



McCALL FISH HATCHERY

2004 Summer Chinook Salmon Brood Year Report

by

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ABSTRACT

The South Fork Salmon River trapping season began on June 18 with the weir installation and opening of the trap. Trapping operations concluded on September 7, 2004.

Chinook salmon *Oncorhynchus tshawytscha* spawning at the trap commenced on August 13 and concluded on September 3, 2004. A total of 6,189 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 86.5%.

Of the 6,189 fish trapped: 2,594 were females, of which 726 were ponded; 325 were released above the weir, and the remaining hatchery females were used for fishery recycle or subsistence giveaway. There were two females that died in the trap. The pre-spawn mortality for females was 21.3%. There were 2,615 adult males trapped of which 481 were released above the weir, 1,096 were ponded for spawning, and the remaining hatchery males were also used for fishery recycle or subsistence. The pre-spawn mortality for the males was 9.9%. There were 980 jacks trapped (according to length frequency criteria). We released 43 upstream of the weir, 34 were used for spawning, with the majority being recycled through the fishery. Due to the high numbers of reserve adults and jacks, there were 889 given to the tribes or charitable organizations.

From the females ponded, 457 South Fork stock were spawned with an average fecundity rate of 4,460 eggs per female, resulting in 2,038,292 green eggs taken. There were 27 Johnson Creek females held and spawned, resulting in 119,833 eyed eggs. There were 311,200 eyed reserve eggs produced for the Sho-Ban tribal egg box program.

From March 20, through March 23, 2006, there were 1,096,130 Brood Year 2004 smolts weighing 60,450 lbs transported and released at Knox Bridge. Nez Perce tribal fishery personnel transported 90,450 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) administer funding for LSRCP to the Idaho Department of Fish and Game (IDFG).

The MCFH is located within the city limits of McCall, 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.

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 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 cubic feet of rearing area per vat.
3. Two concrete rearing ponds 196-ft x 40.5-ft x 4-ft (water depth); 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.

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 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 2004 trapping season started on June 18, with the ponds set up and water turned on in the fish ladder, and weir installation. The first fish was trapped on June 19. Trapping continued through September 7, 2004. Normal trap installation is usually around June 20 with the fish arriving shortly thereafter. The peaks of the run for 2004 were July 7 and August 18.

There were 6,189 fish trapped; 2,594 (42%) were female, and 3,595 (58%) were male. A total of 980 male fish (27.3%) were jacks (three-year-old-fish) according to length frequency criteria. There were 325 females, 481 adult males, and 43 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 5,594 marked (90.4%) and 595 (9.6%) unmarked fish. Of the 5,339 adipose fin (AD) clipped reserve fish trapped 351 (6.6%) were noted as having a partial adipose fin. In addition there were 623 (253 females and 370 males) previously trapped and released adipose clipped fish that were re-trapped. Re-trapped fish numbers were considerably higher than last year (181). Of the tags recovered or detected, 212 were Passive Integrated Transponder (PIT) tags, 658 Coded Wire Tags (CWT), and 26 radio tags. The CWTs recovered were from the fishery and the trap.

A total of 50 CWTs were detected in unclipped fish. These were supplementation fish reared through parr in the Stolle acclimation pond (100% coded wire tagged w/o fin clip). These fish were recorded as supplementation fish in the database. Detection and recovery of the tags was important to identify potential year class survival and return rates between Brood Years.

A total of 212 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. The detection device functioned well this year. The reader box was linked directly to a laptop computer this season, improving tag recording procedures.

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, 849 (481 males, 325 females, 43 jacks) were released above the weir, at the time of trapping. The percent release for unmarked males and females was 64.7% and 73.3%, respectively. A 1:1 ratio was required by NMFS in the Department's trapping permit. There were 3,071 reserve fish transported to a site near Dollar Creek and a site upstream of, Goat Creek to be recycled through the fishery. ShoBan tribe representatives received 311,200 eyed reserve eggs from McCall Hatchery, for placement into in-stream egg incubation boxes located in the South Fork Salmon River (SFSR) drainage.

There were 889 reserve adult and jack salmon killed for consumptive purposes and given to tribal and non-profit organizations

A total of 1,929 SFSR stock adults were held for hatchery production. Pre-spawn mortality for the females was 21.3%, with 9.9% for the males. It is likely that low water conditions in conjunction with warmer water temperature contributed to the 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. Nez Perce fisheries personnel held 57 summer Chinook salmon trapped from Johnson Creek on site at the South Fork trap, 30 females and 25 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 119,833 green eggs were collected from 27 females. There were four females culled due high BKD ELISA values. Eye-up was 90.3% and fecundity was 4,438 eggs per female. Spawning operations began on August 13 and concluded on September 3. Tuesdays and Fridays were reserved for spawning. A total of 7 spawn days were needed to spawn 457 South Fork females, resulting in 2,038,292 green eggs.

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 bags and packed in coolers for transportation back to the hatchery.

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. Females with values of 0.19 or greater were culled out from the population. A total of 41 females returned ELISA values of 0.19 or greater. Seven hatchery females were culled during spawning operations. Trays with double females lost two fish, bringing the total effective number of females culled to 82. Overall average fecundity was 4,460 eggs/female and average eye up was 86.5 %.

Incubator flows were set at a five gallon per minute 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.

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 gallons per minute (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 feed and remain on #3 until they reach 700 fish per pound (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 was a 4.9% increase in production numbers, determined at marking, resulting in an additional 54,263 fish on hand. By the end of September, there were 1,098,245 fish on station. There also 90,758 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 2006 for the BY04 South Fork and Johnson Creek summer Chinook programs. During this production cycle, half of the fish on station were fed a single medicated feed treatment, while the other half received two prophylactic treatments of erythromycin medicated feed to control *Renibacterium salmoninarum*, the causative agent of Bacterial Kidney Disease, at target dose of 100 mg/kg for 28 days. There were no significant differences noted during the pre-release assessment. Adult Chinook entering the South Fork Trap were given an intra-peritoneal injection of erythromycin at a target dose of 20 mg/kg.

Renibacterium was detected during routine brood stock inspections at the South Fork Trap. Eggs from females with ELISA optical densities greater than 0.25 were culled from production in both the South Fork summer Chinook and the Johnson Creek summer Chinook.

Organosomatic Index

See attachments.

Acute Losses

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

Other Assessments

IHNV seems to be increasing in the anadromous stocks in the Pacific Northwest. We have seen increased detection in Idaho stocks. In 2004 and early in 2005, IHN caused mortality in the BY03 and BY04 Pahsimeroi summer Chinook. Awareness, prevention, and disinfection will be the key to controlling this etiologic agent. IHNV was not detected during routine inspections of brood females at the South Fork Trap.

FISH MARKING

The fish marking crew was here in June and July and marked approximately 1.15 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 51,940 fish. The breakdown of tagged released fish appears in Appendix 13.

FISH DISTRIBUTION

The Brood Year 2004 smolt hauling operation began on March 20 and concluded on the evening of March 23. There were approximately twenty-eight loads of fish hauled in four days. The river conditions were clear and low at the time of release. All together there were 1,096,130 Brood Year 2004 smolts at 18.13 fpp totaling 60,450 lbs released. The new adult truck was put into service hauling smolts for the first time. It performed well even in the adverse conditions. All trucks had to be chained up due to heavy snow and slick roads, at least once during this release period (Appendix 8).

Nez Perce Tribal fishery personnel transported 90,450 smolts to Johnson Creek on March 13-15, for release.

EXPERIMENTS

.Approximately half of the reserve stock received two prophylactic medicated feed treatments for BKD, the other half received only one. There was no noticeable difference noted of BKD prevalence in either group. Egg transport bags were used this year instead of the rigid egg tubes for egg transport back to the hatchery. Increased eye-up was noted due to less handling of the eggs during rinsing and packing.

CONCLUSIONS

The Brood Year 2004 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 new adult truck is a welcome addition to the fleet of transport vehicles. It worked well for smolt stocking.

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 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 2004 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	904	980	0	0
4	2,471	2,433	2,428	2,456
5	220	182	166	138
Totals	3,595	3,595	2,594	2,594

*CWT data based on 658 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 = three-year-olds, jacks
67-89 cm = four-year-olds
90 cm = five-year-olds

R-Mix Length frequency

<64cm = three-year-olds
64-88 cm = four-year-olds
>88 cm = five-year-olds

Appendix 2. Lengths of Brood Year 2004 fish trapped at McCall Hatchery.

Fork Length (cm)	Males	Females
40		
41		
42	1	
43	5	
44	3	
45	8	
46	10	
47	19	
48	13	
49	42	
50	57	
51	50	
52	57	
53	63	
54	100	
55	72	
56	81	
57	87	
58	68	
59	49	
60	45	
61	26	
62	22	1
63	31	
64	24	1
65	22	2
66	25	4
67	31	4
68	51	9
69	67	18
70	84	46
71	100	62
72	134	106
73	127	146
74	183	159
75	174	215
76	196	230
77	198	291
78	201	277
79	168	224
80	150	172
81	129	126
82	122	115
83	76	67
84	78	32
85	51	44

Appendix 2. Continued

Fork Length (cm)	Males	Females
86	39	24
87	28	30
88	26	26
89	20	25
90	19	18
91	7	26
92	16	29
93	12	19
94	11	13
95	8	9
96	15	4
97	19	10
98	4	7
99	14	2
100	13	1
101	11	
102	10	
103	6	
104	7	
105	3	
106	1	
107	3	
108	1	
109		
110	1	
111	1	
Totals	3,595	2,594

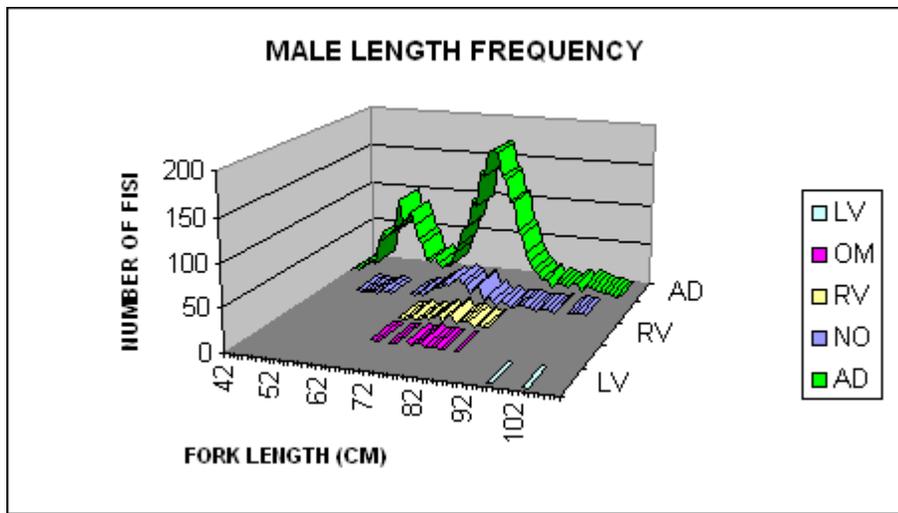
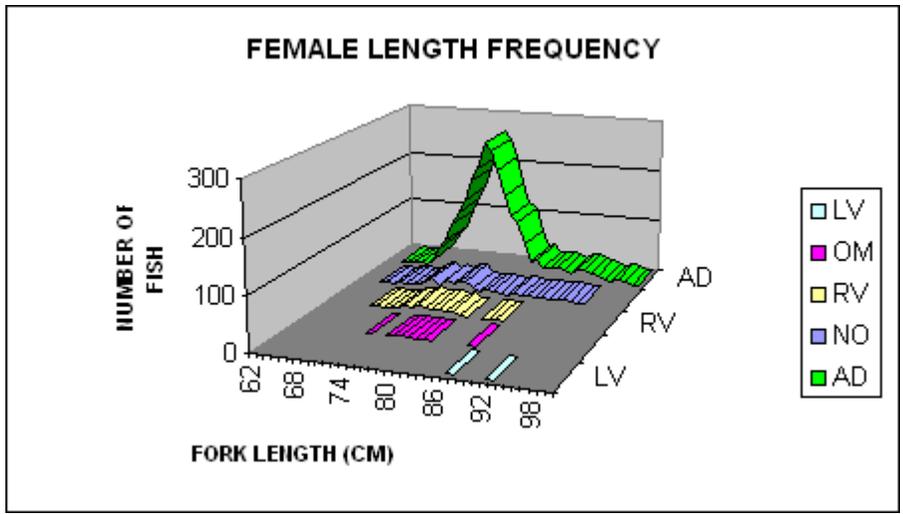
Appendix 3. Length frequency for Brood Year 2004 summer Chinook broodstock at the South Fork of the Salmon River Trap, according to mark type recorded at McCall Fish Hatchery.

FEMALE						MALE						TOTAL
AD	LV	RV	OM	NO	SUM FE	AD	LV	RV	OM	NO	SUM MA	
						1					1	1
						5					5	5
						3					3	3
						8					8	8
						10					10	10
						19					19	19
						13					13	13
						42					42	42
						54				3	57	57
						49				1	50	50
						55				2	57	57
						62				1	63	63
						97			1	2	100	100
						71				1	72	72
						76				5	81	81
						83			1	3	87	87
						67				1	68	68
						49					49	49
						45					45	45
						23		1		2	26	26
				1	1	22					22	23
						27				4	31	31
1					1	21				3	24	25
1				1	2	16				6	22	24
3				1	4	19		1	1	4	25	29
3				1	4	20		1	1	9	31	35
3		1		5	9	35		1	1	14	51	60
13		1		4	18	46		4		17	67	85
40		1		5	46	66		1	1	16	84	130
55		1		6	62	72		2	1	25	100	162
88		4	1	13	106	106		5	2	21	134	240
117		8	1	20	146	99		3		25	127	273
142	1	8		8	159	142		6	5	30	183	342
182		13	2	18	215	138		9	2	25	174	389
207		8	2	13	230	167		4	3	22	196	426
261		8	3	19	291	170		10	5	13	198	489
244		10	2	21	277	167		12	1	21	201	478
208		6	1	9	224	138		4	2	24	168	392
157		10	2	3	172	134	1	6	3	6	150	322
116		2	1	7	126	107		7	1	14	129	255
107		1		7	115	108		6	1	7	122	237
63			1	3	67	72		1		3	76	143
30		1		1	32	67		3	1	7	78	110
34	1	1		8	44	44		1	1	5	51	95

Appendix 3. Continued.

18		1	1	4	24	35		2		2	39	63
21	3	1	1	4	30	25				3	28	58
22	1			3	26	21				5	26	52
20				5	25	14				6	20	45
12	2			4	18	15	1			3	19	37
22				4	26	6				1	7	33
21	1		1	6	29	11	3	1		1	16	45
16	1			2	19	10				2	12	31
12				1	13	8				3	11	24
7				2	9	6			1	1	8	17
4					4	12	2			1	15	19
10					10	13	1			5	19	29
7					7	4					4	11
1				1	2	12				2	14	16
1					1	10				3	13	14
						8	1			2	11	11
						7				3	10	10
						4	1			1	6	6
						6	1				7	7
						3					3	3
						1					1	1
						3					3	3
										1	1	1
								1			1	1
						1					1	1
2269	10	86	19	210	2594	3070	11	92	35	387	3595	6189

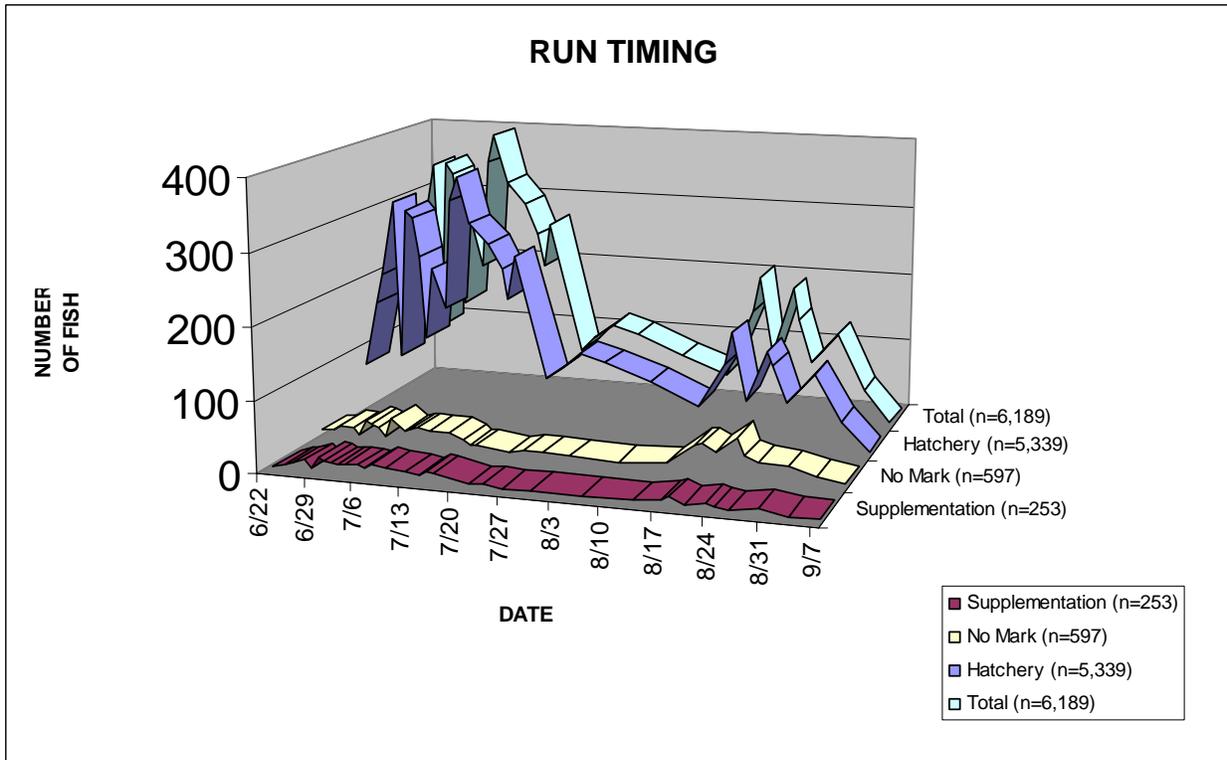
Appendix 4. South Fork Salmon River summer Chinook length frequency graph Brood Year 2003.



Appendix 5. McCall Fish Hatchery 2004 Summer Chinook run timing, South Fork Salmon River.

Date	Number Trapped
6/22	80
6/24	181
6/25	234
6/27	347
6/28	100
6/29	351
6/30	335
7/1	273
7/2	139
7/3	268
7/5	197
7/6	355
7/7	397
7/9	326
7/12	295
7/14	250
7/15	204
7/16	266
7/21	76
7/23	97
7/26	118
7/30	108
8/6	81
8/13	57
8/17	154
8/18	206
8/20	93
8/23	192
8/24	145
8/26	83
8/30	129
9/3	49
9/7	3
Totals	6,189

Appendix 6. McCall Fish Hatchery South Fork Salmon River Chinook run timing graph Brood Year 2004.



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

Brood	Release	Number		Year		Year		Year
Year	Year	of Fish	3-year-olds	Returned	4-year-olds	Returned	5-year-olds	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	0	2006
2002	2004	1,088,810	491	2005	0	2006	0	2007
2003	2005	1,047,530	0	2006	0	2007	0	2008
2004	2006	1,096,130	0	2007	0	2008	0	2009

Appendix 8. Summer Chinook distribution in the South Fork of the Salmon River from McCall Hatchery

Destination	Weight	Number/pound	Number released
Knox Bridge	16,800	18.13	304,600
Knox Bridge	16,800	18.13	304,600
Knox Bridge	16,800	18.13	304,600
Knox Bridge	10,050	18.13	182,330
	60,450		1,096,130

Appendix 9. Brood Year 2004 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
2,038,292	1,763,425	86.50%	1,104,943	96.50%	1,096,130	77.20%

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

Appendix 10. Temperature range from August 2004 to April 2006.

Date	Temperature
Aug-04	51.6
Sep-04	48.6
Oct-04	47.0
Nov-04	43.0
Dec-04	39.0
Jan-05	37.5
Feb-05	37.0
Mar-05	38.0
Apr-05	40.5
May-05	43.6
Jun-05	49.0
Jul-05	54.5
Aug-05	51.0
Sep-05	48.7
Oct-05	45.5
Nov-05	43.0
Dec-05	39.5
Jan-06	38.0
Feb-06	37.0
Mar-06	38.0
Apr-06	40.0

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			

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Appendix 12. Brood Year 2004 production cost table.

Number of Fish	Pounds of Feed	Cost of Feed	Pounds of Fish	Conversion	Total Cost	Cost/1,000	Cost/Pound
1,096,130	70,575.00	\$79,260	60,450	1.17	\$429,708	\$392.07	\$7.11

Appendix 13. Brood Year 2004 marked fish released.

Date	Number of Marks Applied	Mark	Purpose	Number Marked Fish Released	Site/group Released
6/06-6/10/05	836,318	AD	Identification	777,079	1,096,130
7/06-7/12/05	268,198	AD/CWT	US-Canada	267,155	1,096,130
2/13-2/15/06	51,940	AD/PIT	Migration	51,896	1,096,130
<u>Total</u>	<u>1,156,456</u>			<u>1,096,130</u>	<u>1,096,130</u>

Summary of Fish Autopsy

ACCESSION NO:	06-047	LOCATION:	MCCALL
SPECIES:	SU	AUTOPSY DATE:	2/22/2006
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	43.10	1.72	0.04
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN	8.50	0.72	0.09

*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 5
B1 0	F 0	S 0	1 0	1 1	R 20	1 0	S 0	B 18	1 14
B2 0	C 0	L 0	2 0	2 3	G 0	2 0	M 0	C 2	2 1
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 7	E 0	Mean=0.00	U 0	E 0	
H1 0	OT 0	OT 0			OT 0		T 0	F 0	Mean=0.8
H2 0		O 0		Mean=3.1				OT 0	
M1 0									
OT 0									

SUMMARY OF NORMALS

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

GENERAL REMARKS:

FINS:

GONADS:

SKIN:

OTHER:

Summary of Fish Autopsy

ACCESSION NO:	06-048	LOCATION:	MCCALL
SPECIES:	SU	AUTOPSY DATE:	2/22/2006
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	0.10
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN	8.10	0.55	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 2
B1 0	F 0	S 0	1 0	1 0	R 20	1 0	S 0	B 20	1 15
B2 0	C 0	L 0	2 0	2 7	G 0	2 0	M 0	C 0	2 3
E1 0	M 0	S&L 0		3 8	NO 0		G 0	D 0	3 0
E2 0	P 0	I 0	Mean=0.00	4 5	E 0	Mean=0.00	U 0	E 0	
H1 0	OT 0	OT 0			OT 0		T 0	F 0	Mean=1.05
H2 0		O 0		Mean=2.9				OT 0	
M1 0									
OT 0									

SUMMARY OF NORMALS

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

GENERAL REMARKS:

FINS:

GONADS:

SKIN:

OTHER:

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