

McCALL FISH HATCHERY

2002 Summer Chinook Salmon Brood Year Report

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**IDFG 04-39
November 2004**

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APPENDICES

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ABSTRACT

The South Fork Salmon River trapping season began on June 26, with the weir installation and opening of the trap. Trapping operations concluded on September 13, 2002.

Chinook salmon *Oncorhynchus tshawytscha* spawning at the trap commenced on August 9 and concluded on September 5, 2002. A total of 8,603 returning Chinook salmon were trapped, measured, and recorded during this period. The overall average eye-up from eggs taken from the South Fork stock was 87.3%.

Of the 8,603 fish trapped: 3,846 were females, of which 770 were ponded; 833 were released above the weir, while the remaining hatchery females were used for fishery recycle or subsistence giveaway. There were 21 females that died in the trap. The pre-spawn mortality for females was 38.4%. There were 3,623 adult males trapped of which 962 were released above the weir. The pre-spawn mortality for the males was 18.3%. There were 1,134 jacks trapped (according to length frequency criteria). 120 were released, 34 were used for spawning. Due to the high numbers of reserve adults and jacks, there were 1,614 given to the tribes or charitable organizations.

From the females ponded, 381 South Fork stock were spawned with an average fecundity rate of 4,747 eggs per female, resulting in 1,804,033 green eggs taken. There were 43 Johnson Creek females held and spawned, resulting in 134,237 eyed eggs. There were 75 reserve female and 75 reserve male adult salmon transported and held for spawning at the Sawtooth Fish Hatchery for the Shoshone-Bannock Tribe (SBT) egg box program.

During the period of March 22 through March 25, 2004, there were 1,088,810 Brood Year 2002 smolts weighing 52,096 lbs transported and released at Knox Bridge. Nez Perce Tribe (NPT) fishery personnel transported 112,870 Johnson Creek stock smolts to Johnson Creek for release.

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INTRODUCTION

McCall Fish Hatchery (MCFH) was built in 1979 as a result of the Water Resources Development Act enacted by Congress in 1976. A portion of this Act is the Lower Snake River Fish and Wildlife Compensation Plan (LSRCP). The LSRCP compensates Idaho for fish and wildlife losses caused by the Lower Snake River Projects (Ice Harbor, Lower Monumental, Little Goose, and Lower Granite dams). The MCFH was the first hatchery built as a partial fulfillment of the LSRCP. The US Fish and Wildlife Service (USFWS) administers funding for LSRCP to the Idaho Department of Fish and Game (Department).

The MCFH is located within the city limits of McCall, ID along the North Fork of the Payette River, approximately 0.16 km (1/4 mile) downstream from Payette Lake.

A satellite facility for trapping and spawning adult Chinook salmon *Oncorhynchus tshawytscha* is located on the South Fork Salmon River near Warm Lake, approximately 26 miles east of Cascade, ID

The main production for MCFH is summer Chinook reared to smolt size. There is also a resident trout program funded solely by the Department.

The first salmon reared at the MCFH were transferred in from the Mackay Fish Hatchery and the Dworshak/Kooskia National Fish Hatchery complex. These eggs were the products of adult summer Chinook trapped at Little Goose and Lower Granite dams. The first eggs from the South Fork of the Salmon River were received in August 1980.

OBJECTIVES

The mitigation goal is to return 8,000 adult summer Chinook salmon above Lower Granite Dam. The objectives of the MCFH are:

1. Restore summer Chinook salmon to the South Fork Salmon River; historically a major summer Chinook stream in Idaho.
2. Trap and spawn adult salmon returning to the South Fork Salmon River.
3. Raise 1,000,000 summer Chinook smolts for release into the South Fork Salmon River.
4. Work with management and research to identify optimum operating procedures for the MCFH.

FISH REARING FACILITIES

The hatchery facility consists of six buildings on approximately 15 acres. The largest building consists of a shop, parking garage, incubation and early rearing area, generator room, and a feed/freezer room. The office and a three-bedroom dormitory are contained in one

building. There is a visitor center with restrooms, a flow chart for a self-guided tour, and historical information signs. There are three residences for permanent personnel also located on the site.

The fish production facilities include:

1. Twenty-six eight-tray stacks of FAL (Flex-A-Lite, Consolidated) vertical flow (Heath type) incubators.
2. Fourteen concrete vats 4-ft x 40-ft x 2-ft (water depth); with 320 cubic feet of rearing area per vat.
3. Two concrete rearing ponds 196-ft x 40.5-ft x 4-ft (water depth); with 23,814 cubic feet of rearing space per pond.
4. One concrete collection basin 101-ft x 15-ft x 4-ft (water depth). The hatchery is designed to raise a maximum capacity of 1,000,000 smolts, averaging 17 fish per pound (fpp).

An adult trapping and spawning facility is located on the South Fork of the Salmon River near Warm Lake. This facility is equipped with a removable weir, fish ladder, trap, two adult holding ponds (10-ft x 90-ft), and a covered spawning area. Water is supplied from the South Fork Salmon River through a 33-inch underground pipeline. Holding capacity for the facility is approximately 1,000 adult salmon. Some adults are passed above the weir to spawn naturally, with an additional group transported to Stolle Meadows for Idaho Supplementation Studies (ISS) research. Eggs collected at the facility are transported "green" to MCFH for incubation and rearing.

WATER SUPPLY

Hatchery water is obtained by gravity flow from Payette Lake through a 36-inch underground pipeline. Water may be taken from the surface or from a depth of up to 50 ft, thus providing the capability of obtaining optimum rearing water temperatures.

Through an agreement with the Payette Lake Reservoir Company, 20 cubic feet per second (cfs) of water flow is available for hatchery use. Design criteria and production goals were established using this constraint, ensuring the hatchery has enough water to meet its production goals.

Water quality analysis reveals a somewhat "distilled" system for rearing fish (Appendix 12); the pH stays about 6.8. There is no indication of problems with heavy metals and temperature is maintained at 52°F to 56°F, with a low of 37°F.

STAFFING

The hatchery is staffed with three permanent employees: a Hatchery Manager II, an Assistant Hatchery Manager, and a Fish Culturist. In addition, there are five temporary employees to assist during the busy field season.

TRAPPING AND SPAWNING

The 2002 trapping season started on June 26, with the ponds set up and water turned on in the fish ladder, and weir installation. The first fish was trapped on June 27. Trapping continued through September 13, 2001. Normal trap installation is usually around June 20 with the fish arriving shortly thereafter. The peaks of the run for 2002 were July 1, July 16, and August 28.

There were 8,603 fish trapped; 3,846 (44.7%) were females, and 4,757 (55.3%) were males. A total of 1,134 male fish (13.2%) were jacks (three-year-old fish) according to length frequency criteria. There were 833 females, 842 adult males, and 120 jacks released upstream of the weir.

Trap data obtained from the fish included fork length, sex, and mark type. All of the fish were also checked for internal and external tags.

The run was comprised of 7,322 marked (85.1%) and 1,281 (14.9%) unmarked fish. Of the 6,218 AD-clipped reserve fish trapped 682 (10.9%) were noted as having a partial adipose fin. In addition there were 281 (85 females and 196 males) previously trapped and released adipose clipped fish that were re-trapped. Re-trapped fish numbers were up from last year (134). Of the tags recovered or detected, 292 were Passive Integrated Transponder (PIT) tags, 491 Coded-Wire-Tags (CWT), 3 jaw tags, 17 radio tags, and 1 Floy tag.

A total of 30 CWTs were detected in unclipped fish. These were either supplementation fish released by the NPT as parr in 1998 (100% coded-wire-tagged w/o fin clip) or supplementation fish reared through parr in the Stolle acclimation pond (100% coded-wire-tagged w/o fin clip). These fish were recorded as unmarked fish in the database. Detection and recovery of the tags was important to identify potential year-class survival and differentiate between the two parr release groups.

A total of 292 PIT tags were detected during trapping operations this year. A new passive method of detecting tags was implemented to reduce handling time and increase detection rates. A few problems did arise with moisture inside the display on the reader making it difficult to read and detect pit codes. To avoid this problem in the future the reader will be directly linked to the laptop. There were seven fish with pit tags recorded as unmarked (NO clip) in the trapping database that were noted as hatchery fish (AD clip) when the one fish history origins were reviewed in the PTAGIS database. Also there were four fish with pit tags in the trapping database recorded as hatchery (AD clip) that were noted as "wild" (NO clip) after reviewing the PTAGIS database. These mark types remain as recorded during trapping operations.

The jaw tags recovered were part of a tangle net study on the Columbia River being performed by the Washington Department of Fish and Wildlife. The radio tags detected were part of a migration study on adult salmon in the lower Snake and Salmon Rivers conducted by the University of Idaho. A total of 53 (51 AD, 1 RV, 1 NO) fish were collected by university graduate student Amy Pinson and analyzed for the migration study. The age-class determination by length frequency was used at the trap site during initial trapping. The CWT recovery data and scale analysis show an overlap of age-classes originally determined using length frequency (Appendix 1).

Fork lengths were taken on all of the fish trapped, and all of the adult fish were injected with Erythromycin (Erythro 200) at a rate of 10 mg/kg.

Of the total number of fish released, 1,795 (842 males, 833 females, 120 jacks) were released above the weir at the time of trapping. The percent release for unmarked males and females was 78.7% and 86.3%, respectively. A 1:1 ratio was required by National Marine Fisheries Service (NMFS) in the Department trapping permit. There were 2,943 reserve fish transported to a site near Dollar Creek and a site upstream of, Goat Creek to be recycled through the fishery. There were 75 reserve female and 75 reserve male South Fork stock removed from the trap and transported to Sawtooth Fish Hatchery. Sawtooth hatchery personnel spawned these fish and eyed the resulting eggs. Sho-Ban tribe representatives received the 113,000 eyed-eggs from Sawtooth Fish Hatchery, 120,190 eyed reserve and 20,201 eyed supplementation eggs from McCall Fish Hatchery, for placement into in-stream egg incubation boxes located in the South Fork Salmon River (SFSR) drainage. There were 1,614 reserve adult and jack salmon killed for consumptive purposes and given to tribal and non-profit organizations

A total of 2,306 SFSR stock adults were held for hatchery production. Pre-spawn mortality for the females was 38.4% and 18.3% for the males. It is likely that low water conditions, in conjunction with warmer water temperatures, contributed to the increased mortality rate. Nez Perce fisheries personnel held 98 summer Chinook salmon trapped from Johnson Creek on site at the South Fork trap, 43 females and 55 males (2 jacks). These fish were initially held with the South Fork stock. At primary sort, Johnson Creek males were moved into a circular holding tank. This was done to eliminate the need for excess sorting of South Fork males during spawning. Johnson Creek females were held along with SFSR females throughout spawning. All Johnson Creek fish were uniquely marked to distinguish them from South Fork stock. Multiple marks were used to ensure positive identification. A total 134,237 eyed-eggs were collected from 34 females. Two females returned high BKD ELISA values resulting in the culling of 8,549 eggs. Eye up was 86.0% and fecundity was 4,886 eggs/female. Due to potentially high rearing densities 14,996 Johnson Creek eggs were given to NPT fisheries personnel on October 22 for placement into artificial redds in Johnson Creek. Hatchery personnel estimate rearing 100,000 smolts from this brood year for release in the spring of 2004. Spawning operations began on August 9 and concluded on September 5. Tuesdays and Fridays were reserved for spawning. A total of 7 spawn days were needed to spawn 381 South Fork females, resulting in 1,804,033 green eggs. The mark type breakdown was 304 adipose clip, 39 ventral clip, and 38 unmarked.

Spawning procedures remained relatively consistent with recent years. Reserve fish were spawned with reserve fish. Hatchery staff tried to spawn unmarked fish with ventral clips (supplementation) when possible however due to the difficulty in finding suitable males ventral fish were at times spawned with other ventral fish and unmarked with unmarked. All spawned out carcasses were returned to the river. Approximately 34 jacks were used in the spawning process. The eggs from one female were halved into two colanders and fertilized with two males producing a male to female ratio of 2 to 1. The colanders were then placed into activation buckets for approximately two minutes. The eggs were then recombined and placed in an iodine (100-ppm) solution and allowed to harden for one hour. After hardening, the eggs were placed in numbered egg tubes and packed in coolers for transportation back to the hatchery. Hatchery staff alternated bleeding groups of females prior to spawning to try and determine if not bleeding females prior to spawning was negatively affecting eye up. No conclusive results were obtained. Also the practice of icing down egg coolers prior to transport

back to the hatchery was terminated. Hatchery personnel believe this practice, more than the failure to bleed females, was responsible for the increased eye up rate.

Reserve females were double-loaded into hatchery incubation egg trays. Eggs from supplementation and unmarked fish were single loaded. This was done to allow eggs from listed fish to be culled individually if needed. Ovarian fluid was collected from a sample of females by pathology personnel and tested for viruses. Kidney samples were collected from all spawned females to assess BKD levels through ELISA testing. ELISA optical density values of 0.12 or greater were considered high positive for bacterial kidney disease. Females with values of 0.12 or greater were culled out from the population. A total of 33 females returned ELISA values of 0.12 or greater. Six of these were listed fish. Two hatchery females, one right ventral clip, and one unmarked female were culled during spawning operations. Trays with double females lost two fish, bringing the total effective number of females culled to 61. Overall average fecundity was 4,747 eggs per female and average eye up was 87.3 %.

Incubator flows were set at a five-gallon per minute (gpm) rate, and incubators were loaded at 2 females per tray due to space concerns. The eggs were treated with 1,667 ppm of formalin for 15 minutes starting three days after fertilization and continuing on a daily basis until the eggs started to hatch.

Eggs eyed-up at approximately 600 thermal units (TU) and were then shocked, picked, and enumerated. Hatching began at approximately 925 TUs.

FISH PRODUCTION

Early Rearing

Fry were sent out to the concrete vats approximately three days prior to initial feeding. Initial feeding begins between 1,750 and 1,775 TUs. Flows for the vats are set at 80 gpm and are loaded at 30,000 to 55,000 fish per vat, depending on the number of fish on hand. The vats start at half-length and are extended to full length when the density index (DI) reaches 0.30 to 0.35, usually around mid-February.

Beginning growth rates are slow, only 0.003-inch to 0.004-inch per day, due to cold water temperatures of only 37°F to 39°F. The fry are started on BioDiet #2 and #3 feeds and remain on #3 until they reach 700 fpp. BioDiet feed has been used successfully at MCFH, using modified feed rates. The conversion rates average 1.1:1 to 1.5:1 during the fry- rearing stage.

Fish are moved to the outside rearing ponds mid-June and mid-July. They are adipose clipped, ventral clipped, coded wire tagged (CWT), and enumerated as they are moved to the ponds. There were 80,340 supplementation fish moved to the Stolle Meadows acclimation pond on July 14, 15, and 16. By the end of August, there were 1,089,878 fish on station. There were also 115,876 Johnson Creek stock for Nez Perce tribal releases in to Johnson Creek (Appendix 13).

FISH HEALTH

Diseases Encountered and Treatment

Aeromonas hydrophila was detected in an inspection on July 31, 2003 (3/10 fish +). Since fish mortality was not elevated, an antibiotic treatment was not applied. No other pathogens were detected in Brood Year 2002 SFSR summer Chinook and Johnson Creek summer Chinook salmon. Two prophylactic treatments of erythromycin-medicated feed were applied to Brood Year 2002 summer Chinook salmon at this facility at the current recommended dose of 100 mg/kg/day for 28 days to reduce horizontal transmission of *Renibacterium salmoninarum* (RS). Preliberation samples did not detect viral replicating agents, RS, or *Myxobolus cerebralis* (MC) during this reporting period.

Adult Chinook salmon entering the trap at the South Fork of the Salmon River received an intraperitoneal injection of Gallimycin (injectable erythromycin) at a 20 mg/kg dose. No viral replicating agents were detected in either SFSR summer Chinook or Johnson Creek summer Chinook salmon. The culling point, using current KPL antibodies, was set at 0.25 optical density. South Fork summer Chinook salmon had a culling rate of 6.2%, while no fish (eggs) were culled from the Johnson Creek summer Chinook salmon program. *Myxobolus cerebralis* was not detected in either stock of adult salmon held at this satellite facility.

Organosomatic Index

See attachments.

Acute Losses

Acute losses were not experienced at this facility during this reporting period.

Other Assessments

Pre-spawning mortality increased from 28% in 2002 to 32% in 2003. Suspected causes of pre-spawning mortality were elevated water temperatures, trauma during migration, and sport and tribal fisheries. The hatchery manager and anadromous pathologist have discussed plans to minimize mortality by reducing stress and handling. These strategies will be applied during 2004.

FISH MARKING

The fish marking crew was here in June and July and marked approximately 1.25 million fish. These fish receive Ad-clips, CWT/Ad-clips, and CWT only.

The marking crew returned in February and Passive Integrated Transponder (PIT) tagged 71,670 fish. The breakdown of tagged released fish appears in Appendix 13.

FISH DISTRIBUTION

The Brood Year 2002 smolt hauling operation began on March 22 and concluded on the evening of March 25. Approximately twenty-eight loads of fish were hauled in four days. The river conditions were clear and low at the time of release. All together there were 1,088,810 Brood Year 2002 smolts at 20.9 fpp totaling 52,096 lbs released (Appendix 8).

Nez Perce Tribal fishery personnel transported 112,870 smolts to Johnson Creek on March 15-18, for release.

EXPERIMENTS

The supplementation research carried over to the brood year 2002 Chinook. This project is designed in an attempt to generate more returning adults to natural spawning grounds. Supplementation smolts are the prodigy of unmarked adults. These fish were isolated within the hatchery until they could be differentially marked to ensure that genetic crossover with hatchery production fish would not occur. There were 80,340 supplementation fish (CWT only plus 600 PIT), released into the acclimation pond that was renovated near Stolle Meadows. These fish are to be volitionally released in the fall of 2003.

CONCLUSIONS

The Brood Year 2002 summer Chinook released from MCFH were in excellent condition at release time. The culling program utilized on the BKD high-positive eggs had a positive effect on the overall health and condition of the fish. The release pipe and tempering pump were utilized again this year. The fish transport and stocking went smoothly despite slick snowy roads and adverse weather conditions.

RECOMMENDATIONS

During the peak rearing cycle, low phosphate feed with a higher vitamin pack was utilized with no adverse effects noted. It is recommended to continue utilizing low phosphate feed. All of the Chinook eggs that tested high-positive for BKD were culled this year and should be continued as egg numbers will allow. The gabion baskets need to be replaced to make a stable footing for the weir, as the existing ones have rotted out over time. The entire asphalt driveway for the hatchery is in need of extensive repair or replacement.

APPENDICES

Appendix 1. Age distribution of 2002 summer chinook returns to McCall Fish Hatchery, South Fork Salmon River, based on CWT and length frequency data.

| Age | Males | | Females | |
|---------------|---------------|---------------------------|--------------|---------------------------|
| | CWT* Estimate | Length/frequency Estimate | CWT Estimate | Length/frequency Estimate |
| 3 | 1,151 | 1,134 | 0 | 4 |
| 4 | 2,921 | 3,222 | 3,129 | 3,272 |
| 5 | 685 | 401 | 717 | 570 |
| Totals | 4,757 | 4,757 | 3,846 | 3,846 |

*CWT data based on 491 snouts recovered.
 Length data is taken at trapping prior to first sort.

Age-class breakdown

66 cm = three-year-olds, jacks
 67-89 cm = four-year-olds
 90 cm = five-year-olds

Appendix 2. Lengths of brood year 2002 fish trapped at McCall Hatchery.

| Fork Length (cm) | Males | Females |
|-------------------------|--------------|----------------|
| 37 | 0 | 0 |
| 38 | 0 | 0 |
| 39 | 1 | 0 |
| 40 | 1 | 0 |
| 41 | 1 | 0 |
| 42 | 2 | 0 |
| 43 | 4 | 0 |
| 44 | 2 | 0 |
| 45 | 8 | 0 |
| 46 | 14 | 0 |
| 47 | 15 | 0 |
| 48 | 36 | 0 |
| 49 | 39 | 0 |
| 50 | 65 | 0 |
| 51 | 71 | 0 |
| 52 | 70 | 0 |
| 53 | 80 | 0 |
| 54 | 101 | 0 |
| 55 | 90 | 0 |
| 56 | 104 | 0 |
| 57 | 86 | 0 |
| 58 | 78 | 0 |
| 59 | 61 | 0 |
| 60 | 52 | 0 |
| 61 | 41 | 1 |
| 62 | 33 | 1 |
| 63 | 21 | 0 |
| 64 | 20 | 1 |
| 65 | 19 | 1 |
| 66 | 19 | 0 |
| 67 | 14 | 6 |
| 68 | 26 | 5 |
| 69 | 37 | 10 |
| 70 | 48 | 25 |
| 71 | 79 | 33 |
| 72 | 79 | 50 |
| 73 | 139 | 95 |
| 74 | 154 | 145 |
| 75 | 186 | 158 |
| 76 | 230 | 221 |
| 77 | 236 | 301 |
| 78 | 234 | 303 |
| 79 | 240 | 331 |
| 80 | 233 | 291 |
| 81 | 209 | 249 |
| 82 | 178 | 212 |
| 83 | 199 | 167 |
| 84 | 173 | 121 |
| 85 | 136 | 92 |

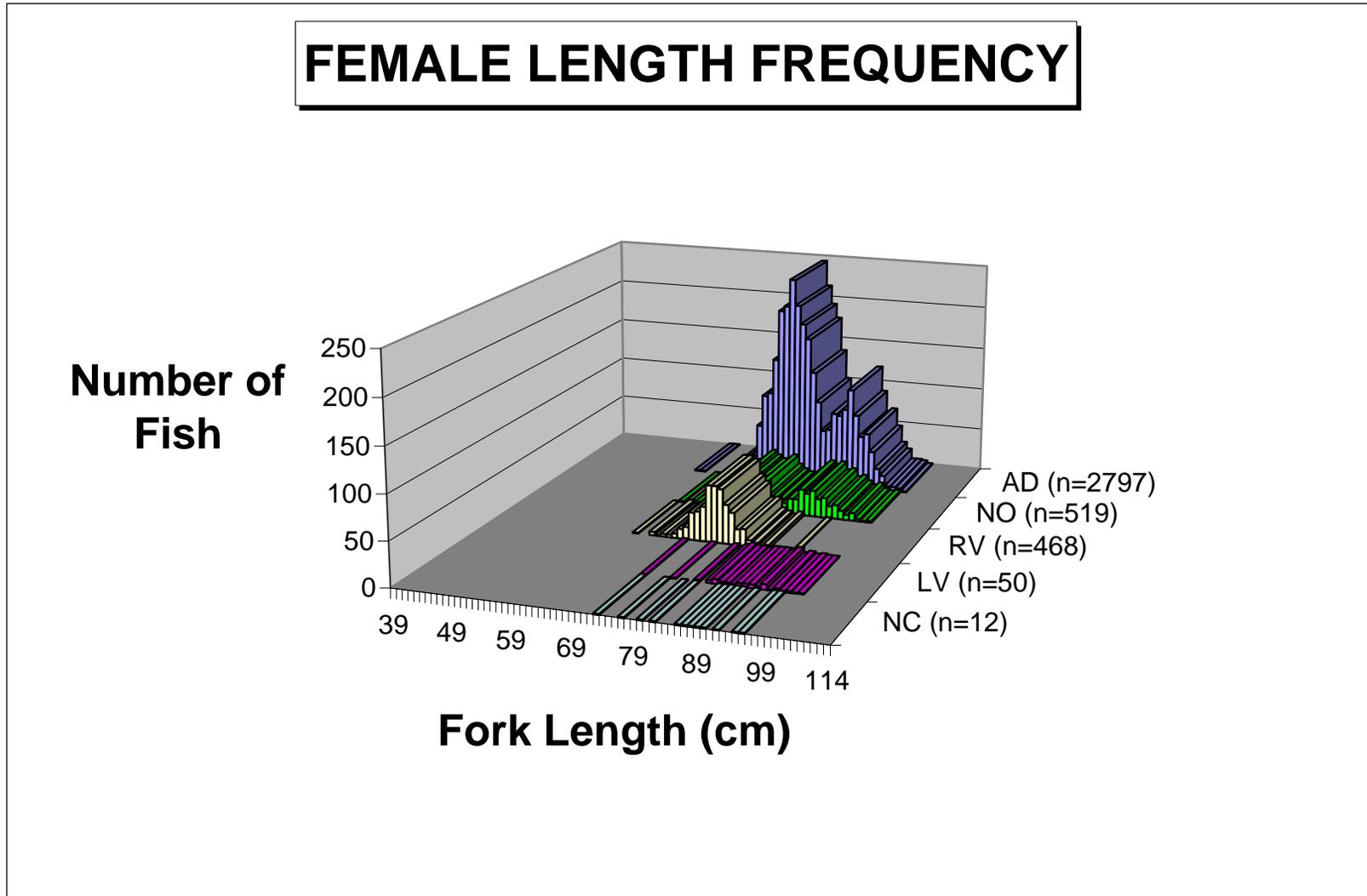
Appendix 2. Continued.

| Fork Length (cm) | Males | Females |
|-------------------------|--------------|----------------|
| 86 | 126 | 90 |
| 87 | 117 | 125 |
| 88 | 87 | 114 |
| 89 | 62 | 128 |
| 90 | 62 | 143 |
| 91 | 34 | 114 |
| 92 | 36 | 81 |
| 93 | 39 | 88 |
| 94 | 31 | 56 |
| 95 | 34 | 35 |
| 96 | 27 | 28 |
| 97 | 17 | 10 |
| 98 | 19 | 7 |
| 99 | 16 | 7 |
| 100 | 19 | 1 |
| 101 | 25 | 0 |
| 102 | 14 | 0 |
| 103 | 9 | 0 |
| 104 | 6 | 0 |
| 105 | 5 | 0 |
| 106 | 3 | 0 |
| 107 | 1 | 0 |
| 108 | 3 | 0 |
| 114 | 1 | 0 |
| Totals | 4757 | 3846 |

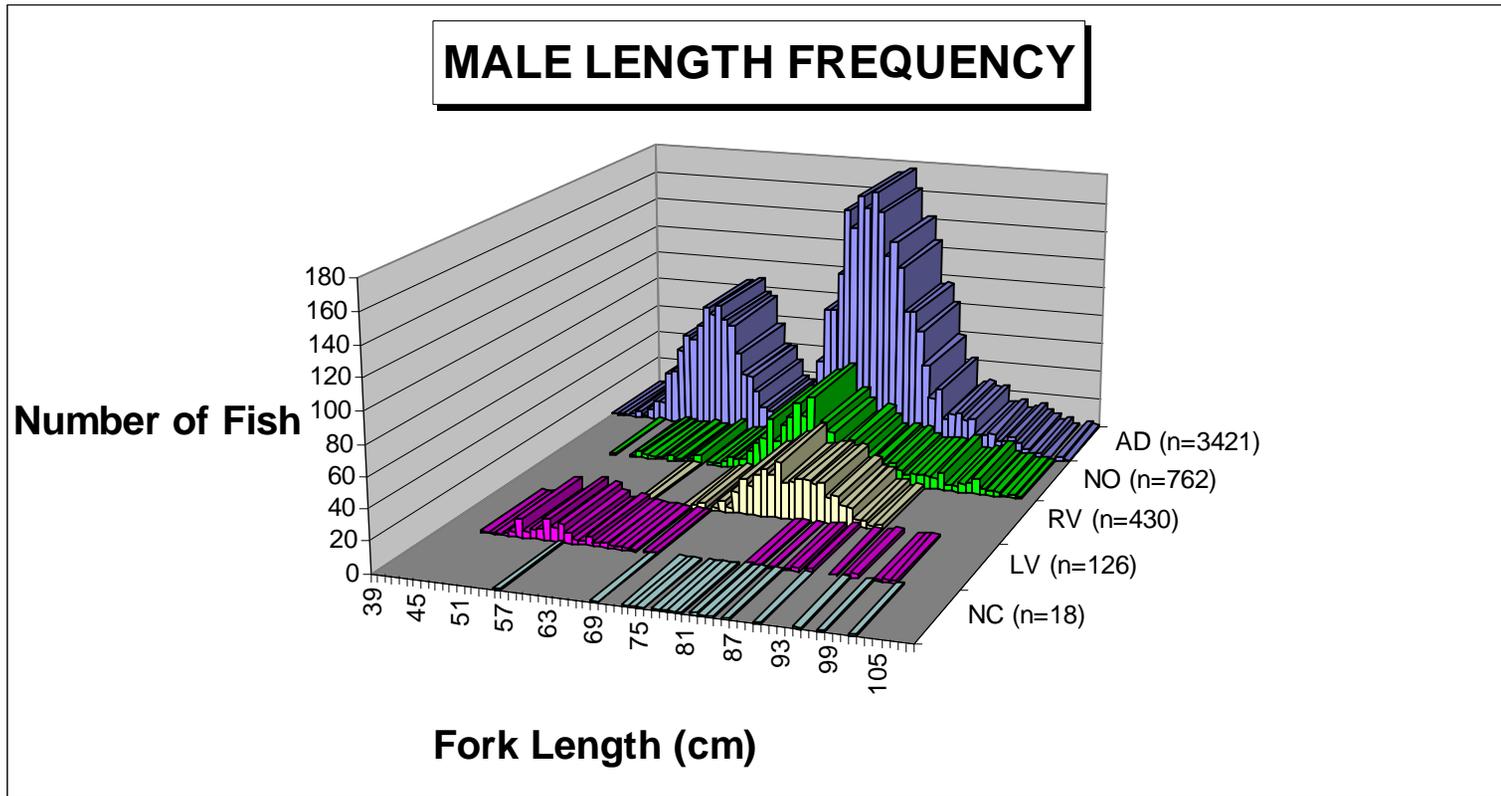
Appendix 3. Length frequency for brood year 2002 summer Chinook broodstock at the South Fork of the Salmon River Trap, according to mark type recorded at McCall Fish Hatchery.

| Fork Length (cm) | Female | | | | | Sum F | Male | | | | | Sum M | TOTAL |
|------------------|--------|----|-----|----|-----|-------|------|-----|-----|----|-----|-------|-------|
| | AD | LV | RV | NC | NO | | AD | LV | RV | NC | NO | | |
| 39 | | | | | | 0 | 1 | | | | | 1 | 1 |
| 40 | | | | | | 0 | 1 | | | | | 1 | 1 |
| 41 | | | | | | 0 | 1 | | | | | 1 | 1 |
| 42 | | | | | | 0 | 2 | | | | | 2 | 2 |
| 43 | | | | | | 0 | 4 | | | | | 4 | 4 |
| 44 | | | | | | 0 | 2 | | | | | 2 | 2 |
| 45 | | | | | | 0 | 7 | 1 | | | | 8 | 8 |
| 46 | | | | | | 0 | 13 | 1 | | | | 14 | 14 |
| 47 | | | | | | 0 | 13 | 1 | | | 1 | 15 | 15 |
| 48 | | | | | | 0 | 34 | 2 | | | | 36 | 36 |
| 49 | | | | | | 0 | 36 | 3 | | | | 39 | 39 |
| 50 | | | | | | 0 | 52 | 12 | | | 1 | 65 | 65 |
| 51 | | | | | | 0 | 63 | 4 | | | 4 | 71 | 71 |
| 52 | | | | | | 0 | 61 | 6 | | | 3 | 70 | 70 |
| 53 | | | | | | 0 | 71 | 7 | | | 2 | 80 | 80 |
| 54 | | | | | | 0 | 85 | 14 | | | 2 | 101 | 101 |
| 55 | | | | | | 0 | 80 | 9 | | | 1 | 90 | 90 |
| 56 | | | | | | 0 | 87 | 12 | | 1 | 4 | 104 | 104 |
| 57 | | | | | | 0 | 77 | 7 | | | 2 | 86 | 86 |
| 58 | | | | | | 0 | 74 | 3 | | | 1 | 78 | 78 |
| 59 | | | | | | 0 | 54 | 3 | 1 | | 3 | 61 | 61 |
| 60 | | | | | | 0 | 39 | 6 | 1 | | 6 | 52 | 52 |
| 61 | 1 | | | | | 1 | 38 | 3 | | | | 41 | 42 |
| 62 | 1 | | | | | 1 | 28 | 3 | | | 2 | 33 | 34 |
| 63 | | | | | | 0 | 17 | 2 | | | 2 | 21 | 21 |
| 64 | | | 1 | | | 1 | 14 | 2 | | | 4 | 20 | 21 |
| 65 | | | | | 1 | 1 | 10 | 2 | | | 7 | 19 | 20 |
| 66 | | | | | | 0 | 11 | 1 | 1 | | 6 | 19 | 19 |
| 67 | 1 | | 4 | | 1 | 6 | 5 | | 2 | | 7 | 14 | 20 |
| 68 | 2 | | 1 | | 2 | 5 | 8 | 1 | 4 | | 13 | 26 | 31 |
| 69 | 6 | | 3 | | 1 | 10 | 16 | 1 | | 1 | 19 | 37 | 47 |
| 70 | 20 | | 3 | | 2 | 25 | 23 | | 2 | | 23 | 48 | 73 |
| 71 | 22 | | 5 | | 6 | 33 | 36 | | 7 | | 36 | 79 | 112 |
| 72 | 27 | | 11 | | 12 | 50 | 54 | | 3 | | 22 | 79 | 129 |
| 73 | 64 | 1 | 14 | 1 | 15 | 95 | 91 | | 14 | 1 | 33 | 139 | 234 |
| 74 | 101 | | 31 | | 13 | 145 | 91 | | 23 | 1 | 39 | 154 | 299 |
| 75 | 105 | | 33 | | 20 | 158 | 117 | | 19 | 1 | 49 | 186 | 344 |
| 76 | 146 | | 39 | | 36 | 221 | 162 | | 27 | | 41 | 230 | 451 |
| 77 | 205 | | 64 | 1 | 31 | 301 | 150 | | 31 | 1 | 54 | 236 | 537 |
| 78 | 211 | 1 | 64 | | 27 | 303 | 172 | | 28 | 1 | 33 | 234 | 537 |
| 79 | 243 | | 61 | | 27 | 331 | 164 | | 37 | 1 | 38 | 240 | 571 |
| 80 | 213 | | 44 | 1 | 33 | 291 | 176 | | 24 | 1 | 32 | 233 | 524 |
| 81 | 191 | | 36 | | 22 | 249 | 162 | | 25 | | 22 | 209 | 458 |
| 82 | 174 | 2 | 18 | 1 | 17 | 212 | 132 | 1 | 27 | 2 | 16 | 178 | 390 |
| 83 | 134 | | 19 | | 14 | 167 | 142 | 1 | 27 | 1 | 28 | 199 | 366 |
| 84 | 99 | 3 | 7 | | 12 | 121 | 125 | | 25 | 1 | 22 | 173 | 294 |
| 85 | 65 | 5 | 4 | | 18 | 92 | 94 | 1 | 26 | | 15 | 136 | 228 |
| 86 | 67 | 3 | 1 | 1 | 18 | 90 | 95 | | 17 | 1 | 13 | 126 | 216 |
| 87 | 87 | 3 | 4 | 1 | 30 | 125 | 81 | 1 | 19 | | 16 | 117 | 242 |
| 88 | 85 | 2 | | 1 | 26 | 114 | 58 | 2 | 13 | | 14 | 87 | 201 |
| 89 | 93 | 4 | | 1 | 30 | 128 | 35 | | 12 | | 15 | 62 | 190 |
| 90 | 117 | 4 | | 1 | 21 | 143 | 42 | 3 | 5 | 1 | 11 | 62 | 205 |
| 91 | 87 | 4 | | | 23 | 114 | 21 | | 5 | | 8 | 34 | 148 |
| 92 | 62 | 3 | 1 | 1 | 14 | 81 | 25 | | 2 | | 9 | 36 | 117 |
| 93 | 66 | 6 | | | 16 | 88 | 26 | 1 | 3 | | 9 | 39 | 127 |
| 94 | 45 | 1 | | | 10 | 56 | 22 | | | | 9 | 31 | 87 |
| 95 | 25 | 3 | | 1 | 6 | 35 | 23 | 2 | | 1 | 8 | 34 | 69 |
| 96 | 17 | 1 | | 1 | 9 | 28 | 12 | 3 | | | 12 | 27 | 55 |
| 97 | 5 | 2 | | | 3 | 10 | 13 | | | | 4 | 17 | 27 |
| 98 | 5 | 1 | | | 1 | 7 | 14 | | | 1 | 4 | 19 | 26 |
| 99 | 4 | 1 | | | 2 | 7 | 9 | 1 | | | 6 | 16 | 23 |
| 100 | 1 | | | | | 1 | 10 | 2 | | | 7 | 19 | 20 |
| 101 | | | | | | 0 | 13 | 2 | | | 10 | 25 | 25 |
| 102 | | | | | | 0 | 9 | | | 1 | 4 | 14 | 14 |
| 103 | | | | | | 0 | 6 | | | | 3 | 9 | 9 |
| 104 | | | | | | 0 | 3 | | | | 3 | 6 | 6 |
| 105 | | | | | | 0 | 4 | | | | 1 | 5 | 5 |
| 106 | | | | | | 0 | 1 | | | | 2 | 3 | 3 |
| 107 | | | | | | 0 | | | | | 1 | 1 | 1 |
| 108 | | | | | | 0 | 3 | | | | | 3 | 3 |
| 114 | | | | | | 0 | 1 | | | | | 1 | 1 |
| TOTALS | 2797 | 50 | 468 | 12 | 519 | 3846 | 3421 | 126 | 430 | 18 | 762 | 4757 | 8603 |

Appendix 4a. South Fork Salmon River summer Chinook female length frequency graph BY01

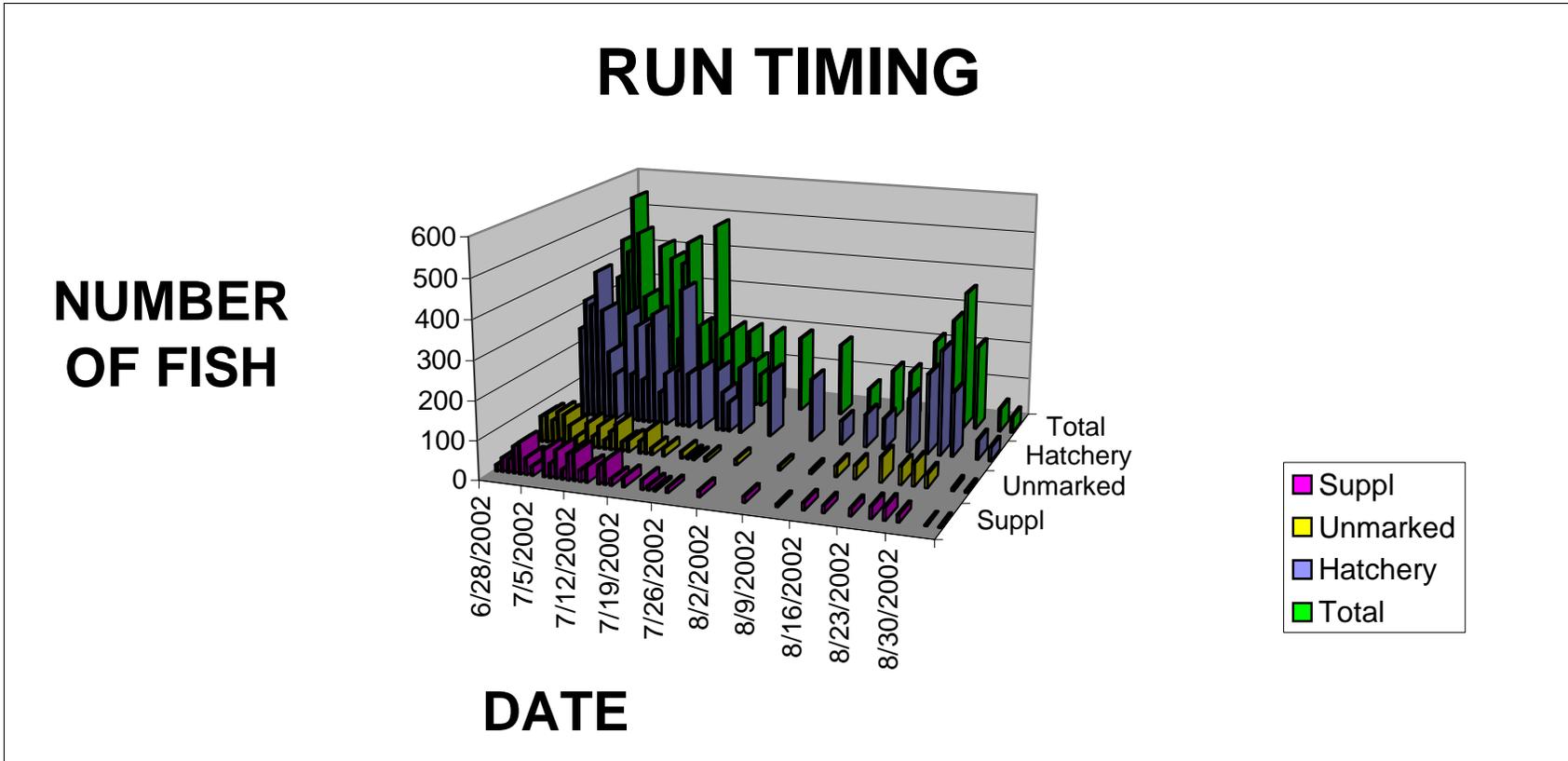


Appendix 4b. South Fork Salmon River summer Chinook male length frequency graph BY01.



Appendix 5 McCall Fish Hatchery 2002 Summer Chinook run timing, South Fork Salmon River.

| Date | Number Trapped |
|---------------|-----------------------|
| 6/28 | 325 |
| 6/29 | 431 |
| 6/30 | 400 |
| 7/1 | 552 |
| 7/2 | 454 |
| 7/3 | 277 |
| 7/4 | 169 |
| 7/6 | 421 |
| 7/7 | 196 |
| 7/8 | 391 |
| 7/9 | 165 |
| 7/10 | 379 |
| 7/11 | 438 |
| 7/12 | 141 |
| 7/13 | 209 |
| 7/15 | 227 |
| 7/16 | 490 |
| 7/17 | 179 |
| 7/19 | 206 |
| 7/22 | 205 |
| 7/23 | 123 |
| 7/24 | 88 |
| 7/26 | 200 |
| 7/31 | 200 |
| 8/7 | 191 |
| 8/12 | 78 |
| 8/16 | 134 |
| 8/19 | 135 |
| 8/23 | 225 |
| 8/26 | 287 |
| 8/26 | 363 |
| 8/30 | 221 |
| 9/3 | 61 |
| 9/5 | 42 |
| Totals | 8,603 |



Appendix 6. McCall Fish Hatchery South Fork Salmon River Chinook run timing graph Brood Year 2002

Appendix 7. Historic hatchery releases and returns logged at McCall Fish Hatchery.

| Brood Year | Release Year | Number of Fish | 3-year-olds | Year Returned | 4-year-olds | Year Returned | 5-year-olds | Year Returned |
|-------------------|---------------------|-----------------------|--------------------|----------------------|--------------------|----------------------|--------------------|----------------------|
| 1978 | 1980 | 124,800 | 124 | 1981 | 462 | 1982 | 161 | 1983 |
| 1979 | 1981 | 248,926 | 48 | 1982 | 272 | 1983 | 221 | 1984 |
| 1980 | 1982 | 122,247 | 504 | 1983 | 713 | 1984 | 151 | 1985 |
| 1981 | 1983 | 183,896 | 595 | 1984 | 1,259 | 1985 | 203 | 1986 |
| 1982 | 1984 | 269,880 | 828 | 1985 | 1,265 | 1986 | 202 | 1987 |
| 1983 | 1985 | 564,405 | 1,222 | 1986 | 2,117 | 1987 | 893 | 1988 |
| 1984 | 1986 | 970,348 | 386 | 1987 | 1,392 | 1988 | 191 | 1989 |
| 1985 | 1987 | 958,300 | 50 | 1988 | 252 | 1989 | 30 | 1990 |
| 1986 | 1988 | 1,060,400 | 495 | 1989 | 911 | 1990 | 154 | 1991 |
| 1987 | 1989 | 975,000 | 28 | 1990 | 237 | 1991 | 25 | 1992 |
| 1988 | 1990 | 1,032,500 | 821 | 1991 | 2,617 | 1992 | 1,312 | 1993 |
| 1989 | 1991 | 708,600 | 206 | 1992 | 1,363 | 1993 | 299 | 1994 |
| 1990 | 1992 | 901,500 | 28 | 1993 | 158 | 1994 | 17 | 1995 |
| 1991 | 1993 | 607,298 | 70 | 1994 | 189 | 1995 | 37 | 1996 |
| 1992 | 1994 | 1,060,163 | 101 | 1995 | 424 | 1996 | 166 | 1997 |
| 1993 | 1995 | 1,074,598 | 738 | 1996 | 3,448 | 1997 | 555 | 1998 |
| 1994 | 1996 | 585,654 | 45 | 1997 | 343 | 1998 | 246 | 1999 |
| 1995 | 1997 | 238,367 | 76 | 1998 | 972 | 1999 | 90 | 2000 |
| 1996 | 1998 | 393,872 | 743 | 1999 | 3,306 | 2000 | 263 | 2001 |
| 1997 | 1999 | 1,182,615 | 3,416 | 2000 | 9,565 | 2001 | 971 | 2002 |
| 1998 | 2000 | 1,039,930 | 1,094 | 2001 | 6494 | 2002 | 0 | 2003 |
| 1999 | 2001 | 1,165,231 | 1,138 | 2002 | 0 | 2003 | 0 | 2004 |
| 2000 | 2002 | 1,064,250 | 0 | 2003 | 0 | 2004 | 0 | 2005 |
| 2001 | 2003 | 1,053,660 | 0 | 2004 | 0 | 2005 | 0 | 2006 |

Appendix 8. Summer Chinook distribution in the South Fork of the Salmon River logged at McCall Fish Hatchery.

| Destination | Weight | Number/pound | Number released |
|-----------------------|---------------|---------------------|------------------------|
| Knox Bridge | 12,800 | 20.9 | 267,520 |
| Knox Bridge | 12,800 | 20.9 | 267,520 |
| Knox Bridge | 19,200 | 20.9 | 401,280 |
| Knox Bridge | 7,296 | 20.9 | 152,490 |
| Stolle Pond | 717 | 112 | 80,340 |
| Total Released | 52,813 | | 1,169,150 |

Appendix 9. Brood Year 2002 summer Chinook survival from green eggs to released smolts.

| Number of Green Eggs | Number of Eyed Eggs | Percent Survival | Ponded | Percent Survival | Released Smolts | Percent Survival |
|-----------------------------|----------------------------|-------------------------|---------------|-------------------------|------------------------|-------------------------|
| 1,804,033 | 1,325,348 | 87.30% | 1,180,330 | 82.30% | 1,088,810 | 80.50% |

*Totals do not include culled eggs from green egg total, eyed eggs to Sho-Bans, and parr to Stolle Pond.

Appendix 10. Temperature range from August 2002 to April 2004 at McCall Fish Hatchery.

| Date | Temperature |
|-------------|--------------------|
| Aug-02 | 51.8 |
| Sep-02 | 49.5 |
| Oct-02 | 45.6 |
| Nov-02 | 43.1 |
| Dec-02 | 40.2 |
| Jan-03 | 37.8 |
| Feb-03 | 38.2 |
| Mar-03 | 38.2 |
| Apr-03 | 38.2 |
| May-03 | 41.5 |
| Jun-03 | 46.4 |
| Jul-03 | 54.6 |
| Aug-03 | 50.8 |
| Sep-03 | 49.2 |
| Oct-03 | 46.3 |
| Nov-03 | 43.1 |
| Dec-03 | 39.3 |
| Jan-04 | 37.7 |
| Feb-04 | 37.5 |
| Mar-04 | 38.0 |
| Apr-04 | 40.5 |

Appendix 11. Water analysis at McCall Fish Hatchery.

| Date | pH | Ammonia | Nitrate | Nitrite | Total Phosphate | Total Nitrogen | KJEL Hardness | CaCO ₂ Saturation | Oxygen ppm |
|------|-----|---------|---------|---------|-----------------|----------------|---------------|------------------------------|------------|
| 1988 | 6.8 | - | - | - | - | - | <10 | 97/103 | 7/10 |
| 1991 | | <0.05 | <0.1 | <0.1 | <0.05 | <0.10 | | | |
| 1993 | 6.9 | <0.05 | <0.1 | <0.01 | <0.05 | <0.10 | | | |
| 1994 | 6.9 | <0.05 | <0.1 | <0.01 | 0.01 | <0.10 | | | |

Appendix 12. Brood year 2002 production cost table.

| Number of Fish | Pounds of Feed | Cost of Feed | Pounds of Fish | Conversion | Total Cost | Cost/1,000 | Cost/Pound |
|----------------|----------------|--------------|----------------|------------|------------|------------|------------|
| 1,169,150 | 62,585.00 | \$62,208 | 52,821 | 1.18 | \$504,490 | \$431.56 | \$9.55 |

Includes the Stolle Pond fish.

Appendix 13. Brood year 2002 marked fish released.

| Date | Number of Marks Applied | Mark | Purpose | Number Marked Fish Released | Site/group Released |
|--------------|-------------------------|--------|-----------------|-----------------------------|---------------------|
| 5/27-6/04/03 | 586,242 | AD | Identification | 508,575 | 1,088,810 |
| 6/30-7/16/03 | 334,852 | AD/CWT | US-Canada | 333,918 | 1,088,810 |
| 2/09-2/12/04 | 71,670 | AD/PIT | Migration | 71,567 | 1,088,810 |
| 6/30-7/16/03 | 175,046 | CWT | Supplementation | 174,150 | 1,088,810 |
| 6/30-7/16/03 | 600 | CWT | Supplementation | 600 | 1,088,810 |
| 6/30-7/16/03 | 80,340 | CWT | Supplementation | 80,340 | 80,340 |
| TOTAL | 1,248,750 | | | 1,169,150 | 1,169,150 |

Appendix 14. Summary of Fish Autopsy.

Summary of Fish Autopsy

ACCESSION NO: 04-110 LOCATION: MCCALL
 SPECIES: SU AUTOPSY DATE: 3/9/2004
 STRAIN: SF AGE: juv
 UNIT: SAMPLE SIZE: 20
 RIVER FOR AUTOPSY: Prelib.
 INVESTIGATOR(S): Munson
 REMARKS:

| | MEAN | STANDARD DEVIATION | COEFFICIENT OF VARIATION |
|---------------|-------|--------------------|--------------------------|
| LENGTH | 0.00 | 0.00 | 0.00 |
| WEIGHT | 0.00 | 0.00 | 0.00 |
| KTL* | 0.00 | 0.00 | 0.00 |
| CTL* | 0.00 | 0.00 | 0.00 |
| HEMATOCRIT | 42.85 | 2.70 | 0.06 |
| LEUCOCRIT | 0.00 | 0.00 | 0.00 |
| SERUM PROTEIN | 8.52 | 0.70 | 0.08 |

*EXPRESSED AT KTL TIMES 10 TO THE FIFTH POWER

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

| EYES | | GILLS | | PSEUDO-BRANCHS | | THYMUS | | FAT | | MESEN. SPLEEN | | GUT | | HIND KIDNEY | | LIVER | | BILE | |
|------|----|-------|----|----------------|----|-----------|----|----------|----|---------------|----|-----------|----|-------------|----|-------|----|-----------|----|
| N | 20 | N | 20 | N | 20 | 0 | 20 | 0 | 0 | B | 0 | 0 | 20 | N | 20 | A | 0 | 0 | 20 |
| B1 | 0 | F | 0 | S | 0 | 1 | 0 | 1 | 0 | R | 20 | 1 | 0 | S | 0 | B | 17 | 1 | 0 |
| B2 | 0 | C | 0 | L | 0 | 2 | 0 | 2 | 6 | G | 0 | 2 | 0 | M | 0 | C | 3 | 2 | 0 |
| E1 | 0 | M | 0 | S&L | 0 | | | 3 | 14 | NO | 0 | | | G | 0 | D | 0 | 3 | 0 |
| E2 | 0 | P | 0 | I | 0 | Mean=0.00 | | 4 | 0 | 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=2.7 | | | | | | | | OT | 0 | | |
| M1 | 0 | | | | | | | | | | | | | | | | | | |
| OT | 0 | | | | | | | | | | | | | | | | | | |

SUMMARY OF NORMALS

| | | | | | | | | | | | | | | | | | | | |
|-----|----|------|----|----|----|------|----|----|----|------|----|----|----|----|----|----|----|----|----|
| SEX | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | M: 0 | | | | F: 0 | | | | U: 0 | | | | | | | | | |

GENERAL REMARKS:

FINS: GONADS:
 SKIN: OTHER:

Appendix 14. Continued.

Summary of Fish Autopsy

ACCESSION NO: 04-111 LOCATION: MCCALL
 SPECIES: SU AUTOPSY DATE: 3/9/2004
 STRAIN: JC AGE: juv
 UNIT: SAMPLE SIZE: 20
 RIVER FOR AUTOPSY: Prelib.
 INVESTIGATOR(S): Munson
 REMARKS:

| | MEAN | STANDARD DEVIATION | COEFFICIENT OF VARIATION |
|---------------|-------|--------------------|--------------------------|
| LENGTH | 0.00 | 0.00 | 0.00 |
| WEIGHT | 0.00 | 0.00 | 0.00 |
| KTL* | 0.00 | 0.00 | 0.00 |
| CTL* | 0.00 | 0.00 | 0.00 |
| HEMATOCRIT | 43.55 | 4.12 | 0.09 |
| LEUCOCRIT | 0.00 | 0.00 | 0.00 |
| SERUM PROTEIN | 8.14 | 0.60 | 0.07 |

*EXPRESSED AT KTL TIMES 10 TO THE FIFTH POWER

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

| EYES | | GILLS | | PSEUDO-BRANCHS | | THYMUS | | FAT | | MESEN. SPLEEN | | GUT | | HIND KIDNEY | | LIVER | | BILE | |
|------|----|-------|----|----------------|----|-----------|----|-----------|---|---------------|----|-----------|----|-------------|----|-------|----|-----------|----|
| N | 20 | N | 20 | N | 20 | 0 | 20 | 0 | 0 | B | 0 | 0 | 20 | N | 20 | A | 0 | 0 | 20 |
| B1 | 0 | F | 0 | S | 0 | 1 | 0 | 1 | 4 | R | 20 | 1 | 0 | S | 0 | B | 19 | 1 | 0 |
| B2 | 0 | C | 0 | L | 0 | 2 | 0 | 2 | 7 | G | 0 | 2 | 0 | M | 0 | C | 1 | 2 | 0 |
| E1 | 0 | M | 0 | S&L | 0 | | | 3 | 9 | NO | 0 | | | G | 0 | D | 0 | 3 | 0 |
| E2 | 0 | P | 0 | I | 0 | Mean=0.00 | | 4 | 0 | 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=2.25 | | | | | | | | OT | 0 | | |
| M1 | 0 | | | | | | | | | | | | | | | | | | |
| OT | 0 | | | | | | | | | | | | | | | | | | |

SUMMARY OF NORMALS

| | | | | | | | | | | | | | |
|-----|----|------|----|----|------|----|----|----|------|----|----|----|----|
| SEX | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | M: 0 | | | F: 0 | | | | U: 0 | | | | |

GENERAL REMARKS:

FINS: GONADS:
 SKIN: OTHER:

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