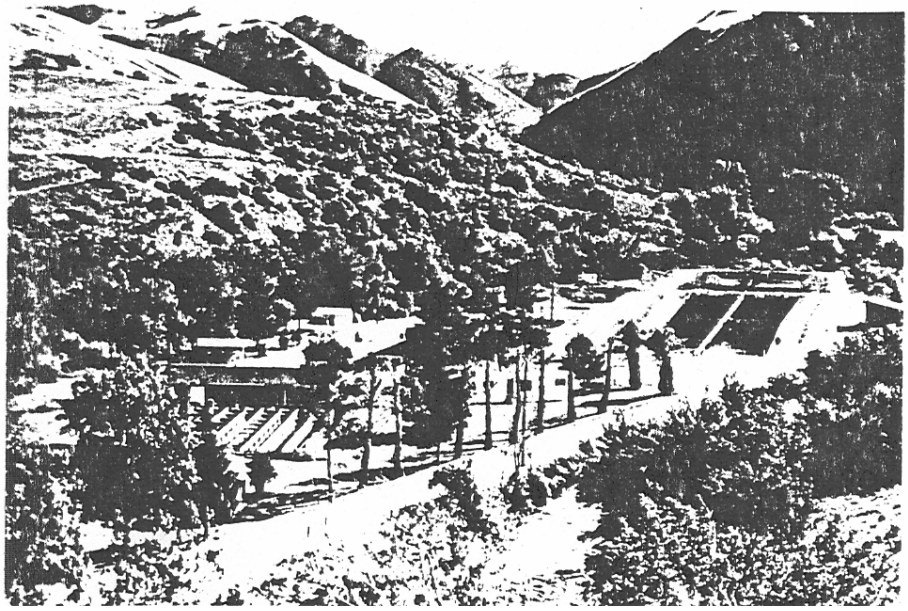
RAPID RIVER FISH HATCHERY

1996 CHINOOK BROOD YEAR REPORT



by

Richard L. Lowell
Fish Hatchery Manger II

Ralph E. Steiner
Assistant Fish Hatchery Manage,

Jeff A. Helndel
Fish Culturist

IDFG 98-44
October 1998

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF APPENDICES

TABLE OF CONTENTS

TABLE OF CONTENTS

Page

ABSTRACT

The Rapid River Fish Hatchery trap operated from March 13 to September 16, 1996. From May 29 to August 28, 1,412 marked chinook *Oncorhynchus tshawytscha* were collected. This included 661 adults and 751 jacks. The Oxbow Hatchery trapped and transferred 58 marked and three-unmarked chinook from Hells Canyon to Rapid River Hatchery for spawning. The sex ratio for the 1,470 combined Rapid River and Snake River marked returns was 307 adult males (20.88%), 362 females (24.63%), and 801 jacks (54.49%). The age-class structure of the 1,412 marked chinook returning to Rapid River was 751 three-year-olds (53.19%), 659 four-year-olds (46.67%), and 2 five-year-olds (0.14%). The age-class ratio of the marked fish received from Oxbow Hatchery was 50 three-year-olds (86.21%), 7 four-year-olds (12.07%), and one five-year-old (1.72%).

In addition, to marked chinook various, other species were trapped in 1996. A total of 84 unmarked chinook (58 adults and 26 jacks) were trapped from June 23 to September 12. Unmarked chinook were released into Rapid River above the trap. The age-class composition of the unmarked component of the 1996 salmon run was 26 three-year-olds, 53 four-year-olds, and five five-year-olds. There were 45 wild and 41 hatchery steelhead *O. mykiss* trapped from March 15 to June 3. The sex ratio of the returning steelhead was 11 wild males, 34 wild females, 28 hatchery males, and 13 hatchery females. Wild steelhead were released above the trap. Hatchery steelhead were released into the Little Salmon River. A total of 224 bull trout *Salvelinus confluentus* were trapped from June 19 to September 4, and released into Rapid River above the trap.

In 1996 there was no sport fishery on the Little Salmon River and no tribal fishery on Rapid River.

Prespawning mortality of the salmon brood stock was 11 adult males (0.7%), 28 females (1.9%), and 56 jacks (3.8%), for a total of 95 fish or 6.4% of the fish held. This is the second lowest in the history of this hatchery (the lowest was 2% in 1968).

Spawning took place from August 13 to September 30, 1996. This year 329 females were spawned producing 1,171,610 green eggs. Total survival to eye-up was 1,092,966-eyed eggs. Overall eye-up was 93.3% and average fecundity was 3,561 eggs per female for the 329 females spawned. As spawning progressed, 168,754 eyed eggs from females that tested moderate or high for bacterial kidney disease (BKD) by ELISA (Enzyme Linked Immunosorbent Assay) were transferred to Clearwater Fish Hatchery. The total inventory remaining at Rapid River Hatchery was 924,212-eyed eggs.

Marking of brood year 1996 fingerlings was conducted in two sessions from July 28 to August 1, and September 8 to September 11, 1997. The marking crew reported 896,953 fish were adipose fin-clipped and 336,527 of these received coded-wire tags (CWT). From February 9 through 11, Passive integrated transponder (PIT) tags were placed in 48,388 smolts before release.

From March 16 to April 28, 1998, a total of 896,170 smolts were released into Rapid River. Survival from marking to release was 99.9%. Feed conversion for brood year 1996 fish was 1.33.

Authors:

Richard L. Lowell
Fish Hatchery Manager II

Ralph Steiner
Assistant Fish Hatchery Manager

Jeff A. Hiendel
Fish Culturist

INTRODUCTION

Funding Source

Rapid River Fish Hatchery (RRFH) was constructed in 1964 by Idaho Power Company (IPC) to mitigate for loss of spring chinook salmon resulting from the construction of Brownlee, Oxbow, and Hells Canyon dams on the Snake River. This loss included anadromous fish runs to confluent drainages between Hells Canyon and Shoshone Falls near Twin Falls in south-central Idaho. Mitigation mandated by the Federal Energy Regulatory Commission required IPC to transplant a run of spring chinook salmon from the Snake River to the Salmon River drainage and to provide funds for the production of three million spring chinook salmon smolts annually at this facility. These fish are designated for release into Rapid River and into the Snake River below Hells Canyon Dam. The RRFH is staffed and operated by the Idaho Department of Fish and Game (Department) and is solely funded by IPC.

Location

The RRFH is in Idaho County seven miles southwest of the community of Riggins. It is located on Rapid River, a tributary of the Little Salmon River. Travel distance for salmon to the ocean is approximately 600 river miles.

OBJECTIVES

The objectives of RRFH are:

1. To produce three million spring chinook salmon smolts annually. The average size is to be approximately 22.7 g (20 fish/pound). These fish are to be released into Rapid River and the Snake River below Hells Canyon Dam.

2. To trap and spawn adult spring chinook salmon returning to Rapid River.

3. To evaluate various strategies and techniques for rearing spring chinook salmon.

4. To provide eggs and/or fry for supplementation purposes.

FACILITY DESCRIPTION

Fish rearing facilities at RRFH consist of 50 vertical stack incubators (800 trays), 12 outdoor concrete raceways (6 ft x 90 ft), and six earthen rearing ponds (RP) with concrete side walls: Pond 1A and 1B (42 ft x 188 ft each), Pond 2A and 2B (35 ft x 197 ft each), and Pond 2C and 2D (37 ft x 173 ft each). Adult salmon brood stock holding facilities consist of one concrete holding pond (HP) HP-1 (80 ft x 25 ft), and one earthen holding pond HP-2 (40 ft x 150 ft). This provides space for holding up to 4,000 adult salmon before spawning. Production capacities by unit are listed in Appendix 1. Rearing space by unit is shown in Appendix 2.

The RRFH facilities include a fish trap on Rapid River approximately 1.5 miles downstream from the hatchery. It is designed to trap and hold upstream migrating adult fish. The trap consists of a permanent wooden velocity barrier, a seven-step fish ladder, and a two-stage trap. Adult salmon can be transferred from the trap by means of an Alaska Steep Pass Ladder to a 500-gallon bucket lifted by an overhead hoist to a 1,000-gallon tank truck for transport to the hatchery. The trap facility allows unimpeded migration of anadromous and resident fish around the velocity barrier during periods when the trapping operations are not in progress.

RECOMMENDED FACILITY IMPROVEMENTS

As part of our mandate to evaluate production methods, we have identified two areas where improvement can be made by modifying the existing facility. One relates to adult salmon handling and the other to general hygiene and disease control. Average prespawning mortality at RRFH from 1970 to 1994 was 18.3%. Prespawning mortality records show increased mortality after first sort and subsequent crowding of the adults. Our current method of gathering fish for sorting involves netting all adult fish in a large seine each spawn day. This results in severe handling stress twice each week during the spawning season. An improved system for crowding adult fish can have a direct effect on prespawning mortality. The other area of improvement involves the way water is supplied to RP-1. All water entering RP-1 must pass through the raceway system. When fingerlings are present in the raceways, RP-1 and HP-2 receive their effluent. Direct supply to RP-1 would solve this.

WATER SUPPLY

Water Source

Rapid River originates in Adams County and flows through an undeveloped canyon before reaching the hatchery. The drainage is protected as part of the Wild and Scenic Rivers Act and is not subjected to perturbations, such as logging, or road building. Rapid River generally provides adequate water for rearing spring chinook salmon, however, the length and steep nature of the drainage make it a highly variable river. Spring runoff and flash floods can be violent and carry a tremendous volume of silt into the hatchery. Specific water measurement data are recorded by the National Forest Service (NFS) but are not available for water-year 1996 at this time. We estimate that high water during the spring of 1996 peaked at more than 1000 cfs and was high well into June. This is very high when compared with recent years and we believe exceeded 1993 when the spring runoff peaked at 905.3 cfs. The peak flow occurred during June and was preceded by several smaller peaks throughout the spring. This high run off was later than normal and the water conditions were turbid and cold. Water temperature is also normally quite variable. The minimum in January is about 34°F and the maximum in August can exceed 60°F. The late high water, and lower than normal water temperatures during spring 1996, were associated with late snowfall occurring in June. Mean monthly water temperatures were an average of 2.6°F below the ten-year norm for each month during the holding period. Pond temperatures during adult holding are in Appendix 3. Water quality parameters are in Appendix 4.

Water Supply

Hatchery water is obtained through one 30-inch and one 24-inch pipeline. A five-foot high wooden diversion dam provides the necessary hydraulic head. The RRFH has specific water rights under a state license to 28 cfs for the hatchery facility and 18.6 cfs for the fish trap. This water is diverted from Rapid River and then returned after passing through the hatchery. Rearing units operate on gravitational flow. Water for the incubation system is pumped from the headrace by one of two 7.5-horsepower electric pumps. A gasoline-operated pump and a gravitational flow filter bed provide water during electrical failures.

STAFFING

Three permanent employees, a Fish Hatchery Manager II, an Assistant Fish Hatchery Manager, and a Fish Culturist staff the RRFH. Approximately five seasonal employees are hired each year from February through November. The Summer Youth Employee Training Program may provide one or two employees to help with ground maintenance. Housing accommodations include three residences for the permanent staff and a 65 ft x 14 ft mobile home for seasonal employees.

FISH PRODUCTION

Adult Collection

Spring Chinook Salmon Returns to Rapid River

The RRFH trap was in operation from March 13 through September 16, 1996. Water conditions presented no problem for the fish and minimal restrictions to trapping. The trap was closed down from June sixth through ninth in 1996, due to high water and turbidity. The trap was also out of operation for a few hours for cleaning on June 13 and 19 and again on July 1.

Marked chinook were collected for spawning purposes and transported to holding ponds at the hatchery. The first marked chinook was trapped on May 29 and the last on August 28, 1996 (Appendix 5 and 6). The majority of the run followed a normal curve with a slight delay due to lower than normal water temperatures and late and high runoff. The peak of the 1996 run was during the first week of July with another small surge during the first week of August. This year 1,412 marked chinook (661 adults and 751 jacks) were trapped. These marks consisted of 1,400 adipose (AD) fin clips and 12 left ventral (LV) fin clips. All but one of these fish were transported to holding ponds and held for spawning. One LV marked jack was released into Rapid River. This yielded a total of 1,411 marked Rapid River chinook placed in holding at RRFH. A total of 58 marked (57 AD clips and one LV clip) and three unmarked salmon were received from Oxbow Hatchery this year which brought the total number of fish in holding at RRFH to 1,472 (1,411 marked Rapid River fish, 58 marked Snake River fish, 3 unmarked Snake River fish, or 1,472 fish held). This year we continued to combine holding of the Rapid River returns with fish that returned to the Snake River. The HP-1 allows less stressful handling during the sorting and spawning process (see Recommend Facility Improvements). We believe these considerations outweigh the statistical problems created by mixing the fish. Fork lengths are measured at the time of trapping so separate age-class information is available for the two groups. However, sexual dimorphism is not evident

until later in the summer after the groups were combined. For this reason the sex ratio must be for all the fish placed in holding. The sex ratio of the 1,470 total marked fish (1,411 marked Rapid River fish in holding, 1 marked Rapid River fish released, 58 marked Snake River fish) was 307 adult males (20.88%), 362 females (24.63%), and 801 jacks (54.49%). The three unmarked fish received from Oxbow Hatchery were all jacks. Polymodal analysis of length-frequencies and CWT return data from the 1995 run were used to determine age-class criteria. Age-class composition of 1,412 marked Rapid River chinook was 751 (53.19%) three-year-olds (<61 cm), 659 (46.67%) four-year-olds (61-83 cm), and two (0.14%) five-year-olds (>83 cm), (Appendix 7, and 8).

A large number of jacks returned this year. We were directed to hold some for possible use by the Nez Perce Tribe (Tribe). To accommodate this potential utilization, 305 jacks were not injected with antibiotic and placed in HP-2. The Tribe elected not to take these fish and this group of jacks were not used for spawning.

Ancillary species were collected, recorded, and released. Unmarked chinook, unmarked steelhead, and bull trout were released into Rapid River above the trap, and marked steelhead were released into the Little Salmon River about one mile above the confluence of Rapid River. Scale samples were collected from unmarked chinook and steelhead. This year a study of emigration of all species from Rapid River was performed. A screw-trap was installed above the hatchery diversion dam and trapped fish were recorded daily then released. Hatchery personnel assisted with this project by maintaining the trap and processing fish. For more information regarding this project contact the Department Research Office in Nampa Idaho.

This year 28 marked chinook were trapped with jaw tags and PIT-tags (Appendix 9). Four marked chinook arrived at Rapid River with radio transmitters and visual identification (VI) tags. One of the fish received from Oxbow Hatchery also had a VI tag and radio. We also trapped one fish with a VI tag and no radio at Rapid River. A radio transmitter was found in the attraction channel to our trap (Appendix 10).

Injuries were documented throughout the trapping season. When multiple injuries were present on the same fish, they were recorded separately. Injuries consisted of 43 nitrogen burns, 34 gill net scars, and 300 other types of injuries (Appendix 11). This year we did not find any gaff wounds and only one fishhook.

Hells Canyon Spring Chinook Salmon Returns

The IPC personnel transported 61 chinook from the Hells Canyon trap to RRFH. Three of these were unmarked jacks that returned to the trap more than once. The age-class composition of the 58 marked chinook in the Hells Canyon run was 50 three-year-olds (86.21), seven four-year-olds (12.07%), and one five-year-old (1.72%). This is based on the same age-class criteria used for Rapid River returns. The sex ratio of the Hells Canyon run is not available separately because sexual dimorphism is not evident at the time trapping. The sex ratio of the combined Rapid River and Snake River returns was determined during holding at RRFH. For more information see the *Oxbow Hatchery Spring Chinook Salmon Run Report for 1996.*

Inventory of Miscellaneous Species

Unmarked chinook entered the trap from June 23 through September 12, 1996. The timing of this part of the run is shown in Appendices 6 and 12. This component of the Rapid River run included 58 adults and 26 jacks. These fish were measured to the nearest centimeter fork length (Appendices 8 and 13), injected with antibiotic, then released above the trap into the Rapid River drainage. The released salmon received an operculum punch to identify recaptures. Age-class composition of this part of the salmon run was 26 three-year-olds (30.95%), 53 four-year-olds (63.10%), and five five-year-olds (5.95%). The sex ratio was not determined this year because the early arrival of unmarked fish precluded identification of sex because dimorphism was indistinct.

From March 15 through June 3, 1996, a total of 86 adult steelhead were trapped (Appendices 14, and 15) and measured to the nearest centimeter fork length (Appendices 16, and 17). The steelhead run included 45 wild fish and 41 hatchery fish. The sex ratio was 11 wild males, 34 wild females, 28 hatchery males, and 13 hatchery females. Steelhead of hatchery origin were transported back to the Little Salmon River and released approximately one mile upstream from its confluence with Rapid River. Wild steelhead were released into Rapid River upstream from the trap with a caudal fin punch to identify recaptures.

A total of 224 bull trout were trapped from June 19 through September 4, 1996 (Appendix 18 and 19). These fish ranged in size from 34 cm to 59 cm total length (Appendix 20 and 21). Department research personnel continued a study of bull trout movement this year. Hatchery personnel assisted with implanting PIT tags, marking, and various other aspects of the study. Further information regarding this study can be obtained from the Department Research Office in Nampa Idaho. An inventory of all species trapped in 1996 is shown in Appendix 22.

Harvest Data/Sport and Tribal Fishery

In 1996 there was no sport fishery on the Little Salmon River. There was also no tribal fishery on Rapid River in 1996.

Holding and Spawning

Adult Treatments

Hatchery personnel removed fish from the trap daily and processed them on site. The fish were all handled as little as possible and processing was conducted with the fish immersed. The steep pass ladder does not work well with low numbers of fish so this year each fish was processed one at a time within the trap building. They were anesthetized with 40 ppm MS-222, measured to the nearest centimeter fork length, and injected with antibiotic. Fish that were placed in HP-1 were marked with a numbered Tyvek tag stapled to the outside of the operculum. This year operculum tags were placed on 1,072 fish. Of these, only 540 were retained throughout the holding period and 532 were lost. This is a tag loss of 49.6%, which is better than the tag loss rate for 1995, but still raises some question about the relative value of this type of tag for returned adults within the hatchery.

All fish to be ponded in HP-1 or released received an intraperitoneal injection of erythromycin base injectable (Gallimycin-100) at 20 mg/kg body weight. The 305 jacks held in HP-2 were not injected and not marked with operculum tags. The administration of the antibiotic was performed in accordance with veterinary extra label usage by prescription from Dr. Dave Hunter, Department veterinarian at the Caldwell Wildlife lab in Caldwell, Idaho.

All fish held for brood stock were placed in pond HP-1. The holding period extended from May 24 to September 30. Formalin treatments were administered three times each week from June 20 to September 5, to control ectoparasites and reduce prespawning mortality. Formalin treatments consisted of precharging the pond with formalin to 170 ppm, followed by introduction of formalin in the inflow water for one hour at a rate of 170 ppm. During the holding and spawning period, water temperatures ranged from 39.0°F to 56.1°F (Appendix 3). Carcasses from holding and spawning were frozen then hauled to a landfill in Montana once each week by the Walco Company.

Prespawning Mortality

The combined prespawning mortality for Rapid River and Hells Canyon chinook was 95 fish or 6.4% of the 1,472 fish placed in holding. After August 28, males were not considered part of prespawning mortality. The sex ratio was 11 adult males (0.7%), 28 females (1.9%), and 56 jacks (3.8%). This is the second year in a row in which prespawning mortality has been below 8% (the average from 1970 through 1994 was 18.7%). We believe factors influencing this improvement include holding in HP-1, crowding with racks rather than nets, precharging the formalin treatments, and generally good condition of the fish upon arrival.

Hatchery personnel performed routine necropsies of all prespawning mortalities. Causal factors for prespawning mortality are shown in Appendix 23. A profile of cumulative prespawning mortality as percent of total fish held is shown in Appendix 24. Snouts were collected from AD-clipped fish and sent to the Department Fish Marking Laboratory at Lewiston Idaho for CWT analysis.

Salmon Spawning

In 1996, a total of 329 female chinook were spawned from August 13 to September 30; they produced a total egg take of 1,171,610 eggs. Complete egg enumeration and disposition data is compiled in Appendix 25. During spawning four females were destroyed and their eggs discarded because they were green and one was not used due to poor egg quality. This year no females were discarded for gross symptoms of BKD. Each female was sampled during spawning for BKD analysis. The results of ELISA tests are shown in Appendix 26. We followed standard procedure recommended by the Integrated Hatchery Operations Team (IHOT) for random cross of two males per female. This was done to ensure that all females were fertilized with a fertile male. This method may be responsible for the improvement in the eye-up percentage this year. Females were killed with a blow to the head. The eggs from each female were put in a colander to drain off the ovarian fluid, transferred to a bucket where they were fertilized with the milt from two males, and mixed with approximately 250 ml of well water to activate the sperm. Jacks were included at random for fertilization throughout the spawning season. Males were given a right operculum punch to identify them as having been spawned and then returned to the holding pond. All fertilized eggs were water hardened for 30 minutes in a minimum of 100 ppm Argentyne. After water

hardening, eggs were placed in vertical stack incubators that were set to a flow rate of six gallons per minute.

Incubation

Eggs were incubated at a rate of one female per tray to allow segregation of individual fish pending results of ELISA studies.

The total egg take for 1996 was 1,171,610 eggs from 329 females. This yields an average fecundity of 3,561 eggs per female. After primary pick off of 78,644 bad eggs 1,092,966-eyed eggs remained. This is an overall eye-up of 93.3%.

In 1996, 50 of the 329 females spawned tested moderate or high positive for BKD by ELISA. These females produced 179,925 green eggs, which yielded 168,754-eyed eggs. After picking and counting the eyed eggs were transferred to Clearwater Fish Hatchery for isolated incubation. The eggs were transferred in EggTUBE containers manufactured by the AquaSeed Corporation. EggTUBEs were placed in EggBOX coolers and transported by RRFH personnel. This group of eggs had an overall eye-up of 93.8% and the average fecundity of the 50 females was 3,599 eggs per female.

Approximately 924,212-eyed eggs were retained at RRFH. These came from 991,685 green eggs taken from 279 of the 329 females that tested negative or low by ELISA. Overall eye-up for this group was 93.2% and average fecundity of the 279 females was 3,554 eggs per female.

All eggs incubated at RRFH were shocked at 500 daily temperature units (DTU) by pouring them from the trays into water and back into trays. They were picked two days later using the salt bath method. A Jensorter egg counter was used to establish inventory numbers. After counting, the eggs were returned to clean trays. At 1,000 DTUs, when most of the eyed eggs had hatched, the trays were picked again and a third pick off was performed just prior to ponding. All trays were rodded weekly, after eye-up, to remove silt. Three days each week, formalin was administered to each incubator stack at a rate of 1,667 ppm for 15 minutes to retard external *mycosis.* This procedure was discontinued after each egg "Lot" accumulated 800 DTUs. *Mycosis* was successfully controlled. Swim-up fry were ponded at approximately 1750 DTUs.

Early Rearing

Fry were ponded from December 27, 1996 through March 29, 1997. The first lot was initially ponded in our two indoor vats then transferred to raceways. Subsequent lots were ponded in four outdoor raceways. Average initial raceway loading density was 0.19 to 0.26 (Piper, et. al. 1982, Appendix 27). Initial water depth was 1.5 ft and water flow was adjusted to 270 gpm. As the fish increased in size, water depth and flows were increased to a maximum depth of 3 ft and flow of 850 gpm. To maintain density indices below 0.3 the fingerings were split into eight raceways in June 1997. The fingerlings remained in the raceways until marking when they were transferred to rearing ponds. This year the fingerlings were marked in two groups. The first group increased in size to an average weight of 27.1 g (81.3 fish per pound) at the end of the early rearing period. The second group reached 41.6 g (53.0 fish per pound). Density and flow indices averaged 0.22 and 1.17 for the first group and 0.35 and 0.94 for the second group when they were transferred (Appendix 28).

Mortality during early rearing was 12,582 fish or 1.4% of the total of inventory reported at marking plus recorded mortality prior to marking.

Final Rearing

Rearing ponds were disinfected with a 200 ppm chlorine bath prior to ponding fish. The fingerlings were transferred from raceways to ponds through four-inch irrigation pipe. The marking crew reported that a total of 896,953 spring chinook were marked and moved during two marking sessions from July 28 through August 1, 1997, and September 8 through September 11, 1997. This is a decrease of 0.91% from hatchery inventory for the raceways marked from July 28 through August 1, 1997 and a decrease of 1.47% from inventory for the raceways marked from September 8 through September 11, 1997. The difference between total hatchery inventory and the total number reported marked was a decrease of 0.44%. As in the past, hatchery inventory numbers were adjusted to the number reported marked and transferred into the final rearing ponds. Initial pond loading densities (after completion of marking on September 11, 1997) are reported in Appendix 29. Fingerlings were ponded at a mean length of 76.4 mm (1.94 in), and increased to 206.3 mm (5.24 in) at release. Average final rearing density prior to the initiation of volitional release on March 16, 1998 was 0.18 (Appendix 30). The maximum recommended by Department for density index is 0.30. The average flow index was 1.29. The maximum recommended flow index for oxygen saturated water at 45°F and 2,188 ft above sea level is 2.09. Both these parameters were within prescribed limits.

Feed Use and Conversion

A total of 60,869.7 lbs of Bioproducts feed was used for 1996 brood year fish prior to the beginning of volitional release on March 16, 1998. During the early rearing period 18,629 lbs of feed were fed with a feed conversion of 1.21. Another 42,240.3 lbs were fed during the final rearing period with a feed conversion of 1.39. The overall feed conversion was 1.33 based on inventory and fish size on March 16. Between March 16 and egress of the last fish on April 28, another 4495.9 lbs were fed to maintain vigor and visceral fat. This yields 65,365.6 lbs total feed, however, conversion based on this number would be meaningless due to lack of specific inventory information for the period between March 16 and April 28. We feel the value of volitional release far exceeds the need for precision of conversion data. Specific data on feed types and sizes are listed in Appendix 31.

From April 18 to May 3, 1997 all brood year 1996 fingerlings were fed 4.0% TM-100 D at a rate of 0.94% body weight/day to yield a dose of 3.75 g oxytetracycline/100 lbs. body weight/day, for 10 days. The treatment period lasted 16 days because all fingerlings were taken off feed after the start of treatment due to high water and turbidity. When feeding resumed, medicated feed was fed for 10 consecutive days.

From June 8 through June 21, 1997 all fingerlings were fed 6% TM-100 D, at a rate of 1.67% body weight/day to yield a dose of 10.0 g oxytetracycline/100 lbs body weight/day, for 14 days. This was followed immediately (starting June 22) by feeding 2.25% Aquamycin-100 at 2.2% body weight/day or a dose rate of 100 mg erythromycin/kg body weight/day for 28 days. Starting August 1, all fingerlings were fed 2% TM-100 D, at 2.6% body weight/day or a dose of 5.2 g oxytetracycline/100 Ibs. body weight/day for 14 days. Another 28-day treatment with 2.25%

Aquamycin-100 was administered starting August 18, 1997. This was fed at 2.2% body weight/day for a dose of 100 mg erythromycin/kg body weight/day.

Erythromycin treatments were followed by toxicity testing and were performed according to guidelines set forth in interactive new animal drug protocol (INAD) number 4333. Treatments of TM-100 were performed according to guidelines set forth in INAD 30126.

Fish Health

Diseases Encountered and Treatment

Parts of this section of the 1996 Brood Year Report are reproduced with permission from Mr. Doug Munson of the Eagle Fish Health Laboratory in Eagle Idaho. The summary of the preliberation inspection was reduced from the routine Fish Health Inspection Report for March 9, 1998 accession number 98-051. A summary of Eagle Health Laboratory results for inspections of brood year 1996 brood stock and juveniles are shown in Appendix 32.

Fish were treated with 3.75 g of oxytetracycline/100 lbs of fish/ day for 10 days to alleviate mortalities due to *Aeromonas hydrophila* during April 1997. Chronic mortality was persistent and two more oxytetracycline treatments were administered; one at 10 g/100 lbs fish/day starting June 8, and one at 5.2 g/100 lbs fish/day starting August 1. Both subsequent treatments lasted 14 days. Two prophylactic treatments of erythromycin were applied for 28 days each. The florescent antibody test (DFAT) and ELISA positive fish were found in preliberation sampling, but clinical disease was not observed.

Organosomatic Index

The Organosomatic Index in this context is a measure of fish health developed as part of the Autopsy-Based Fish Health/Condition Assessment System (Goede, R. W., and S. Houghton. 1987). A summary of the fish autopsy is shown in Appendix 33.

Acute Losses

Acute losses were not experienced in production fish. Chronic losses were experienced in production fish due to *Aeromonas hydrophila* infection. Oxytetracycline was applied successfully to reduce mortalities (INAD 30126).

Other Assessments

Cooperation between hatchery, pathology, and marking personnel during the *Aeromonas* epizootic allowed the fish to recover from this bacterial infection before marking. Obviously the fish were healthier for the duration of hatchery rearing because of the flexibility of the marking crew.

Fish Marking

Fisheries management protocol requires the adipose fin to be removed from all hatchery-reared salmon. The marking crew reported that a total of 896,953 fish were AD clipped. The CWTs were placed in 336,527 of these. Marking was interrupted by a disease outbreak (see Fish Health Section). Marking started July 28 and was halted August 1. It resumed September 8 and was completed September II, 1997. After marking, the fish were sampled monthly for a quality check of AD clips. A total of 739 fish were sampled and the results were: 93.9% with full clips, 0.9% without clips, and 5.1% with partial clips.

The PIT-tags were placed in 48,388 fish from February 9 through February 11, 1998. As the fish were PIT-tagged they were transferred to Rearing Pond 2C. During the remainder of the final rearing period all mortalities from Pond 2C were scanned and PIT-tag numbers recorded.

Specific marking information is presented in Appendix 34. For more information regarding marking consult the Annual Release Summary of Marked Salmon and Steelhead published by the Department.

Fish Distribution

Egg Transfers

During 1996, 168,754-eyed eggs from 50 females were transferred to Clearwater Hatchery for isolated incubation and rearing. Smolts from these eggs were released into the Snake River during April 1997 by Clearwater Hatchery personnel. For more information contact the Clearwater Hatchery.

Fingerling Transfers

No brood year 1996 fingerlings were transferred.

Smolt Releases

The total release of brood year 1996 spring chinook from RRFH was 896,170 fish (44,174 lbs). All brood year 1996 smolts were released into Rapid River. Releases took place from March 16 through April 28, 1998.

Final sample counts were taken at the start of volitional smolt releases on March 16, 1998. Smolts averaged 22.3 g (20.3 fish/lb) and 133.1 mm fork length (5.24 in). Rearing densities at the time of release are listed in Appendix 30. Based on visual observations, we estimate that about 70% of the smolts emigrated volitionally. The remaining fish were seined from the ponds as they were dewatered. The last fish emigrated on April 28. Release data is reported in Appendix 35. Survival from marking to release was 99.9% (Appendix 36).

Cost of Production

The total cost of production for any specific brood year is not a straight forward calculation. At RRFH the rearing cycle is 19 months. For any brood year it extends from September when spawning starts to March, nineteen months later when the smolts are released. In the past, cost of production has been reported for the total cost incurred by IPC for the entire 19-month period. Overlap in brood year classes causes the expenditure for September through March of the first year and for the expenditure for September through March of the second year to be reported twice. This results in inflated estimates of production cost because it reports total cost for 14 of the 19 months in three successive brood year reports. We continue to report greatly inflated production cost figures. This is because we report the total cost paid by IPC for the entire period, rather than costs associated with production of a given brood year. In an effort to address this problem, IPC has supplied us with total cost broken down by month, so that we can prorate each month by brood year (letter dated July 30, 1998 from Paul Abbott, IPC Hatchery Biologist, P.O. Box 70, Boise, Idaho). This is one logical approach, however, in our report for brood year 1995 (last year's report) we proposed prorating monthly cost by the percent each brood year made up of total inventory during any specific month. This created some problems. While this method was rational and would have resulted in reporting cost numbers only once, the resulting cost per pound was 1/3 that calculated using the old method. At this hatchery's IHOT evaluation meeting on March 8, 1996 this figure appeared inconsistent with data from previous years and we were directed to continue to use the old method. We recommend a future meeting with discussion and a decision regarding this question. For now, we will continue to report total cost paid by IPC for the entire period.

The total cost paid by IPC for September 1, 1996 through March 30, 1998 was $706,983.63. Expressed as cost per pound of production, this was high for brood year 1996 due to low inventory. This is because total cost includes variable expenses (e.g., feed cost), and fixed costs which by definition fluctuate very little with changes in inventory. Fixed costs or overhead are why the cost per pound this year is high while total cost is consistent with other years. Cost of production data is listed in Appendix 37.

HISTORICAL INFORMATION

As always, we have included some archival information to put this year's report into perspective. Historic information about returns by return year is listed in Appendix 38, and by brood year in Appendix 39. Average feed and growth statistics are listed in Appendix 40. Release and transfer information is listed in Appendix 41.

ACKNOWLEDGMENTS

The crew at RRFH would like to thank Mr. Paul Abbott and the fisheries staff at IPC for their support and assistance in helping us to maintain and improve the hatchery facility. We would also like to thank Department personnel who helped us during the spawning season. Our gratitude again goes to Officer Roy Kinner and other conservation officers for security at the hatchery and trapping facility. In addition, we extend our appreciation to Doug Munson and the Eagle Fish Health Lab staff for disease diagnostic work at the hatchery, and assistance with preparation of this document. This team effort helps to keep Rapid River a successful hatchery.

LITERATURE CITED

Goede, R. W., and S. Houghton. 1987. ASUM A Computer Program For The Autopsy-Based Fish Health/Condition Assessment System. Utah Division of Wildlife Resources Fisheries Experiment Station, 1465 West 200 North, Logan, Utah 84321.

Piper, P. G., I. B. McElwain, L. E. Orme, J.P. McCraren, J.R. Leonard. 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service. Washington D. C.

APPENDICES

Appendix 1. Rapid River Hatchery production capacity.

Rearing unit	Volume		Carrying capacity	
Incubators	800	trays	3,200,000	eggs
Raceways (12)	1,890	cubic ft	3,800.000	fry
Rearing Pond #1	54,625	cubic ft	1,000,000	smolts
Rearing Pond #2	92,827	cubic ft	2,000,000	smolts
Adult Holding Pond 1	12,000	cubic ft	1,000	adults
Adult Holding Pond 2	24,000	cubic ft	3,000	adults

Appendix 2. Rapid River Hatchery pond volume.

Rearing/holding area	Volume (cubic ft)
Rearing pond 1A	27,496
Rearing pond 1B	27,129
Rearing pond 2A	23,858
Rearing pond 2B	22,607
Rearing pond 2C	22,468
Rearing pond 2D	23,894
Adult holding pond 1	12,000
Adult holding pond 2	24,000

Appendix 3. Rapid River Hatchery adult holding pond temperatures (°F), 1996.

Month	Maximum	Minimum	Average	Ten yearaverage
April	49.1	39.0	42.9	44.9
May	47.5	39.4	43.6	46.5
June	51.0	42.1	46.7	50.1
July	55.8	44.6	51.4	54.4
August	56.1	47.5	52.2	55.7
September	53.8	43.0	48.9	51.4

The average monthly water temperature was an average of 2.86° lower than the ten-year average for that month.

Appendix 4. Rapid River water quality analysis.

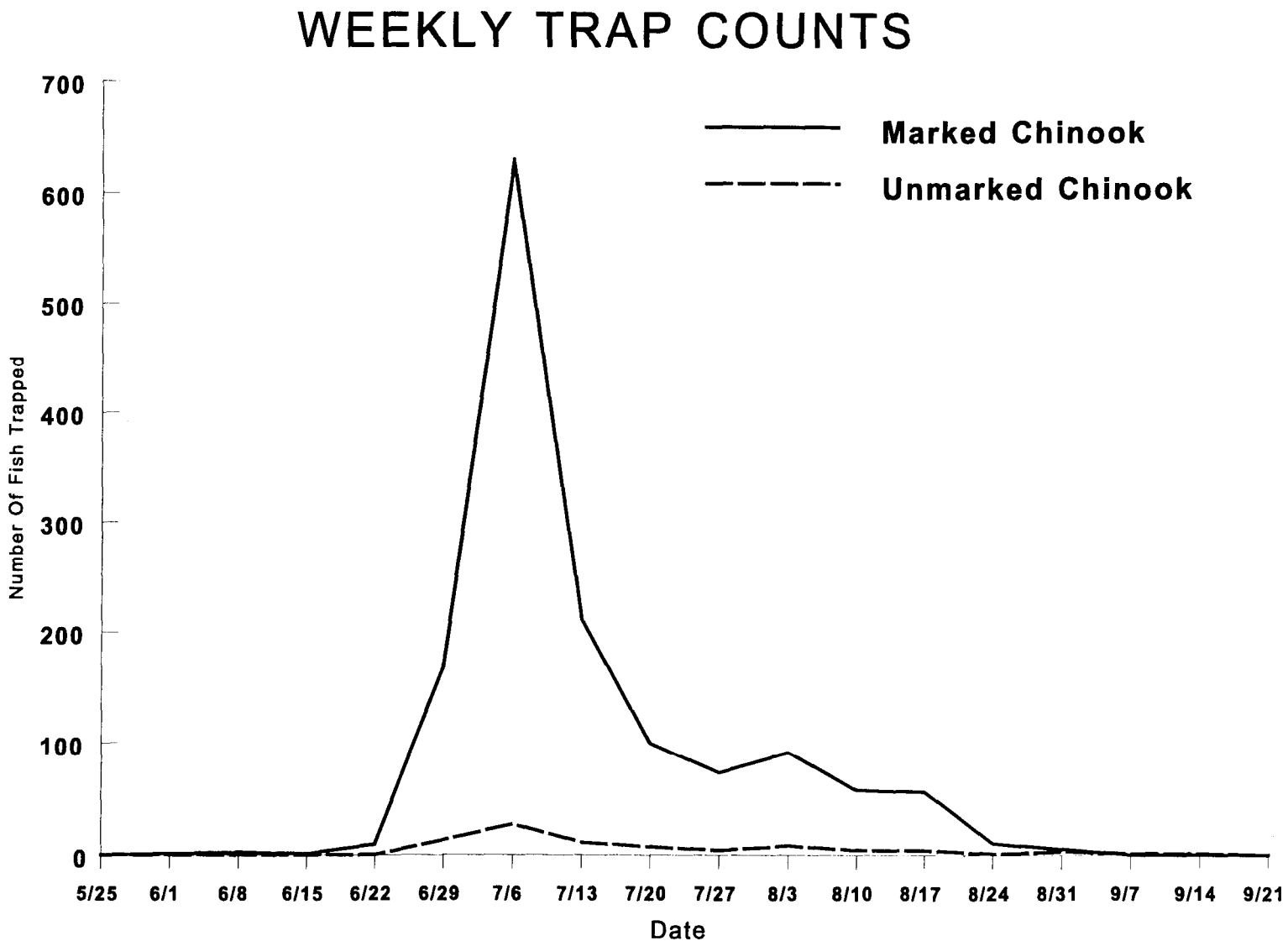
Analyte	P Q L	Result	Units
Nitrate/N	0.05	ND	mg/L
Nitrite	0.05	ND	mg/L
Sulfate	1	14	mg/l
Orthophosphate/P	0.05	ND	mg/L
Ammonia/N	0.5	ND	mg/L
Alkalinity	10	74	mg/L as CaCO3
Hardness	10	80	mg/L as CaCO4
pH		7.63	
Hydrogen Sulfide	0.2	ND	mg/L
Chlorine	0.1	ND	mg/L
Arsenic	1	ND	ug/L
Cadmium	1	ND	ug/L
Chromium	1	ND	ug/L
Mercury	1	ND	ug/L
Lead	1	ND	ug/L
Selenium	1	ND	ug/L
Silver	1	ND	ug/L
Iron	30	120	ug/L
Zinc	1	51	ug/L
Cooper	1	ND	ug/L
Aldrin	0.1	ND	ug/L
Endrin	0.1	ND	ug/L
Dieldrin	0.1	ND	ug/L
Heptachlor	0.1	ND	ug/L
Chlordane	0.1	ND	ug/L
Methoxychlor	0.1	ND	ug/L
Lindane	0.1	ND	ug/L
Guthion	0.1	ND	ug/L
Malathion	0.1	ND	ug/L

PQL= practical Quantitation Limit
ND = not detected(<PQL)

Appendix 5. Rapid River spring chinook run timing, 1996.

Week ending	Number of fish	Percent of marked chinook
May 25	0	0.00
June 1	1	0.07
June 8	2	0.14
June 15	1	0.07
June 22	9	0.64
June 29	170	12.04
July 6	628	44.48
July 13	210	14.87
July 20	99	7.01
July 27	73	5.17
August 3	91	6.44
August 10	57	4.04
August 17	56	3.97
August 24	10	0.71
August 31	5	0.35
September 7	0	0.00
September 14	0	0.00
September 21	0	0.00
Total	**1,412**	**100.00**

Appendix 6. Adult salmon returns to Rapid River trap during 1996.



Appendix 7. Rapid River spring chinook lengths, 1996.

Fork length (cm)	Number of fish
< 40	5
40	3
41	6
42	13
43	20
44	23
45	35
46	73
47	85
48	112
49	88
50	86
51	75
52	47
53	42
54	16
55	6
56	2
57	4
58	5
59	4
60	1
61	4
62	4
63	3
64	4
65	5
66	20
67	21
68	25
69	33
70	54
71	73
72	80
73	74
74	67
75	53
76	67
77	32
78	16
79	13
80	7
81	3
82	1
83	0
84	0
85	1
86	0
87	0
88	0
89	0
90	0
91	0
92	0
>92	1
Total run	**1,412**

*The sex ratio includes 58 marked fish received from Oxbow Hatchery

Sex composition data

801 (54.49%)	jacks
307 (20.88%)	males
362 (24.63%)	females
1,470 (100.00%)	***Total**

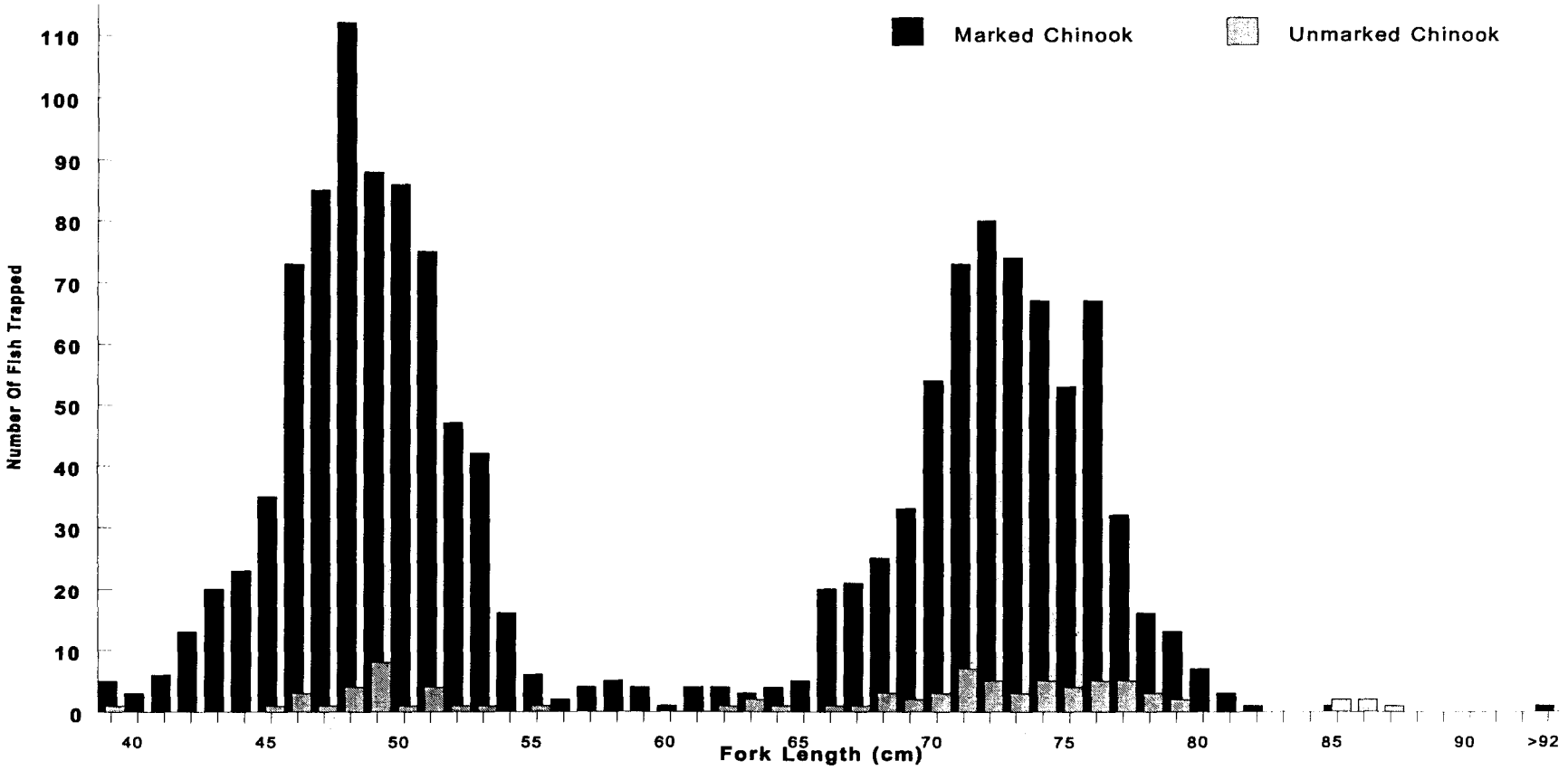
Age-class data

751 (53.19%)	three-year-old
659 (46.67%)	four-year-old
2 (0.14%)	five-year old
1,412 (100.00%)	**Total**

Age-class criteria

< 60 cm =	three-year old
61 - 83 cm =	four-year-old
> 83 cm =	five-year-old

Appendix 8. Length-frequency of adult salmon returning to Rapid River during 1996.



Appendix 9. Adult chinook recaptured at Rapid River trap with jaw and PIT tags.

Trap date	Fish id number	Jaw tag number	Pit tag number	Fin clip
6-25	37B	T0150	22606E575A	AD
6-29	163B	T0152	22494A7D2D	AD
7-1	332B	T0153	2245541D51	LV
7-2	422B	T0157	225B3C600C	AD
7-3	499B	T0180	2250276F16	AD
7-3	508B	T0164	22495B7F61	AD
7-3	512B	T0167	2247690E7B	AD
7-3	559B	T0187	2249550131	AD
7-3	592B	T0169	226005053B	AD
7-4	641B	T0170	225C7E5C64	AD
7-4	657B	T0165	225008222F	AD
7-4	667B	T0172	2261242066	AD
7-5	778B	T0182	2251242A41	AD
7-5	816B	T0166	225A523106	AD
7-6	851B	T0186	224160024F	AD
7-8	880B	T2106	225B68765D	AD
7-8	906B	T0161	2251015D47	AD
7-9	922B	T0173	22627D5A4D	AD
7-11	979B	T0194	22450E7E01	AD
7-11	996B	T0181	2262043228	AD
7-11	1010B	T0179	2251334F11	AD
7-13	1072B	T01	2247690E7B	AD
7-15	1095B	T0171	22603B1615	AD
7-15	1103B	T0189	225A5A2E64	AD
7-17	1135B	T02103	2246761418	AD
7-19	1162B	T0183	22467F554E	AD
8-10	1409B	T0177	2247236E50	AD
8-10	1410B	T0158	225D7A401D	AD

Appendix 10. Adult chinook recaptured at Rapid River trap with VI and radio tags.

Trap date	Fish id number	VI tag number	Radio CH/Code	Fin clip
7-4	686B	J13	08/80	AD
7-4	636B	JS8	07/31	AD
7-11	972B	MC5	10/06	AD
7-18	Radio found in trap		09/31	
7-30	1288B	JE2	07/86	AD
7-31	1299B	FY7	No radio	AD
8-11	1488B	No tag	05/70	AD
6-24	033X	J30	08/51	AD

Fish number 033X was trapped at Hells Canyon and transported to Rapid River.

Appendix 11. Injuries to adult chinook returning to Rapid River trap, 1996.

Trap/mark	Body injury	Body scar	Bite wound	Eye damage	Fish hook	Fungus	Gill net	Nitrogen blister	Pectoral fin	Pelvic fin
Rapid River										
AD or LV	168	70	7	7	1	1	32	43	1	3
Unmarked	13	2	1	0	0	2	2	0	0	0
Hells Canyon	5	19	0	0	0	0	0	0	0	0
Total	**186**	**91**	**8**	**7**	**1**	**3**	**34**	**43**	**1**	**3**

Appendix 12. Rapid River summer chinook run timing, 1996.

Week ending	Number of fish	Percent of unmarked chinook
May 25	0	0.00
June 1	0	0.00
June 8	0	0.00
June 15	0	0.00
June 22	0	0.00
June 29	13	15.48
July 6	27	32.14
July 13	11	13.10
July 20	7	8.33
July 27	4	4.76
August 3	8	9.52
August 10	4	4.76
August 17	4	4.76
August 24	1	1.19
August 31	3	3.57
September 7	1	1.19
September 14	1	1.19
September 21	0	0.00
Total	**84**	**100.00**

Appendix 13. Rapid River summer chinook lengths, 1966.

Fork length (cm)	Number of fish	Fork length (cm)	Number of fish
<40	1	80	0
40	0	81	0
41	0	82	0
42	0	83	0
43	0	84	0
44	0	85	2
45	1	86	2
46	3	87	1
47	1	88	0
48	4	89	0
49	8	90	0
50	1	91	0
51	4	92	0
52	1	>92	0
53	1	**Total run**	**84**
54	0		
55	1		
56	0		
57	0		
58	0		
59	0		
60	0		
61	0		
62	1		
63	2		
64	1		
65	0		
66	1		
67	1		
68	3		
69	2		
70	3		
71	7		
72	5		
73	3		
74	5		
75	4		
76	5		
77	5		
78	3		
79	2		

Sex composition data

26 (30.95%)	jacks
*Not available	males
*Not available	females
84 (100.00%)	***Total**

Age-class data

26 (30.95%)	three-year-old
53 (63.10%)	four-year-old
5 (5.95%)	five-year-old
84 (100.00%)	**Total**

Age-class criteria

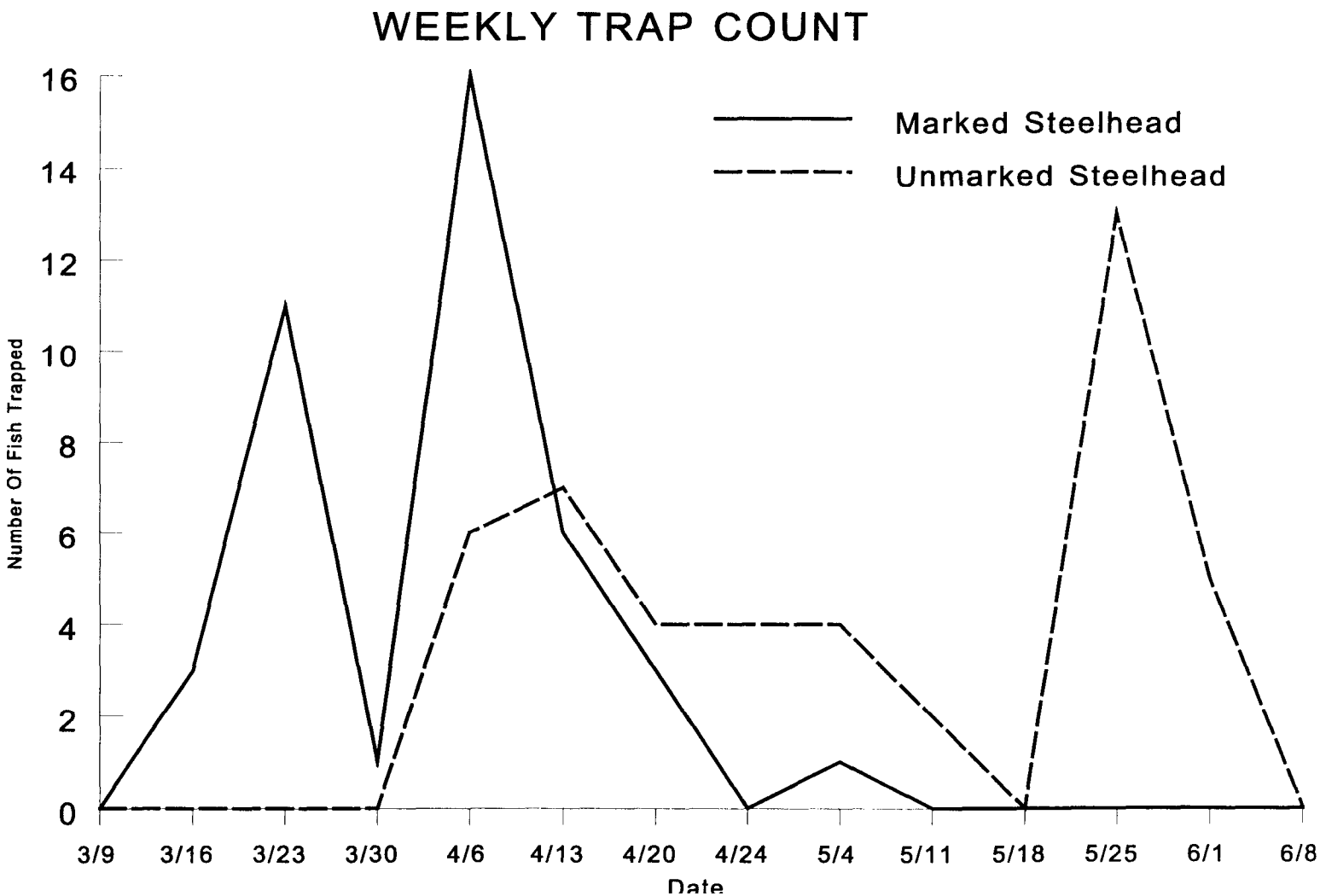
0 – 60 cm =	three-year old
61 – 83 cm =	four-year-old
84 - > =	five-year-old

*Over half the unmarked fish returned prior to explicit dimorphism.

Appendix 14. Rapid River steelhead run timing, 1996.

Week ending	Number of fish	Percent of steelhead run
March 9	0	0.0
March 16	1	1.2
March 23	13	15.1
March 30	1	1.2
April 6	7	8.1
April 13	27	31.4
April 20	8	9.3
April 24	2	2.3
May 4	7	8.1
May 11	2	2.3
May 18	0	0.0
May 25	13	15.1
June 1	3	3.5
June 8	2	2.3
June 15	0	0.0
Total	**86**	**100.0**

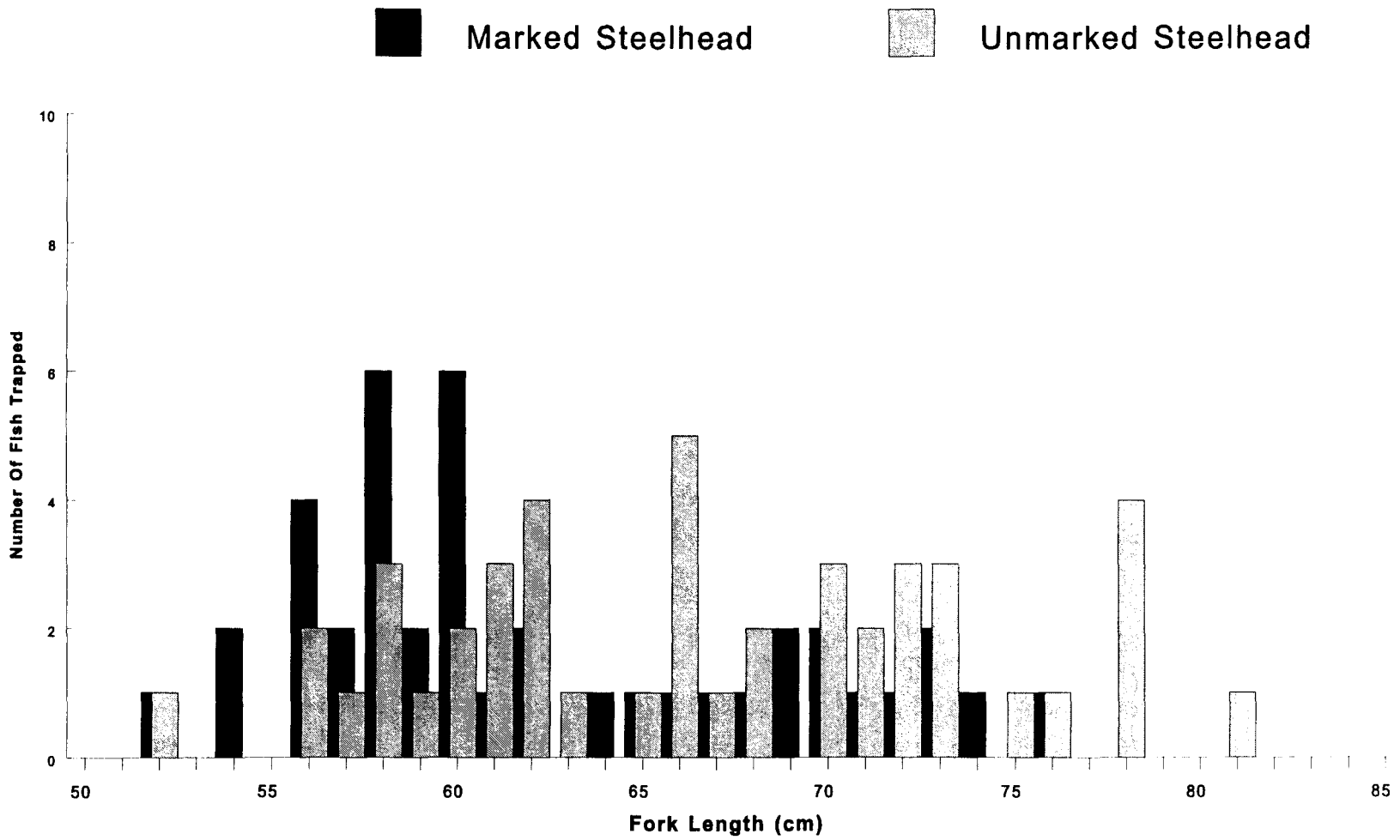
Appendix 15. Adult steelhead returns to Rapid River trap during 1996.



Appendix 16. Rapid River steelhead lengths, 1996.

Fork	Hatchery		Wild	
Length (cm)	Male	Female	Male	Female
51				
52		1		1
53				
54	2			
55				
56	3	1		2
57	2			1
58	5	1		3
59	1	1		1
60	4	2		2
61	1		2	1
62	2		1	3
63			1	
64	1			
65		1		1
66		1	1	4
67		1		1
68		1	1	1
69	2			
70		2	2	1
71	1			2
72	1			3
73	1	1	1	2
74	1			
75				1
76	1		1	
77				
78			1	3
79				
80				
81				1
82				
83				
84				
85				
86				
87				
88				
89				
Column total	28	13	11	34
Origin total	41		45	
Total run		**86**		

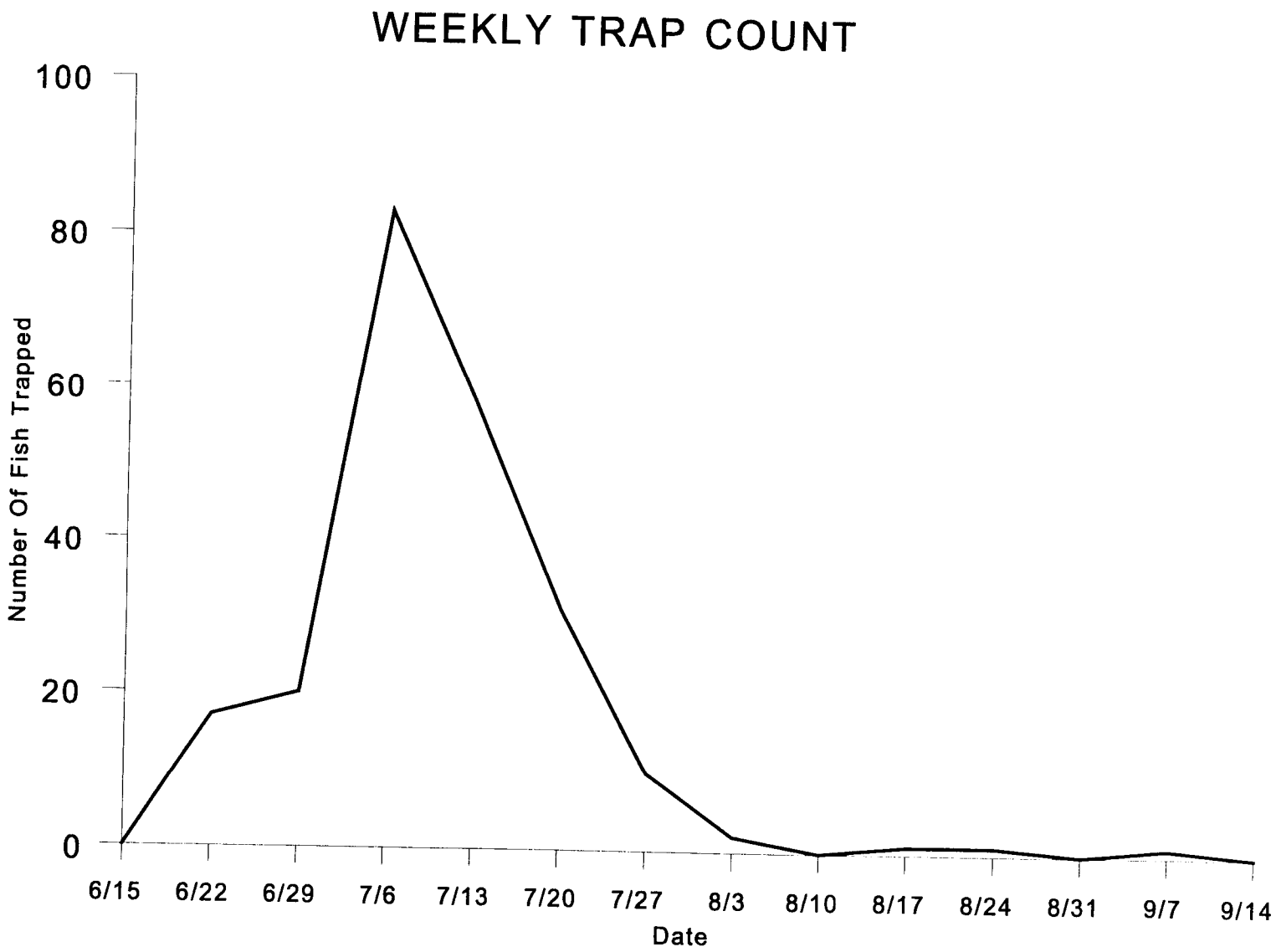
Appendix 17. Length-frequency of steelhead returning to Rapid River trap during 1996.



Appendix 18. Rapid River bull trout run timing, 1996.

Week ending	Number of fish	Percent of bull trout run
June 15	0	0.0
June 22	17	7.6
June 29	20	8.9
July 6	83	37.1
July 13	58	25.9
July 20	31	13.8
July 27	10	4.5
August 3	2	0.9
August 10	0	0.0
August 17	1	0.4
August 24	1	0.4
August 31	0	0.0
September 7	1	0.4
September 14	0	0.0
Total	**224**	**100.0**

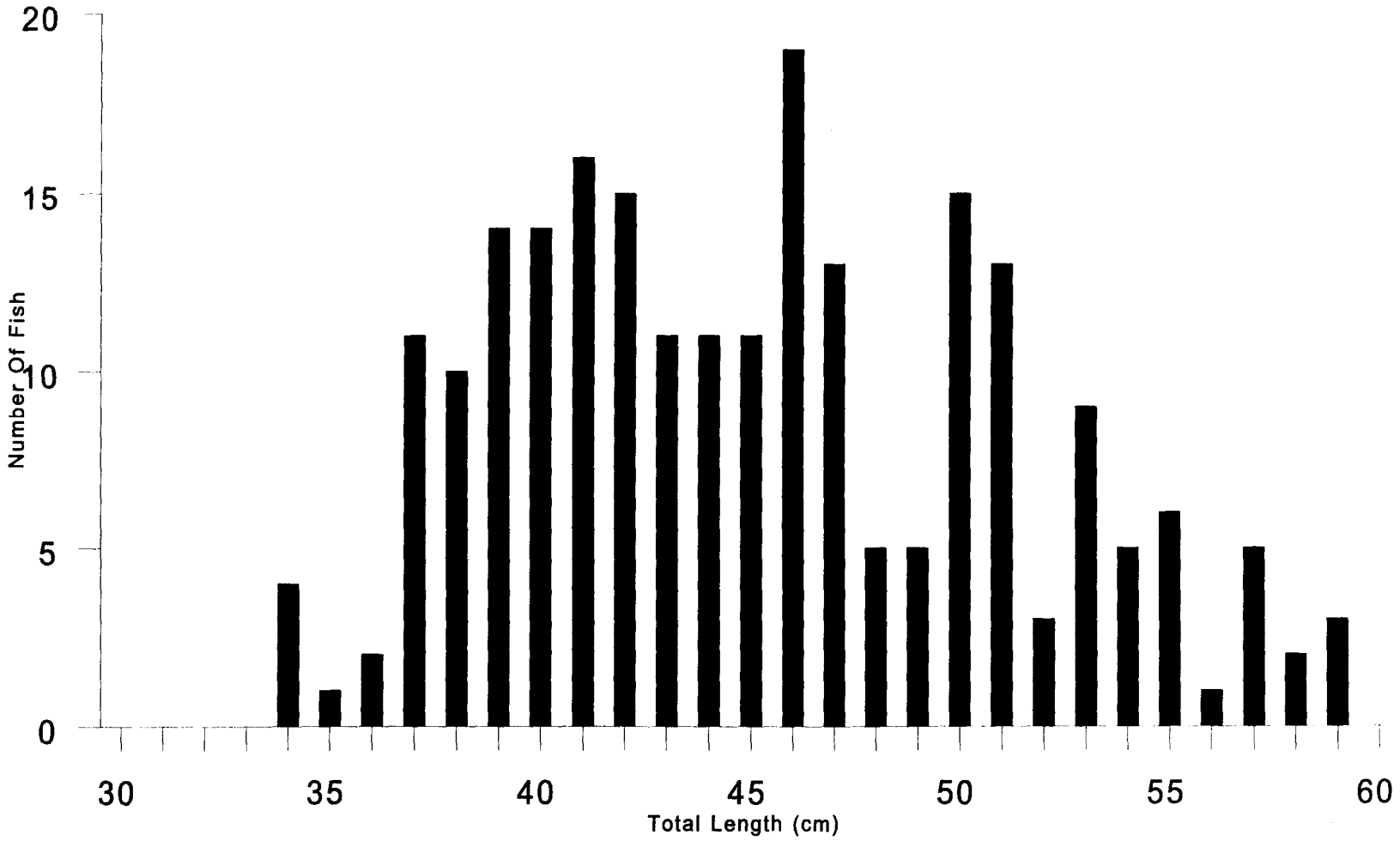
Appendix 19. Adult bull trout returns to Rapid River trap during 1996.



Appendix 20. Rapid River bull trout lengths, 1996.

Total length (cm)	Number of fish	Total length (cm)	Number of fish
21	0	41	16
22	0	42	15
23	0	43	11
24	0	44	11
25	0	45	11
26	0	46	19
27	0	47	13
28	0	48	5
29	0	49	5
30	0	50	15
31	0	51	13
32	0	52	3
33	0	53	9
34	4	54	5
35	1	55	6
36	2	56	1
37	11	57	5
38	10	58	2
39	14	59	3
40	14	60	0
Total			**224**

Appendix 21. Length-frequency of adult bull trout returning to Rapid River trap during 1996.



Appendix 22. Species trapped in Rapid River, 1996.

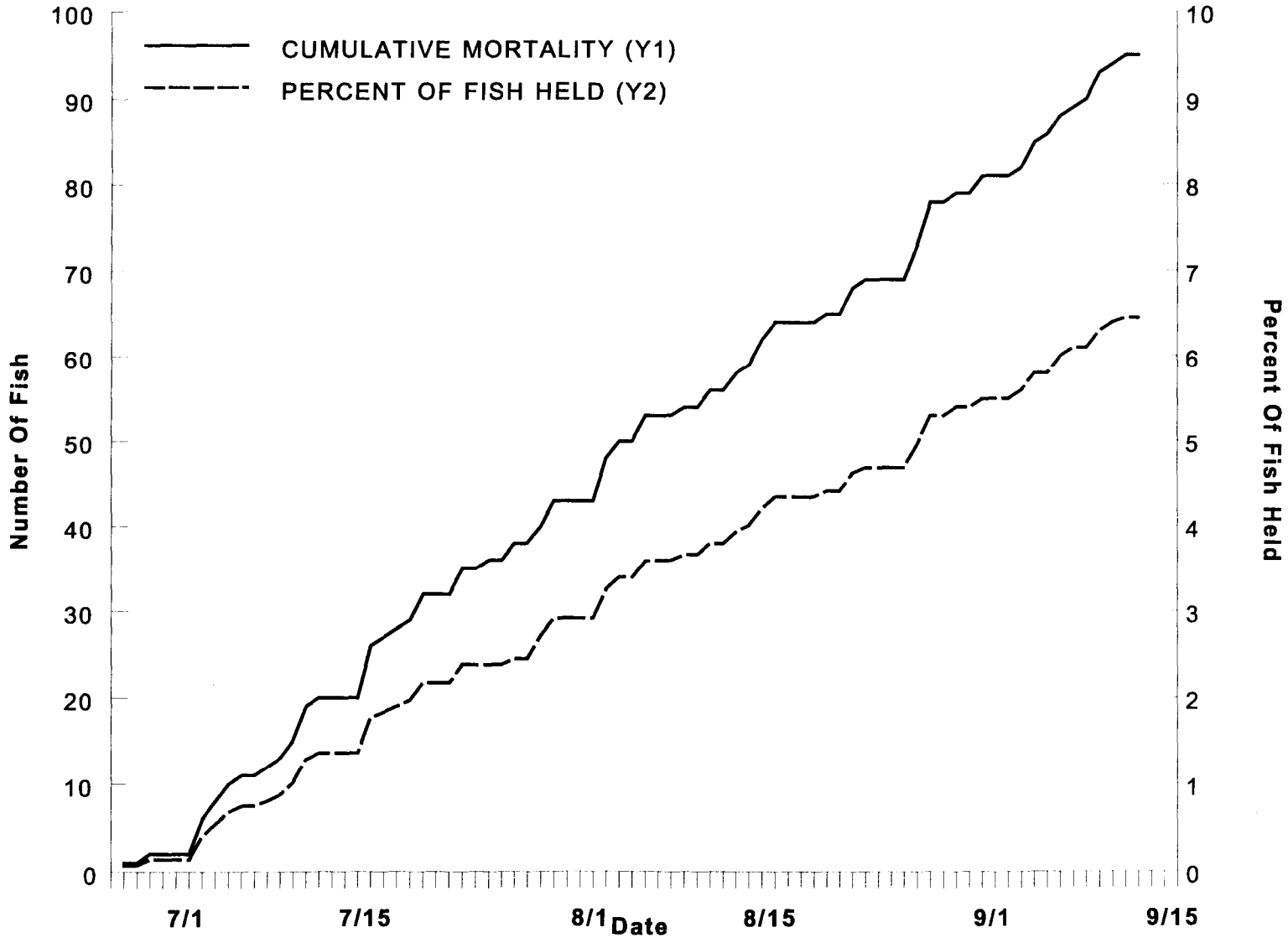
Species	Number trapped
Marked chinook	1,412
Unmarked chinook	84
Steelhead	86
Bull trout	224

Appendix 23. Causes of prespawning adult mortality at Rapid River Hatchery, 1996.

Cause	Number of fish	Percent of fish held
Unknown	92	6.2
BKD	0	0.0
Jaundice	0	0.0
Nitrogen burn	3	0.2
Wounds	0	0.0
Total	**95**	**6.4**

Prespawning mortality of Hells Canyon returns was 9 fish. That is 14.7% of the 61 fish received from Oxbow Hatchery and 9.5% of all prespawning mortality.

Appendix 24. Prespawning mortality of adult salmon at Rapid River Hatchery during 1996.



Appendix 25. Rapid River Hatchery egg enumeration.

Total Eggs Taken at Rapid River Hatchery in 1996.

Lot	Eyed	Bad	Green	Percent eyed	Average fecundity	Females
RI	21,275	3,047	24,322	87.5	3,475	7
R2	54,578	5,449	60,027	90.9	3,531	17
R3	19,627	1,183	20,810	94.3	3,468	6
R4	70,934	4,910	75,844	93.5	3,792	20
R5	285,448	11,397	296,845	96.2	3,711	80
R6	309,812	11,464	321,276	96.4	3,570	90
R7	195,062	17,446	212,508	91.8	3,428	62
R8	93,201	17,173	110,374	84.4	3,560	31
R9	40,472	6,201	46,673	86.7	3,112	15
R10	2,557	374	2,931	87.2	2,931	1
Total	**1,092,966**	**78,644**	**1,171,61**	**93.3**	**3,561**	**329**

Eggs Transferred to Clearwater Hatchery From Rapid River Hatchery in 1996.

Lot	Eyed	Bad	Green	Percent eyed	Average fecundity	Females
RI	2,885	494	3,379	85.4	3,379	1
R2	4,448	2,420	6,868	64.8	3,434	2
R4	4,645	374	5,019	92.5	5,019	1
R5	34,650	877	35,527	97.5	3,553	10
R6	78,358	2,235	80,593	97.2	3,504	23
R7	17,949	1,109	19,058	94.2	3,812	5
R8	14,461	3,055	17,516	82.6	3,503	5
R9	8,801	233	9,034	97.4	4,517	2
R10	2,557	374	2,931	87.2	2,931	1
Total	**168,754**	**11,171**	**179,925**	**93.8**	**3,599**	**50**

Eggs Retained at Rapid River Hatchery in 1996.

Lot	Eyed	Bad	Green	Percent eyed	Average fecundity	Females
RI	18,390	2,553	20,943	87.9	3,491	6
R2	50,130	3,029	53,159	94.3	3,544	15
R3	19,627	1,183	20,810	94.3	3,468	6
R4	66,289	4,536	70,825	93.6	3,728	19
R5	250,798	10,520	261,318	96.0	3,733	70
R6	231,454	9,229	240,683	96.2	3,592	67
R7	177,113	16,337	193,450	91.6	3,394	57
R8	78,740	14,118	92,858	84.8	3,571	26
R9	31,671	5,968	37,639	84.1	2,895	13
Total	**924,212**	**67,473**	**991,685**	**93.2**	**3,554**	**279**

Appendix 26. Rapid River brood stock ELISA results, 1996.

Lot number	Date sampled	Negative		Positive		
		Number sampled	<0.99	Low.1-.25	Moderate .26-.59	High >.60
RI	8/13	7	2	4	0	1
R2	8/19	17	2	13	0	2
R3	8/22	6	1	5	0	0
R4	8/26	20	1	18	0	1
R5	8/29	80	6	64	4	6
R6	9/03	90	3	64	18	5
R7	9/06	62	14	43	5	0
R8	9/09	31	7	19	4	1
R9	9/12	15	1	12	1	1
R10	9/30	1	0	0	0	1
Total	**10**	**329**	**37**	**242**	**32**	**18**

Appendix 27. Initial raceway loading densities.

Raceway	Inflow (cfs)	Number of fish	Fish per pound	Density index	Flow index
2	.31	227,323	1,494.0	0.29	0.88
5	.31	145,844	1,157.0	0.34	0.67
8	.31	245,811	1,347.0	0.34	1.02
10	.31	173,365	1,500.0	0.26	0.67

Appendix 28. Final raceway loading densities.

Raceway	Inflow (cfs)	Number of fish	Fish per pound	Density index	Flow index
1	1.11	112,764	87.0	0.25	0.81
3	1.11	111,905	47.0	0.32	1.22
4	1.36	71,670	73.0	0.18	0.47
6	1.11	71,624	78.0	0.17	0.56
7	1.28	120,224	44.6	0.36	1.17
9	1.11	122,724	80.0	0.29	0.94
10	1.32	146,573	48.6	0.41	1.31
11	1.28	143,551	48.6	0.40	1.32

The raceway numbers here are different from Appendix 26 because the raceways were split to maintain density criteria. The numbers of fish represent hatchery inventory and differ slightly from the actual number reported marked.

Appendix 29. Initial pond loading densities.

Pond	Inflow (cfs)	Number of fish	Fish per pound	Density index	Flow index
Pond 2A	7.76	415,638	39.2	0.11	0.73
Pond 2D	6.61	481,147	43.9	0.11	0.92

Appendix 30. Pond loading densities at release.

Pond	Inflow (cfs)	Number of fish	Fish per pound	Density index	Flow index
Pond 2A	4.93	394,414	20.3	0.16	1.69
Pond 2C	4.82	48,314	22.0	0.02	0.19
Pond 2D	4.82	453,442	20.1	0.18	1.98

Appendix 31. Feed for brood year 1996 at Rapid River Hatchery.

Product Type/size	Additives	Amount used	Unit price	Total cost
BioDiet:				
No. 2 Starter		299.4 kg	2.1600	$646.70
NO. 3 Starter		209.7 kg	2.1600	$452.95
NO. 3 Starter	TM-100	76.7 kg	3.8800	$297.60
1.0 mm Grower		439.1 kg	1.6900	$742.08
1.3 mm Grower		459.0 kg	1.7100	$784.89
1.3 mm Grower	TM-100	199.6 kg	3.6800	$734.53
1.5 mm Grower		938.0 kg	1.5900	$1,491.42
1.5 mm Grower	TM-100	259.5 kg	3.6800	$954.96
1.5 mm Grower	Aquamycin	1955.9 kg	3.3960	$420.75
2.0 mm Grower	Aquamycin	2634.5 kg	3.3960	$8,946.76
2.5 mm Grower	TM-100	1277.3 kg	2.8500	$3,640.31
2.5 mm Grower	Aquamycin	1237.4 kg	4.4600	$5,518.80
BioMoist				
2.0 mm Grower		6050.0 lb	0.6500	$3,932.50
2.5 mm Grower	[a]EIBSvitamin pac	7900.0 lb	0.5150	$4,068.50
3.0 mm Grower	EIBSvitamin pac	24950.3 lb	0.4950	$12,350.40
Total fed prior to start of volitional release		60869.7 lb		$44,983.14
[b]Total for Brood Year 96		**65365.6 lb**		**$47,208.62**

[a]EIBS vitamin pac: 5 x C and B12, and 10 x Folic Acid.
[b]Includes 4495.9 lbs 3.0mm BioMoist fed after start of release.

Appendix 32. Department Eagle Fish Health Laboratory inspection results for brood year 1996.

Brood Year stock	Log number	IHN	IPN	EIBS	BKD	FUR	ERM	CWD	WHD	CSH	Comments
Juvenile samples											
RRSC	97-039	-	-			-	-	-			NO P.S. FLUORESCENS 1/4, VIRO 0/5
RRSC	97-168	-	-		-	-	-	-			NO PATHOGENS DETECTED; VIRO 0/4, FAT 0/4, BACTE 0/8
RRSC	97-205	-	-		-	-	-	-			NO PATHOGENS DETECTED
RRSC	97-220	-	-		-	-	-	+			MAS, CWD; VIRO 0/10, A. HYDROPHILA 4/4, F. PSYCHROPHILUM 3/4, PSEUDOMONAS SPP. 4/4
RRSC	97-343	-	-		-	-	-	-			MAS; VIRO 0/6, FAT 0/6, AEROMONAS SOBRIA 3/6
RRSC	98-029				+	-	-	-			BKD FAT 2/10, BACTE-NSG
RRSC	98-051	-	-	-	+				-		MYXOBOLUS, RS; VIRO 0/20, EIBS 0/10, FAT 0/20, ELISA 4/4 (X58, O.D.=0.179, 0.184, 0.194, 0.342), WHD 0/20, MYXOBOLUS SPP. 1/4 (X5)
Brood samples											WHD 0/20
RRSC	96-274	+	-		+				-		IHN,RS; ELISA 5/7(4 LOW,1HIGH)OD#S=0.130,0/142,0/103, 0.138,1.390; IHN 4/7, IPN 0/7, WHD 0/7
RRSC	96-298	+	-		+				-		RS; ELISA 14/16(12 LOW, 2 HIGH), WHD 0/15, IHN 4/16, IPN 0/16
RRSC	96-305	-	-		+				-		RS; ELISA 5/6 LOW, VIRO 0/6, WHD 0/5
RRSC	96-310	+	-		+				-		RS; IHNV; IHN 12/20, IPN 0/20, WHD 0/5, ELISA 19/20(18 LOW, 1 HIGH)
RRSC	96-325	+	-		+						RS; ELISA 74/80(65 LOW, 4 MOD, 5 HIGH), IHN 12/18 (5FISH POOLS)
RRSC	96-330				+						RS; ELISA 87/91(65 LOW, 17MOD, 5 HIGH))
RRSC	96-351				+						RS; ELISA 46/61(5 MOD, 4 LOW)
RRSC	96-356				+						RS; ELISA 24/31(19 LOW, 4 MOD, 1 HIGH)
RRSC	96-367				+						RS; ELISA 14/15(12 LOW, 1 MOD, 1 HIGH)

Appendix 33. Pre-Liberation organosomatic index, brood year 1996.

Hematology						
	Hematocrit			Serum protein		
Date	[a]Mean	[a]SD	[b]CF	[a]Mean	[b]SD	[c]CF
03/09/98	NA	NA	NA	NA	NA	NA

[a]Standard deviation
[b]Coefficient of variation

Combined autopsy summary

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	0
B1	0	F	0	S	0	1	0	1	1	R	19	1	0	S	0	B	20	1	0
B2	0	C	0	L	0	2	0	2	1	G	0	2	0	M	0	C	0	2	0
El	0	M	0	S&L	0			3	18	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0			4	0	E	1			U	0	E	0		
H1	0	OT	0	OT	0					OT	0			OT	0	F	0		
H2	0			O	0											OT	0		
M1	0																		
OT	0																		

SUMMARY OF NORMALS									
20	20	20	20	20	19	20	20	20	0

N= normal
F= frayed
OT= other
Thymus: 0= no hemorrhage
Mesenteric fat: 0= none, 1= <50% coverage, 2= 50%, 3= >50%, 4= 100%
Spleen: R= red, E= enlarged (EIBS enlarges spleens)
Hind gut: 0= no inflammation
Liver: B= pail red
Bile: 0= yellow bile <full bladder

Appendix 34. Rapid River Hatchery marking summary, brood year 1996.

Adipose fin clipped fish releases

Release site	Date released	Marked Fish released	Release Group mark code	Clip	Purpose	Pond
Rapid River	3/16-4/28/98	336,243	10-49-5	Ad	Hatchery ID	2ACD
Rapid River	3/16-4/28/98	559,927	Ad only	Ad	Hatchery ID	2ACD

PIT tag releases

Release site	Date released	*PIT tagged fish released	Release Group mark code	Clip	Purpose	Pond
Rapid River	3/16-4/28/98	48,314	10-49-5 and Ad only	Ad	Hatchery PIT tag study and FPC	2C

*The number of PIT tagged fish released is the number PIT tagged, minus documented mortality of PIT tagged fish.

Appendix 35. Smolts released from Rapid River Hatchery in 1998 (Brood Year 1996).

Release site date	Release method	Number released	Number of fish per pound
Rapid River			
3/16-4/21/98	Volitional release pond 2ACD	627,319	20.3
	Volitional release Subtotal	627,319	
4/21-4/28/98	Smolts flushed pond 2ACD	268,851	20.3
	Pond flush subtotal	268,851	
Site total	Number released	896,170	20.3
Hatchery total	Number released	896,170	20.3
	Pounds released	44,174	

Appendix 36. Survival from eggs to smolts at Rapid River Hatchery brood year 1996.

[a]Green eggs	Eyed egg number	Percent survival	Swimup	[b]Percent survival	[c]Marked number	Released smolts	[d]Percent survival
991,685	924,212	93.2	901,715	90.9	896,953	896,170	99.9

[a]Green eggs retained by Rapid River Hatchery after segregation of green eggs for transfer Clearwater Hatchery.

[b]Percent survival from green eggs to swim-up.

[c]the reported number marked was 0.44% less than hatchery inventory at the time of marking.

[d]Percent survival from marking to release.

Appendix 37. Cost of production at Rapid River Hatchery brood year 1996.

Number of fish	Pounds of fish	Pounds of feed	Cost of feed	[a]Feed conversion	[b]Total cost	Cost per thousand	Cost per pound
896,170	44,174	60,870	$44,983.15	1.33	$706,983.63	$788.95	$16.00

[a]Feed conversion is based on feed used prior to release. An additional 4496 lbs was fed during release at a cost of $2,225.47. This feed is not included in the calculation of conversion because inventory and weight data are unavailable. However the $2,225.47 are included in total cost.

[b]The figure $706,983.63 represents the total cost incurred by IPC from 9/1/96 through 3/31/98. This amount may exceed cost associated with production of Brood Year 1996 due to overlap in the brood year rearing cycle (see the discussion in the Smolt Release section). These costs include funds provided to by IPC, as well as internal costs incurred by IPC.

Appendix 38. Returns to Rapid River Hatchery, 1964-1997.

Return year	Snake R. Return (adults)	Rapid R. return (adults)	Rapid R. Return (jacks)	Percent Prespawning mortality	Females spawned	Eggs/ female	Number of eggs taken
1964	349			16	182	4,874	887,000
1965	408			21	133	4,541	604,000
1966	1,5111			18	621	3,697	2,296,000
1967	974	1,039		11	581	3,537	2,055,000
1968	351	3,416	740	2	1,809	3,671	6,540,000
1969	672	2,817	1,043	8	1,415	3,655	5,151,697
1970		6,470	887	10	3,520	4,136	14,560,280
1971		3,357	1,754	19	1,722	3,507	6,038,785
1972		12,310	943	15	3,825	3,941	15,072,604
1973		17,054	286	37	3,454	3,912	13,510,465
1974		3,457	538	27	1,756	3,924	6,890,186
1975		4,428	573	7	2,184	3,894	8,503,606
1976		6,342	1,765	15	3,055	3,762	11,492,878
1977		7,767	437	11	3,781	3,745	14,160,330
1978		5,735	34	21	2,350	4,266	10,026,888
1979		3,054	350	31	1,141	4,950	5,648,722
1980		1,528	432	30	543	3,235	1,756,827
1981		3,087	176	7	1,666	3,675	6,122,273
1982		3,646	30	11	1,883	3,973	7,482,330
1983		1,864	94	15	859	4,015	3,449,471
1984		1,705	651	7	821	3,807	3,125,911
1985	673	6,376	351	8	2,962	3,741	11,535,461
1986	360	6,546	177	34	2,451	4,355	10,673,138
1987	534	3,808	210	30	1,133	4,379	5,656,145
1988	381	3,608	172	19	1,645	4,879	7,905,702
1989	86	2,372	428	11	1,082	4,139	4,478,045
1990		2,566	40	13	1,063	3,967	4,217,103
1991		1,675	238	10	657	3,886	2,553,218
1992	912	2,370	96	24	1,177	3,988	4,534,404
1993	411	4,451	17	17	1,737	4,090	6,404,312
1994	29	261	4	21	116	4,226	490,249
1995	35	70	59	7	35	3,771	132,002
1996	58	1,412	751	6	329	3,561	1,171,610
1997	788	10,510	10	10	1,138	3,930	4,472,573

From 1985 on, total eggs taken includes Snake River adults.

Appendix 39. Returns to Rapid River Hatchery by brood year.

Brood year	Year released	Number released	3 year-olds	Year returned	4 year-olds	Year returned	5 year-olds	Year returned	Return from release	% Return from release
1964	1966	588,000	1,309	1967	3,422	1968	197	1969	4,928	0.84
1965	1967	479,267	740	1968	2,620	1969	874	1970	4,234	0.88
1966	1968	1,460,150	1,043	1969	5,596	1970	364	1971	7,003	0.48
1967	1969	900,192	887	1970	2,992	1971	1,544	1972	5,423	0.60
1968	1970	3,172,000	1,754	1971	10,766	1972	4,403	1973	16,923	0.53
1969	1971	2,718,720	943	1972	12,654	1973	1,759	1974	15,356	0.56
1970	1972	2,809,200	285	1973	1,698	1974	386	1975	2,369	0.08
1971	1973	2,908,425	538	1974	4,206	1975	1,120	1976	5,864	0.20
1972	1974	2,707,917	573	1975	5,222	1976	634	1977	6,429	0.24
1973	1975	3,373,700	1,765	1976	7,110	1977	1,845	1978	10,720	0.32
1974	1976	3,358,940	437	1977	3,890	1978	2,413	1979	6,740	0.20
1975	1977	2,921,172	34	1978	598	1979	46	1980	678	0.02
1976	1978	2,412,678	350	1979	1,482	1980	146	1981	1,978	0.08
1977	1979	2,866,993	432	1980	3,068	1981	557	1982	4,057	0.14
1978	1980	2,604,823	176	1981	3,089	1982	1,206	1983	4,471	0.17
1979	1981	2,372,607	30	1982	838	1983	356	1984	1,224	0.05
1980	1982	1,476,766	94	1983	1,349	1984	199	1985	1,642	0.11
1981	1983	2,998,103	651	1984	6,177	1985	1,456	1986	8,284	0.28
1982	1984	3,246,197	351	1985	5,090	1986	1,155	1987	6,596	0.20
1983	1985	2,491,238	177	1986	2,444	1987	1,557	1988	4,178	0.17
1984	1986	1,594,688	210	1987	2,051	1988	379	1989	2,640	0.17
1985	1987	2,836,400	172	1988	1,933	1989	135	1990	2,240	0.08
1986	1988	2,630,200	428	1989	2,431	1990	421	1991	3,280	0.12
1987	1989	2,319,500	40	1990	1,254	1991	161	1992	1,455	0.06
1988	1990	2,520,400	238	1991	2,209	1992	1,905	1993	4,352	0.17
1989	1991	2,564,900	96	1992	2,546	1993	122	1994	2,764	0.11
1990	1992	2,615,500	17	1993	139	1994	9	1995	165	0.006
1991	1993	2,060,300	4	1994	61	1995	2	1996	67	0.003
1992	1994	2,928,146	59	1995	659	1996	177	1997	895	0.03
1993	1995	3,286,455	751	1996	10,333	1997		1998	11,084	0.34
1994	1996	379,167	10	1997		1998		1999	10	0.003
1995	1997	85,840		1998		1999		2000	0	0.00
1996	1998	896,170		1999		2000		2001	0	0.00

Lower Granite Dam was completed 1975.

Appendix 40. Average feed and growth data for Rapid River Hatchery.

Month	Average Water Temperature (°F)	Density index	Flow index	[a]Feed conv.	Hatchery constant	[b]Daily length increase	[b]Monthly length increase	Condition factor	Percent Body Weight fed	Number Feedings per day	Average #/lb. At end of month	Average length at end of month
FEB	38	N.A.	N.A.	N.A.	1.98	0.0024	0.07	0.00027	1.42	8	1109	1.50
MAR	41	0.24	0.59	1.07	2.26	0.0070	0.20	0.00028	1.89	8	809	1.64
APR	44	0.29	0.64	1.02	3.23	0.0105	0.34	0.00031	2.40	8	439	1.95
MAY	46	0.29	0.74	1.00	4.54	0.0151	0.29	0.00031	2.30	8	271	2.29
JUN	49	0.0	0.69	1.20	7.10	0.0297	0.59	0.00031	2.93	4	136	2.87
JUL	54	0.09	0.83	1.59	7.36	0.0155	0.47	0.00036	2.75	4	79	3.43
AUG	55	0.12	1.33	1.59	7.82	0.0164	0.50	0.00035	2.70	5	49	3.86
SEP	51	0.15	1.57	1.70	8.66	0.0170	0.51	0.00035	2.00	5	36	4.31
OCT	46	0.16	1.69	1.71	5.03	0.0098	0.30	0.00035	1.37	3	30	4.60
NOV	51	0.17	1.81	2.22	1.54	0.0023	0.07	0.00035	0.47	2	28	4.67
DEC	38	0.17	1.88	4.46	2.12	0.0016	0.03	0.00034	0.21	1	30	4.67
JAN	37	0.18	1.89	2.83	1.15	0.0013	0.03	0.00034	0.21	1	29	4.69
FEB	38	0.18	2.01	1.24	1.47	0.0040	0.12	0.00032	0.53	2	26	4.95
MAR	41	0.19	1.97	1.55	3.47	0.0074	0.22	0.00032	0.92	2	22	5.19

[a]Feed conversion is expressed as actual feed weight over weight gain.
[b]Growth data may vary during periods of high water.

Appendix 41. Release and transfer summary for Rapid River Hatchery, 1964-1997.

Brood year	No. Eggs taken	Egg or fry plants and site			Smolt plants and site		Fish/ pound
1964	887,000	None			588,000	Rapid River	22.6
1995	60,400	None			479,267	Rapid River	23.2
1966	2,296,000	None			1,460,150	Rapid River	25.0
1967	2,055,000	None			900,192	Rapid River	24.0
1968	6,540,000	757,376	eggs	Clearwater H Channel	3,172,000	Rapid River	20.0
1969	5,171,697	497,000	eggs	Dworshak NFH to start	2,718,720	Rapid River	21.0
1970	14,560,280	4,417,454	eggs	Sweetwater Eye Stat.	2,809,200	Rapid River	19.4
		2,224	eggs	Kooskia NFH.	91,800	Lochsa River	19.4
		526,516	eggs	Hayden Cr. Hatchery			
		2,473,983	eggs	Clearwater H Channel			
		4,607,736	eggs	Rapid River Hatchery			
		200,520	fry	Lemhi River			
		353,970	fry	Decker Pond			
		100,000	fry	Sandpoint Hatchery			
1971	6,038,785	600,000	eggs	Hayden Cr. Hatchery	2,908,425	Rapid River	17.0
		53,562	fry	Lemhi River	197,303	SF Clearwater	
		104,300	fry	Red River			
		29,800	fry	Ten Mile Creek			
		44,700	fry	American River			
		14,900	fry	Papoose Creek			
		59,600	fry	Brushy Creek			
		44,700	fry	Fish Creek			
		14,900	fry	Post Office Creek			
		44,700	fry	Squaw Creek (Lochsa)			
		61,500	fry	Lochsa River			
		60,000	fry	Ten Mile Creek			
		200,000	fry	Sandpoint Hatchery			
		401,305	fry	Decker Pond			
1972	15,072,604	5,256,662	eggs	Sweetwater Eye Stat.	2,707,917	Rapid River	17.5
		3,012,358	eggs	Hayden Creek Hatchery			
		1,293,592	eggs	Red River H Channel			
1973	13,510,464	3,915,900	eggs	Sweetwater Eye Stat.	3,373,700	Rapid River	14.8
		1,295,424	eggs	Hayden Creek Hatchery	117,000	SF Clearwater	
		104,760	eggs	Hagerman Hatchery			
		502,200	eggs	Crooked R. H Channel			
		702,000	eggs	Kooskia NFH			
		806,400	eggs	Hayden Creek Hatchery			
		504,000	eggs	Minnesota walleye trade			
		210,734	fry	Sandpoint Hatchery			
		206,360	fry	Kooskia NFH			
		88,480	fry	Ten Mile Creek.			
		18,200	fry	Newsome Creek			
		633,000	fry	Lemhi River			
		10,428	fry	Capehorn Creek			
1974	6,890,186	809,400	eggs	Hayden Creek Hatchery	3,358,940	Rapid River	18.4
		407,012	eggs	Indian Creek	205,700	SF Clearwater	
		203,500	fry	Sandpoint Hatchery			
		21,840	fry	Capehorn Creek			
		59,962	fry	Red River			
		30,750	fry	Newsome Creek			
		10,250	fry	Ten Mile Creek			
		1,140,300	fry	Lemhi River			

Appendix 41. Release and transfer summary for Rapid River Hatchery (cont).

Brood Year	No. Eggs take	Egg or fry plants and site			Smolt plants and site		Fish/ pound
1975	8,503,606	2,363,200	eggs	Sweetwater Eye Stat.	2,921,172	Rapid River	15.9
		252,200	eggs	Mullan Hatchery	249,750	SF Clearwater	
		255,000	eggs	Hayden Creek Hatchery			
		280,659	eggs	Indian Creek H Chan.			
		4,906,492	eggs	Rapid River Hatchery			
		34,000	fry	Ten Mile Creek			
		156,000	fry	Lemhi River			
		65,960	fry	SF Clearwater River			
		412,800	fry	Decker Pond			
		209,950	fry	Sandpoint Hatchery			
		36,143	fry	Bear Valley Creek			
1976	11,492,878	1,161,608	eggs	Mullan Hatchery	2,413,678	Rapid River	15.7
		2,937,994	eggs	Sweetwater Eye Stat.			
		261,900	eggs	Hayden Creek Hatchery			
		261,900	eggs	Sandpoint Hatchery			
		1,267,208	eggs	Mackay Hatchery			
		47,008	fry	Univ. of Idaho			
		3,111,850	fry	Mackay Hatchery			
		104,500	fry	Lolo Creek			
		501,600	fry	Red River Pond			
		80,600	fry	SF Clearwater			
1977	14,160,330	2,633,400	eggs	Sweetwater Eye Stat.	2,866,993	Rapid River	15.0
		2,287,800	eggs	Kooskia NFH	156,362	White Sand Cr.	
		2,689,000	eggs	Mullan Hatchery	44,373	Newsome Creek	
		288,000	eggs	Hayden Creek Hatchery			
		20,700	eggs	Univ. of Idaho			
		1,007,340	eggs	Crooked River H Chan.			
		723,000	fry	Mackay Hatchery			
		50,800	fry	Decker Pond			
		200,025	fry	Red River Pond			
		265,600	fry	Lemhi River			
1978	10,026,888	767,322	eggs	Hayden Creek Hatchery	2,604,823	Rapid River	15.0
		970,728	eggs	Mackay Hatchery	57,440	White Sand Cr.	
		1,540,282	eggs	Sweetwater Eye Stat.			
		706,936	eggs	Dworshak NFH			
		38,160	eggs	Univ. Of Idaho			
		10,864	eggs	U of I Hayden Cr.			
		1,250,010	eggs	Crooked River H Chan.			
		249,696	eggs	Sweetwater Eye Stat.			
		232,500	fry	Red River Pond			
		10,000	fry	Ten Mile Creek			
1979	5,646,722	806,400	eggs	Hayden Creek Hatchery	2,372,607	Rapid River	17.9
		330,880	eggs	Dworshak NFH	1,001,700	Snake River	21.0
		293,249	fry	Red River Pond			
1980	1,756,827	None			1,473,733	Rapid River	28.0
1981	6,122,273	608,384	eggs	Pahsimeroi Hatchery	2,998,103	Rapid River	22.0
		256,608	eggs	Oxbow Hatchery	250,020	Snake River	27.0
		449,280	eggs	Dworshak NFH			
1982	7,420,450	493,346	eggs	Looking Glass (Ore)	3,246,197	Rapid River	20.0
		1,332,200	eggs	Pahsimeroi Hatchery	500,850	Snake River	27.0
		375,028	eggs	Dworshak NFH			
		125,055	eggs	Hagerman NFH			
		306,000	fry	Red River Pond			

Appendix 41. Release and transfer summary for Rapid River Hatchery (cont).

Brood year	No. Eggs taken	Egg or fry plants and site			Smolt plants and site		Fish/ pound
1983	3,449,471	None			2,491,238	Rapid River	23.0
					437,360	Snake River	27.0
1984	3,125,911	152,000	fry	Red River	159,688	Rapid River	22.0
					140,000	Snake River	20.0
					136,000	Red River	30.0
1985	11,535,461	497,520	eggs	Oregon	2,630,200	Rapid River	22.5
		3,668,000	eggs	Dworshak NFH	103,000	Snake River	31.1
		2,450,907	eggs	Sawtooth Hatchery			
		100,590	fry	Boulder Creek			
		349,650	fry	Crooked River			
		200,158	fry	Eldorado Creek			
		55,123	fry	Hopeful Creek			
		144,443	fry	Crooked Fork Creek			
		70,282	fry	White Sand Creek			
		49,437	fry	Ten Mile Creek			
		102,282	fry	Newsome Creek			
		115,352	fry	Brushy Fork Creek			
1986	10,673,138	2,368,400	eggs	Dworshak NFH	2,630,200	Rapid River	19.0
		712,905	eggs	Sawtooth Hatchery	400,600	Snake River	19.8
		348,600	fry	Crooked Fork Creek			
		202,400	fry	White Sand Creek			
		98,000	fry	Big Flat Creek			
		238,900	fry	Red River Pond			
1987	5,656,145	30,000	fry	Little Salmon River	2,319,500	Rapid River	22.0
		103,800	fry	Lolo Creek	500,000	Snake River	20.0_5
		137,800	fry	Eldorado Creek			
		62,200	fry	Crooked Fork Creek			
		108,300	fry	Hopeful Creek			
		72,200	fry	White Sand Creek			
		19,500	fry	Big Flat Creek			
		113,800	fry	American River			
		112,100	fry	Newsome Creek			
		100,100	fry	Meadow Creek			
		200,100	fry	Crooked River			
		50,100	fry	Red River			
		50,100	fry	Yankee Fork			
		202,000	fry	Brushy Fork			
		150,100	fry	Ten Mile Creek			
		100,200	fry	White Sand Creek			
1988	7,881,379	1,475,677	eggs	Oregon Fish and Game	2,520,400	Rapid River	26.0
		149,570	fry	Little Salmon River	250,000	Little Salmon	27.8
		100,278	fry	Ten Mile Creek	551,200	Snake river	30.0
		149,570	fry	Little Salmon River			
		100,278	fry	Ten Mile Creek			
		101,062	fry	Crooked River			
		100,862	fry	Crooked River			
		100,628	fry	Newsome Creek			
		100,299	fry	Boulder Creek			
		100,342	fry	Boulder Creek			
		100,097	fry	Newsome Creek			
		195,398	fry	Brushy Fork			
		99,919	fry	White Sand Creek			

Appendix 41. Release and transfer summary for Rapid River Hatchery (cont).

Brood year	No. Eggs taken	Egg or fry plants and site			Smolt plants and site		Fish/ pound
1988		100,148	fry	White Sand Creek			
		99,401	fry	American River			
		51,369	fry	American River			
		39,163	fry	Meadow Creek			
1989	3,925,585	211,509	fry	Crooked River	256,490	Rapid River	24.2
		548,876	fry	Sawtooth Hatchery	100,100	Little Salmon	22.5
					500,500	Snake River	22.5
1990	4,271,103	200,000	eggs	Looking Glass Hatch.	2,615,500	Rapid River	20.3
		403,400	fry	Sawtooth Hatchery	500,500	Snake River	20.3
1991	2,553,218	3,050	fry	Hayden Creek Hatchery	2,060,300	Rapid River	24.7
		10,126	fry	Squaw Creek	200,300	Snake River	26.8
		90,125	fry	White Sand Creek			
1992	4,534,404	92,897	eggs	Dworshak Hatchery	2,547,624	Rapid River	20.4
					380,600	Snake River	20.5
1993	6,404,312	2,176,157	eggs	Clearwater Hatchery	2,786,919	Rapid River	18.5
					499,536	Snake River	19.1
1994	490,249	58,791	eggs	Clearwater Hatchery	379,167	Rapid River	16.8
1995	132,002	16,402	eggs	Clearwater Hatchery	85,840	Rapid River	20.5
1996	1,171,610	168,754	eggs	Clearwater Hatchery	896,170	Rapid River	20.3
1997	4,472,573	1,015,496	eggs	Clearwater Hatchery			

Submitted by:

Richard L. Lowell
Fish Hatchery Manager II

Ralph Steiner
Assistant Fish Hatchery Manager

Jeff A. Hiendel
Fish Culturist

Approved by:

Virgil K. Moore, Chief
Bureau of Fisheries

Tom Rogers
Anadromous Fish Hatchery Manager