



McCall FISH HATCHERY

2006 Summer Chinook Salmon Brood Year Report



by

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TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT	1
INTRODUCTION	2
OBJECTIVES	2
FISH REARING FACILITIES	3
WATER SUPPLY	3
STAFFING	4
TRAPPING AND SPAWNING	4-7
FISH PRODUCTION	7-8
FISH HEALTH	8
FISH MARKING	9
FISH DISTRIBUTION	9
EXPERIMENTS.	10
CONCLUSION	10
RECOMMENDATIONS	10
APPENDICES	11

ABSTRACT

The South Fork Salmon River trapping season began on June 30th with the weir installation and opening of the trap. Trapping operations concluded on September 13, 2006.

Chinook salmon *Oncorhynchus tshawytscha* spawning at the trap commenced on August 16 and concluded on September 13, 2006. A total of 2,151 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 86.9%.

Of the 2,151 fish trapped: 958 were females, of which 546 were ponded; 227 were released above the weir, while the remaining hatchery females were used for fishery recycle or subsistence giveaway. There were 7 females that died in the trap. The pre-spawn mortality for females was 9.4%. There were 898 adult males trapped of which 252 were released above the weir, 595 were ponded for spawning, with the remaining hatchery males also used for fishery recycle or subsistence. There were 5 adult males that died in the trap. The pre-spawn mortality for the males was 5.5%. There were 295 jacks trapped (according to length frequency criteria); 25 were released upstream of the weir, 17 were used for spawning, with the majority being recycled through the fishery or distributed for subsistence giveaways. Due to the low numbers of reserve adults and jacks, there were only 63 given to the tribes or charitable organizations.

From the females ponded, 432 South Fork stock were spawned with an average fecundity rate of 4,470 eggs per female, resulting in 1,931,415 green eggs taken. There were 26 Johnson Creek females held and spawned, resulting in 89,938 eyed eggs. There were 343,063 eyed reserve eggs produced for the Sho-Ban tribal egg box program.

During the period of March 17, through March 20, 2008, there were 1,060,540 brood year 2006 smolts (57,793 pounds) transported and released at Knox Bridge. Nez Perce tribal fishery personnel transported 88,085 (3,678 pounds) 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 U.S. Fish and Wildlife Service administers funding for LSRCP to the Idaho Department of Fish and Game (IDFG).

The MCFH is located within the city limits of McCall, Idaho along the North Fork of the Payette River, approximately .25 miles 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, Idaho.

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

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 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); 320 ft.³ of rearing area per vat.
3. Two concrete rearing ponds 196-ft x 40.5-ft x 4-ft (water depth); 23,814 ft.³ 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.

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 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 up to a depth of 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 10). 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 six temporary employees to assist during the busy field season.

TRAPPING AND SPAWNING

The 2006 trapping season started on June 30, with the ponds set up and water turned on in the fish ladder, and weir installation. The first fish was trapped on July 1. Trapping continued through September 13, 2006. Normal trap installation is usually around June 20 with the fish arriving shortly thereafter. The peaks of the run for 2006 were July 11, and August 22.

There were 2,151 fish trapped; 958 (45%) were females and 1,193 (55%) were males. A total of 295 male fish (24%) were jacks (three-year-old-fish) according to length frequency criteria. There were 227 females, 252 adult males, and 25 jacks released upstream of the weir. Table 1.

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 1,889 marked (87.8%) and 262 (12.2%) unmarked fish. Of the 1,563 AD clipped reserve fish trapped 189 (12.1%) were noted as having a partial adipose fin. In addition there were 109 (22 females and 87 males) previously trapped and released adipose clipped fish that were re-trapped. Re-trapped fish numbers were comparable to last year (98). Of the tags recovered or detected, 105 were PIT tags, 404 CWT, and 33 radio tags. The CWT recovered were from the fishery and the trap.

Table 1. Trapping Summary.

	AD	OM	NO	Total
Females	698	168	92	958
Males	597	152	149	898
Jacks	268	6	21	295
Total	1,563	326	262	2,151

Mark Type Key:

AD = adipose clip, hatchery fish.

OM = no clip with coded micro-wire tag, supplementation fish.

NO = no clip "unmarked", wild or natural fish.

A total of 326 coded wire tags were detected in unclipped fish. These were either supplementation fish reared through parr in the Stolle acclimation pond from brood year 2001 and 2002 or from a supplementation group, BY 2002, reared through smolt at the McCall Fish Hatchery. The release group for Stolle Pond BY 2001 was 61,800 parr and 80,340 parr for BY 2002. Both 100% coded wire tagged w/o fin clip. The hatchery supplementation smolt release for BY 2002 was 174,750 marked as 100% coded wire tag w/o fin clip. These fish were recorded as supplementation fish in the database. The regional research biologist is responsible for recovery and analysis of the coded wire tags obtained from spawning ground surveys and carcass recovery. Detection and recovery of the tags is important for identifying potential year class survival and return rates between release groups. A wand type detector was used to scan fish for the presence of a coded micro-wire tag.

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, 504 (252 males, 227 females, 25 jacks) were released above the weir, at the time of trapping. The percent release for unmarked males and females was 55% and 45% respectively. A 1:1 ratio was required by NMFS in the IDFG trapping permit. A total of 556 hatchery fish and 3 supplementation fish were released downstream of the SFSR weir. There were 76 hatchery salmon were released for recycling during the tribal fisheries. Toward the end of the run excess hatchery fish and three supplementation fish were released downstream as spawn take goals and upstream supplementation adult versus natural adult escapement quotas had been achieved. Two release sites, the mouth of Dollar Cr. and Roaring Cr. were selected for their location attributes and accessibility. The Roaring Cr. site has been referred to as the Goat Cr. site in previous years however hatchery staff determined Roaring Cr. is actually closer to the actual release site than Goat Cr. Downstream releases included 553 to Roaring Cr. and 6 went to an area above the mouth of Dollar Cr. to recycle fish with radio tags for a University of Idaho study. No erythromycin injections were given to fish released below the weir. Table 2., 3.

ShoBan tribe representatives received 343,063 eyed reserve eggs from McCall Hatchery, for placement into in-stream egg incubation boxes located in the South Fork Salmon River drainage. There were 63 reserve adult and jack salmon killed for consumptive purposes and given to tribal and non-profit organizations

Table 2. Trap Disposition Summary by Age and Sex.

AGE		DISPOSITION								TOT
One Ocean										
Male Only	MARK	D	P1	PO	RO	RA	RB	KN	KS	
	AD	4	110	84	4	0	33	22	11	268
	OM	0	1	0	0	5	0	0	0	6
	NO	1	0	0	0	20	0	0	0	21
Total		5	111	84	4	25	33	22	11	295
Two Ocean										
Male / Female	AD	1 / 4	549 / 510	11 / 66	4 / 1	0	8 / 15	0 / 13	1 / 16	574 / 625
	OM	3 / 1	45 / 31	0	0	104 / 134	0	0	0	152 / 166
	NO	1 / 1	0	0	0	137 / 84	0	0	0	138 / 85
Total		5 / 6	594 / 541	11 / 66	4 / 1	241 / 218	8 / 15	0 / 13	1 / 16	864 / 876
Three Ocean										
Male / Female	AD	22 / 67	1 / 5	0	0	0	0 / 1	0	0	23 / 73
	OM	0	0	0	0	0 / 2	0	0	0	0 / 2
	NO	0	0	0	0	11 / 7	0	0	0	11 / 7
Total		22 / 67	1 / 5	0	0	11 / 9	0 / 1	0	0	34 / 82

Note: Re-traps not included in table.

Disposition Key:

P1 = Ponded; generally fish held for spawning purposes.

PO = Poned; typically for holding hatchery fish to be released at a later date for subsistence or recycling.

RA = Fish released upstream of the weir.

RB = Released Below; hatchery fish released below the weir (SFSR).

RO = Released Other; hatchery fish held for subsistence and recycling below the weir.

D = Dead, trap mortality.

KS = Killed for the Shoshone Bannock Tribe.

KN = Killed for the Nez Perce Tribe.

Table 3. Fish Released Upstream.

Fish Type	OM	NO	Total
Female	136	91	227
Male	104	148	252
Jacks	5	20	25
Total	245	259	504

A total of 1,251 SFSR stock adults were held for hatchery production. Pre-spawn mortality for the females was 9.4%, with 5.5% for the males. Improved handling and adult holding techniques contributed to the lower pre-spawn mortality rate. This year the female pond was divided into two sections; one to hold females for spawning, the other for hatchery fish for recycle or subsistence distribution. This greatly reduced the amount of handling. An extra disposition tube was also installed for this process, plus additional shade cover.

Spawning operations began on August 15th and concluded on September 5th. Tuesdays and Fridays were reserved for spawning. A total of 7 spawn days were needed to spawn 432 South Fork females of which eggs from 368 of these females were retained for hatchery production and Shoshone-Bannock Tribe egg boxes in Dollar Cr., a tributary to the South Fork Salmon River. Eggs were collected from both hatchery (ad clip) and supplementation (no mark w/cwt) stock this year.

Due to the number of supplementation fish arriving at the weir, some supplementation fish were held to spawn and prevent upstream supplementation to natural ratios from exceeding the maximum target ratio of 60 % supplementation to 40 % natural. Initially this ratio was to remain as close to 1:1 as possible. Supplementation fish were randomly intermixed with hatchery reserve stock during spawning this year. Otherwise, spawning procedures remained relatively consistent with recent years. All spawned out carcasses were returned to the South Fork Salmon River immediately below the trap water intake. Approximately 17 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 (100ppm) solution and allowed to harden for one hour. After hardening, the eggs were placed in numbered egg bags and packed in coolers for transportation back to the hatchery. Females were bled prior to spawning to prevent blood from inhibiting fertilization.

Reserve females were double loaded into hatchery incubation egg trays. Eggs from the Johnson creek stock 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 0.25 or greater were considered high positive for bacterial kidney disease. Nine females were found to be high BKD positive during incubation and their eggs, paired with those from nine other females, were culled prior to hatching resulting in the loss of 80,460 eggs. Eggs from 24 low BKD positive females (ELISA 0.165 – 0.249) were culled to achieve full hatchery rearing capacity. These females were paired with 22 additional females and resulted in culling 165,112 eyed eggs. In all, eggs from 64 females were culled during incubation. In addition two females were culled during spawning operations (1 BKD visual cull and 1 bloody cull). Overall average fecundity was 4,470 eggs per female and average eye up was 86.9 %

Incubator flows were set at a 5 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 TU.

JOHNSON CREEK TRAPPING AND SPAWNING

Nez Perce fisheries personnel transferred 60 unmarked summer chinook salmon trapped at the Johnson Cr. weir to the South Fork facility for brood stock. A total of 28 females, 30 adult males and 2 jacks were transferred. 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 excessive sorting of South Fork males during spawning. Johnson Creek females were held along with SFSR females throughout the spawning process. All Johnson Cr. fish were uniquely marked to distinguish them from South Fork stock. Multiple marks were used to ensure positive identification. Two adipose clipped SFSR stock fish were trapped at the Johnson Cr. trap and transferred to the south fork facility where they were dispatched and returned to the south fork for nutrient enhancement.

A total of 103,076 green eggs were collected from 26 females and returned to MCFH for incubation. During spawning, eggs from one additional female were culled following visual inspection of the carcass which demonstrated gross clinical signs consistent for BKD. Eggs from one female were culled during incubation once ELISA testing determined they came from a high BKD positive female. Eye up was 90.5 % producing 93,283 good eggs. Fecundity was 3,964 eggs per female. Pre-spawn mortality on the females was 3.6 % (1/28) and 18.8 % (6/32) for the males.

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 temperature units (TU). Flows for the vats are set at 80 gpm and are loaded at 50,000 to 85,000 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 Skretting BioVita #0 and appear to be

doing well. The fish appear to start on feed a little slower than the past. Once they start feeding actively, they appear to do well.

Fish are moved to the outside rearing ponds mid June and mid July. They are adipose clipped, ventral clipped and coded wire tagged (CWT), and enumerated as they are moved to the ponds. There was a 2.62% increase in production numbers, determined at marking, resulting in an additional 27,226 fish on hand. By the end of September, there were 1,062,610 fish on station. There also 88,313 Johnson Creek stock for Nez Perce tribal releases in to Johnson Creek.

FISH HEALTH

DISEASES ENCOUNTERED AND TREATMENT

Epizootics were not encountered during the rearing cycle that ended with release in the spring of 2008 for the BY'06 South Fork and Johnson Creek summer Chinook programs. Either one or no prophylactic treatments of erythromycin medicated feed were applied to Chinook salmon to control *Renibacterium salmoninarum*, the causative agent of Bacterial Kidney Disease. The target dose of 100 mg/kg for 28 days was applied to approximately one half of the South Fork of the Salmon River summer Chinook (SFSR SU) salmon and all of the Johnson Creek summer Chinook salmon (JC SU). Adult Chinook entering the South Fork Trap were given an intra-peritoneal injection of erythromycin at a target dose of 10 mg/kg to limit pre-spawning mortality due to BKD.

Renibacterium was detected during routine brood stock inspections at the South Fork Trap during 2006. Eggs from females with ELISA optical densities greater than 0.25 were culled from production in the South Fork summer Chinook (9, 2.1%). The Johnson Creek summer Chinook had one female with an ELISA value above 0.25 (3.8%). The eggs from this female were culled. Due to excess eggs, the culling point was reduced to 0.165. Thus an additional 168,252 eggs were culled from production. Neither IHNV nor *Myxobolus cerebralis* were detected in SFSR SU or JC SU brood fish.

Preliberation ELISA sampling detected 0/4+ pools for all Chinook salmon stocks reared at this facility. Viral replicating agents and *Myxobolus cerebralis* were not detected in either stock.

ORGANOSOMATIC INDEX. See attachment 13,a,b.

ACUTE LOSSES.

Neither acute nor chronic losses were experienced at this facility this year.

OTHER ASSESSMENTS.

DFAT and ELISA values were almost identical for all treatment groups at preliberation sampling. We will continue to investigate the effects of reduction of erythromycin feed. We will be looking for other means of reducing BKD without the use of medicated feed. The Eagle Fish Health Laboratory will develop a method of BKD surveillance using DFAT and Polymerase Chain Reaction to detect early disease development within these fish.

Pre-spawning mortality for the males was approximately 5.5% for 2006. McCall staff has been diligent in reducing handling. This has brought pre-spawning mortality down from the 30% range to less than ten per cent in the last four years. *Ichthyophthirius multifiliis* has been on the increase for several years in Idaho. It will be important to be vigilant and ready to deal with this parasite.

FISH MARKING

The fish marking crew was here in June and July and marked approximately 1.14 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 51,733 fish. The breakdown of tagged released fish appears in Appendix 13. Nez Perce Tribal Fishery personnel tagged 394 fry from our production group with "mini" PIT to determine how small a fish could be and be tagged and still survive. There were 372 fish released with the regular release containing these tags.

FISH DISTRIBUTION

The brood year 2006 smolt hauling operation began on March 17 and concluded on the evening of March 20. There were approximately twenty-five loads of fish hauled in four days. The river conditions were clear and low at the time of release. All together there were 1,060,540 brood year 2006 smolts at 18.35 fish per pound totaling 57,793 pounds released. (Appendix 7). The Sho-Ban Tribe received 343,063 eyed reserve eggs for their egg box program in the Dollar Creek area.

Nez Perce Tribal fishery personnel transported 88,085 smolts weighing 3,678 pounds to Johnson Creek on March 10 through 12, for release.

EXPERIMENTS

Approximately one-half of the reserve stock received one prophylactic medicated feed treatment for BKD, the rest received none. The Johnson Creek production received one prophylactic medicated feed treatment. There was no noticeable difference noted of BKD prevalence in either group. Egg transport bags were used again this year instead of the rigid egg tubes for egg transport back to the hatchery.

CONCLUSIONS

The brood year 2006 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 over-all 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. The Bio-Oregon fish food company went out of the fish food business and sold their plant and formulas to Skretting. We shifted to the Skretting diet out of necessity and have had good results to date. On September 10, the construction crew began work on the new permanent weir and bridge facility. On November 9, the crew pulled out and the concrete sill and bridge abutments were ready for the new bridge to be installed in the coming spring. A considerable amount of quality work was completed in a short work window.

RECOMMENDATIONS

Low phosphate feed with a higher vitamin pack was utilized during the peak rearing cycle with no adverse effects noted. It is recommended to continue to 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 entire asphalt driveway for the hatchery is in need of extensive repair or replacement.

APPENDICES

- Appendix 1. 2006 summer chinook returns to McCall Fish Hatchery, South Fork Salmon River, based on R-mix data and length frequency data age distribution of brood year.
- Appendix 2. Lengths of brood year 2006 fish trapped at McCall Fish Hatchery by mark type
- Appendix 3. Length frequency for brood year 2006 summer chinook broodstock at the South Fork of The Salmon River Trap, according to mark type recorded at McCall Fish Hatchery
- Appendix 4. McCall Fish Hatchery 2006 Summer Chinook Run Timing, South Fork Salmon River
- Appendix 5. McCall Fish Hatchery South Fork Salmon River chinook run timing by origin
- Appendix 6. Historic hatchery releases and returns logged at McCall Fish Hatchery
- Appendix 7. Summer chinook distribution in the South Fork of the Salmon River logged at McCall Fish Hatchery
- Appendix 8. Brood year 2006 chinook survival from green eggs to released smolts
- Appendix 9. Temperature range from August 2006 Through April 2008 at McCall Fish Hatchery
- Appendix 10. Water analysis at McCall Fish Hatchery
- Appendix 11. Brood year 2006 production cost table
- Appendix 12. Brood year 2006 marked fish that were released
- Appendix 13. a. b. Summary of fish autopsy

Appendix 1. Age distribution of 2006 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	286	295	0	0
4	856	862	794	878
5	86	34	164	82
Totals	1,193	1,191	958	960

*CWT data based on 326 snouts recovered at the trap and from the fishery, using R-mix. Length data is taken at trapping prior to first sort (Historical Breakdown).

Historical Age-class breakdown

<66 cm = 1 Ocean Male Only
 66 - 90cm = 2 Ocean Male
 >90 cm = 3 Ocean Male
 <88 cm = 2 Ocean Female
 >87 cm = 3 Ocean Female

R-Mix Length frequency

<63 cm = 1 Ocean Males
 63-84cm = 2 Ocean Males
 ≥85 cm = 3 Ocena Males
 <84 cm = 2 Ocean Females
 ≥84 cm = 3 Ocean Females

Appendix 2. Lengths of brood year 2006 fish trapped at McCall Hatchery by mark type.

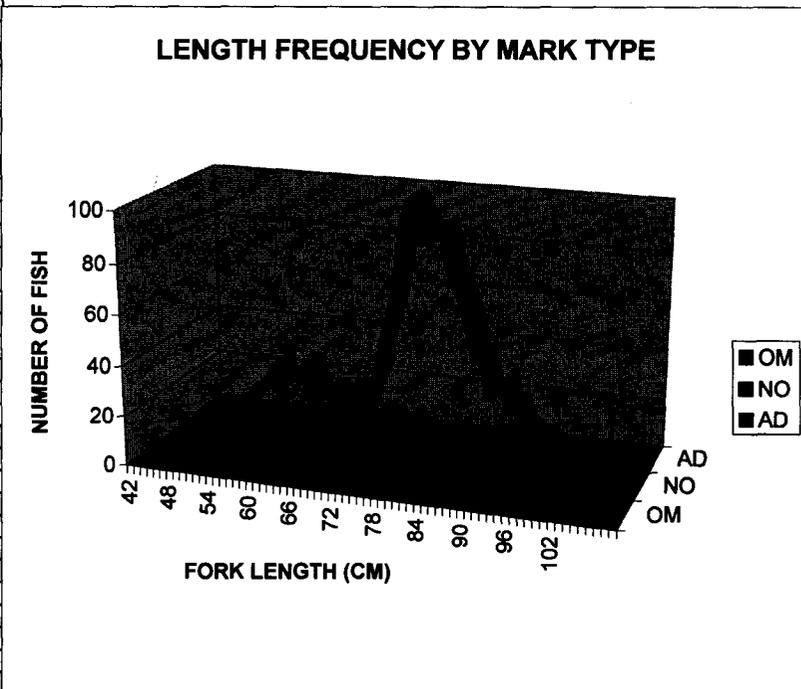
Fork Length (cm)	Ad-clip	Supplementation	No Mark
42	1	0	0
43	2	0	1
44	1	0	0
45	2	0	0
46	3	0	0
47	4	0	0
48	4	0	0
49	3	0	0
50	10	0	1
51	15	0	0
52	17	0	0
53	14	0	2
54	25	0	0
55	14	0	2
56	16	0	0
57	22	0	0
58	24	1	0
59	24	0	1
60	13	0	0
61	11	0	1
62	15	0	2
63	15	2	1
64	11	1	5
65	3	2	6
66	9	4	8
67	13	3	2
68	10	3	5
69	18	6	15
70	23	12	14
71	39	20	9
72	49	17	10
73	63	10	9
74	87	27	6
75	98	23	17
76	93	26	11
77	88	29	14
78	81	24	18
79	83	29	14
80	88	16	12
81	72	21	9
82	64	17	9
83	58	10	7
84	50	11	6
85	35	4	5
86	36	2	7
87	22	1	9
88	21	2	6
89	28	1	5
90	17	0	0

Continued

91	19	0	4
92	7	0	3
93	7	1	2
94	4	0	1
95	3	0	1
96	2	0	0
97	1	0	0
98	0	0	1
99	2	0	2
100	1	0	0
101	0	0	0
102	0	0	0
103	2	0	0
104	0	0	0
105	0	0	0
106	1	0	0
Totals	1563	325	263

Appendix 3. Length Frequency by Mark Type.

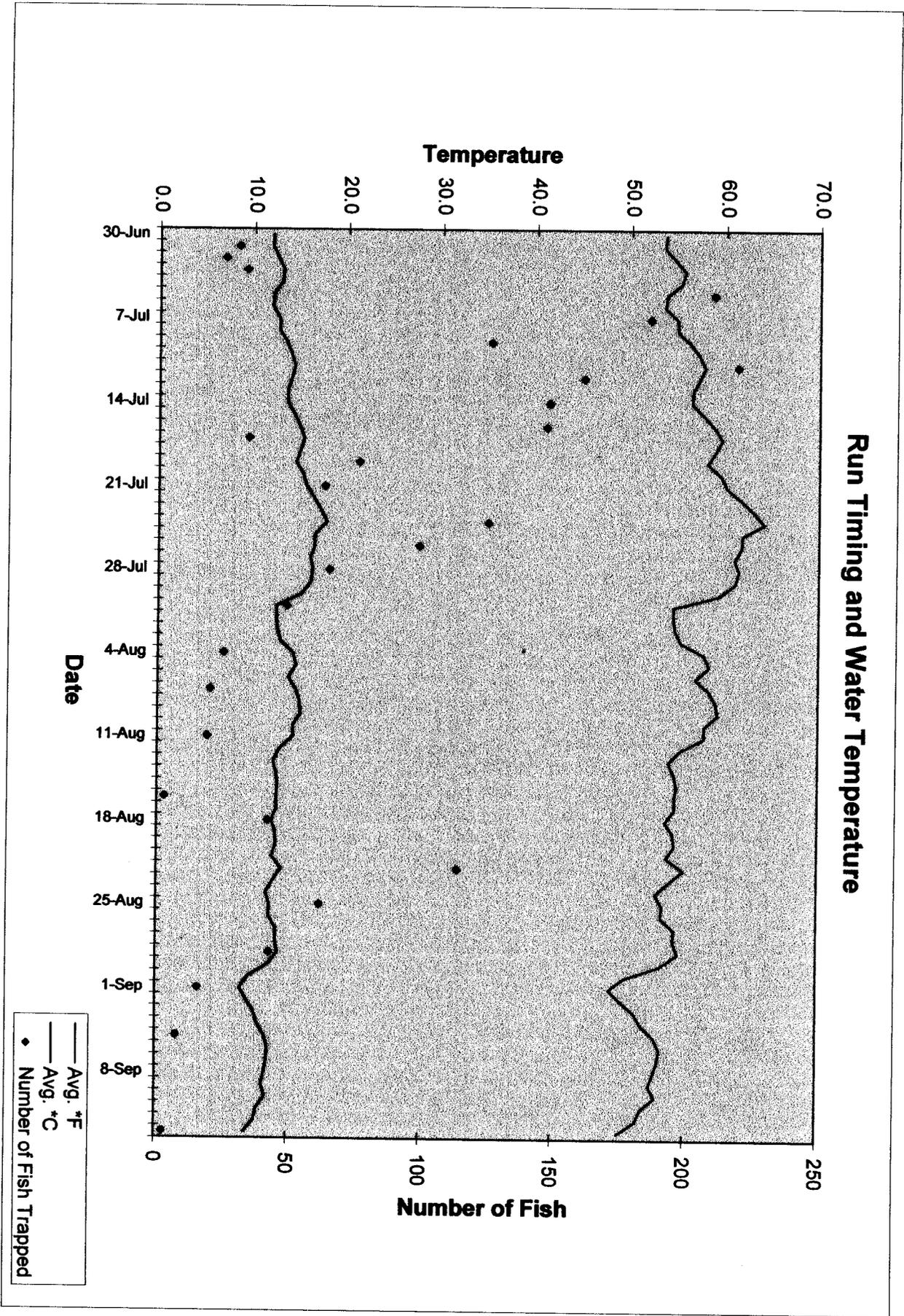
Fork L.	Mark Type		
	AD	OM	NO
42	1	0	0
43	2	0	1
44	1	0	0
45	2	0	0
46	3	0	0
47	4	0	0
48	4	0	0
49	3	0	0
50	10	0	1
51	15	0	0
52	17	0	0
53	14	0	2
54	25	0	0
55	14	0	2
56	16	0	0
57	22	0	0
58	24	1	0
59	24	0	1
60	13	0	0
61	11	0	1
62	15	0	2
63	15	2	1
64	11	1	5
65	3	2	6
66	9	4	8
67	13	3	2
68	10	3	5
69	18	6	15
70	23	12	14
71	39	20	9
72	49	17	10
73	63	10	9
74	87	27	6
75	98	23	17
76	93	26	11
77	88	29	14
78	81	24	18
79	83	29	14
80	88	16	12
81	72	21	9
82	64	17	9
83	58	10	7
84	50	11	6
85	35	4	5
86	36	2	7
87	22	1	9
88	21	2	6
89	28	1	5
90	17	0	0
91	19	0	4
92	7	0	3
93	7	1	2
94	4	0	1
95	3	0	1
96	2	0	0
97	1	0	0
98	0	0	1
99	2	0	2
100	1	0	0
101	0	0	0
102	0	0	0
103	2	0	0
104	0	0	0
105	0	0	0
106	1	0	0
TOTALS	1563	325	263



Appendix 4 McCall Fish Hatchery 2006 Summer Chinook run timing, South Fork Salmon River.

Date	Avg. *F	Avg. *C	Number of Fish Trapped				
30-Jun	53.6	12.03		19-Aug	54.7	12.63	
1-Jul	53.5	11.95	30	20-Aug	54.9	12.71	
2-Jul	54.6	12.55	25	21-Aug	54.1	12.27	
3-Jul	55.7	13.15	33	22-Aug	55.9	13.29	114
4-Jul	55.3	12.95		23-Aug	54.4	12.42	
5-Jul	53.8	12.11	210	24-Aug	52.9	11.63	
6-Jul	53.6	11.97		25-Aug	53.7	12.05	62
7-Jul	54.9	12.73	186	26-Aug	53.5	11.97	
8-Jul	55.0	12.75		27-Aug	55.0	12.76	
9-Jul	56.3	13.50	126	28-Aug	54.9	12.71	
10-Jul	57.2	14.00		29-Aug	55.3	12.97	43
11-Jul	57.9	14.36	219	30-Aug	53.5	11.95	
12-Jul	57.3	14.03	161	31-Aug	49.7	9.84	
13-Jul	56.5	13.63		1-Sep	48.1	8.96	16
14-Jul	56.5	13.62	148	2-Sep	49.4	9.67	
15-Jul	57.8	14.33		3-Sep	50.8	10.46	
16-Jul	58.9	14.95	147	4-Sep	51.5	10.86	
17-Jul	59.7	15.39	34	5-Sep	52.9	11.62	8
18-Jul	59.0	15.00		6-Sep	53.5	11.95	
19-Jul	58.2	14.54	76	7-Sep	53.3	11.83	
20-Jul	59.5	15.30		8-Sep	52.9	11.59	
21-Jul	60.2	15.67	63	9-Sep	52.4	11.32	
22-Jul	61.7	16.52		10-Sep	53.1	11.70	
23-Jul	63.1	17.26		11-Sep	51.5	10.85	
24-Jul	64.2	17.87	125	12-Sep	51.0	10.56	
25-Jul	61.8	16.58		13-Sep	49.1	9.50	3
26-Jul	61.8	16.56	99				
27-Jul	61.0	16.13					
28-Jul	61.5	16.39	65				
29-Jul	61.1	16.18					
30-Jul	59.4	15.23					
31-Jul	54.6	12.57	49				
1-Aug	54.6	12.58					
2-Aug	54.8	12.69					
3-Aug	55.4	13.01					
4-Aug	57.9	14.38	25				
5-Aug	58.4	14.68					
6-Aug	57.0	13.90					
7-Aug	58.5	14.70	20				
8-Aug	59.2	15.10					
9-Aug	59.4	15.20					
10-Aug	58.0	14.44					
11-Aug	57.9	14.42	19				
12-Aug	55.5	13.05					
13-Aug	54.2	12.34					
14-Aug	54.8	12.69					
15-Aug	55.1	12.83					
16-Aug	54.9	12.72	3				
17-Aug	54.9	12.72					
18-Aug	53.9	12.18	42				

Appendix 5. South Fork Salmon Trap Run Timing and Water Temperature.



Appendix 6. Historic hatchery smolt releases and returns logged at McCall 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	3,344	2003
1999	2001	1,165,231	1,138	2002	2,983	2003	386	2004
2000	2002	1,064,250	1,771	2003	4,899	2004	346	2005
2001	2003	1,053,660	904	2004	2,377	2005	116	2006
2002	2004	1,088,810	491	2005	1,740	2006	270	2007
2003	2005	1,047,530	295	2006	1,913	2007	0	2008
2004	2006	1,096,130	1,562	2007	0	2008	0	2009
2005	2007	1,087,170	0	2008	0	2009	0	2010
2006	2008	1,060,540	0	2009	0	2010	0	2011

Appendix 7. Summer Chinook distribution in the South Fork of the Salmon River from McCall Hatchery

Destination	Weight	Number/pound	Number released
Knox Bridge	21,000	18.35	385,350
Knox Bridge	18,200	18.35	333,970
Knox Bridge	14,700	18.35	269,784
Knox Bridge	3,893	18.35	71,436
	57,793		1,060,540

Appendix 8. Brood year 2006 summer chinook survival from green eggs to released smolts.

Number of Green Eggs	Number of Eyed Eggs	Percent Survival	Ponded	Released Smolts	Percent Survival
1,931,415	1,678,089	86.90%	1,069,515	1,060,540	79.00%

*Totals do no include 245,572 culled eggs from green egg total, or the 343,063 eyed eggs to the Sho-Ban tribe.

Appendix 9. Temperature range from August 2006 to April 2008.

Date	Temperature
Aug-06	53.0
Sep-06	50.0
Oct-06	47.5
Nov-06	42.5
Dec-06	40.0
Jan-07	39.0
Feb-07	38.0
Mar-07	39.0
Apr-07	40.0
May-07	44.5
Jun-07	51.0
Jul-07	51.0
Aug-07	52.0
Sep-07	49.5
Oct-07	46.5
Nov-07	43.5
Dec-07	39.0
Jan-08	38.0
Feb-08	38.0
Mar-08	38.0
Apr-08	38.0

Appendix 10. 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 11. Brood year 2006 production cost table.

Number of Fish	Pounds of Feed	Cost of Feed	Pounds of Fish	Conversion	Total Cost	Cost/ 1,000	Cost/ Pound
1,060,540	50,358.00	\$69,772	57,793	0.88	\$364,473	\$343.84	\$6.31

Appendix 12. Brood year 2006 marked fish released.

Date	Number of Marks Applied	Mark	Purpose	Number Marked Fish Released	Site/group Released
6/11-6/15/07	811,462	AD	Identification	755,422	1,060,540
7/09-7/16/07	254,193	AD/CWT	US-Canada	253,440	1,060,540
2/11-2/13/08	51,788	AD/PIT	Migration	51,678	1,060,540
Total	1,117,443			1,060,540	1,060,540

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