CLEARWATER FISH HATCHERY
ANNUAL REPORT

BROOD YEAR 1999 CHINOOK
AND
BROOD YEAR 2000 STEELHEAD

By:

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1999 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 or full-term smolts.

Powell

Two adult traps were operated in the Lochsa basin. The Crooked Fork trap was installed on June 2, 1999. High water was not a factor in operation of the weir in 1999. The trap was taken out of operation on September 10, 1999.

The Walton Creek weir was installed on June 13,1999 and taken out of operation September 16,1999. The run total for both traps was 188 fish, of which there were 124 jacks, 31 adult males, and 33 adult females. A total of 8 fish were released to spawn naturally. All remaining fish were held for spawning. A total of 27 females were spawned, producing 126,815 green eggs.

A total of 212,648 full-term smolts from Powell stock chinook were released from Powell pond from April 9 through April 12, 2001.

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 BY98, chinook stocks from Powell have occasionally been used to backfill the South Fork populations. Stocks were combined due to high rate of straying. The integrity of all supplementation and natural fish were maintained in their native streams.

The Red River weir was installed on June 15, 1999 and taken out of operation September 16, 1999. The run total of 31 fish were combined with the returning adults from Crooked River. A total of 24 chinook were released to spawn naturally.

The Crooked River weir was installed June 1, 1999 and taken out of operation September 16, 1999. The run total of 125 fish were combined with returning adults from Red River. A total of 55 chinook were released to spawn naturally.

The South Fork had a run total of 156 fish. A total of 79 fish were released to spawn naturally. All remaining fish were held for spawning. A total of six females were spawned, producing 21,739 green eggs.

A total of 68,684 pre-smolts from the South Fork / Lookingglass stock were released from the Red River pond September 28, 2000.

A total of 105,507 pre-smolts from the South Fork / Lookingglass stock were released from the Crooked River raceways September 28, 2000.

A total of 45,706 low BKD full-term smolts from South Fork and Lookingglass stock were released from Crooked River raceways April 9, 2001 through April 13, 2001. A total of 38,943 high-BKD full-term smolts from the South Fork and Lookingglass stocks were released from Crooked River raceways March 28 and 29, 2001.

Lookingglass

During the 1999 spawning season unpicked eyed eggs from 199 females from Rapid River stock were transferred to CFH by Nez Perce Tribal (NPT) staff from Lyons Ferry Hatchery. These fish were Rapid River stock, trapped at Lower Granite Dam, transported to Lyons Ferry Hatchery by Lookingglass Hatchery, spawned by Lyons Ferry personnel, and incubated until eyed. These eggs were used for the NPT releases in Lolo and Newsome Creeks, as well as to backfill the CFH program on the South Fork of the Clearwater. A total of 732,048 Lookingglass unpicked eyed eggs (Rapid River stock) were received. A total of 197 of these females had low ELISA test results and two had high results.

A total of 155,195 low BKD full-term smolts from Rapid River stock were direct released at Lolo Creek by the NPT on March 27 and March 28, 2001.

A total of 155,140 low-BKD full-term smolts from Rapid River stock were released in Newsome Creek by NPT on March 29, 30 and April 2, 2001.

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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 USACE, 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 agreement 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 USACE estimated cost for construction of CFH and three satellite facilities would be $43,153,000 (Joe McMichael's report December 1991).

Location

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

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

Powell satellite facility is 122 river miles east of CFH at the headwaters of the Lochsa River. The closest town is 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 LSRCP goal of CFH and its satellite facilities is to return 12,000 adult salmon and 14,000 adult steelhead over Lower Granite Dam.

Idaho Department of Fish and Game Objectives:

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

FACILITY DESCRIPTION

General Hatchery Description

Clearwater Hatchery

Clearwater Fish Hatchery is the final facility built by the USACE 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 16 people, a living room, dining room, a kitchen, shower rooms, and a laundry room. The administration portion consists of office space with a visitor center and entry lobby.

The shop area includes a vehicle maintenance shop, 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.

The isolation incubation building is used for receiving eggs with unknown disease status, and as 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 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°F to 58® F) to the hatchery.

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 seven psi to the hatchery. The structure consists of primary and secondary chambers. The primary and secondary pipelines have each been outfitted with a hydroelectric generator and put into operation June 2000. The two generators will produce approximately 2400KW of electricity.

A 73,600 cuft cleaning sedimentation pond is used during cleaning to settle out the settle able 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.

This year a new 2,040 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. The two side areas are a nice addition of waterproof storage. The end of one side was partitioned off to house archived documents.

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, a walk-in freezer to store fish food, and a support cabin with kitchen, dining room, living room, bathroom, and bedroom.

Powell

The Powell facility is at the confluence of Crooked Fork 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 on Colt Killed Creek. A weir diverts fish that come up Walton Creek into the fish ladder and fish trap. The fish trap is connected to two adult holding ponds and covered spawning

area. A floating weir that spans the Lochsa River is stored at the facility for use when needed. Also, on site is a support cabin with a kitchen, dining room, living room, bedroom, bathroom, and walk-in freezer to store fish feed. During the summer of 1994 the Corps of Engineers constructed a 16-ft x 14-ft formalin storage building.

Red River

The Red River facility consists of four structures. A freezer/storage building which houses a walk-in-freezer, 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. 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.

Production Capacities by Unit

Clearwater Hatchery

The steelhead raceways consist of 300 ft x 10 ft x 6-ft deep raceways supplied by a center head raceway with an east and west bank of 12 raceways each. A total rearing space of 24 raceways is 216,000 cubic feet. This area will rear a maximum capacity of 2.4 million steelhead smolts with 0.3 density index (DI) (Piper 1986). A flow of approximately 1.67 cubic feet per second (cfs) is available for each raceway, but this flow will only allow 1.7 million steelhead to be reared in these raceways without exceeding the flow index (FI) of 1.2 (Piper). All water for these raceways flow through degassing towers and then into the head raceway. These raceways are supplied with water from both intakes.

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

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

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

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

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

Crooked River

The Crooked River 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 6 cfs. Each raceway is outfitted with three automatic Nielson feeders. The adult trapping facility measures 10-ft x 12-ft x 4-ft deep with a total of 480 cuft rearing space. 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 normal loading of 320,000 fish produces the best looking smolts and a DI significantly less than 0.3. The maximum design capacity is 500,000 fish with a DI of 0.092. Water flow through this pond is 6.24 cfs. A catwalk across the length of the pond supports eight automated Nielson feeders.

The 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, with a total of 3,400 cuft of holding space and a trap area 8-ft x 16-ft x 4-ft. 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.

A 170-ft x 70-ft x 4-ft 6 in rearing pond will rear a maximum of 320,000 chinook smolts. The maximum design capacity is 500,000 fish with a DI of 0.092. Maximum water flow through this pond is 6.24 cfs. This pond has a hypalon plastic liner with 8-inch to 10-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 (CFH) 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 forty feet below the surface. The cool water intake is stationary at 245 feet below the top of the dam. An estimated 10 cfs of water is provided by the cool water supply and 70 cfs of water from the 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 at Crooked River. The water rights stipulate 10 cfs from Apr. 1 to June 30 and six cfs from July 1 to October 1 at the rearing facility. Temperatures ranged from 42°F to 64°F (Appendix B1). All temperatures were taken at the adult trap. All water supplied to both facilities is gravity flow.

Powell

The intake is 100 yards upstream from the facility. Powell's water right for the gravity intake is 6.24 cfs from a gravity-flow system on Walton Creek, and 2.5 cfs from a supply pumped out of Colt Killed Creek. Two 7.5 hp pumps can be used to supply Walton Creek with water from Colt Killed Creek during periods of low water. Water temperatures ranged from 43°F to 58°F from Walton Creek (Appendix B2).

Red River

Red River is supplied by gravity flow from an intake at the bottom of the South Fork of Red River, 225 yards upstream from the facility. The water right for the facility is 8.18 cfs. During low flow in the summer, about five cfs is available to the hatchery. Temperatures ranged from 42°F to 65°F (Appendix B3).

Water Quality Analysis

The water quality analysis at CFH was done by the State of Idaho, Department of Health and Welfare in Boise and 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 (Appendices C2, C3 and C4).

STAFFING

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

ADULT CHINOOK COLLECTION

South Fork of the Clearwater River

The Crooked River and Red River production population was combined in 1997. Trapping protocols for the South Fork trap included ponding all adipose (AD) clipped fish and releasing all ventral clipped fish and no-marked fish above the trap.

All right ventral (RV) five-year-old chinook were released above Crooked River trap and all four-year-old RV-clipped fish and five-year-old left ventral (LV) clipped fish were released above the Red River trap no matter where they were trapped. All no-marked chinook were released above the trap where they were captured. In the past, all chinook were held until first sort. In 1998 a decision was made to release all unmarked or LV/RV clipped fish at the time of trapping.

The Crooked River weir and trap was in operation between June 1, 1999 and September 16, 1999. A total of 125 fish (116 jacks and 9 adults) were trapped.

The Red River trap was installed on June 15, 1999 and taken out of operation on September 16, 1999. A total of 31 fish (24 jacks and 7 adults) were trapped.

Age class breakdown of this run included: 140 I-ocean males (<64 cm), 3 II-ocean males, 6 II-ocean females (64-82 cm), 5 III-ocean males and 2 III-ocean females (83+ cm) (Appendices D1, D2, E1, E2, F1, and F2).

Powell

During 1999, two adult traps were installed in the Lochsa basin. A picket weir was installed on Crooked Fork Creek approximately one mile upstream of the Twin Bridges. This was an effort to reduce hatchery straying in that tributary.

The trap on Walton Creek was installed on June 13, 1999 and taken out of operation September 16, 1999. The Crooked Fork trap was installed June 2, 1999 and taken out of operation September 15, 1999. A total of 188 fish (124 jacks and 64 adults) were trapped.

Trapping protocols for the Powell trap included ponding all Ad-clipped fish and opercle punching and releasing all ventral clipped and unmarked fish back 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 at Powell for production. All ventral clipped fish were released below the trap and all naturals / wild fish were released upstream.

Age class breakdown for this run includes: 124 I-ocean males (<64 cm), 5 II-ocean males and 8 II-ocean females (64 – 82 cm), 26 III-ocean males and 25 III-ocean females (Appendices G1, G2, G3, and H).

ADULT HOLDING

All the South Fork production fish chinook were held at Red River and the Lochsa production fish were held at Powell.

All fish were injected with Erythromycin 200 at a rate of 20 mg/kg at trapping to inhibit BKD. Fish were treated with a formalin drip for one hour every other day to prevent fungal growth. Fish held at Red River 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

At Powell and South Fork a 4:1 male/female spawning ratio was used (CFH genetics protocol for 25 or less females).

At each facility, eggs were placed in egg tubes and coolers with100-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 and 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.

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

South Fork of the Clearwater

Chinook were sorted twice per week for ripeness. The first fish was spawned August 18, 1999 and the last on August 31, 1999. A total of six females were spawned. Pre-spawn mortality for the South Fork stock was one fish (0.6% pre-spawning mortality). Pre-spawn and spawned 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 6, 1999 and the last on August 30, 1999. A total of 27 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 11 fish (5.9% pre-spawn mortality).

Eggs Received

During the1999 spawning season, 10,134 eyed-eggs from high-BKD parentage were received from Lyons Ferry (Rapid River stock). Clearwater Fish Hatchery received a total of 732,048 eyed-eggs from 199 females from Lookingglass (Rapid River stock) (Appendix I).

INCUBATION

Clearwater Hatchery

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

Females were screened for BKD using ELISA techniques. Females with optical density (OD) over 0.8 were culled. The BKD tests resulted in culling two females at Powell and one female from the South Fork, or approximately 14,492 green eggs (9.76% of egg take). At Powell, females with OD between 0.40 and 0.79 were highs, and on the South Fork females with OD between 0.40 and 0.799 were highs.

A total of 880,602 eggs (148,554 green eggs and 732,048 eyed-eggs) were incubated from BY99 spring chinook salmon at CFH. Overall development from green eggs to eyed-eggs numbered 123,336 for a total eye-up of 83.0%. South Fork achieved 85.6% eye-up and Powell 82.6% eye-up (Appendix I).

Beginning on the third or fourth day of incubation, all egg lots were treated with formalin to reduce fungal development. Treatments were administered three times per week at a 1:600 concentration (1667-ppm) for 15 minutes and continued until each egg lot accumulated 800 thermal units (TUs).

Eye-up occurred at approximately 500 TUs at which time all egg lots were shocked, then picked and enumerated with an 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. Survival of green eggs to swim-up fry for the South Fork and Powell averaged 78.0%. Lookingglass eggs were received as unpicked eyed eggs (Appendix I).

EARLY REARING

At swim-up, fry were ponded in hatchery vats. Vats were loaded with fry at approximately 15,000 to 44,000 fish per vat. A total of 818,235 swim-up fry were ponded into 25 vats. Fish were segregated by stock and by BKD status. Fish were started on feed in a full-length vat with baffles in

place. Initial water flows were set at 46 gpm for approximately 10 days to start the fry on feed. Water flows were increased to 92 gpm on day 11 and remained set at that rate until the fish were moved outside. Flow indices were held at or below 1.5 while DI never exceeded 0.3 during the entire early rearing period.

Water temperatures for the early rearing period ranged from 37.7°F to 57.7° F (Appendices A1 and A2).

Bio-Oregon starter and Biodiet grower formula were used to feed all lots of fish during early rearing. A total of 6,456 lbs of food was fed at a cost of $5.681.28. The conversion rate for this period was 0.95 lbs of feed for one lb of gain (Appendix J).

Fall Pre-Smolt

Acclimation and release of pre-smolts occurred at Crooked River and Red River. Pre-smolts were transported to Crooked River September 18, 2000 (20.9 fpp), and to Red River September 19, 2000 (21.7 fpp). Due to mechanical failure in the adult transport tanker, there was a loss of 11,051 pre-smolts during transport from CFH to Red River. There were 100 fish lost in transport to Crooked River in the same truck.

On September 28, 68,684 fish were released from the Red River acclimation pond. These fish averaged 21.7 fpp. On September 28, 105,507 fish were released from upper Crooked River raceway into Crooked River. These fish were 20.9 fpp (Appendix K).

Water temperatures for this rearing period ranged from 55°F to 62°F. All rearing units were outfitted with electric bug zappers to add natural feed to the fishes' diet. All pre-smolts received one 28-day erythromycin feed treatment prior to release.

Full-Term Smolt

All spring chinook salmon reared to full term smolts were raised at the main Clearwater Hatchery. All chinook utilized for CFH and NPT programs were reared in the chinook bank.

Chinook were acclimated for two weeks at two satellite rearing ponds in 2001. Smolts were transported to Powell on March 26 and 27, 2001 and to upper Crooked River on March 28, 2001. The screens were removed from the Crooked River satellite high-BKD acclimation pond for volitional release on March 28. On April 9, 2001 screens were removed from the Powell acclimation pond and low-BKD Crooked River acclimation pond for a volitional release.

Between March 28 and 29, 38,943 high-BKD fish at 10.35 fpp were released from one pond at upper Crooked River. Between April 9 and April 12, 2001, 212,648 fish at 12.61 fpp were released from Powell into Walton Creek. Between April 9 and April 13, 2001, 45,706 low-BKD fish at 13.50 fpp were released from upper Crooked River pond (Appendix K).

On March 27 and 28 NPT personnel released 155,195 fish at 13.51 fpp into Lolo Creek. On March 29, 30 and April 2, 155,140 fish at 12.53 fpp were released into Newsome Creek by NPT personnel.

Conversion rates for these fish were 1.32 for Powell stock, 1.28 for South Fork stock and 1.31 for Lookingglass (Rapid River stock).

Water temperatures during this 16-month rearing period ranged from 37.7°F to 57.7° F (Appendices A1 and A2). All smolts released at the satellites received two 28-day Erythromycin feed treatments.

Bio-Oregon's BioDiet grower feed was used throughout the final rearing period. A total of 56,045 lbs of fish food was used during final rearing at a cost of $45,273.35. Total feed used in early and final rearing was 62,501 lbs at a cost of $50,954.63 (a conversion rate of 1.31). A total of 58,805 lbs of food was purchased by CFH and fed to BY99 chinook at a cost of $50,954.63 (Appendix J). An additional 3,696 lbs of food was fed to the BY99 chinook purchased by NPT. Percent body weights fed ranged from 1.0% to 5%.

Chinook were fed full rations until June 2000. At that time, all chinook were fed an alternating feed regimen of four days on feed and three days off, then three days on and four days off, except during medicated feed treatments. This alternating feeding regimen continued until two weeks prior to release, at which time they were switched to full rations until release. This feed regimen was done to slow growth, yet, maintain fin quality, fat reserves, and reduce the necessary manpower to one outside person on weekends. Fin quality and fat reserves remained excellent.

All final rearing raceways were set up with jump screens and floating shade structures (3-4 per pond) to reduce stress and increase available shade to fish. Shade was available over twenty percent of the pond surface.

Water temperatures during the final rearing period were kept as cool as possible to reduce growth rates. Every effort was made to stay below 55°F. Hatchery water temperatures varied from 38°F to 50°F during the final rearing period (Appendices A1 and A2). An estimated 2.2 cfs of water was supplied to each raceway.

FISH HEALTH

The BY99 spring chinook reared at CFH were separated into two groups. The first group was progeny from parents with OD <0.399 at Powell and <0.399 on the South Fork. These fish were reared as low-BKD fish. All the high-BKD chinook had an OD $\leq$0.799 from Clearwater egg takes. All chinook eggs above this OD were culled.

All high-BKD chinook were released separately from the low-BKD chinook at upper Crooked River.

Chinook received two 28-day Erythromycin medicated feed treatments. All fish were fed Bio-Oregon's feed with 2.25% Aquamycin-100. The fish were fed between 75 and 150 mg Erythromycin per kilogram of fish weight to comply with Investigational New Animal Drug (INAD) specifications.

PATHOLOGIST REPORT

Diseases Encountered and Treatment. Brood Year 1999 chinook were not challenged by epizootics by bacterial, viral, or mycotic infectious agents. Two prophylactic treatments of erythromycin-medicated feed were applied to all chinook stocks to reduce the risk of *Renibacterium* producing a BKD outbreak. These feed treatments are allowed via Investigational New Animal Drug (INAD) 6013/4333. Preliberation sampling shows a low level of *Renibacterium* in all stocks sampled. Brood stock sampling at the Powell and Red River satellites did not find viral replicating agents, but ELISA sampling of kidney tissue did find *Renibacterium*. *Myxobolus spores* were not found at any preliberation sampling. Returning brood spring chinook were transported from Red River and Crooked River satellites to the main facility. These fish had a very high prevalence of high ELISA optical density positive fish at spawning (Appendices L1, L2, L3, L4).

Organosomatic Index. See attachments.

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

Other Assessments. Preliberation sampling revealed a very robust and healthy fish. See Attachment.

Crooked River

Diseases Encountered and Treatments. No diseases were encountered during acclimation of fall release and spring release juveniles. Viral replicating agents were not found during routine chinook brood fish sampling, but *Renibacterium* was found during ELISA testing (Appendices L1 and L2).

Organosomatic Index. See attachments.
Acute losses. Neither acute nor chronic losses were experienced at this satellite.

Other Assessments. No comment.

Powell

Diseases Encountered and Treatments. No juveniles were reared at this facility. Only spring acclimated fish were released at this facility. Only *Renibacterium* was found in juvenile

chinook via ELISA technology. Chinook brood fish were only positive for *Renibacterium* via ELISA technology (Appendix L3).

Organosomatic Index. See attachments.

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

Other Assessments. No comment.

Red River

Diseases Encountered and Treatment. No diseases were found in fall and spring preliberation sampling of chinook. ELISA technology found low optical densities of *Renibacterium* in these chinook juveniles. Chinook brood fish were negative for viral replicating agents, but positive for *Renibacterium* via ELISA technology (Appendix L4).

Organosomatic Index. See attachments.

Acute Losses. No losses due to etiologic agents were experienced at this facility.

Other Assessments. No comment.

FISH MARKING

A total of 800,652 spring chinook were marked. Marks included: 123,021Adipose (AD) clipped; 442,946 coded wire tagged (CWT); 44,819 blank CWT; 106,020 right ventral (RV) clipped and 80,140 left ventral (LV) clipped (Appendix K).

Chinook were marked from early rearing vats (inside) into final rearing raceways (outside). Marking started on May 15 and was completed on June 2, 2000. Fish ranged in size from 101 to 143 fpp. A total of 3,706 fish were Passive Integrated Transponder (PIT) tagged. Of this total, 1,598 chinook were PIT tagged by Department personnel and 2,108 were PIT tagged by NPT personnel.

FISH DISTRIBUTION

Releases from CFH occurred in two different life stages:

Pre-smolt	174,191
Full -term smolt	607,632
TOTAL	781,823

Fall Pre-Smolt

Crooked River

A total of 105,507 fish (20.9 fpp) were released into Crooked River on September 28, 2000. All pre-smolts were RV clipped, no fish were CWT, and 500 fish were PIT tagged (Appendix K).

Red River

A total of 68,684 fish (21.7 fpp) were released into Red River on September 28, 2000. All pre-smolts were LV clipped, no fish were CWT tagged, and 500 were PIT tagged (Appendix K).

Full-Term Smolt

Powell

A total of 212,648 smolts (12.61 fpp) were released into Walton Creek. Smolts were transported to Powell on March 26 and 27, 2001. After approximately two weeks of acclimation, fish were volitionally released on April 9, 2001. On April 12 the pond was drained and all remaining smolts were released from the pond. Of the fish released, 105,402 smolts were AD-clipped, 62,427 were CWT tagged, 44,819 received blank CWT tags, and 299 fish received PIT tags (Appendix K).

Crooked River

A total of 84,649 smolts (11.93 fpp) were released into Crooked River. Smolts were transported to Crooked River on March 28, 2001. Low-BKD fish were released volitionally on April 9, 2001. The pond was drained and all remaining smolts were released on April 13. The high-BKD chinook were volitionally released on March 28, 2001. On March 29 the pond was drained and all remaining smolts were released. Of the 84,649 smolts released into Crooked River, 68,227 were CWT tagged, 16,422 were AD-clipped and 299 were PIT tagged (Appendix K).

Lolo Creek

A total of 155,195 low-BKD smolts (13.51 fpp) were direct released by NPT personnel into Lolo Creek. Smolts were transported on March 27 and 28, 2001. Of the 155,195 smolts released into Lolo Creek, all fish received CWTs and 1,048 were PIT tagged (Appendix K).

Newsome Creek

A total of 155,140 low-BKD smolts (12.53 fpp) were direct released by NPT personnel into Newsome Creek. Smolts were transported on March 29, 30 and April 2, 2001. Of the 155,140 smolts released into Newsome Creek, all received CWTs and 1,060 were PIT tagged (Appendix K).

BROOD YEAR 2000 STEELHEAD REPORT

ABSTRACT

Clearwater Fish Hatchery (CFH) received 985,886 eyed Brood Year 2000 North Fork B-run steelhead eggs from Dworshak National Fish Hatchery (DNFH). A total of 786,954 smolts from the North Fork stock were released between April 9 and April 20, 2001. A total of 97,766 went to Red House Hole, 97,540 at Kooskia Hatchery on Clear Creek, 249,270 at Red River, 245,547 at Crooked River, 23,459 in Meadow Creek, 24,549 in Mill Creek and 48,823 in Lolo Creek. The size of fish at release for the one-year rearing cycle was 7.08 fpp, for a total of 109,948 lbs and average length was 183mm.

A total of 151,911 lbs of feed was fed with a cost of $45,481.28 to produce 109,948 lbs of fish at CFH. The conversion rate was 1.35.

Author:

Tom Tighe, Assistant Hatchery Manager

Typist:
Rene'e Hedrick, Office Specialist II

SYNOPTIC HISTORY

Clearwater Hatchery

Brood Source

Dworshak National Fish Hatchery (DNFH) 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, CFH 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 CFH at DNFH, two of our crew assisted with their spawning operation. We collected and packaged all the disease samples to ship by airmail to Eagle Fish Health Lab.

Incubation

Eyed steelhead eggs were received from DNFH in three weekly shipments from March 24 through April 7, 2000 (Appendix M). On April 28, 2000, 68,507 eyed eggs were kept from take 7, destined for Magic Valley Hatchery (MVH) for the CFH program to meet production goals due to severe culling from IHN at Dworshak Hatchery. The eggs from DNFH lots six (March 7) through eight (March 21) were incubated approximately 17 days at Dworshak until the eggs eyed-up. All eggs from negative IHNV females were disinfected and transported to CFH. The transport vehicle was met at the front gate, the 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 8,000 eggs per basket, and water flows through each stack were set at six gallons per minute (gpm). A total of 985,886 eggs were received (Appendix M). During incubation, steelhead eggs were on primary water only. Clearwater Fish Hatchery incubated an additional 762,096 green eggs for MVH and Hagerman National Hatchery. Magic Valley received 544,161 eyed-eggs and Hagerman National received 217,935 eyed-eggs. These eggs came from Dworshak

stock B-run steelhead, were incubated at CFH until eye-up stage, and transported to MVH and Hagerman National for early rearing.

EARLY REARING

At swim-up, unfed fry from Dworshak stock B-run steelhead were moved to vats 22 through 46 and were divided as evenly as possible (27,855 to 39,965 fish/vat). The initial DI was 0.07 and FI was 0.36. Fish were held in the hatchery vats from July 24 through August 3, 2000, when they were marked and moved to twelve steelhead bank raceways (1 - 6 east and west) and raceways 9a, 9b, 10a, and 10b in the chinook bank. Average length of the fish at the end of early rearing was 3.22 inches (82 mm). The fish averaged 77 fpp.

Water temperatures for the early rearing period ranged from 52°F to 60°F (Appendix A2). Whenever the temperatures exceeded 58°F for more than two days, the water was cooled back down by either blending in more secondary water or by lowering the primary intake in Dworshak Reservoir.

Rangen's high energy starter and grower was fed to most of the fish. Moore-Clark Nutra 2000 starter feed was used on a smaller study group during early rearing period, in which 12,073 lbs of feed were used to achieve a feed conversion of 1.12 for a cost of $3,984.09.

FINAL REARING

The juvenile Dworshak stock B-run steelhead were moved to outside steelhead raceways 1 through 6-east and west and raceways 9a, 9b, 10a, and 10b in the chinook bank from July 24 through August 3, 2000. The move was done in conjunction with fin clipping and CWT tagging to avoid double stressing the fish. Fin clipping was done in eight-hour shifts per day. Baffles were removed from vats; fish were then moved to the clipping trailers using the transfer tanks. Portions of the Red River and Crooked River fish were not clipped, but were inventoried during the move outside. Nez Perce Tribe (NPT) steelhead destined for Mill, Meadow, and Lolo creeks were not marked and were inventoried during their move to raceways 9a, 9b, 10a, and 10b in the chinook bank on September 28 and 29, 2000.

The DI of the Dworshak steelhead ranged from 0.22 to 0.33 and the FI ranged from 0.44 to 0.99. These indices were recalculated biweekly and were never allowed to exceed DI of 0.33 or FI of 1.5.

Water temperatures during final rearing period were maintained to keep temperatures as close to 57°F as possible (Appendix A2). Reservoir water temperatures began to drop in late-October and bottomed out in January at 38.7°F. Temperatures began to slowly increase in late-February and had reached 44°F by mid-March. Estimated water flow per raceway was 3.5 cfs.

Fish were fed dry feed until released. A total of 139,838 lbs of feed was used during final rearing producing 98,834 lbs of gain at a cost of $41,497.19. A total of 151,911 lbs of feed was used throughout the entire rearing period to produce 109,948 lbs of fish at a cost of $45,481.28 (Appendix J). The overall conversion rate from fry to smolt was 1.35. Percent body weight fed ranged from 0.58% to 4%. Percent body weight fed dropped to 0.58% after a period of extreme cold water temperatures from December to release in April.

A feed performance test was conducted comparing Bio-Oregon starter and grower feeds to Moore-Clark feed. Feed amounts and cost were included in production costs. A complete report on our findings will be printed at a later date.

FISH HEALTH

Brood Year 2000 steelhead were challenged by coldwater diseases (Appendix N). Cold Water Disease (CWD) was diagnosed in the BY2000 steelhead, so a 14-day medicated feed treatment of 4% Oxytetracycline (10.00 g oxy/100 lbs) was administered from September 6 through September 19, 2000. Shortly after the medicated feed treatment the steelhead began to flash. Pathologists confirmed that the fish had large numbers of ectoparasites (Gyrodactylus) irritating their skin. A one-hour formalin treatment (167 ppm) was given to the fish on September 26, 2000. The flashing ceased and the fish recovered nicely after this treatment; however, several critical weeks of growth were lost for these steelhead (Appendix N).

FISH MARKING

Crooked River steelhead received 600 PIT tags, 19,978 blank CWTs, 69,651 CWT/AD/LV, 80,099 AD only and 75,819 had no marks or tags (Appendix O). The Red House Hole group received 300 PIT tags, 66,976 CWT/LV/AD, and 30,790 AD only. The Clear Creek fish received 22,532 CWT/LV/AD and 75,008 AD only.

The Red River steelhead received 300 PIT tags, 149,636 AD only, and 103,012 no marks or tags.

The NPT steelhead that went to Meadow Creek (23,459) and Mill Creek (24,549) received no marks or tags. The NPT steelhead that went into Lolo Creek (48,823) received 300 PIT tags and the remaining had no marks or tags.

FISH DISTRIBUTION

On April 19, 2001, a total of 97,766 (7.88 fpp) Dworshak B-run steelhead were direct released at the Red House Hole plant site (approximately 3.5 miles upstream of the Highway 13 and 14 junction) on the lower South Fork of Clearwater River. Also, 97,540 (6.9 fpp) Dworshak B-

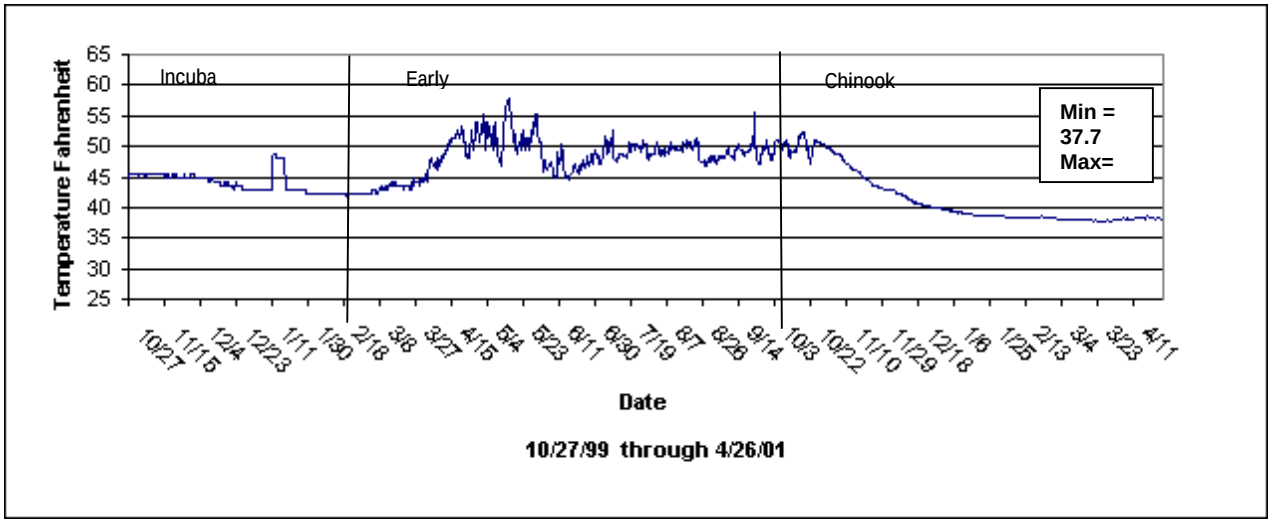
run steelhead were direct released into Clear Creek at Kooskia Hatchery on April 20, 2001. There were 226,050 fish released between April 25 and 26 at Red River, which averaged 7.19 fpp and an additional 23,220 (6.45 fpp) steelhead were accidentally direct released into Red River by NPT on April 20, 2001. These fish were scheduled for an acclimation period in the Red River juvenile pond. There were an additional 245,547 fish released at Crooked River between April 25 and 26, 2001 which averaged 7.07 fpp. The NPT hauled 23,459 (6.40 fpp) unmarked steelhead to Meadow Creek and direct released them on April 13, 2001. They also hauled 24,549 (7.50 fpp) unmarked steelhead to Mill Creek and direct released them on April 12, 2001. Then an additional 48,823 (7.28 fpp) steelhead that had 300 PIT tags and the rest no marks were direct released in Lolo creek on April 16, 2001 by NPT. There was very little crowding and hauling mortality from the fish transportation to the release sites (Appendix O).

ACKNOWLEDGEMENTS

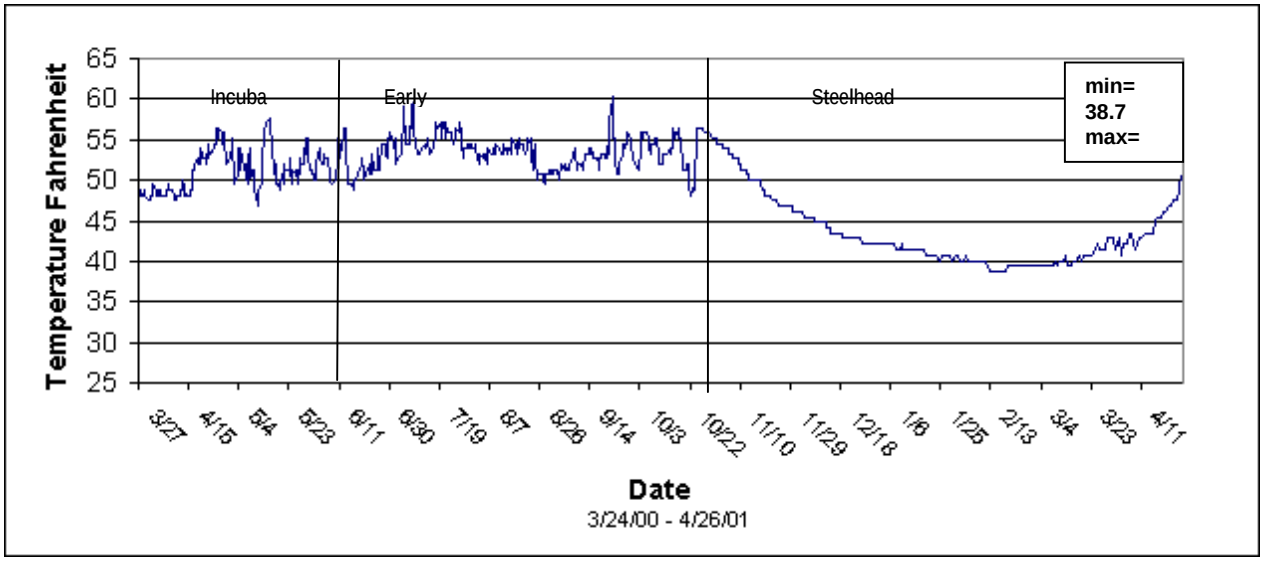
The Clearwater Hatchery has a crew of 22 people who are all assigned a wide variety of responsibilities. Everyone on station has contributed to the success of the program. The hatchery crew consists of the following: Jerry McGehee, Hatchery Manager; Brad George and Tom Tighe, Assistant Hatchery Managers; CalLee Davenport, Zach Olson and Chris Shockman, Fish Culturists, Rene'e Hedrick, Office Specialist II, and Ernie Yost, Utility Craftsman. The part time staff in 1999/2000 included Ron Hopper, Chad Henson and Don West, Fishery Technicians; Ben Daly, Charles Ball, Laborers; and Bio-Aides Theresa Elliott, Chris Bennett, Steve Dalton, Stacey Goeckner, Amanda Lopes, Jim Mackley, Shane Richards, Bob Schloss and Tiffany Tumelson.

APPENDICES

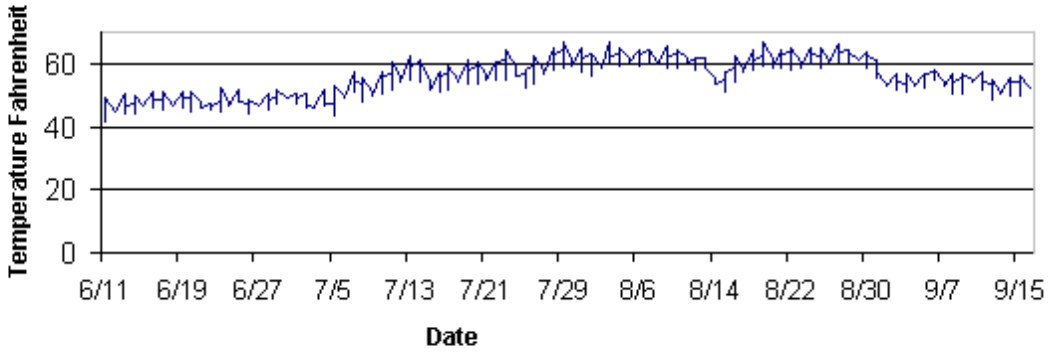
Appendix A1. Brood Year 1999 chinook water temperatures.



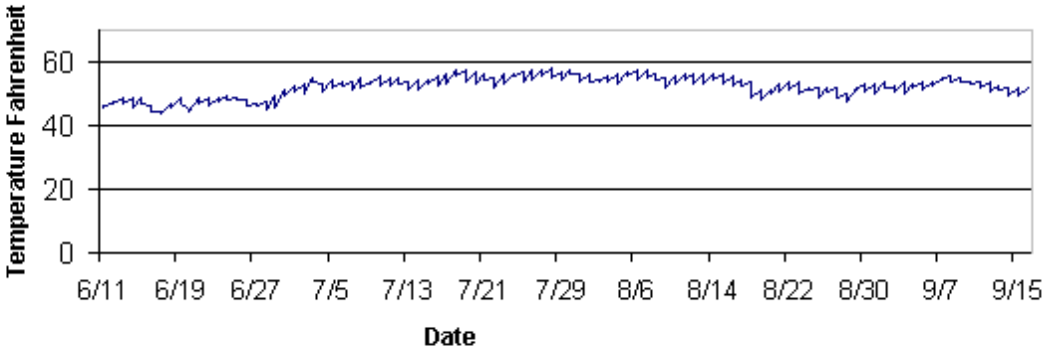
Appendix A2. Brood Year 2000 steelhead water temperatures.



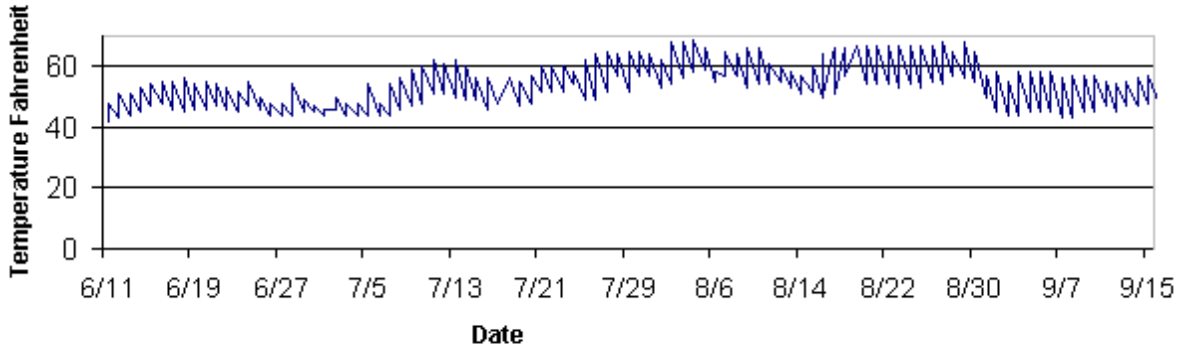
Appendix B1. Crooked River water temperatures, 1999



Appendix B2. Powell water temperatures, 1999



Appendix B3. Red River water temperatures,1999



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

ANALYSIS	RESULTS (mg/l)	DATE ANALYZED	OPTIMAL 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.
Analysis done by Anatek Labs, Inc., Moscow, Idaho

PRIMARY CONTAMINANTS

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

SECONDARY CONTAMINANTS

Contaminant	Result	MDL	Method	Analysis Date	Contaminant	Result	MDL	Method	Analysis Date
Chloride	ND	0.001	EPA 300.0	06/27/97	Ammonia/N	ND	0.1	EPA 350.2	07/01/97
Color	2	0.005	EPA 110.2	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.
Analysis done by Anatek Labs, Inc., Moscow, Idaho

PRIMARY CONTAMINANTS

Contaminant	Result	MDL	Analysis Method	Analysis Date	Contaminant	Result	MDL	Analysis Method	Analysis 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

Contaminant	Result	MDL	Analysis Method	Analysis Date	Contaminant	Result	MDL	Analysis Method	Analysis Date
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	EPA 110.2	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.
Analysis done by Anatek Labs, Inc., Moscow, Idaho

PRIMARY CONTAMINANTS

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

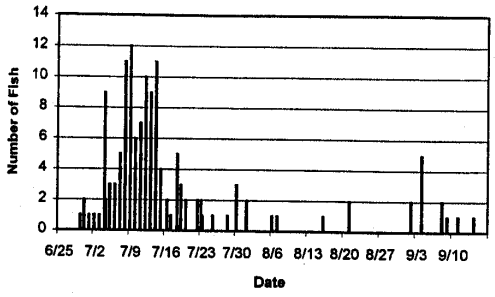
SECONDARY CONTAMINANTS

Contaminant	Result	MDL	Method	Analysis Date	Contaminant	Result	MDL	Method	Analysis Date
Chloride	ND	0.001	EPA 300.0	07/03/97	Ammonia/N	ND	0.1	EPA 350.2	07/01/97
Color	15	0.005	EPA 110.2	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 sensiiivity of the instrument
---=No analysis performed for this contaminant
Numerical Entry=Detection at level indicated
MCL (numbers in parenthesis)=EPA maximum contaminant level

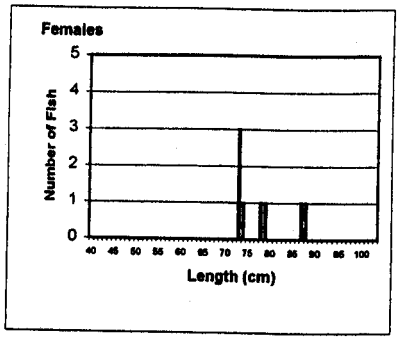
Appendix D1. Crooked River chinook run timing 1999.

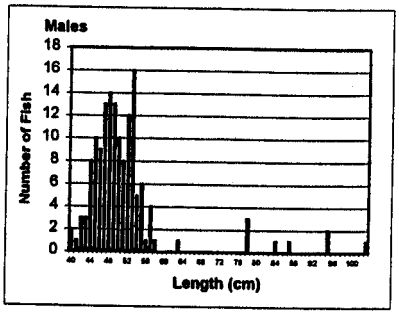
Date	Adults	Jacks	Total	Date	Adults	Jacks	Total
6/25	0	0	0	8/12	0	0	0
6/26	0	0	0	8/13	0	0	0
6/27	0	0	0	8/14	0	0	0
6/28	0	0	0	8/15	0	0	0
6/29	0	0	0	8/16	1	0	1
6/30	0	2	2	8/17	0	0	0
7/1	0	1	1	8/18	0	0	0
7/2	0	1	1	8/19	0	0	0
7/3	0	1	1	8/20	0	0	0
7/4	0	9	9	8/21	1	1	2
7/5	0	3	3	8/22	0	0	0
7/6	0	3	3	8/23	0	0	0
7/7	0	5	5	8/24	0	0	0
7/8	0	11	11	8/25	0	0	0
7/9	1	11	12	8/26	0	0	0
7/10	0	6	6	8/27	0	0	0
7/11	1	6	7	8/28	0	0	0
7/12	1	9	10	8/29	0	0	0
7/13	2	7	9	8/30	0	0	0
7/14	1	10	11	8/31	0	0	0
7/15	0	4	4	9/1	0	0	0
7/16	0	0	0	9/2	0	2	2
7/17	0	1	1	9/3	0	0	0
7/18	0	0	0	9/4	0	5	5
7/19	0	3	3	9/5	0	0	0
7/20	0	2	2	9/6	0	0	0
7/21	0	0	0	9/7	0	0	0
7/22	0	0	0	9/8	0	2	2
7/23	0	2	2	9/9	0	1	1
7/24	0	0	0	9/10	0	0	0
7/25	0	0	0	9/13	0	1	1
7/26	0	0	0	9/14	0	0	0
7/27	0	0	0	9/15	0	0	0
7/28	0	0	0	9/16	0	1	1
7/29	0	0	0	**TOTAL**	**9**	**116**	**125**

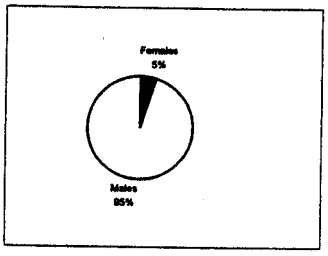


Appendix D2. South Fork (Red River / Crooked River) chinook length frequency 1999.

Length (cm)	Females	Males	Total
40	0	2	2
41	0	1	1
42	0	3	3
43	0	3	3
44	0	8	8
45	0	10	10
46	0	9	9
47	0	13	13
48	0	14	14
49	0	13	13
50	0	10	10
51	0	8	8
52	0	12	12
53	0	16	16
54	0	5	5
55	0	6	6
56	0	1	1
57	0	4	4
58	0	1	1
59	0	0	0
60	0	0	0
61	0	0	0
62	0	0	0
63	0	1	1
64	0	0	0
65	0	0	0
66	0	0	0
67	0	0	0
68	0	0	0
69	0	0	0
70	0	0	0
71	0	0	0
72	0	0	0
73	3	0	3
74	1	0	1
75	0	0	0
76	0	0	0
77	0	0	0
78	1	3	4
79	1	0	1
80	0	0	0
81	0	0	0
82	0	0	0
83	0	0	0
84	0	1	1
85	0	0	0
86	0	0	0
87	1	1	2
88	1	0	1
89	0	0	0
90	0	0	0
91	0	0	0
92	0	0	0
93	0	0	0
94	0	0	0
95	0	2	2
96	0	0	0
97	0	0	0
98	0	0	0
99	0	0	0
100	0	0	0
101	0	0	0
102	0	0	0
103	0	1	1
	8	148	156

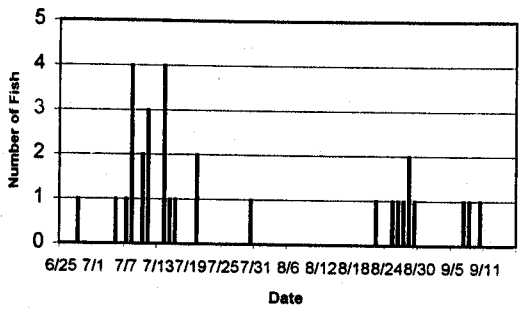






Appendix E1. Red River Run Chinook Timing, 1999

Date	Adults	Jacks	Total	Date	Adults	Jacks	Total
6/25	0	0	0	8/12	0	0	0
6/26	0	0	0	8/13	0	0	0
6/27	0	0	0	8/14	0	0	0
6/28	0	1	1	8/15	0	0	0
6/29	0	0	0	8/16	0	0	0
6/30	0	0	0	8/17	0	0	0
7/1	0	0	0	8/18	0	0	0
7/2	0	0	0	8/19	0	0	0
7/3	0	0	0	8/20	0	0	0
7/4	0	0	0	8/21	0	0	0
7/5	0	1	1	8/22	1	0	1
7/6	0	0	0	8/23	0	0	0
7/7	1	0	1	8/24	0	0	0
7/8	1	3	4	8/25	0	1	1
7/9	0	0	0	8/26	0	1	1
7/10	0	2	2	8/27	0	1	1
7/11	0	3	3	8/28	1	1	2
7/12	0	0	0	8/29	1	0	1
7/13	0	0	0	8/30	0	0	0
7/14	1	3	4	8/31	0	0	0
7/15	0	1	1	9/1	0	0	0
7/16	0	1	1	9/2	0	0	0
7/17	0	0	0	9/3	0	0	0
7/18	0	0	0	9/4	0	0	0
7/19	0	0	0	9/5	0	0	0
7/20	0	2	2	9/6	0	0	0
7/21	0	0	0	9/7	0	1	1
7/22	0	0	0	9/8	0	1	1
7/23	0	0	0	9/9	0	0	0
7/24	0	0	0	9/10	0	1	1
7/25	0	0	0	9/11	0	0	0
7/26	0	0	0	9/12	0	0	0
7/27	0	0	0	9/13	0	0	0
7/28	0	0	0	9/14	0	0	0
7/29	0	0	0	9/15	0	0	0
7/30	1	0	1	9/16	0	0	0
7/31	0	0	0	TOTAL	7	24	31
8/1	0	0	0				
8/2	0	0	0				
8/3	0	0	0				
8/4	0	0	0				
8/5	0	0	0				
8/6	0	0	0				
8/7	0	0	0				
8/8	0	0	0				
8/9	0	0	0				
8/10	0	0	0				
8/11	0	0	0				



Appendix E2. South Fork Chinook summary of fish trapped, released, spawned, and disposition of carcasses, Brood Year 1999.

TOTAL FISH TRAPPED: 156

AGE CLASSES	**FEMALES**	**MALES**
3 Years = (<64 cm)	0	140
4 Years = (64 - 82 cm)	6	3
5 Years = (> 83 cm)	2	5
	8	**148**

FISH DISPOSITION FEMALES:

SPAWNED	6
RELEASED	2*****
TOTAL	**8**

FISH DISPOSITION MALES:

SPAWNED	21
MORTALITY	1
RELEASED	77*****
KILLED	49
TOTAL	**148**

*****Released 24 at Red River, 55 at Crooked River

All spawning carcasses were disposed of in Red River

Appendix F1. Summary of spring chinook returns to Crooked River by brood year.

Brood Year	Year Released	Number Released	3-yr-olds	Year Returned	4-yr-olds	Year Returned	5-yr-olds	Year Returned	Total by return	% return from plant
1985	-------	-------		1988	-------	1989	4	1990	4	
1986	-------	-------		1989	23	1990	5	1991	28	
1987	Spr 1989 (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	0.000%
1996	Spr 1998	205,906	122	1999	637	2000		2001		
1997	Fall 1998	162,119	454	2000		2001		2002		
	Spr 1999	600,981								
		763,100								
1998	Fall 1999	89,299		2001		2002		2003		
	Spr 2000	399,060								
		488,359								
1999	Fall 2000	105,507		2002		2003		2004		
	Spring 2001	84,649								
		190,156								

(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.

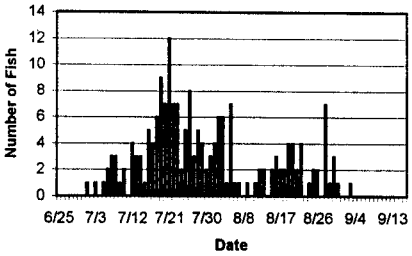
Appendix F2. Summary of chinook returns to Red River by brood year.

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)	136,000	35	1987	132	1988	74	1989	241	0.176%
	Fall 1986(c)	96,400	3	1988	25	1989	13	1990	41	0.021%
1985	Spr 1997 (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								
		460,800								
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	
1996	Spr 1998	208 LV/RV	15	1999	81	2000		2001	96	
1997	Fall 1998	66114 **LV**	1	2000		2001		2002		
	Spr 1999	360,983	178	2000		2001		2002		
		427,097								
1998	Fall 1999	74,981		2001		2002		2003		
	Spr 2000	159,051								
		234,032								
1999	Fall 2000	68,684		2002		2003		2004		

(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 National Fish 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.

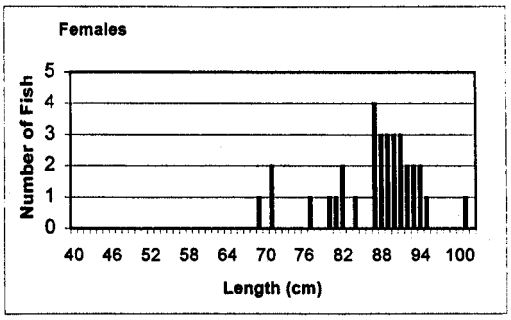
Appendix G1. Powell and Crooked Fork Creek chinook run timing 1999.

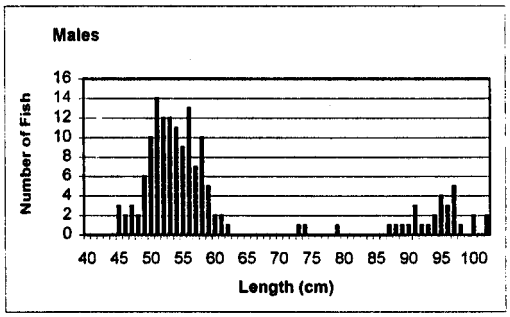
Date	Adults	Jacks	Total
6/25	0	0	0
6/26	0	0	0
6/27	0	0	0
6/28	0	0	0
6/29	0	0	0
6/30	0	0	0
7/1	0	1	1
7/2	0	0	0
7/3	0	1	1
7/4	0	0	0
7/5	0	1	1
7/6	0	2	2
7/7	3	0	3
7/8	1	2	3
7/9	0	1	1
7/10	1	1	2
7/11	0	0	0
7/12	1	3	4
7/13	0	3	3
7/14	1	2	3
7/15	0	1	1
7/16	0	5	5
7/17	1	3	4
7/18	2	4	6
7/19	5	4	9
7/20	5	2	7
7/21	6	6	12
7/22	2	5	7
7/23	3	4	7
7/24	0	2	2
7/25	3	2	5
7/26	4	4	8
7/27	2	1	3
7/28	2	3	5
7/29	2	2	4
7/30	0	2	2
7/31	3	0	3
8/1	2	2	4
8/2	1	5	6
8/3	2	4	6
8/4	0	1	1
8/5	0	7	7
8/6	0	1	1
8/7	0	1	1
8/8	0	0	0
8/9	1	0	1
8/10	0	0	0
8/11	0	1	1
8/12	2	0	2
8/13	2	0	2
8/14	0	0	0
8/15	0	2	2
8/16	0	3	3
8/17	1	1	2
8/18	0	2	2
8/19	1	3	4
8/20	1	3	4
8/21	0	2	2
8/22	1	3	4
8/23	0	0	0
8/24	1	0	1
8/25	0	2	2
8/26	0	2	2
8/27	0	0	0
8/28	0	7	7
8/29	0	1	1
8/30	0	3	3
8/31	1	0	1
9/1	0	0	0
9/2	0	0	0
9/3	1	0	1
9/4	0	0	0
9/5	0	0	0
9/6	0	0	0
9/7	0	0	0
9/8	0	0	0
9/9	0	0	0
9/10	0	1	1
9/13	0	0	0
9/14	0	0	0
9/15	0	0	0
9/16	0	0	0
TOTAL	64	124	188

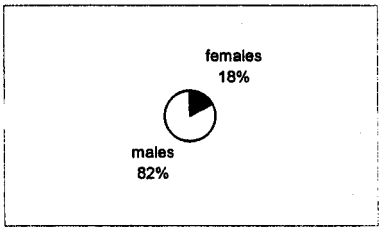


Appendix G2. Powell and Crooked Fork Creek Length frequency, 1999

Length (cm)	Females	Males	Total
40	0	0	0
41	0	0	0
42	0	0	0
43	0	0	0
44	0	0	0
45	0	3	3
46	0	2	2
47	0	3	3
48	0	2	2
49	0	6	6
50	0	10	10
51	0	14	14
52	0	12	12
53	0	12	12
54	0	11	11
55	0	9	9
56	0	13	13
57	0	7	7
58	0	10	10
59	0	5	5
60	0	2	2
61	0	2	2
62	0	1	1
63	0	0	0
64	0	0	0
65	0	0	0
66	0	0	0
67	0	0	0
68	0	0	0
69	1	0	1
70	0	0	0
71	2	0	2
72	0	0	0
73	0	1	1
74	0	1	1
75	0	0	0
76	0	0	0
77	1	0	1
78	0	0	0
79	0	1	1
80	1	0	1
81	1	0	1
82	2	0	2
83	0	0	0
84	1	0	1
85	0	0	0
86	0	0	0
87	4	1	5
88	3	1	4
89	3	1	4
90	3	1	4
91	3	3	6
92	2	1	3
93	2	1	3
94	2	2	4
95	1	4	5
96	0	3	3
97	0	5	5
98	0	1	1
99	0	0	0
100	0	2	2
101	1	0	1
102	0	2	2
	33	155	188







Appendix G3. Powell chinook summary of fish trapped, released, spawned, and disposition of carcasses for Powell and Crooked Fork adult traps, Brood Year 1999

TOTAL FISH TRAPPED: 188

AGE CLASSES	FEMALES	MALES
3 Years = (<64 cm)	0	124
4 Years = (64 - 82 cm)	8	5
5 Years = (> 83 cm)	25	26
	33	155

FISH DISPOSITION FEMALES:	
SPAWNED	27
MORTALITY	4
RELEASED	2
TOTAL	33

FISH DISPOSITION MALES:	
SPAWNED	87
MORTALITY	7
KILLED	55
RELEASED	6
TOTAL	155

All spawning carcasses were disposed in the Lochsa River.

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	88k	2000	97	0.273%
1996	Spr 1998	244,847	119	1999	877	2000		2001		
1997	Fall 1998	330,555	300	2000		2001		2002		
	Spr 1999	334,482								
		665,037								
1998	Spr 2000	293,522		2001		2002		2003		
1999	Spr 2001	212,648		2002		2003		2004		

(a) Rapid River stock reared at Dworshak

(b)Clearwater stock reared at Kooskia and Dworshak

(c)Clearwater stock 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 Walton 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 Creek

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

Appendix I. Clearwater Hatchery spring chinook egg inventory information, Brood Year 1999. Sources of eggs are shown.

POWELL

Spawn Date	Number Females Spawned	Number Males *	Number Females Culled	Number Production Females	Number Green Eggs	Number Eyed Eggs	
8/6/99	9	36	-	9	49,355	38,548	
8/10/99	5	20	-	5	24,716	17,828	
8/13/99	4	16	1	3	16,326	16,091	
8/20/99	4	16	*	4	16,334	15,033	
8/24/99	3	12	1	2	11,338	9,312	
8/27/99	1	4	-	1	4,816	4,499	
8/30/99	1	4	-	1	3,930	3,420	
							Total % eye-up
TOTAL	27	108	2	25	126,815	104,731	82.6%

Fecundity = 5,072 eggs/f

SOUTH FORK

Spawn Date	Number Females Spawned	Number Males *	Number Females Culled	Number Production Females	Number Green Eggs	Number Eyed Eggs	
8/18/99	2	8	-	2	7,883	7,229	
8/26/99	2	8	1	1	5,506	4,431	
8/31/99	2	8	-	2	8,350	6,945	
							Total % eye-up
TOTAL	6	24	1	5	21,739	18,605	85.6%

Fecundity = 4,348 eggs /f

* Adult males used more than once for spawning, jacks only once

LYONS FERRY

Received Date	Number Females Spawned	Number Green Eggs	Number Eyed Eggs	
9/17/99	4	16,521	15,735	
9/22/99	9	37,156	36,143	
9/29/99	53	199,943	190,263	
10/6/99	90	357,834	348,556	
10/13/99	39	133,945	128,927	
10/20/99	4	13,661	12,424	
				Total % eye-up
TOTAL	199	759,060	732,048	96.4%

Lyons Ferry - Received 10,134 HBKD Fecundity = 3,814 eggs /f

Appendix J. Production cost for BY99 Chinook and BY00 North Fork Steelhead

REARING TO RELEASE

	Chinook (BY-99)	North Fork Steelhead (BY-00)
No. Produced	781,823	786,954
Weight	56,085	109,948
% Mortality (from eyed eggs)	8.6%	20.2%
Conversion Rate	1.31	1.35

FOOD FED AND WEIGHT GAINED

	Chinook (BY-99)	North Fork Steelhead (BY-00)
Period Fed	Jan. 2000 - Apr. 2001	May 2000 - Apr. 2001
Feed Used Lbs.	62,501	151,911
Weight Gain	56,085	109,948
Feed Cost	$50,954.63	$45,481.28

Total Feed Cost $96,435.91

Average Cost per pound feed only $0.910

$0.41 Steelhead

Appendix K. Clearwater Fish Hatchery BY99 spring chinook fish marking and distribution summary.

Date	Species	Site	Brood Year	Length	Pounds	Number	FPP	Marks
9/28/00	SC	Crooked R	99	4.93	5,048	105,507	20.9	500 PIT, All RV
9/28/00	SC	Red R	99	5.06	3,165	68,684	21.7	500 PIT, All LV
4/13/01	SC	Crooked R	99	5.96	3,386	45,706	13.50	All CWT
3/29/01	SC	Crooked R	99	6.51	3,763	38,943	10.35	22,521 CWT, 16,422 AD only, 299 PIT
4/12/01	SC	Walton Cr	99	6.1	16,858	212,648	12.61	105,402 ad, 62427 CWT, 44,819-Blank CWT, 299 PIT
3/29/01	SC	Newsome Cr	99	6.11	12,380	155,140	12.53	1,060 pit tags, 155,140 CWT only
3/27/01	SC	Lolo Cr	99	5.96	11,485	155,195	13.51	1,048 PIT tags, 155,195 CWT
TOTALS				**5.80**	**56,085**	**781,823**	**13.94**	

Appendix L1. Crooked River summary of fish autopsy, Brood Year 1999

ACCESSION NO:	**01-87**	**LOCATION:**	**Crooked River Satellite**
SPECIES:	**Chinook Spring**	**AUTOPSY DATE:**	**04/4/01**
STRAIN:	**SF CLW SC**	**AGE:**	**Juv**
UNIT:	**All ponds sampled**	**SAMPLE SIZE:**	**20**
REASON 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	**47.4**	**5.0**	**0.12**
LEUCOCRIT	**0.00**	**0.00**	**0.00**
SERUM PROTEIN	**5.0**	**.47**	**.01**

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

VALUES AS PERCENTS OF TOTAL SAMPLE

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		MESEN. FAT		SPLEEN		**HIND** GUT		KIDNEY		LIVER		BILE	
N	**20**	**N**	**20**	**N**	**20**	**0**	**20**	**0**	**0**	**B**	**20**	**0**	**20**	**N**	**20**	**A**	**0**	**0**	**0**
B1	**0**	**F**	**0**	**S**	**0**	**1**	**0**	**1**	**2**	**R**	**0**	**1**	**0**	**S**	**0**	**B**	**18**	**1**	**0**
B2	**0**	**C**	**0**	**L**	**0**	**2**	**0**	**2**	**5**	**G**	**0**	**2**	**0**	**M**	**0**	**C**	**2**	**2**	**0**
E1	**0**	**M**	**0**	**S&L**	**0**			**3**	**7**	**NO**	**0**			**G**	**0**	**D**	**0**	**3**	**0**
E2	**0**	**P**	**0**	**I**	**0**	**Mean=0.00**		**4**	**6**	**E**	**0**	**Mean=0.00**		**U**	**0**	**E**	**0**		
H1	**0**	**OT**	**0**	**OT**	**0**					**OT**	**0**			**T**	**0**	**F**	**0**	**Mean=0.00**	
H2	**0**			**O**	**0**			**Mean=2.85**								**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: GOOD

GONADS:

SKIN: LOSING SCALES

OTHER:

Appendix L2. Crooked River summary of fish autopsy, Brood Year 1999

ACCESSION NO:	**99-348**	**LOCATION:**	**Crooked River Satellite**
SPECIES:	**Chinook Spring**	**AUTOPSY DATE:**	**9/26/00**
STRAIN:	**SF CLW SC**	**AGE:**	**Juv**
UNIT:	**All ponds sampled**	**SAMPLE SIZE:**	**20**
REASON FOR AUTOPSY:	**prelib**		
INVESTIGATOR(S):	**Munson**		
REMARKS:			

	MEAN	STANDARD DEVIATION	COFFICIENT OF VARIATION
LENGTH	**0.00**	**0.00**	**0.00**
WEIGHT	**0.00**	**0.00**	**0.00**
KTL*	**0.00**	**0.00**	**0.00**
CTL*	**0.00**	**0.00**	**0.00**
HEMATOCRIT	**0**	**0**	**0**
LEUCOCRIT	**0.00**	**0.00**	**0.00**
SERUM PROTEIN	**0**	**0**	**0**

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

VALUES AS PERCENTS OF TOTAL SAMPLE

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		MESEN. FAT		SPLEEN		**HIND** GUT		KIDNEY		LIVER		BILE	
N	**20**	**N**	**20**	**N**	**20**	**0**	**20**	**0**	**0**	**B**	**0**	**0**	**20**	**N**	**20**	**A**	**0**	**0**	**0**
B1	**0**	**F**	**0**	**S**	**0**	**1**	**0**	**1**	**0**	**R**	**20**	**1**	**0**	**S**	**0**	**B**	**0**	**1**	**0**
B2	**0**	**C**	**0**	**L**	**0**	**2**	**0**	**2**	**3**	**G**	**0**	**2**	**0**	**M**	**0**	**C**	**20**	**2**	**0**
E1	**0**	**M**	**0**	**S&L**	**0**			**3**	**7**	**NO**	**0**			**G**	**0**	**D**	**0**	**3**	**0**
E2	**0**	**P**	**0**	**I**	**0**	**Mean=0.00**		**4**	**10**	**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=3.35**								**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: GOOD **GONADS:**

SKIN: **OTHER:**

Appendix L3. Powell summary of fish autopsy, Brood Year 1999.

ACCESSION NO:	**01-88**	**LOCATION:**	**Powell Satellite**
SPECIES:	**Chinook Spring**	**AUTOPSY DATE:**	**04/5/01**
STRAIN:	**Powell SC**	**AGE:**	**Juv**
UNIT:	**All ponds sampled**	**SAMPLE SIZE:**	**20**
REASON FOR AUTOPSY:	**prelib**		
INVESTIGATOR(S):	**Munson**		
REMARKS:			

	MEAN	STANDARD DEVIATION	COFFICIENT 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	**46.2**	**5.1**	**0.11**
LEUCOCRIT	**0.00**	**0.00**	**0.00**
SERUM PROTEIN	**5.1**	**.47**	**.01**

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

VALUES AS PERCENTS OF TOTAL SAMPLE

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		MESEN. FAT		SPLEEN		**HIND** GUT		KIDNEY		LIVER		BILE	
N	**20**	**N**	**20**	**N**	**20**	**0**	**20**	**0**	**0**	**B**	**20**	**0**	**20**	**N**	**20**	**A**	**0**	**0**	**0**
B1	**0**	**F**	**0**	**S**	**0**	**1**	**0**	**1**	**2**	**R**	**0**	**1**	**0**	**S**	**0**	**B**	**18**	**1**	**0**
B2	**0**	**C**	**0**	**L**	**0**	**2**	**0**	**2**	**4**	**G**	**0**	**2**	**0**	**M**	**0**	**C**	**2**	**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**	**6**	**E**	**0**	**Mean=0.00**		**U**	**0**	**E**	**0**		
H1	**0**	**OT**	**0**	**OT**	**0**					**OT**	**0**			**T**	**0**	**F**	**0**	**Mean=0.00**	
H2	**0**			**O**	**0**			**Mean=2.9**								**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: GOOD

GONADS:

SKIN: LOSING SCALES

OTHER:

Appendix L4. Red River summary of fish autopsy, Brood Year 1999

ACCESSION NO:	**99-349**	**LOCATION:**	**Red River Satellite**
SPECIES:	**Chinook Spring**	**AUTOPSY DATE:**	**9/26/00**
STRAIN:	**SF CLW SC**	**AGE:**	**Juv**
UNIT:	**All ponds sampled**	**SAMPLE SIZE:**	**20**
REASON FOR AUTOPSY:	**prelib**		
INVESTIGATOR(S):	**Munson**		
REMARKS:			

	MEAN	STANDARD DEVIATION	COFFICIENT OF VARIATION
LENGTH	**0.00**	**0.00**	**0.00**
WEIGHT	**0.00**	**0.00**	**0.00**
KTL*	**0.00**	**0.00**	**0.00**
CTL*	**0.00**	**0.00**	**0.00**
HEMATOCRIT	**0**	**0**	**0**
LEUCOCRIT	**0.00**	**0.00**	**0.00**
SERUM PROTEIN	**0**	**0**	**0**

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

VALUES AS PERCENTS OF TOTAL SAMPLE

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		MESEN. FAT		SPLEEN		**HIND** GUT		KIDNEY		LIVER		BILE	
N	**20**	**N**	**20**	**N**	**20**	**0**	**20**	**0**	**0**	**B**	**0**	**0**	**20**	**N**	**20**	**A**	**0**	**0**	**0**
B1	**0**	**F**	**0**	**S**	**0**	**1**	**0**	**1**	**0**	**R**	**20**	**1**	**0**	**S**	**0**	**B**	**4**	**1**	**0**
B2	**0**	**C**	**0**	**L**	**0**	**2**	**0**	**2**	**0**	**G**	**0**	**2**	**0**	**M**	**0**	**C**	**16**	**2**	**0**
E1	**0**	**M**	**0**	**S&L**	**0**			**3**	**0**	**NO**	**0**			**G**	**0**	**D**	**0**	**3**	**0**
E2	**0**	**P**	**0**	**I**	**0**	**Mean=0.00**		**4**	**20**	**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=4.0**								**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: GOOD **GONADS:**

SKIN: **OTHER:**

Appendix M. Brood Year 2000 steelhead (B) eggs received from Dworshak National Fish Hatchery

Egg Take Number	Spawn Date	Eyed Egg Deliver Date	Number Eyed Eggs	Temperature Units
6	03/07/01	03/24/01	243,516	396
7	03/14/01	03/31/01	421,300	374
8	03/21/01	04/07/01	252,563	374
*7	03/14/01	04/28/01	68,507*	493
		TOTAL	**985,886**	

Machine enumeration done at Dworshak National Fish Hatchery.

Stock	#Eyed Eggs	Released Smolts	Survival
Dworshak	985,886	786,954	79.8
TOTAL		**786,954**	

Appendix N. Steelhead summary of fish autopsy, Brood Year 2000

ACCESSION NO:	**01-89**	**LOCATION:**	**Clearwater Hatchery**
SPECIES:	**Steelhead B**	**AUTOPSY DATE:**	**04/6/01**
STRAIN:	**NF CLW**	**AGE:**	**Juv**
UNIT:	**All ponds sampled**	**SAMPLE SIZE:**	**20**
REASON 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	**48.09**	**4.4**	**0.1**
LEUCOCRIT	**0.00**	**0.00**	**0.00**
SERUM PROTEIN	**7.1**	**.33**	**0.02**

***EXPRESSED AT KTL TIMES 10 TO THE FIFTH POWER**

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

VALUES AS PERCENTS OF TOTAL SAMPLE

EYES		GILLS		PSEUDO-BRANCHS		THYMUS		MESEN. FAT		SPLEEN		**HIND** GUT		KIDNEY		LIVER		BILE	
N	**20**	**N**	**20**	**N**	**20**	**0**	**20**	**0**	**0**	**B**	**20**	**0**	**20**	**N**	**20**	**A**	**2**	**0**	**0**
B1	**0**	**F**	**0**	**S**	**0**	**1**	**0**	**1**	**2**	**R**	**0**	**1**	**0**	**S**	**0**	**B**	**18**	**1**	**0**
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**	**10**	**NO**	**0**			**G**	**0**	**D**	**0**	**3**	**0**
E2	**0**	**P**	**0**	**I**	**0**	**Mean=0.00**		**4**	**6**	**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=3.0**								**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: GOOD

GONADS:

SKIN: LOSING SCALES

OTHER:

Appendix O. Brood Year 2000 North Fork steelhead marking and distribution

Date Planted	Site	Brood Year	Length (in)	Pounds	Number	Number/lb	Marks
4/26/01	CROOKED R	2000	7.2	34,711	245,547	7.1	600 PIT, 19,978 blank CWT, 69,651 CWT/ AD/LV, 80,099 Ad Only, 75,819 No Mark or tags
4/19/01	S F CLEARWATER R (Red House Hole)	2000	6.9	12,409	97,766	7.9	300 pit, 66,976 CWT/LV/Ad, 30,790 Ad only
4/26/01	CLEAR CR	2000	7.2	14,144	97,540	6.9	22,532 CWT/LV/AD, 75,008 Ad only
4/20/01	RED R	2000	7.4	3,600	23,220	6.5	No marks or tags
4/26/01	RED R	2000	7.2	31,441	226,050	7.2	**300 PIT,** **99,924 Ad only,** **126,126 No mark or tag**
4/13/01	MEADOW CR	2000	7.4	3,665	23,459	6.4	No marks or tags
4/12/01	MILL CR	2000	7.1	3,273	24,549	7.5	No marks or tags
4/16/01	LOLO CR	2000	7.1	6,705	48,823	7.3	300 PIT tags, 48,823 no marks or tags
TOTAL			**7.2**	**109,948**	**786,954**	**7.2**	

Submitted by:

Tom Tighe
Assistant Hatchery Manager

Approved by:

_____
Virgil K. Moore, Chief
Fisheries Bureau

_____
Tom Rogers
Anadromous Fish Hatcheries Supervisor