced with an EIBS vitamin pack until release. A total of 199,306 lbs of feed was used during final rearing producing 181,513 lbs of gain. A total of 210,996 lbs of feed was used throughout the entire rearing period to produce 199,414 lbs of fish at a cost of $114,524.99. The overall conversion rate from fry to smolt was 1.06. Percent body weight fed ranged from 1.3% to 5.5% (Appendix J).

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

FISH HEALTH PATHOLOGIST REPORT

External lesions from Brood Year 2004 North Fork of the Clearwater steelhead found 7/7 fish examined positive for *Flavobacterium psychrophilum,* the causative agent of coldwater disease, and 7/7 fish positive for *Aeromonas hydrophila* and *Aeromonas sobria.* Since these steelhead did not have an elevated mortality, chemotherapeutants were not applied.

Neither acute losses nor chronic losses were experienced at this facility during this rearing cycle. (Appendix N).

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	203,755	63,359	300
Clear Creek	Smolt	0	0	0
Red River	Smolt	96,488	0	2,493
Crooked River	Smolt	88,114	59,939	299
TOTAL		388,357	123,298	3,092

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

Release Site	Release Size	Non-clipped	Non-clipped/CWT	CWT/Elastomer	Pit tags
Red River (acclimated)	Smolt	49,757	0	47,539	2,506
Red River (non-acclimated)	Smolt	0	0	47,435	2,511
Crooked River	Smolt	63,117	19,960	0	597
Meadow Creek	Smolt	0	0	21,452	1.305
Mill Creek	Smolt	0	0	21,457	1.300
Lolo Creek	Smolt	52,751	0	0	295
Total		165,625	19,960	137,883	8,514

FISH DISTRIBUTION

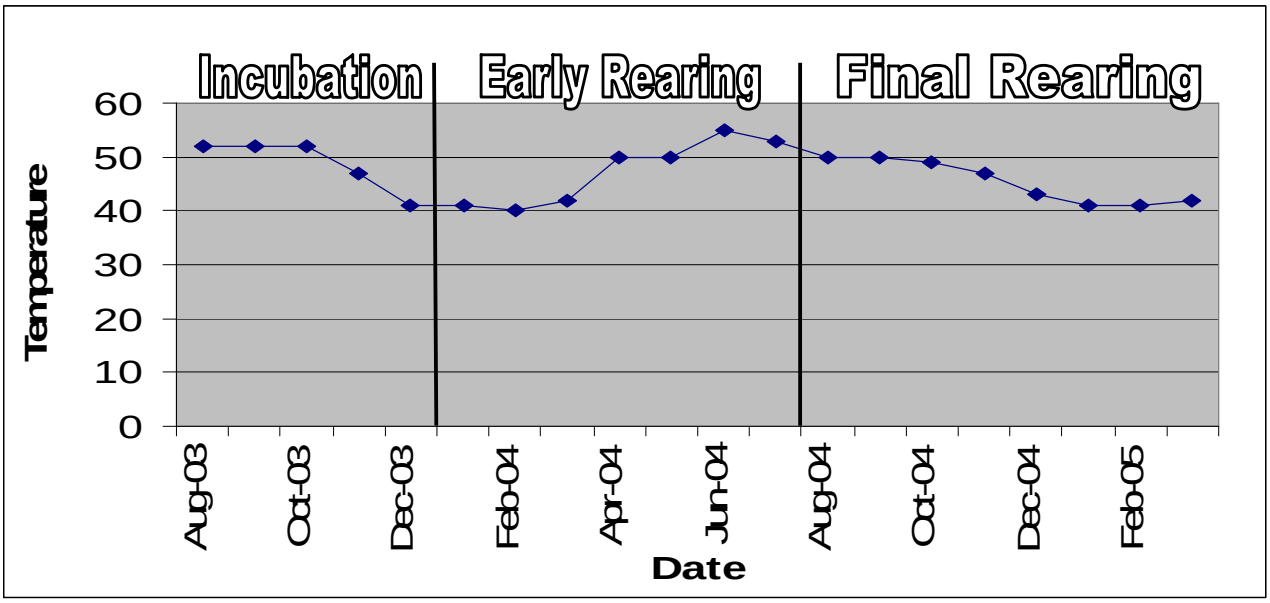
On April 18, 2005 a total of 267,414 (3.98 fpp) Dworshak B-run steelhead were direct released at the Red House Hole plant site (approximately 3.5 miles upstream of Highway 13 and 14 junctions) on the lower South Fork of Clearwater River. There were 248,729 fish, which averaged 4.25 fpp, released at Red River between April 9 and April 19, 2005. here were 232,026 fish, which averaged 4.0 fpp, released at Crooked River between April 9 and April 15, 2005. The 53,046 fish, which averaged 5.0 fpp, released at Lolo Creek were transported by NPTH on April 20, 2005. A total of 22,757 fish, which averaged 5.0 fpp, and 22,757 fish, which averaged 5.0 fpp, were released on April 18, 2005 at Meadow and Mill creeks on the South Fork of the Clearwater. There was very little crowding and hauling mortality from the fish transportation to the release sites (Appendix O).

ACKNOWLEDGEMENTS

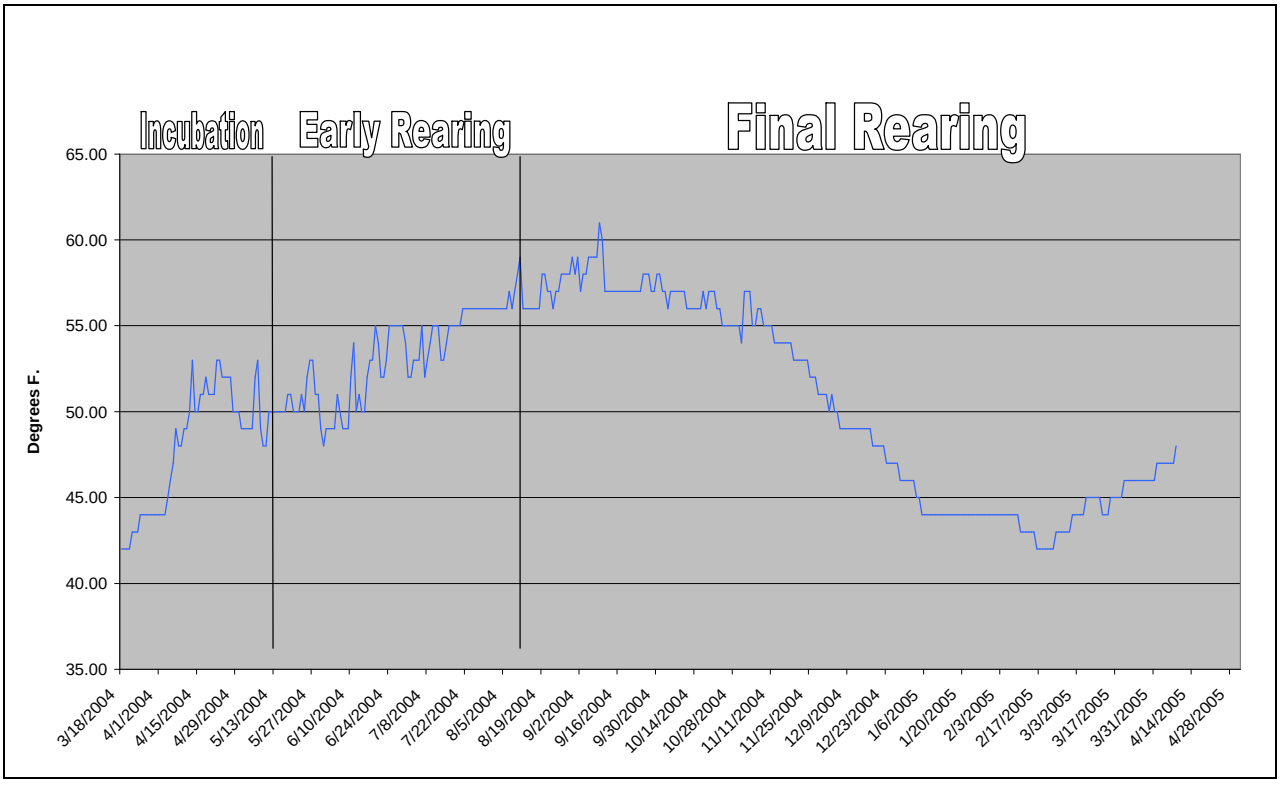
Clearwater Fish Hatchery acknowledges 40 people who contributed to the success of these programs. The hatchery crew consists of: Jerry McGehee - Hatchery Manager; Brad George and Randy Hutzenbiler - Assistant Hatchery Managers; Jeff Houck, Chris Shockman, and Pat Moore - Fish Culturists; Ernie Yost - Utility Craftsman; Walter Boore - Office Specialist II; Ron Hopper, Chad Henson, and Don West - Fish Technicians; Theresa Elliott, Gary Duke, Bob Schloss, Daryn Call, Lacey Alberts, Mike Hamilton, Tim Lee, Britney Hicks, John and Connie Daly, Keith Jackson, Paul Bentley, Brian Peterson, Tanner Hicks, Desiree Downing, Chris Stamper, Max Bausch, Jami Bahader, Mike Tetwiler, Todd Millsap, Becky Haag, and Jenny Hole - Bio-aides; Charles Ball, Kim West, and Joe Calaprice - Grounds Maintenance Workers; Fred Hough- Maintenance Craftsman; J Z Savage, Eric Morin, and Whitney Snyder – Summer Youth Program Students.

APPENDICES

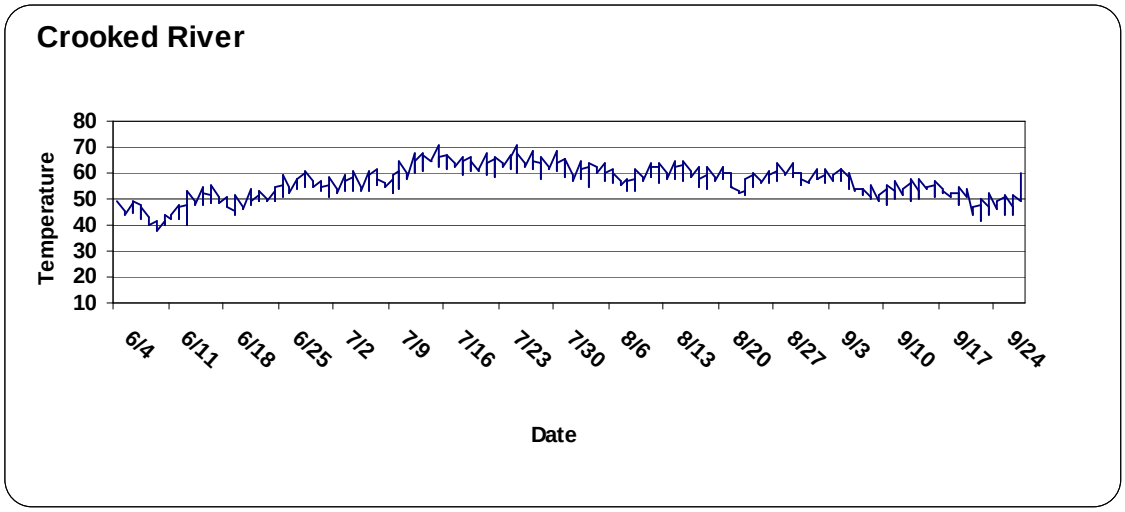
Appendix A1. Brood Year 2003 Chinook water temperatures, August 2003-April 2005

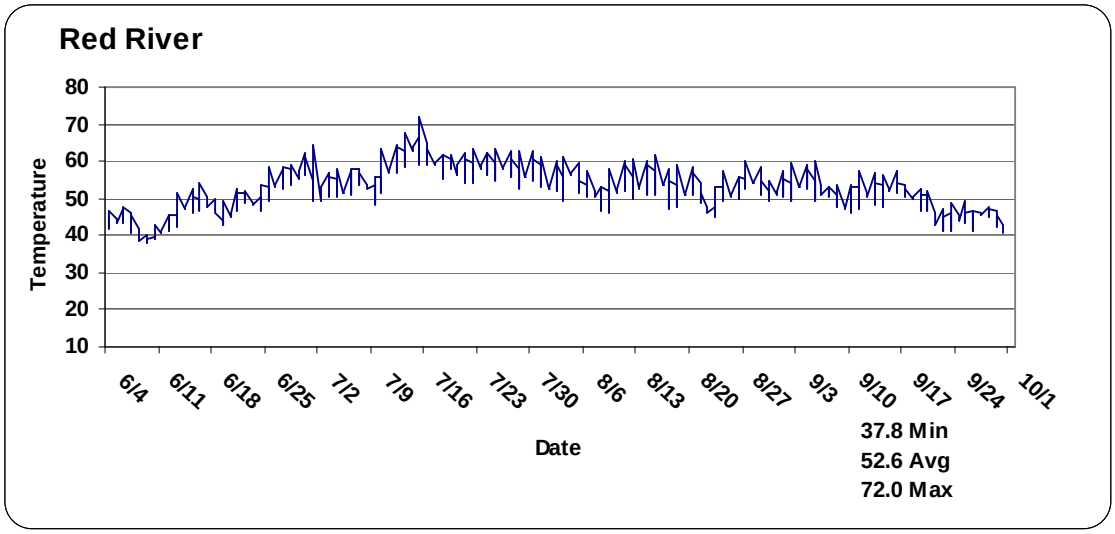


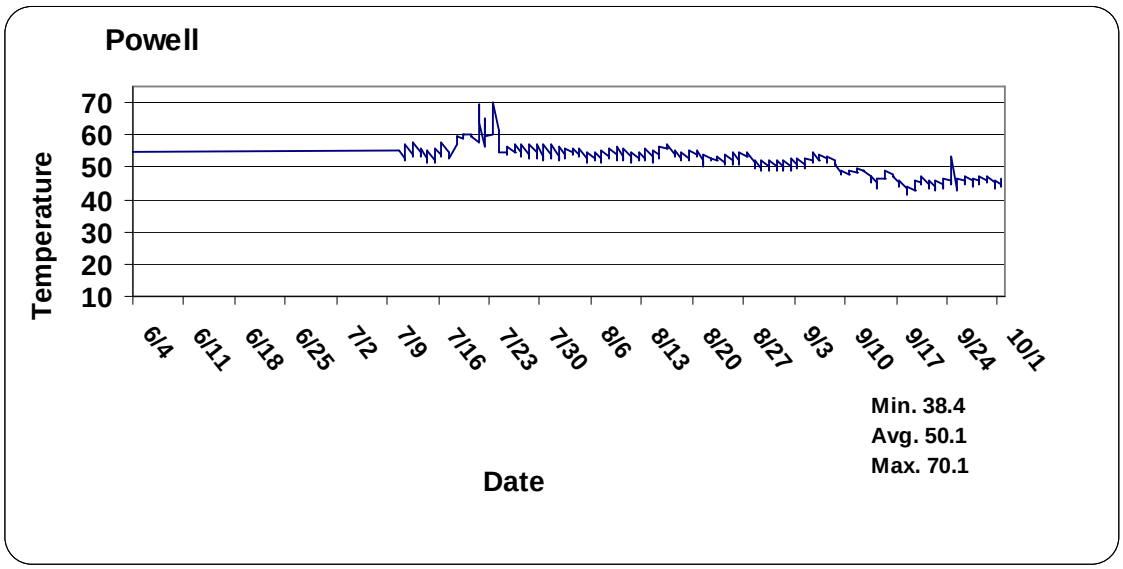
Appendix A2. Brood Year 2004 Steelhead water temperatures, March 2004-April 2005



Appendices B1, B2 and B3. Water temperatures at trap facilities.







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

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

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

PRIMARY CONTAMINANTS ANALYSIS				
Contaminant	Result	MDL	Method	Date
Antimony (0.006)	- - -	0.001	EPA 200.8	07/02/97
Nickel	- - -	0.001	EPA 200.8	07/02/97
Arsenic (0.05)	ND	0.005	EPA 200.8	07/02/97
Selenium (0.05)	ND	0.005	EPA 200.8	07/02/97
Barium (2)	0.029	0.01	EPA 200.8	07/02/97
Sodium	2.9	1	EPA 200.8	07/02/97
Beryllium (0.004)	- - -	0.001	EPA 200.8	07/02/97
Thallium (0.02)	- - -	0.001	EPA 200.8	07/02/97
Cadmium (0.005)	ND	0.001	EPA 200.8	07/02/97
Cyanide (0.2)	ND	0.01	EPA 200.8	07/02/97
Chromium (0.1)	0.002	0.005	EPA 200.8	07/02/97
Fluoride (4.0)	ND	0.1	EPA 300.0	06/27/97
Mercury (0.002)	ND	0.001	EPA 200.8	07/02/97
SECONDARY CONTAMINANTS				
Chloride	ND	0.001	EPA 300.0	06/27/97
Ammonia/N	ND	0.1	EPA 350.2	07/01/97
Color2		0.005	EPA110.2	06/27/97
Calcium	3.6	1	EPA 200.8	07/02/97
Sulfide (HS)	ND	0.01	EPA 376.1	06/27/97
Hardness (CaCO3)	12	5	2340 B0	7/02/97
Iron	0.26	0.05	EPA 236.1	07/02/97
Magnesium	0.6	1	EPA 200.8	07/02/97
Manganese	0.01	0.001	EPA 200.8	07/02/97
pH	6.9		EPA 150.1	07/02/97
Odor	- - -	1	EPA 140.1	
Potassium	0.15	1	EPA 200.8	06/27/97
Surfactants	ND	0.05	SM5540C	06/27/97
Silica(SIO3)	6.8	1	EPA 200.8	07/02/97
TDS	18	1	EPA 160.1	06/27/97
Lead	0.002	0.001	EPA 200.8	07/02/97
Zinc	0.012	0.001	EPA 200.8	07/02/97
Copper	0.016	0.001	EPA 200.8	07/02/97
Sulfate	ND	1	EPA 300.0	06/27/97
Conductivity(uS/cm)	25	10	EPA 120.1	06/27/97
Aluminum	- - -	0.001	EPA 200.8	07/02/97
Langlier Index	- - -			
Alkalinity	12	5	EPA 310.1	06/27/97
Silver	ND	0.01	EPA 200.8	07/02/97
Turbidity(NTU)	- - -	0.5	EPA 180.1	

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

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

PRIMARY CONTAMINANTS ANALYSIS				
Contaminant	Result	MDL	Method	Date
Antimony(0.006)	- - -	0.001	EPA 200.8	07/02/97
Nickel	- - -	0.001	EPA 200.8	07/02/97
Arsenic (0.05)	ND	0.005	EPA 200.8	07/02/97
Selenium(0.05)	ND	0.005	EPA 200.8	07/02/97
Barium (2)	0.009	0.01	EPA 200.8	07/02/97
Sodium	1.9	1	EPA 200.8	07/02/97
Beryllium (0.004)	- - -	0.001	EPA 200.8	07/02/97
Thallium(0.02)	- - -	0.001	EPA 200.8	07/02/97
Cadmium(0.005)	ND	0.001	EPA 200.8	07/02/97
Cyanide(0.2)	ND	0.01	EPA 200.8	07/02/97
Chromium (0.1)	0.002	0.005	EPA 200.8	07/02/97
Fluoride(4.0)	ND	0.1	EPA 300.0	06/27/97
Mercury (0.002)	ND	0.001	EPA 200.8	07/02/97
SECONDARY CONTAMINANTS				
Chloride	ND	0.001	EPA 300.0	06/26/97
Ammonia/N	ND	0.1	EPA 350.2	07/01/97
Color	4	0.005	EPA110.2	06/26/97
Calcium	4.2	1	EPA 200.8	07/02/97
Sulfide(HS)	ND	0.01	EPA 376.1	06/26/97
Hardness(CaCO3)	14	5	2340 B	07/02/97
Iron	0.15	0.05	EPA 236.1	07/02/97
Magnesium	0.7	1	EPA 200.8	07/02/97
Manganese	0.009	0.001	EPA 200.8	07/02/97
pH	- - -		EPA 150.1	
Odor	- - -	1	EPA 140.1	
Potassium	0.07	1	EPA 200.8	07/02/97
Surfactants	ND	0.05	SM5540C	06/26/97
Silica(SIO3)	5	1	EPA 200.8	07/02/97
TDS	15	1	EPA 160.1	06/26/97
Lead	0.002	0.001	EPA 200.8	07/02/97
Zinc	0.006	0.001	EPA 200.8	07/02/97
Copper	0.016	0.001	EPA 200.8	07/02/97
Sulfate	ND	1	EPA 300.0	06/26/97
Conductivity(uS/cm)	27.2	10	EPA 120.1	06/25/97
Aluminum	- - -	0.001	EPA 200.8	07/02/97
Langlier Index	- - -			
Alkalinity	- - -	5	EPA 310.1	
Silver	ND	0.01	EPA 200.8	07/02/97
Turbidity(NTU)	- - -	0.5	EPA 180.1	

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

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

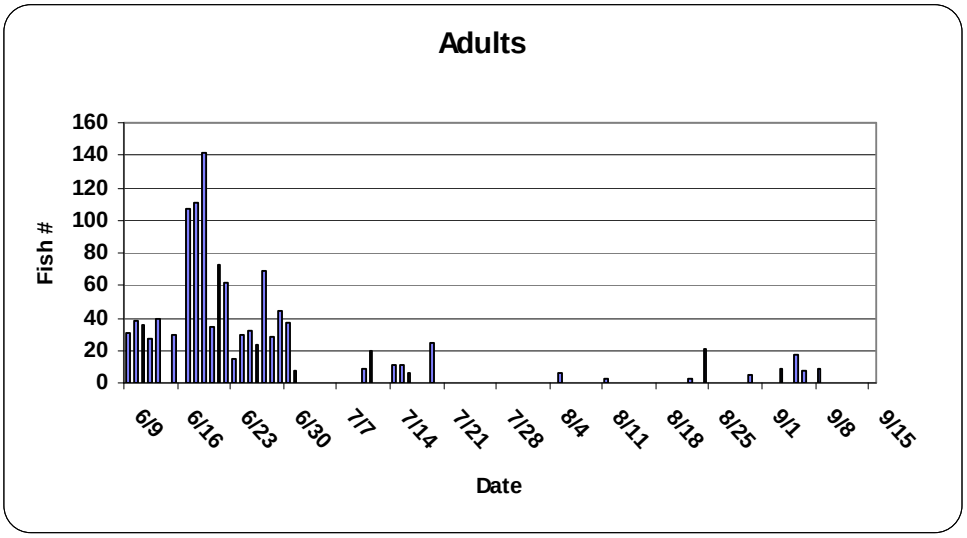
PRIMARY CONTAMINANTS ANALYSIS				
Contaminant	Result	MDL	Method	Date
Antimony (0.006)	- - -	0.001	EPA 200.8	07/16/97
Nickel	- - -	0.001	EPA 200.8	07/16/97
Arsenic (0.05)	ND	0.005	EPA 200.8	07/16/97
Selenium(0.05)	ND	0.005	EPA 200.8	07/16/97
Barium (2)	0.03	0.01	EPA 200.8	07/16/97
Sodium	3.2	1	EPA 200.8	07/16/97
Beryllium (0.004)	- - -	0.001	EPA 200.8	07/16/97
Thallium(0.02)	- - -	0.001	EPA 200.8	07/16/97
Cadmium(0.005)	ND	0.001	EPA 200.8	07/16/97
Cyanide(0.2)	ND	0.01	EPA 200.8	07/16/97
Chromium (0.1)	0.001	0.005	EPA 200.8	07/16/97
Fluoride(4.0)	ND	0.1	EPA 300.0	07/03/97
Mercury (0.002)	ND	0.001	EPA 200.8	07/16/97
Nitrate /N	ND	0.5	EPA 300.0	07/03/97
SECONDARY CONTAMINANTS				
Chloride	ND	0.001	EPA 300.0	07/03/97
Ammonia/N	ND	0.1	EPA 350.2	07/01/97
Color	15	0.005	EPA110.2	07/03/97
Calcium	3.92	1	EPA 200.8	07/16/97
Sulfide(HS)	ND	0.01	EPA 376.1	
Hardness(CaCO3)	13	5	2340 B	07/16/97
Iron	0.37	0.05	EPA 236.1	07/16/97
Magnesium	0.76	1	EPA 200.8	07/16/97
Manganese	0.014	0.001	EPA 200.8	07/16/97
pH	7.06		EPA 150.1	07/03/97
Odor	- - -	1	EPA 140.1	
Potassium	0.53	1	EPA 200.8	07/16/97
Surfactants	- - -	0.05	SM5540C	
Silica(SIO3)	7.9	1	EPA 200.8	07/16/97
TDS	21	1	EPA 160.1	07/03/97
Lead	0.002	0.001	EPA 200.8	07/16/97
Zinc	0.016	0.001	EPA 200.8	07/16/97
Copper	0.016	0.001	EPA 200.8	07/16/97
Sulfate	ND	1	EPA 300.0	07/03/97
Conductivity(uS/cm)	32	10	EPA 120.1	07/03/97
Aluminum	- - -	0.001	EPA 200.8	07/16/97
Langlier Index	- - -			
Alkalinity	- - -	5	EPA 310.1	
Silver	ND	0.01	EPA 200.8	07/16/97
Turbidity(NTU)	1.4	0.5	EPA 180.1	07/03/97

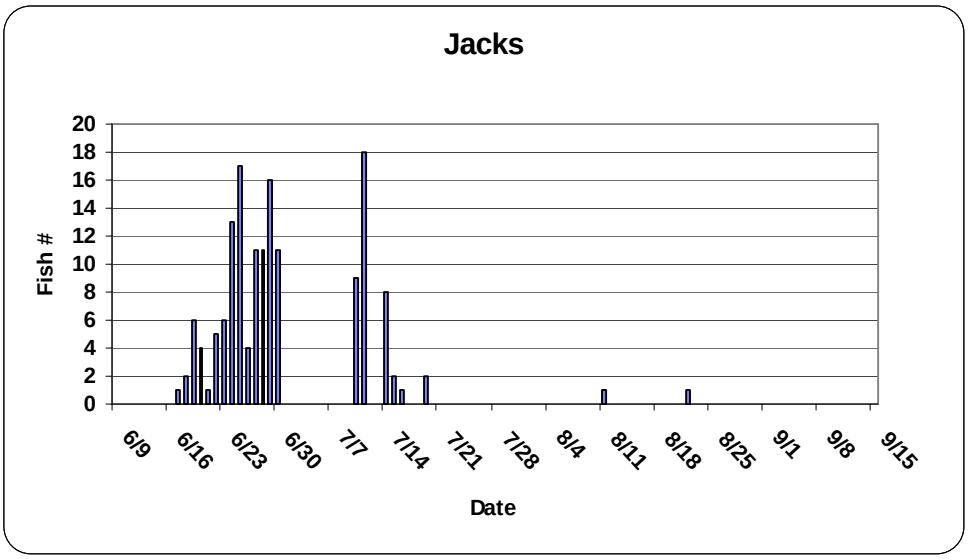
Laboratory Reporting Codes:
Results are mg/L (ppm) unless otherwise noted
ND - Not detected within the sensitivity of the instrument
- - - = No analysis performed for this contaminant
Numerical Entry = Detection at level indicated
MCL (numbers in parenthesis)= EPA maximum contaminant level

Appendix D1. Crooked River Chinook run timing 2003.

Date	Adult	Jack	Total	Date	Adult	Jack	Total
6/9	31	0	31	7/30	0	0	0
6/10	38	0	38	7/31	0	0	0
6/11	36	0	36	8/1	0	0	0
6/12	27	0	27	8/2	0	0	0
6/13	39	0	39	8/3	0	0	0
6/14	0	0	0	8/4	0	0	0
6/15	30	0	30	8/5	6	0	6
6/16	0	0	0	8/6	0	0	0
6/17	107	1	108	8/7	0	0	0
6/18	111	2	113	8/8	0	0	0
6/19	142	6	148	8/9	0	0	0
6/20	35	4	39	8/10	0	0	0
6/21	73	1	74	8/11	2	1	3
6/22	62	5	67	8/12	0	0	0
6/23	15	6	21	8/13	0	0	0
6/24	30	13	43	8/14	0	0	0
6/25	32	17	49	8/15	0	0	0
6/26	24	4	28	8/16	0	0	0
6/27	69	11	80	8/17	0	0	0
6/28	28	11	39	8/18	0	0	0
6/29	44	16	60	8/19	0	0	0
6/30	37	11	48	8/20	0	0	0
7/1	8	0	8	8/21	0	0	0
7/2	0	0	0	8/22	3	1	4
7/3	0	0	0	8/23	0	0	0
7/4	0	0	0	8/24	21	0	21
7/5	0	0	0	8/25	0	0	0
7/6	0	0	0	8/26	0	0	0
7/7	0	0	0	8/27	0	0	0
7/8	0	0	0	8/28	0	0	0
7/9	0	0	0	8/29	0	0	0
7/10	9	9	18	8/30	5	0	5
7/11	20	18	38	8/31	0	0	0
7/12	0	0	0	9/1	0	0	0
7/13	0	0	0	9/2	0	0	0
7/14	11	8	19	9/3	9	0	9
7/15	11	2	13	9/4	0	0	0
7/16	6	1	7	9/5	17	0	17
7/17	0	0	0	9/6	7	0	7
7/18	0	0	0	9/7	0	0	0
7/19	25	2	27	9/8	9	0	9
7/20	0	0	0	**TOTAL**	**1204**	**156**	**1360**
7/21	14	0	14				
7/22	0	0	0				

Appendix D1a. Crooked River run timing graph 2003.

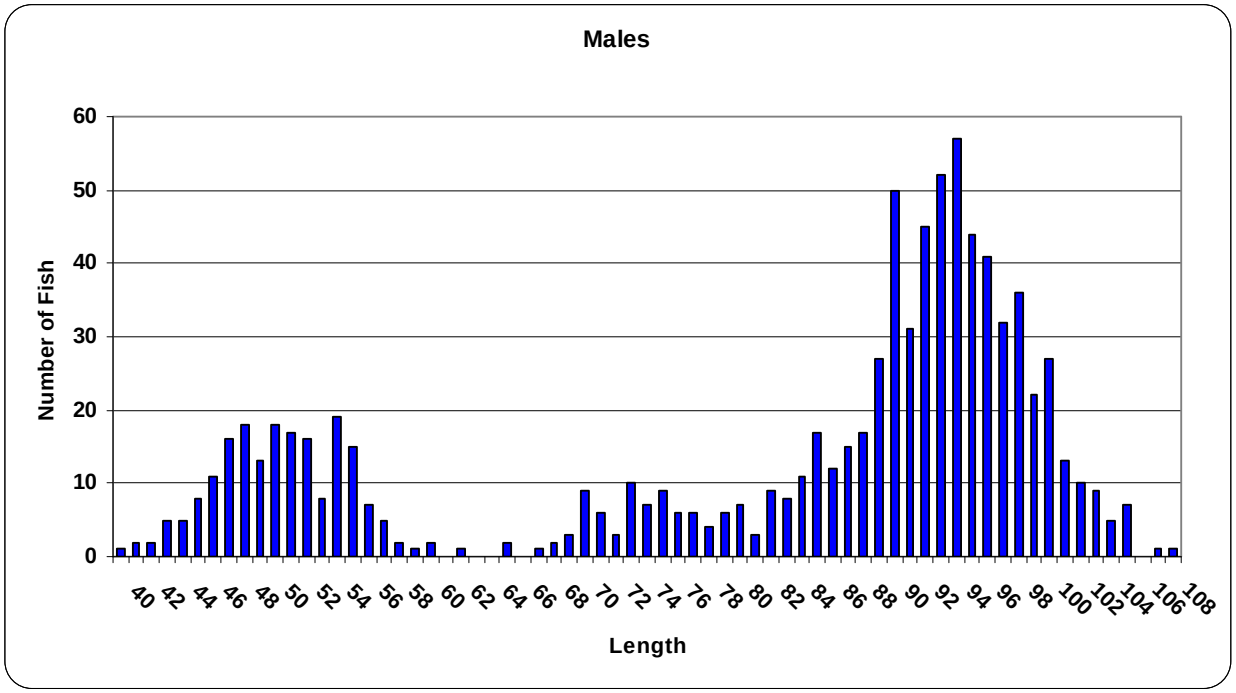


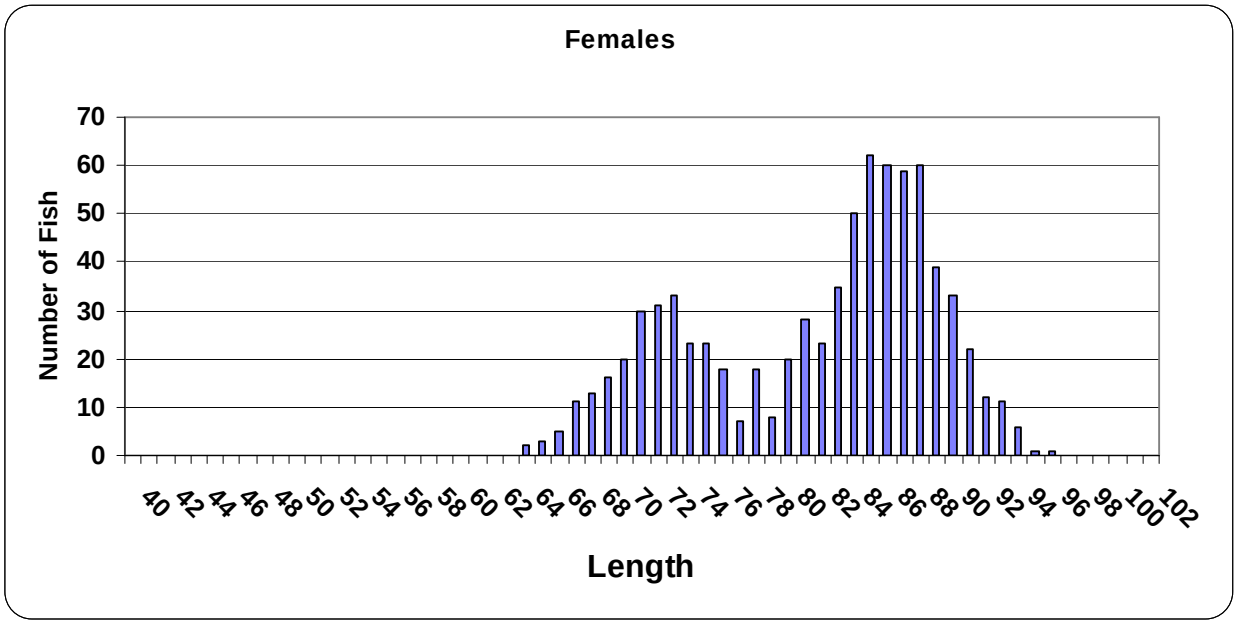


Appendix D2. South Fork (Red River/Crooked River) Chinook length frequency.

Length	Males	Females	Unk	Total	Length	Males	Females	Unk	Total
40	1	0	0	1	84	11	23	0	34
41	2	0	0	2	85	17	35	0	52
42	2	0	0	2	86	12	50	0	62
43	5	0	0	5	87	15	62	0	77
44	5	0	0	5	88	17	60	0	77
45	8	0	0	8	89	27	59	0	86
46	11	0	0	11	90	50	60	0	110
47	16	0	0	16	91	31	39	0	70
48	18	0	0	18	92	45	33	0	78
49	13	0	0	13	93	52	22	0	74
50	18	0	0	18	94	57	12	0	69
51	17	0	0	17	95	44	11	0	55
52	16	0	0	16	96	41	6	0	47
53	8	0	0	8	97	32	1	0	33
54	19	0	0	19	98	36	1	0	37
55	15	0	0	15	99	22	0	0	22
56	7	0	0	7	100	27	0	0	27
57	5	0	0	5	101	13	0	0	13
58	2	0	0	2	102	10	0	0	10
59	1	0	0	1	103	9	0	0	9
60	2	0	0	2	104	5	0	0	5
61	0	0	0	0	105	7	0	0	7
62	1	0	0	1	106	0	0	0	0
63	0	0	0	0	107	1	0	0	1
64	0	0	0	0	108	1	0	0	1
65	2	0	0	2	**Totals**	**875**	**783**	**0**	**1658**
66	0	2	0	2					
67	1	3	0	4					
68	2	5	0	7					
69	3	11	0	14					
70	9	13	0	22					
71	6	16	0	22					
72	3	20	0	23					
73	10	30	0	40					
74	7	31	0	38					
75	9	33	0	42					
76	6	23	0	29					
77	6	23	0	29					
78	4	18	0	22					
79	6	7	0	13					
80	7	18	0	25					
81	3	8	0	11					
82	9	20	0	29					
83	8	28	0	36					

Appendix D2a. South Fork (Red River / Crooked River) Length Frequency Graph.

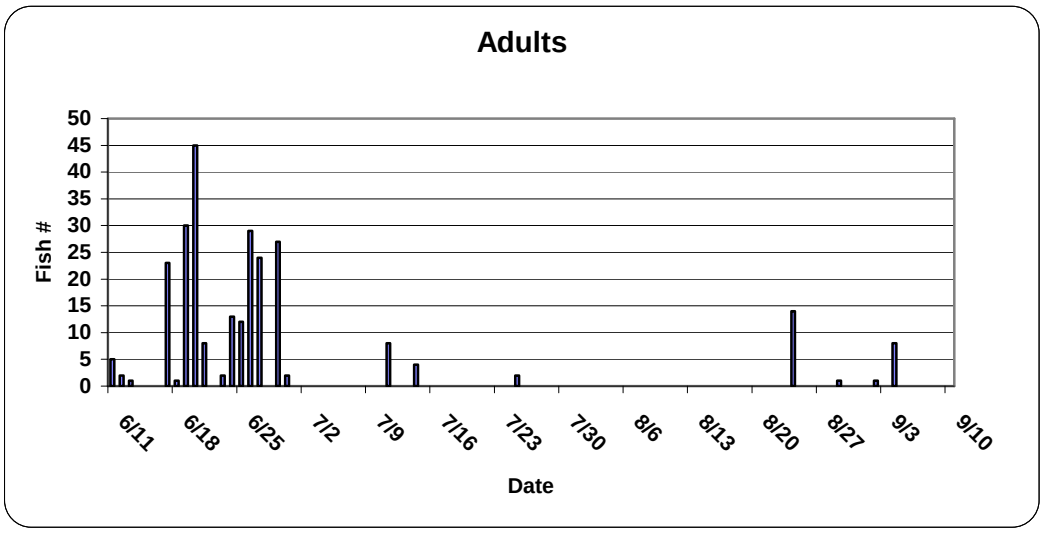


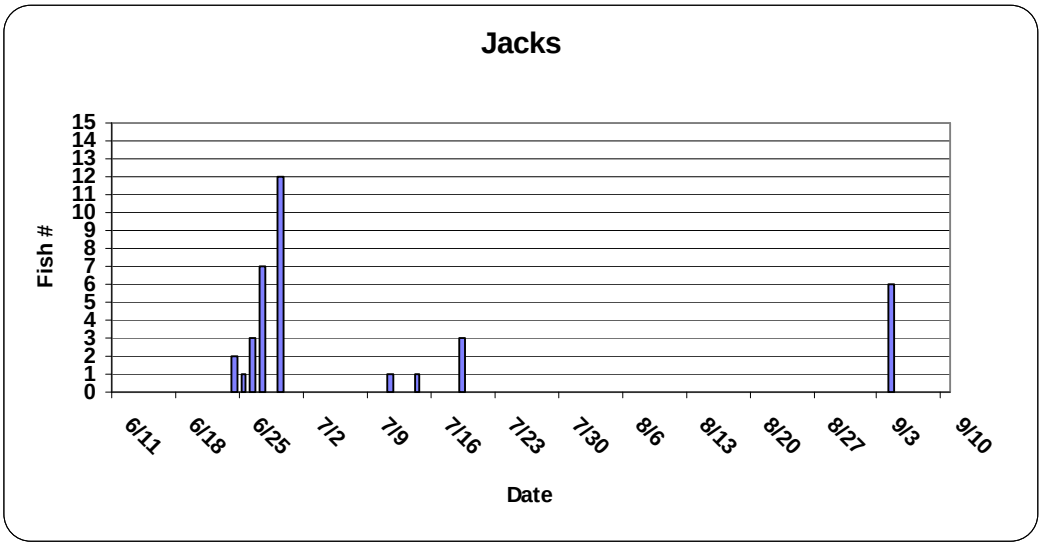


Appendix E1. Red River Chinook run timing, 2003.

Date	Adult	Jack	Total	Date	Adult	Jack	Total
6/11	5	0	5	7/25	2	0	2
6/12	2	0	2	7/26	0	0	0
6/13	1	0	1	7/27	0	0	0
6/14	0	0	0	7/28	0	0	0
6/15	0	0	0	7/29	0	0	0
6/16	0	0	0	7/30	0	0	0
6/17	23	0	23	7/31	0	0	0
6/18	1	0	1	8/1	0	0	0
6/19	30	0	30	8/2	0	0	0
6/20	45	0	45	8/3	0	0	0
6/21	8	0	8	8/4	0	0	0
6/22	0	0	0	8/5	0	0	0
6/23	2	0	2	8/6	0	0	0
6/24	13	2	15	8/7	0	0	0
6/25	12	1	13	8/8	0	0	0
6/26	29	3	32	8/9	0	0	0
6/27	24	7	31	8/10	0	0	0
6/28	0	0	0	8/11	0	0	0
6/29	27	12	39	8/12	0	0	0
6/30	2	0	2	8/13	0	0	0
7/1	0	0	0	8/14	0	0	0
7/2	0	0	0	8/15	0	0	0
7/3	0	0	0	8/16	0	0	0
7/4	0	0	0	8/17	0	0	0
7/5	0	0	0	8/18	0	0	0
7/6	0	0	0	8/19	0	0	0
7/7	0	0	0	8/20	0	0	0
7/8	0	0	0	8/21	0	0	0
7/9	0	0	0	8/22	0	0	0
7/10	0	0	0	8/23	0	0	0
7/11	8	1	9	8/24	14	0	14
7/12	0	0	0	8/25	0	0	0
7/13	0	0	0	8/26	0	0	0
7/14	4	1	5	8/27	0	0	0
7/15	0	0	0	8/28	0	0	0
7/16	0	0	0	8/29	1	0	1
7/17	0	0	0	8/30	0	0	0
7/18	0	0	0	8/31	0	0	0
7/19	0	3	3	9/1	0	0	0
7/20	0	0	0	9/2	1	0	1
7/21	0	0	0	9/3	0	0	0
7/22	0	0	0	9/4	8	6	14
7/23	0	0	0	**TOTAL**	**262**	**36**	**298**
7/24	0	0	0				

Appendix E1a. Red River run timing graph 2003.





Appendix E2. South Fork Chinook summary of fish trapped, released, spawned and disposition of carcasses, Brood Year 2003.

TOTAL SOUTH FORK FISH TRAPPED:

Crooked River	1360
Red River	298
TOTAL	**1658**

AGE CLASSES	FEMALES	MALES	UNK	TOTAL
3 Years = (<64 cm)	0	192	0	192
4 Years = (64 - 82 cm)	281	93	0	374
5 Years = (> 82 cm)	502	590	0	1092
	783	**875**	**0**	**1658**

FISH DISPOSITION FEMALES:

Crooked River		Red River		CFH		TOTAL
				SPAWNED	398	398
MORTALITY	0	MORTALITY	3	MORTALITY	90	93
				KILLED/CULLED @ SPAWN	30	30
RELEASED	219	RELEASED	43			262
TOTAL	**219**	**TOTAL**	**46**	**TOTAL**	**518**	**783**

FISH DISPOSITION MALES:

Crooked River		Red River		CFH		TOTAL
				SPAWNED	499	499
MORTALITY	0	MORTALITY	4	MORTALITY	39	43
RELEASED	252	RELEASED	81			333
TOTAL	**252**	**TOTAL**	**85**	**TOTAL**	**538**	**875**

TOTAL DISPOSITION **1658**

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

Appendix F1. Summary of spring Chinook salmon returns to Crooked River by Brood Year.

Brood Year	Year Released	Number Released	3-yr-olds	Year Returned	4-yr-olds	Year Returned	5-yr-olds	Year Returned	Total by return	% return from plant
1985	-------	-------		1988	-------	1989	4	1990	4	
1986	-------	-------		1989	23	1990	5	1991	28	
1987	Spr 1989 (a)	199,700	2	1990	13	1991	7	1992	22	0.011%
1988	Spr 1990 (b)	300,407	2	1991	208	1992	276	1993	486	0.162%
1989	Fall 1990 (c)	339,087	13	1992	119	1993	10	1994	142	0.042%
1990	Fall 1991 (a)	320,400	7	1993	15	1994	0	1995	22	0.002%
1991	-------	-------	1*	1994	0	1995	1	1996	1	0.000%
1992	Spr 1994 (d)	273,766	6	1995	241 (g)	1996	59	1997	306	0.112%
1993	Fall 1994	199,255								
	Fall 1994 (e)	216,280	94 (g)	1996	935	1997	213	1998	1274	0.134%
	Spr 1995	258,293								
	Spr 1995 (f)	279,615								
		953,443								
1994	Spr 1996	37,071	2	1997	22	1998	3	1999	27	0.073%
1995	Spr 1997	0	0	1998	0	1999	0	2000	0	0.00%
1996	Spr 1998	205,906	122	1999	637	2000	101	2001	860**	0.417%
1997	Fall 1998	162,119	454	2000	1878**	2001	276**	2002	2608**	0.340%
	Spr 1999	600,981								
		763,100								
1998	Fall 1999	89,299	34**	2001	1023**	2002	870**	2003	1927**	0.395%
	Spr 2000	399,060								
		488,359								
1999	Fall 2000	105,507	37**	2002	334**	2003	27**	2004	398**	0.209%
	Spr 2001	84,649								
		190,156								
2000	Fall 2001	155,887	156**	2003	479**	2004		2005		
	Spr 2002	726,489								
2001	Fall 2002	169,768	35**	2004		2005		2006		
	Spr 2003	629,687								
2002	Fall 2003	234,361		2005		2006		2007		
	Spr 2004	750,317								

(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		2005		
	Spr 2002	350,318								
2001	Fall 2002	85,064	18**	2004		2005		2006		
	Spr 2003	351,066								
2002	Fall 2003	108,323		2005		2006		2007		
	Spr 2004	354,868								

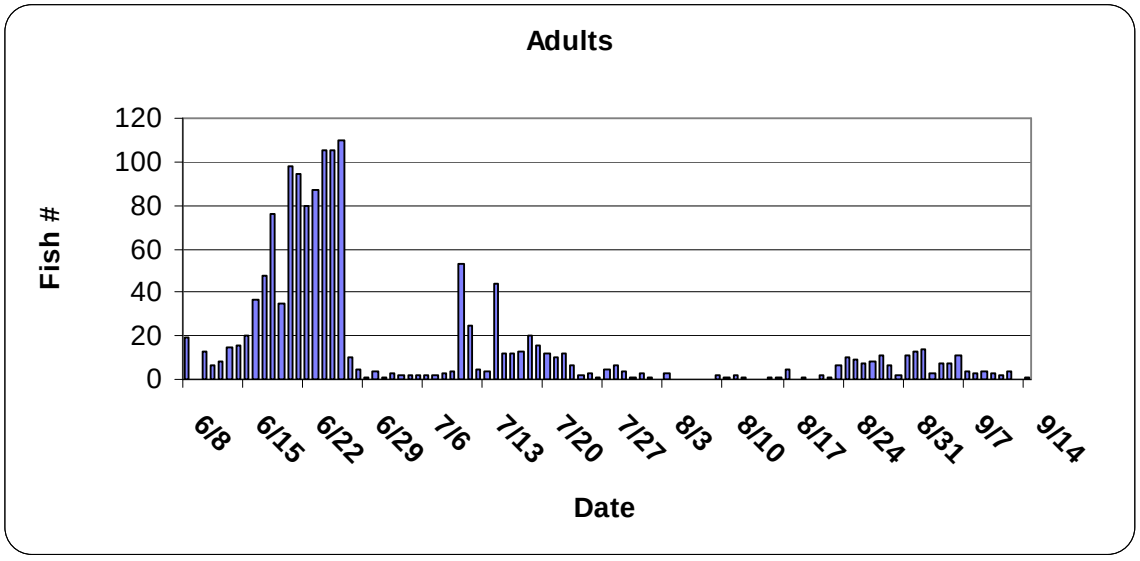
(a) Trap was not installed in 1986 due to construction
(b) These fish wintered in the rearing pond
(c) These fish were Rapid River stock reared at Sawtooth and released directly into Red River with no acclimation
(d) Planted off bridge at ranger station, reared at Dworshak Hatchery, Clearwater Stock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

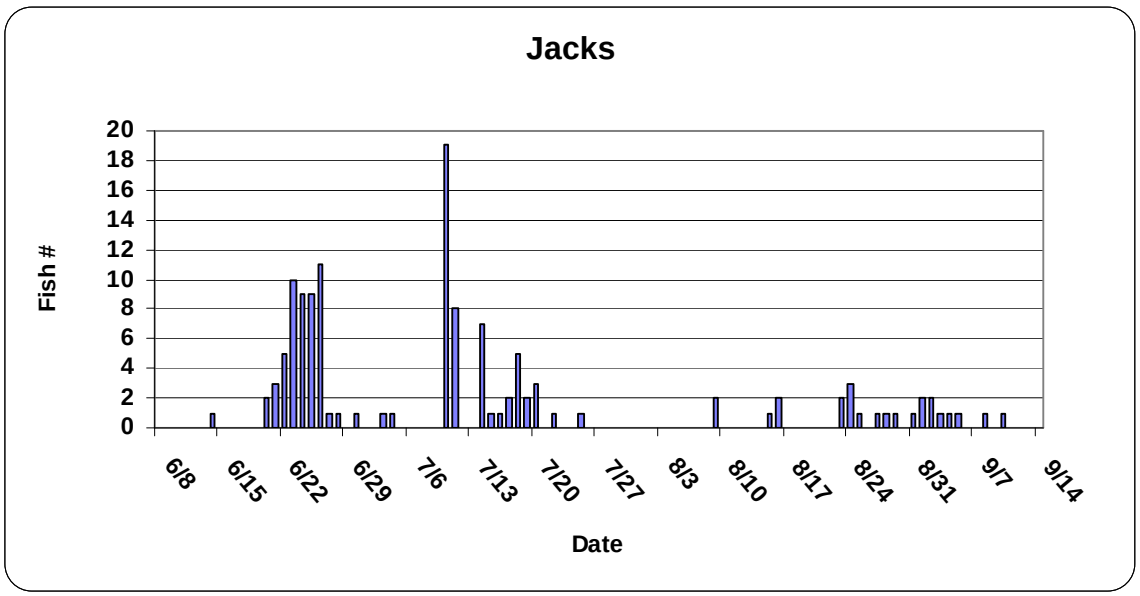
**Does not include fish caught in fishery or left in river.

Appendix G1. Powell and Crooked Fork Creek Chinook Run Timing, 2003.

Date	Adult	Jack	Total	Date	Adult	Jack	Total	Date	Adult	Jack	Total
6/8	19	0	19	7/28	6	0	6	9/9	4	0	4
6/9	0	0	0	7/29	4	0	4	9/10	3	1	4
6/10	13	0	13	7/30	1	0	1	9/11	2	0	2
6/11	6	0	6	7/31	3	0	3	9/12	4	0	4
6/12	8	0	8	8/1	1	0	1	9/13	0	0	0
6/13	15	0	15	8/2	0	0	0	9/14	1	0	1
6/14	16	1	17	8/3	3	0	3	**TOTAL**	**1449**	**129**	**1578**
6/15	20	0	20	8/4	0	0	0				
6/16	37	0	37	8/5	0	0	0				
6/17	48	0	48	8/6	0	0	0				
6/18	76	0	76	8/7	0	0	0				
6/19	35	0	35	8/8	0	0	0				
6/20	98	2	100	8/9	2	2	4				
6/21	94	3	97	8/10	1	0	1				
6/22	80	5	85	8/11	2	0	2				
6/23	87	10	97	8/12	1	0	1				
6/24	105	9	114	8/13	0	0	0				
6/25	105	9	114	8/14	0	0	0				
6/26	110	11	121	8/15	1	1	2				
6/27	10	1	11	8/16	1	2	3				
6/28	5	1	6	8/17	5	0	5				
6/29	1	0	1	8/18	0	0	0				
6/30	4	1	5	8/19	1	0	1				
7/1	1	0	1	8/20	0	0	0				
7/2	3	0	3	8/21	2	0	2				
7/3	2	1	3	8/22	1	0	1				
7/4	2	1	3	8/23	6	2	8				
7/5	2	0	2	8/24	10	3	13				
7/6	2	0	2	8/25	9	1	10				
7/7	2	0	2	8/26	7	0	7				
7/8	3	0	3	8/27	8	1	9				
7/9	4	0	4	8/28	11	1	12				
7/10	53	19	72	8/29	6	1	7				
7/11	25	8	33	8/30	2	0	2				
7/12	5	0	5	8/31	11	1	12				
7/13	4	0	4	9/1	13	2	15				
7/14	44	7	51	9/2	14	2	16				
7/15	12	1	13	9/3	3	1	4				
7/16	12	1	13	9/4	7	1	8				
7/17	13	2	15	9/5	7	1	8				
7/18	20	5	25	9/6	11	0	11				
7/19	16	2	18	9/7	4	0	4				
7/20	12	3	15	9/8	3	1	4				

Appendix G1a. Powell and Crooked Fork Creek Chinook Run Timing Graph, 2003.

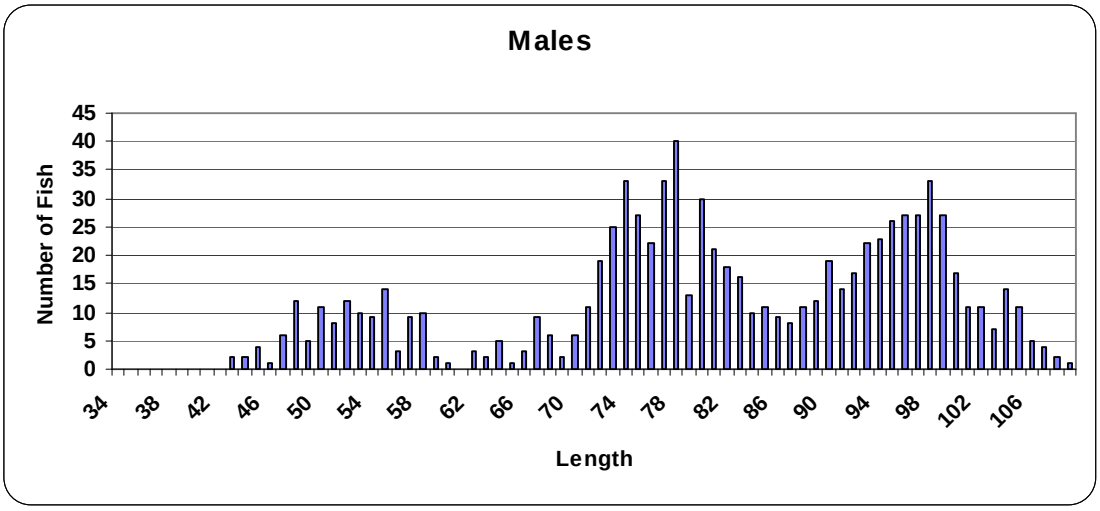


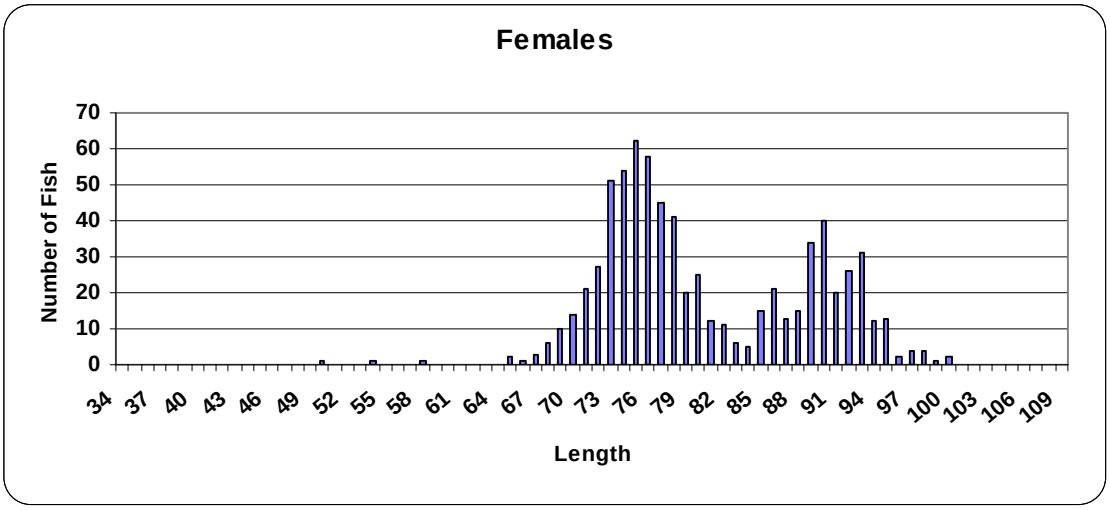


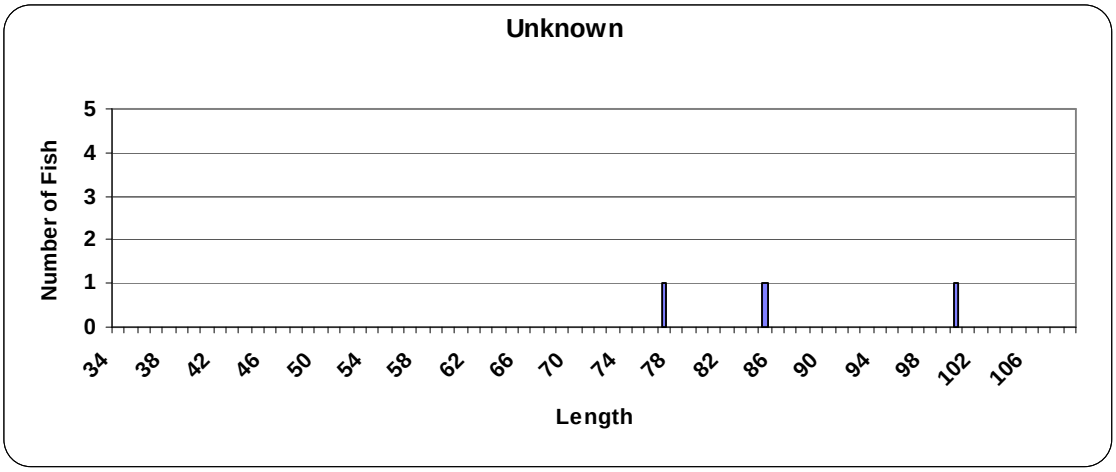
Appendix G2. Powell and Crooked Fork Creek Chinook length frequency 2003.

Length	Males	Females	Unk	Total	Length	Males	Females	Unk	Total
34	0	0	0	0	83	16	6	0	22
35	0	0	0	0	84	10	5	0	15
36	0	0	0	0	85	11	15	1	27
37	0	0	0	0	86	9	21	0	30
38	0	0	0	0	87	8	13	0	21
39	0	0	0	0	88	11	15	0	26
40	0	0	0	0	89	12	34	0	46
41	0	0	0	0	90	19	40	0	59
42	0	0	0	0	91	14	20	0	34
43	2	0	0	2	92	17	26	0	43
44	2	0	0	2	93	22	31	0	53
45	4	0	0	4	94	23	12	0	35
46	1	0	0	1	95	26	13	0	39
47	6	0	0	6	96	27	2	0	29
48	12	0	0	12	97	27	4	0	31
49	5	0	0	5	98	33	4	0	37
50	11	1	0	12	99	27	1	0	28
51	8	0	0	8	100	17	2	1	20
52	12	0	0	12	101	11	0	0	11
53	10	0	0	10	102	11	0	0	11
54	9	1	0	10	103	7	0	0	7
55	14	0	0	14	104	14	0	0	14
56	3	0	0	3	105	11	0	0	11
57	9	0	0	9	106	5	0	0	5
58	10	1	0	11	107	4	0	0	4
59	2	0	0	2	108	2	0	0	2
60	1	0	0	1	109	1	0	0	1
61	0	0	0	0	**TOTAL**	**845**	**730**	**3**	**1578**
62	3	0	0	3					
63	2	0	0	2					
64	5	0	0	5					
65	1	2	0	3					
66	3	1	0	4					
67	9	3	0	12					
68	6	6	0	12					
69	2	10	0	12					
70	6	14	0	20					
71	11	21	0	32					
72	19	27	0	46					
73	25	51	0	76					
74	33	54	0	87					
75	27	62	0	89					
76	22	58	0	80					
77	33	45	1	79					
78	40	41	0	81					
79	13	20	0	33					
80	30	25	0	55					
81	21	12	0	33					
82	18	11	0	29					

Appendix G2a. Powell and Crooked Fork Creek Length Frequency, 2003.







Appendix G3. Powell Chinook summary of fish trapped, released, spawned and disposition of carcasses For Powell and Crooked Fork adult traps, Brood Year 2003

TOTAL FISH TRAPPED:	
Powell	1440
Crooked Fork Creek:	138
TOTAL	**1578**

AGE CLASSES		**FEMALES**	**MALES**	**UNKNOWN**	**TOTAL**
3 Years = (<64 cm)		3	126	0	129
4 Years = (64 - 82 cm)		463	324	1	788
5 Years = (> 83 cm)		264	395	2	661
	TOTAL	**730**	**845**	**3**	**1578**

FISH DISPOSITION FEMALES:

SPAWNED		351
MORTALITY		132
KILLED/CULLED @ SPAWN		18
RELEASED		229
	TOTAL	**730**

FISH DISPOSITION MALES:

SPAWNED		383
MORTALITY		41
RELEASED		383
STOLEN		41
	TOTAL	**848***

*The three (3) unknown fish at trapping were determined to be males at disposition.

TOTAL DISPOSITION	**1578**

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		2005		
	Spr 2002	349,890								
2001	Fall 2002	526,733	48**	2004		2005		2006		
	Spr 2003	350,665								
2002	Fall 2003	385,292		2005		2006		2007		
	Spr 2004	376,797								

(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 I. Chinook spawning record 2003 for the South Fork, Dworshak, and NPT

SOUTH FORK (Red River / Crooked River)

		Number of Females		Females Culled		Females Kept		Green Eggs		Eyed Eggs		Percent Eye Up		Fecundity	
Lot	Spawn Date	NPT	Production	NPT	Production	NPT	Production	NPT	Production	NPT	Production	NPT	Production	NPT	Production
1	8/8/03	0	18	0	4	0	14	0	77,952	0	70,182	0.0%	90.0%	0	5,568
2	8/12/03	0	18	0	2	0	16	0	83,010	0	78,814	0.0%	95.0%	0	5,188
3	8/15/03	0	37	0	6	0	31	0	175,775	0	157,386	0.0%	90.0%	0	5,670
4	8/19/03	1	95	0	23	1	72	4,555	340,257	4,036	311,675	88.6%	91.6%	4,555	4,726
5	8/22/03	8	78	0	22	8	56	26,289	293,817	24,199	284,799	92.0%	96.9%	3,286	5,247
6	8/26/03	8	53	1	12	7	41	27,464	222,642	25,024	213,227	91.1%	95.8%	3,923	5,430
7	8/29/03	11	17	0	3	11	14	32,135	66,251	30,981	63,058	96.4%	95.2%	2,921	4,732
8	9/3/03	11	18	1	1	10	17	32,743	79,735	30,769	76,432	94.0%	95.9%	3,274	4,690
9	9/5/03	7	4	1	1	6	3	18,228	14,819	17,645	13,935	96.8%	94.0%	3,038	4,940
10	9/9/03	7	6	1	1	6	5	29,677	28,529	27,927	20,425	94.1%	71.6%	4,946	5,706
11	9/12/03	1	0	0	0	1	0	5,804	0	5,755	0	99.2%	0.0%	5,804	0
***Post Marking Inventory Adjustment done on 7/30/2004**									***29,316***		***29,316***				
	Sub-Total	***54***	***344***	***4***	***75***	***50***	***269***	***176,895***	***1,412,103***	***166,336***	***1,319,249***	***94.0%***	***93.4%***	***3,538***	***5,249***
	Total	**398**		**79**		**319**		**1,588,998**		**1,514,901**					

DWORSHAK

		Number of Females		Females Culled		Females Kept		Green Eggs		Eyed Eggs		Percent Eye Up		Fecundity	
Lot	Spawn Date		Production		Production		Production		Production		Production		Production		Production
*1	8/27/03		37		32		5		23,889		22,692		95.0%		4,778
*2	9/3/03		39		14		25		131,048		123,073		93.9%		5,242
*3	9/9/03		21		13		8		40,015		39,300		98.2%		5,002
**4	9/16/03		49		34		15		62,602		58,400		93.3%		4,174
**5	9/23/03		31		19		12		50,588		48,723		96.3%		4,216
***Post Marking Inventory Adjustment done on 7/30/2004**									***2,025***		***2,025***				
	Sub-Total		***177***		***112***		***65***		***310,167***		***294,213***		***94.9%***		***4,772***
	Total	**177**		**112**		**65**		**310,167**		**294,213**					

***Used as South Fork FTS**

****Rapid River production**

APPENDIX Ia. Chinook spawning record 2003 for Powell

POWELL

Lot	Spawn Date	Number of Females		Females Culled		Females Kept		Green Eggs		Eyed Eggs		Percent Eye Up		Fecundity	
		NPT	Production	NPT	Production	NPT	Production	NPT	Production	NPT	Production	NPT	Production	NPT	Production
1	8/7/03	0	20	0	3	0	17	0	75,521	0	68,676	0.0%	90.0%	0	4,442
2	8/11/03	0	31	0	3	0	28	0	146,181	0	126,221	0.0%	86.4%	0	5,221
3	8/14/03	2	30	0	2	2	28	6,376	139,580	6,154	126,811	96.5%	90.9%	3,188	4,985
4	8/18/03	8	42	1	3	7	39	23,147	157,610	21,705	135,473	93.8%	86.0%	3,307	4,041
5	8/21/03	10	36	1	4	9	32	27,916	123,156	25,324	111,248	90.7%	90.3%	3,102	3,849
6	8/25/03	21	32	1	7	20	25	58,778	117,335	53,835	110,152	91.6%	93.9%	2,939	4,693
7	8/28/03	23	30	1	6	22	24	65,996	84,968	61,901	77,721	93.8%	91.5%	3,000	3,540
8	9/2/03	10	16	3	4	7	12	24,297	48,800	21,796	45,779	89.7%	93.8%	3,471	4,067
9	9/4/03	8	10	1	1	7	9	22,998	34,769	21,880	33,066	95.1%	95.1%	3,285	3,863
10	9/8/03	0	13	0	2	0	11	0	42,226	0	40,870	0.0%	96.8%	0	3,839
11	9/11/03	2	6	1	0	1	6	4,194	22,548	4,037	20,810	96.3%	92.3%	4,194	3,758
12	9/15/03	1	0	0	0	1	0	3,116	0	2,910	0	93.4%	0.0%	3,116	0
									25,878		***25,878***				
	Sub-Total	***85***	***266***	***9***	***35***	***76***	***231***	***236,818***	***1,018,572***	***219,542***	***922,705***	***92.7%***	***90.6%***	***3,116***	***4,409***
	Total	**351**		**44**		**307**		**1,255,390**		**1,142,247**					

***Post Marking Inventory Adjustment done on 7/30/2004**

Appendix J. Production cost for Brood Year 2003 Chinook and Brood Year 2004 North Fork Steelhead.

Rearing to Release:

	CHINOOK BY-03	**North Fork Steelhead BY-04**
Number Produced	1,980,046	846,729
Weight	121,155	199,414
% Mortality (From eyed eggs)	3.84%	13.9%
Conversion Rate	1.11	1.06

FOOD FED AND WEIGHT GAINED

	Chinook (BY-03)	**North Fork Steelhead (BY-04)**
Period Fed	November 2003-March 2005	April 2004-April 2005
Feed Used lbs.	134,932	210,996
Weight Gain	121,155	199,414
Feed Cost	**$136,426.00**	**$114,525.00**

Total Feed Cost: **$250,951**

Total Budget (-) C.O.: **$992,799**

Average Feed Cost per pound only
Chinook: **$1.12**
Steelhead: **$0.57**

Total Expenditure (-) C.O.
Cost per pound: **$3.09**

Cost Per 1,000 fish using entire budget
Chinook **$199.42**
Steelhead **$705.39**
Combined **$351.09**

Appendix K1. Crooked River Brood Year 2003 spring Chinook summary of fish autopsy, spring 2005 releases.

Summary of Fish Autopsy

ACCESSION NO:	05-086	LOCATION:	CLW
SPECIES:	sc	AUTOPSY DATE:	3/26/2005
STRAIN:	SFCLW	AGE:	juv
UNIT:		SAMPLE SIZE:	20
RIVER FOR AUTOPSY:	Prelib.		
INVESTIGATOR(S):	Munson		
REMARKS:			

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
LENGTH	0.00	0.00	0.00
WEIGHT	0.00	0.00	0.00
KTL*	0.00	0.00	0.00
CTL*	0.00	0.00	0.00
HEMATOCRIT	48.20	3.31	0.07
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN	8.59	0.70	0.08

*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	0	0	20	N	20	A	0	0	10
B1	0	F	0	S	0	1	0	1	0	R	20	1	0	S	0	B	9	1	8
B2	0	C	0	L	0	2	0	2	1	G	0	2	0	M	0	C	11	2	2
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	13	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0	Mean=0.6	
H2	0			O	0			Mean=3.6								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:	Fish at 16.5 FPP

Appendix K2. Powell Brood Year 2003 Chinook, summary of fish autopsy, fall 2004 release

Summary of Fish Autopsy

CESSION N	04-449	LOCATION:	Powell
ECIE	sc	AUTOPSY DATE:	9/22/2004
RAI	Powell	AGE:	juv
	pond	SAMPLE SIZE:	20
VER FOR AUTOPS'	Prelib.		
VESTIGATOR(S	Munson		
MARK			

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
NGT	0.00	0.00	0.00
EIGH	0.00	0.00	0.00
	0.00	0.00	0.00
	0.00	0.00	0.00
MATOCR	44.54	3.75	0.05
UCOCR	0.00	0.00	0.00
RUM PROTE	6.76	1.28	0.17

XPRESSED AT KTL TIMES 10 TO THE FIFTH POWE
ONVERTED FROM KTL; EXPRESSED AS CTL TIMES 10 TO FOUTH POWE

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	20
B1	0	F	0	S	0	1	0	1	0	R	0	1	0	S	0	B	0	1	0
B2	0	C	0	L	0	2	0	2	6	G	0	2	0	M	0	C	0	2	0
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	8	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0	Mean=0.00	
H2	0			O	0			mean=3.1								OT	0		
M1	0																		
OT	0																		

SUMMARY OF NORMALS

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

GENERAL REMARKS:

N GONADS:

I OTHER:

Appendix K3. Powell Brood Year 2003 Chinook, summary of fish autopsy, spring 2005 release.

Summary of Fish Autopsy

CESSION N	05-087	LOCATION:	POW
ECIE	SC	AUTOPSY DATE:	3/26/2005
RAI	POW	AGE:	juv
		SAMPLE SIZE:	20
ER FOR AUTOPS'	Prelib.		
ESTIGATOR(S	Munson		
MARK			

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
NG	0.00	0.00	0.00
IGH	0.00	0.00	0.00
	0.00	0.00	0.00
	0.00	0.00	0.00
MATOCR	51.55	2.56	0.05
UCOCR	0.00	0.00	0.00
RUM PROTE	8.58	0.64	0.08

PRESSED AT KTL TIMES 10 TO THE FIFTH POWE
ONVERTED FROM KTL; EXPRESSED AS CTL TIMES 10 TO FOUTH POWE

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		FAT		MESEN. SPLEEN		GUT		HIND KIDNEY		LIVER		BILE	
N	20	N	20	N	20	0	20	0	0	B	0	0	20	N	20	A	0	0	10
B1	0	F	0	S	0	1	0	1	0	R	20	1	0	S	0	B	18	1	7
B2	0	C	0	L	0	2	0	2	4	G	0	2	0	M	0	C	2	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	11	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0	Mean=0.65	
H2	0			O	0			Mean=3.35								OT	0		
	0																		
	0																		

SUMMARY OF NORMALS

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

GENERAL REMARKS:

GONADS:

I OTHER: Fish at 16.0 FPP

Appendix K4. Dworshak surplus Brood Year 2003 spring Chinook summary of fish autopsy, Fall 2004 release

Summary of Fish Autopsy

CESSIONO:	04-448	LOCATION:	Clearwater
ECIE	sc	AUTOPSY DATE:	9/22/2004
RAI	Dwor-mixed	AGE:	juv
		SAMPLE SIZE:	20
VER FOR AUTOPS'	Prelib.		
VESTIGATOR(S	Munson		
MARK			

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
NGT	0.00	0.00	0.00
EIGH	0.00	0.00	0.00
	0.00	0.00	0.00
	0.00	0.00	0.00
MATOCR	49.20	0.44	0.23
UCOCR	0.00	0.00	0.00
RUM PROTE	6.50	1.00	0.11

XPRESSED AT KTL TIMES 10 TO THE FIFTPOWER
ONVERTED FROM KTL; EXPRESSED AS CTL TIMES 10 TO FOUTH POWE

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		FAT		MESEN. SPLEEN		GUT		HIND KIDNEY		LIVER		BILE	
N	20	N	20	N	20	0	20	0	0	B	0	0	20	N	20	A	20	0	20
B1	0	F	0	S	0	1	0	1	0	R	20	1	0	S	0	B	0	1	0
B2	0	C	0	L	0	2	0	2	3	G	0	2	0	M	0	C	0	2	0
E1	0	M	0	S&L	0			3	10	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0	Mean=0.00		4	7	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0	Mean=0.00	
H2	0			O	0			Mean=3.2								OT	0		
M1	0																		
OT	0																		

SUMMARY OF NORMALS

20	20	20	20	20	20	20	20	20	20

M: 0 F: 0 U: 0

GENERAL REMARKS:

GONADS:

I OTHER:

Appendix L. Clearwater Fish Hatchery BY-03 spring Chinook fish marking and distribution summary.

ATE PLANTED	RELEASE SITE	STOCK	LENGTH	TOTAL POUNDS	NUMBER PER/LB	TOTAL PLANTED	MARKS
/26/2004	Walton Creek	POW	5.50	19,883	17.3	343,967	100% ad; 700 PIT
/22/2004	Walton Creek	DWO	4.90	2,700	24.5	66,150	100% ad clip
/23/2004	Crooked River	DWO	4.90	2,623	24.5	64,263	100% ad clip
	TOTAL/AVG		5.10	25,206	22.1	474,380	
3/29-3/31/2005	Upper Crooked River		5.41	22,164	15.8	350,194	100%ad clipped; 80K CWT;150 PIT
3/29-3/31/2005	Lower Crooked River		5.41	22,164	15.8	350,193	100%ad clipped; 147 PIT
3/24-4/5/2005	Walton Creek		5.43	25,727	15.7	403,917	100%ad clipped; 80K CWT; 300 PIT
3/21-4/4/2005	Red River		5.44	25,894	15.5	401,362	100%ad clipped; 80K CWT; 300 PIT
	TOTAL/AVG		5.42	95,949	15.7	1,505,666	

Appendix M. Brood Year 2004 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	3/2/2004	3/17/2004	763,312	340
5	3/9/2004	3/24/2004	398,079	340
TOTAL			**1,161,957**	

STOCK	NUMBER OF EYED EGGS KEPT	RELEASED SMOLTS	PERCENT SURVIVAL
Dworshak	983,878	846,729	86.1%

Appendix N. Steelhead Brood Year 2004 summary of autopsy report, spring 2005 releases.

Summary of Fish Autopsy

CESSION N	05-085	LOCATION:	CLW
ECIE	STB	AUTOPSY DATE:	3/25/2005
RAI	NF CLW	AGE:	juv
I		SAMPLE SIZE:	20
VER FOR AUTOPS'	Prelib.		
VESTIGATC(S):	Munson		
MARK			

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
NG'	0.00	0.00	0.00
EIGł	0.00	0.00	0.00
	0.00	0.00	0.00
	0.00	0.00	0.00
MATOCR	40.65	1.81	0.05
UCOCR	0.00	0.00	0.00
RUM PROTE	7.27	0.72	0.10

XPRESSED AT KTL TIMES 10 TO THE FIFTH POWE
ONVERTED FROM KTL; EXPRESSED AS CTL TIMES 10 TO FOUTH POWE

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		FAT		MESEN. SPLEEN		GUT		HIND KIDNEY		LIVER		BILE	
N	20	N	20	N	20	0	20	0	0	B	3	0	20	N	20	A	20	0	11
B1	0	F	0	S	0	1	0	1	0	R	17	1	0	S	0	B	0	1	9
B2	0	C	0	L	0	2	0	2	0	G	0	2	0	M	0	C	0	2	0
E1	0	M	0	S&L	0			3	8	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0	Mean=0.00		4	12	E	0	Mean=0.00		U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0	Mean=0.45	
H2	0			O	0			Mean=3.6								OT	0		
M1	0																		
OT	0																		

SUMMARY OF NORMALS

20	20	20	20	20	20	20	20	20	20

M: 0 F: 0 U: 0

GENERAL REMARKS:

N GONADS:

I OTHER: Fish at 4.4 FPP

Appendix O. Brood Year 2004 North Fork steelhead marking and distribution.

DATE PLANTED	RELEASE SITE	LENGTH	TOTAL POUNDS	NUMBER PER/LB	TOTAL PLANTED	MARKS
4/09/2005-4/19/2005	Red River	8.21	44,076	4.51	198,783	2,506 CWT/VIE/PIT; 47,539CWT/VIE (left blue);96,488 Ad-clipped; 2,493 Ad/PIT;49,757 no-clip
4/19/2005	Red River	7.94	9,989	5.0	49,946	2,511 CWT/VIE/PIT;47,435 CWT/VIE (left orange)
4/11/2005-4/15/2005	Upper Crooked River	8.44	20,114	4.16	83,674	298 PIT; 100% no-clip; 20,557 no-clip/CWT
4/12/2005-4/15/2005	Lower Crooked River	8.64	38,334	3.87	148,352	299PIT; 100% ad-clipped; 60,238 Ad/LV/CWT
4/14/2005-4/18/2005	Red House Hole (S. Fork Clearwater River)	8.56	67,190	3.98	267,414	300 PIT; 63,659 Ad/LV/CWT; 100% Ad-clipped
4/18/2005	Meadow Creek (S. Fork Clearwater River)	7.94	4,551	5.0	22,757	1,305 PIT; 100% CWT/VIE (right orange)
4/18/2005	Mill Creek	7.94	4,551	5.0	22,757	1,300 PIT; 100% CWT/VIE (right orange)
4/20/2005	Lolo Creek	7.94	10,609	5.0	53,046	295 PIT; 100% no-clip
	TOTAL/AVG	8.20	199,414	4.57	846,729	

Prepared by:

Jerry McGehee
Hatchery Manager

Randy Hutzenbiler
Assistant Hatchery Manager

Chris Shockman
Fish Culturist

Douglas Munson
Anadromous Fish Pathologist

Walter Boore
Office Specialist

Approved by:

_____

Virgil K. Moore, Chief
Fisheries Bureau

_____

Tom Rogers
Anadromous Fish Hatcheries Supervisor