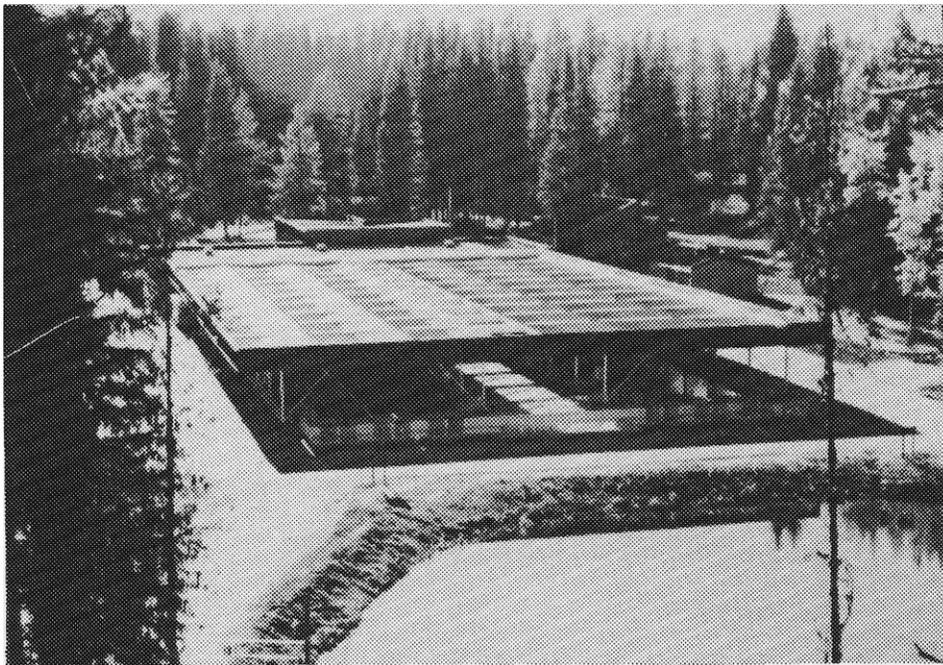




## McCALL FISH HATCHERY

1998 Summer Chinook Salmon Brood Year Report



By

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## ABSTRACT

The South Fork Salmon River trapping season began on June 24, 1998 with the opening of the trap; however the weir was not operational until July 7, 1998. Trapping operations concluded on September 11, 1998.

Chinook salmon *Oncorhynchus tshawytscha* spawning at the trap commenced on August 11 and concluded on September 15, 1998. A total of 974 returning chinook salmon were trapped, measured, and recorded during this period. Fifty-four Johnson Creek summer chinook were transported and held in the ponds at the South Fork trap in cooperation with the Nez Perce Tribal Fisheries office. The overall average eye-up from eggs taken from the South Fork stock was 80.8%, and from Johnson Creek stock was 67.0%.

Of the 974 fish trapped 498 were females; of these, 348 were ponded and 150 were released above the weir. The prespawn mortality for females was 13.5%. There were 400 adult males trapped; 250 were ponded and 150 were released above the weir. The male prespawn mortality was 19.2%. There were 76 jacks trapped (according to length frequency criteria), 14 were released and 15 were used for spawning. Due to the extremely low numbers of jacks, none were given to the tribes or charitable organizations.

From the females ponded, 301 South Fork stock were spawned with an average fecundity rate of 4,793 eggs per female, resulting in 1,433,237 green eggs taken. There were 32 Johnson Creek females spawned with an average fecundity of 4,871 eggs per female, resulting in 155,870 green eggs taken.

During April 2000, there were 1,039,930 brood year 1998 smolts weighing 44,632 lbs transported and released at Knox Bridge on the South Fork Salmon River. In March 2000, there were 78,950 Johnson Creek summer chinook smolts, weighing 2,760 lbs, transported and released into Johnson Creek by Nez Perce fishery personnel.

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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. Funding for LSRCP is administered by the US Fish and Wildlife Service (USFWS) to the Idaho Department of Fish and Game (Department)

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

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 from 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 contains 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. Three residences for permanent personnel are 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 (cu ft) of rearing area per vat.
3. Two concrete rearing ponds 196-ft x 40.5-ft x 4-ft (water depth); 23,814 cu ft 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 lb (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 (10-ft x 90-ft ) adult holding ponds, 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

Three permanent employees staff the hatchery: a Hatchery Manager II, an Assistant Hatchery Manager, and a Fish Culturist. In addition, there are four temporary employees to assist during the busy field season.

## TRAPPING AND SPAWNING

The 1998 trapping season started on June 24, with the ponds set up and water turned on in the fish ladder. High streamflows delayed weir installation until July 7. The first fish was trapped on June 8. Trapping continued through September 11, 1998. Normal trap installation is usually around June 20, with the fish arriving shortly thereafter. The peak of the run for 1998 was July 20.

There were 974 fish trapped; 498 (51.1%) were females, and 476 (48.9%) were males. A total of 76 male fish (7.8%) were jacks (3-year-olds) according to length frequency criteria. There were 150 females, 150 adult males, and 14 jacks released upstream of the weir.

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

The run was comprised of 822 marked (84.4%) and 152 unmarked (15.6%) fish. Excluding coded wire tags (CWTs), there were 43 fish trapped that contained a tag of some type. Several of the fish were tagged more than once. Three of the supplementation fish that had been visual implant elastomer (VIE) tagged fluorescent orange on the lower jaw or above the eye for brood year 1995 returned this year. The tags proved somewhat difficult to locate. Close observation is required to identify this mark. One of the VIE-marked fish also contained a Passive Integrated Transponder (PIT) tag. Of the tags recovered or detected, 19 were PIT tags, 17 were visual implant tags (VI), 11 were radio tags, and 11 were jaw tags. Nine of the fish with radio transmitters also has VI tags above the left eye. Six fish had both a VI tag and a PIT tag and two fish had both a radio tag and a PIT tag. Transmitter tagged fish were part of a migration study on chinook and sockeye salmon being conducted by the University of Idaho.

Of the 974 fish trapped, 62 snouts were removed from adipose fin-clipped (AD) fish indicating coded-wire tags (CWT). These were sent to the lab in Lewiston, Idaho for tag removal.

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, 314 (164 male, 150 female) were released above the weir at the time of trapping. No fish were held for later release. The percent release for males and females was 34.5% and 30.1%, respectively.

In cooperation with the Nez Perce Tribal Fisheries, the McCall satellite was used as a holding facility for adult summer chinook salmon trapped on Johnson Creek, a tributary to the East Fork of the South Fork of the Salmon River (SFSR). Nez Perce personnel transported 54 adult salmon from the trap on Johnson Creek to be held and spawned at the South Fork facility. For stock identification these fish were opercle-tagged prior to transport.

A total of 660 SFSR stock adults were held for hatchery production. Prespawn mortality for the females was 13.5%, and 19.2% for the males. Hatchery personnel concluded that excessive sorting of males while looking for Johnson Creek fish contributed to the increased mortality. Spawntaking activities started on August 11 and ended on September 15, 1998. Two females were culled on-site; one was over-ripe and the other showed gross clinical signs consistent with bacterial kidney disease (BKD). Nez Perce fisheries workers were present during several spawn days to collect sperm for cryogenics preservation. A total of 1,433,237 green eggs were taken from 299 females for an average fecundity rate of 4,793 eggs per female. There were 30 unmarked females, 5 left ventral clipped, and 18 right ventral clipped fish spawned for supplementation research, 246 for reserve or production fish. The average eye-up rate was 80.8%. There were 32 Johnson Creek females spawned resulting in 155,870 green eggs. The fecundity rate for these fish was 4,871 eggs per female, with an average eye-up of 67.0%. All eggs taken were water-hardened for one hour in a 200-ppm titratable iodine solution prior to being transported to the hatchery. The fecundity rate is estimated at 4,500 eggs per female until the eye-up stage is reached and the eggs are enumerated. At eye-up, the eggs are shocked by siphon, picked with an electronic picker, and enumerated by displacement and an electronic counter. The overall eye-up totaled 1,053,017 eggs from the SFSR stock and 83,957 for the Johnson Creek stock. Spawning mortalities were returned to the river both above and below the weir for nutrient enhancement.

All of the spawned females were disease-sampled by pathologists from the Eagle Lab. The fish with ELISA values of 0.25 to 0.79 or greater were considered high positive for BKD. A total 104,978 South Fork stock, and 20,477 Johnson Creek stock eggs were culled out due to BKD.

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 continued on a daily basis until the eggs started to hatch.

Eggs eyed-up at approximately 600 thermal units (TUs) 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 began between 1,750 and 1,775 TUs. Flows for the vats were set at 80 gpm and loaded at 30,000 to 55,000 fish per vat, depending on the number of fish on hand. The vats started at half-length and were extended to full length when the density index (DI) reached 0.30 to 0.35, usually around mid-February.

Due to water temperatures of only 37°F to 39°F, beginning growth rates were slow, only 0.003-inch to 0.004-inch per day. The fry were started on BioDiet #2 and #3 feed and remained on #3 until they reached 700 fish per lb. BioDiet feed has been used successfully at MCFH using modified feed rates. The conversion rates averaged 1.1:1 to 1.5:1 during the fry-rearing stage.

Fish were moved to the outside rearing ponds in mid-June and mid-July. They were adipose-clipped, ventral-clipped and coded wire tagged (CWT), and enumerated as they were moved to the ponds. No supplementation fish were moved to the Stolle Meadows acclimation pond, as the pond is to undergo renovation. The Johnson Creek stock fish were held inside in the vats, received a visual implant elastomer and put into the collection basin in late November for final rearing, as the brood year 1999 fry were coming out of the incubators. By the end of August, there were 1,094,142 fish on station. Approximately 195,620 of these were supplementation fish, and 76,672 were Johnson Creek fish. (Appendix 14).

## **FISH HEALTH**

### **Diseases Encountered and Treatment**

No acute or chronic diseases were experienced at MCFH in BY98 summer chinook. Two erythromycin-medicated feed treatments were applied to these fish for prophylactic control of *Renibacterium salmoninarum*. No signs of clinical BKD were observed, though pools 1 through 4 were low positive for *Renibacterium* via ELISA testing.

### **Organosomatic Index**

Summary of Fish Autopsy (Appendix 14).

### **Acute Losses**

No acute or chronic losses were experienced at MCFH during this brood year.

### **Other Assessments**

As the McCall and Payette Lake area becomes more developed, hatchery and regional staff should be aware of the need to protect Payette Lake, the hatchery's water source, from pollution as well as the introduction of disease carrying fish.

Inventory management is always a concern if Johnson Creek fish are reared for the Nez Perce Tribe.

## **FISH MARKING**

The fish-marking crew was here in June and July and marked approximately 1.12 million fish. These fish receive Ad-clips, CWT/Ad-clips, CWT-only and Right Ventral (RV) clips. The Johnson Creek fish received a red EVI mark in late October and the first week of November.

The marking crew returned in February and PIT-tagged 47,806 fish. Tribal personnel conducted the PIT tagging for the Johnson Creek stock. The breakdown of tagged released fish is shown in Appendix 14.

## **FISH DISTRIBUTION**

The BY98 smolt hauling operation began on April 3 with the release of the reserve and supplementation fish, and concluded on the evening of April 6. Approximately twenty-nine loads of fish were hauled in four days. River conditions were excellent for the release. All together there were 1,039,930 BY98 smolts, at 23.3 fish per lb totaling 44,632 lbs, released (Appendix 10).

From March 27 through March 30, Nez Perce Tribal fishery personnel transported 78,950 smolts to Johnson Creek for release.

## **EXPERIMENTS**

The supplementation research carried over to the BY98 chinook. This project was 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. When these fish return as adults, a portion will be kept for spawning purposes to continue this program. There were 194,686 smolts released in the supplementation group that received a right-ventral (RV) clip. These fish were released at the same time as the normal production group. There were no supplementation fish released into the acclimation pond that was renovated near Stolle Meadows, more extensive renovation is being completed.

Low phosphate feed with a higher vitamin pack was utilized on the BY97 fish with no adverse effects noted. This resulted in a reduction of total phosphorous in the hatchery effluent water to the minimum detectable amount (Appendix 12).

## **CONCLUSIONS**

The BY98 summer chinooks released from MCFH were in excellent condition at release time. The overall survival rate to McNary Dam was estimated at 40.7% based on PIT tag recoveries at the dam. 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

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 utilize 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.

## APPENDICES

Appendix 1. 1998 summer chinook returns to McCall Fish Hatchery, South Fork Salmon River based on CWT data and length frequency data age distribution of brood year.

Age	Males		Females	
	CWT* Estimate	Length/frequency Estimate	CWT Estimate	Length/frequency Estimate
3	115	76	0	0
4	17	124	25	219
5	344	276	473	279
<b>Totals</b>	<b>476</b>	<b>476</b>	<b>498</b>	<b>498</b>

\*CWT data based on 58 tags recovered from 62 snouts

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 1998 fish trapped at McCall Fish Hatchery.

<b>Fork Length (cm)</b>	<b>Males</b>	<b>Females</b>
45	0	
46	0	
47	1	
48	0	
49	0	
50	0	
51	2	
52	0	
53	3	
54	2	
55	5	
56	5	
57	7	
58	10	
59	11	
60	6	
61	7	
62	3	
63	6	
64	3	
65	3	
66	2	
67	1	1
68	2	1
69	1	0
70	0	5
71	0	4
72	1	9
73	0	19
74	7	38
75	2	57
76	0	67
77	6	108
78	8	129
79	8	146
80	3	195
81	8	182
82	6	160
83	7	134
84	11	119
85	10	74
86	15	39
87	10	35
88	18	14
89	10	9

Appendix 2. continued

<b>Fork Length (cm)</b>	<b>Males</b>	<b>Females</b>
90	10	12
91	9	4
92	13	5
93	19	12
94	19	4
95	11	5
96	20	3
97	19	2
98	13	2
99	16	2
100	15	0
101	22	0
102	18	1
103	16	0
104	10	0
105	11	0
106	8	1
107	4	0
108	6	0
109	3	
110	2	
111	0	
112	1	
113	0	
114	0	
115	0	
116	1	
<b>Totals</b>	<b>476</b>	<b>498</b>

Appendix 3. Length frequency for brood year 1998 summer chinook broodstock at the South Fork of the Salmon River trap, according to mark type recorded at McCall Fish Hatchery

Fork Length (cm)	No. Mark	LV	RV	AD
45	0	0	0	0
46	0	0	0	0
47	0	0	0	1
48	0	0	0	0
49	0	0	0	1
50	0	0	0	0
51	0	0	0	2
52	0	0	0	0
53	1	0	0	2
54	1	0	0	1
55	2	0	0	3
56	0	0	0	5
57	0	0	0	7
58	2	0	0	8
59	0	0	1	10
60	1	0	1	4
61	0	0	0	7
62	0	0	1	2
63	1	0	0	5
64	2	0	0	1
65	2	0	0	1
66	0	0	0	2
67	0	0	0	1
68	0	0	0	2
69	0	1	0	0
70	0	0	0	0
71	0	0	0	1
72	0	0	0	2
73	0	0	0	3
74	1	1	0	6
75	0	0	0	3
76	0	3	0	0
77	1	6	0	10
78	1	6	0	13
79	1	6	0	13
80	1	4	0	10
81	2	6	2	14
82	1	1	1	20
45	0	0	0	0
46	0	0	0	0
47	0	0	0	1
48	0	0	0	0
49	0	0	0	1
50	0	0	0	0
51	0	0	0	2

## Appendix 3. continued

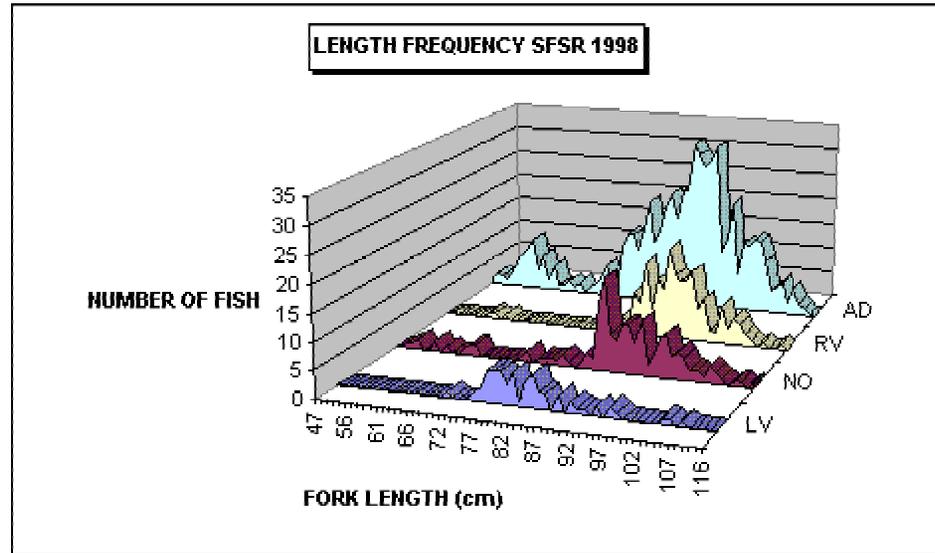
Fork Length (cm)	No. Mark	LV	RV	AD
52	0	0	0	0
53	1	0	0	2
54	1	0	0	1
55	2	0	0	3
56	0	0	0	5
57	0	0	0	7
58	2	0	0	8
59	0	0	1	10
60	1	0	1	4
61	0	0	0	7
62	0	0	1	2
63	1	0	0	5
64	2	0	0	1
65	2	0	0	1
66	0	0	0	2
67	0	0	0	1
68	0	0	0	2
69	0	1	0	0
70	0	0	0	0
71	0	0	0	1
72	0	0	0	2
73	0	0	0	3
74	1	1	0	6
75	0	0	0	3
76	0	3	0	0
77	1	6	0	10
78	1	6	0	13
79	1	6	0	13
80	1	4	0	10
81	2	6	2	14
82	1	1	1	20
83	0	5	2	12
84	1	6	3	14
85	3	3	2	19
86	2	3	8	22
87	12	0	6	17
88	17	3	14	23
89	7	0	5	23
90	6	2	11	32
91	9	1	9	30
92	9	1	17	28
93	6	0	12	29
94	10	2	11	32
95	2	0	11	11
96	4	2	13	14
97	7	1	6	21

Appendix 3. continued

<b>Fork Length (cm)</b>	<b>No. Mark</b>	<b>LV</b>	<b>RV</b>	<b>AD</b>
98	8	0	8	7
99	4	0	2	13
100	5	0	2	13
101	4	0	7	14
102	2	0	3	14
103	2	0	5	10
104	1	1	4	4
105	3	1	2	5
106	2	0	1	6
107	1	1	0	2
108	0	0	1	5
109	1	0	0	2
110	1	0	0	1
111	0	0	0	0
112	0	0	1	0
113	0	0	0	0
114	0	0	0	0
115	0	0	0	0
116	1	0	0	0
<b>TOTAL</b>	<b>152</b>	<b>68</b>	<b>172</b>	<b>582</b>

Appendix 4. South Fork Salmon River summer chinook length frequency graph BY98.

LENGTH	LV	MARK TYPE			TOTAL
		NO	RV	AD	
47	0	0	0	1	0
51	0	0	0	2	0
53	0	1	0	2	1
54	0	1	0	1	1
55	0	2	0	3	2
56	0	0	0	5	0
57	0	0	0	7	0
58	0	2	0	8	2
59	0	0	1	10	1
60	0	1	1	4	2
61	0	0	0	7	0
62	0	0	1	2	1
63	0	1	0	5	1
64	0	2	0	1	2
65	0	2	0	1	2
66	0	0	0	2	0
67	0	0	0	1	0
68	0	0	0	2	0
69	1	0	0	0	1
71	0	0	0	1	0
72	0	0	0	2	0
73	0	0	0	3	0
74	1	1	0	6	2
75	2	2	0	3	4
76	3	0	0	0	3
77	6	1	0	10	7
78	6	1	0	13	7
79	6	1	0	13	7
80	4	1	0	10	5



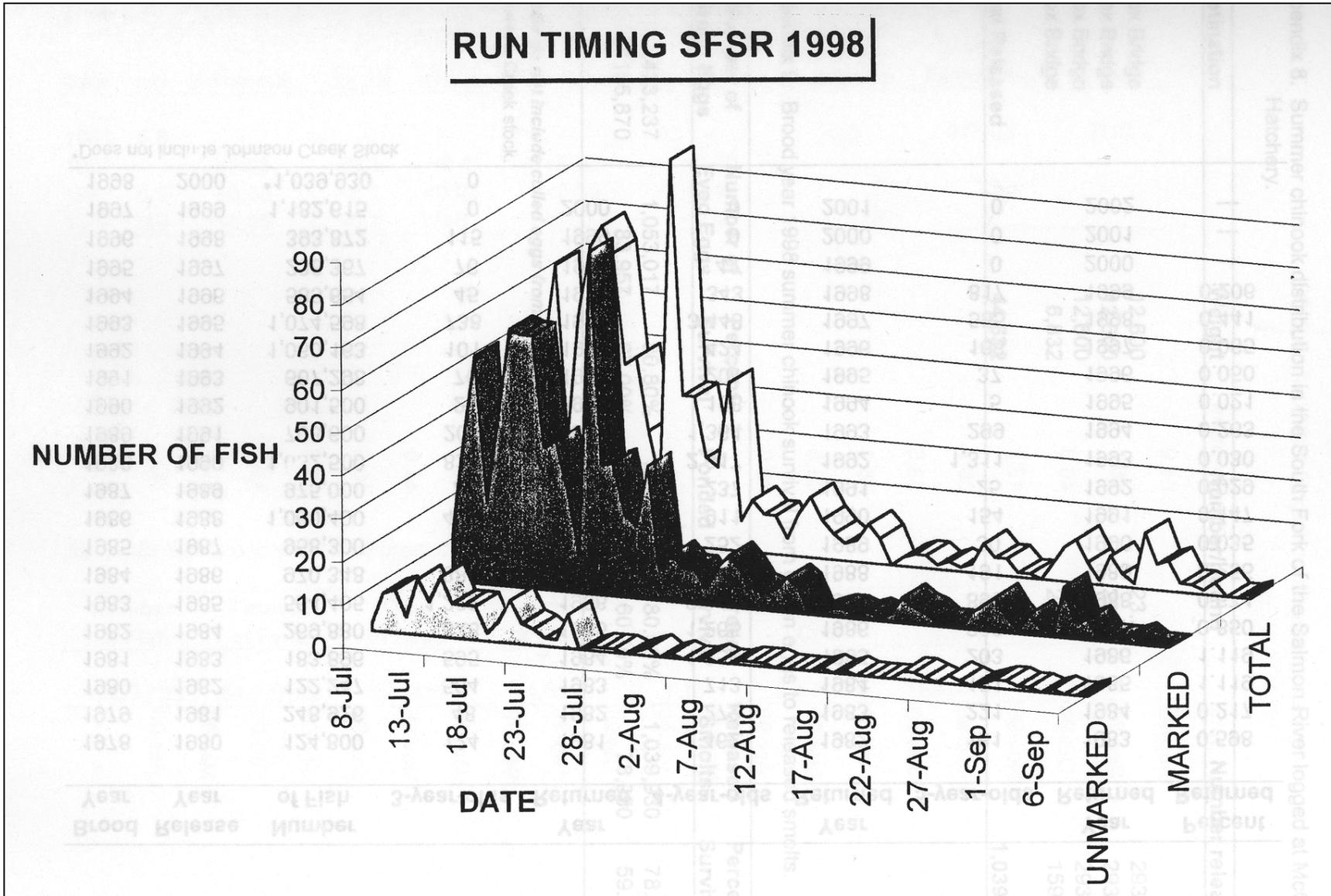
Appendix 4. continued

81	6	2	2	14	10
82	1	1	1	20	3
83	5	0	2	12	7
84	6	1	3	14	10
85	3	3	2	19	8
86	3	2	8	22	13
87	0	12	6	17	18
88	3	17	14	23	34
89	0	7	5	23	12
90	2	6	11	32	19
91	1	9	9	30	19
92	1	9	17	28	27
93	0	6	12	29	18
94	2	10	11	32	23
95	0	2	11	11	13
96	2	4	13	14	19
97	1	7	6	21	14
98	0	8	8	7	16
99	0	4	2	13	6
100	0	5	2	13	7
101	0	4	7	14	11
102	0	2	3	14	5
103	0	2	5	10	7
104	1	1	4	4	6
105	1	3	2	5	6
106	0	2	1	6	3
107	1	1	0	2	2
108	0	0	1	5	1
109	0	1	0	2	1
110	0	1	0	1	1
112	0	0	1	0	1
116	0	1	0	0	1
<b>TOTAL</b>	68	152	172	582	974

Appendix 5. McCall Fish Hatchery 1998 Summer Chinook Run timing, South Fork Salmon River.

<b>Date</b>	<b>Number Trapped</b>	<b>Date</b>	<b>Number Trapped</b>
7/8	13	8/9	2
7/9	43	8/10	3
7/10	63	8/11	3
7/11	23	8/12	1
7/12	52	8/13	2
7/13	68	8/14	1
7/14	73	8/15	2
7/15	67	8/16	7
7/16	41	8/17	4
7/17	43	8/18	4
7/18	26	8/19	1
7/19	14	8/20	1
7/20	90	8/21	0
7/21	35	8/22	4
7/22	35	8/23	8
7/23	21	8/24	10
7/24	19	8/25	5
7/25	39	8/26	1
7/26	7	8/27	7
7/27	12	8/28	3
7/28	9	8/29	1
7/29	9	8/30	13
7/30	4	8/31	6
7/31	10	9/1	7
8/1	14	9/2	2
8/2	9	9/3	2
8/3	6	9/4	1
8/4	4	9/5	3
8/5	5	9/6	0
8/6	9	9/7	0
8/7	6	9/8	1
8/8	0		
<b>Totals</b>			<b>974</b>

Appendix 6. McCall Fish Hatchery South Fork Salmon River chinook run timing graph BY98



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

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Brood Year	Release Year	Number of Fish	Year Returned	3-year-olds	Year Returned	4-year-olds	Year Returned	5-year-olds	Year Returned	Percent Returned
1978	1980	124,800	1981	124	1982	462	1983	161	1984	0.598
1979	1981	248,926	1982	48	1983	272	1984	221	1985	0.217
1980	1982	122,247	1983	504	1984	713	1985	151	1986	1.119
1981	1983	183,896	1984	595	1985	1,259	1986	203	1987	1.119
1982	1984	269,880	1985	828	1986	1,265	1987	202	1988	0.850
1983	1985	564,405	1986	1,222	1987	2,117	1988	893	1989	0.674
1984	1986	970,348	1987	386	1988	1,392	1989	191	1990	0.255
1985	1987	958,300	1988	50	1989	252	1990	30	1991	0.035
1986	1988	1,060,400	1989	495	1990	911	1991	154	1992	0.147
1987	1989	975,000	1990	28	1991	237	1992	25	1993	0.029
1988	1990	1,032,500	1991	821	1992	2,617	1993	1,311	1994	0.030
1989	1991	708,600	1992	206	1993	1,364	1994	299	1995	0.263
1990	1992	901,500	1993	28	1994	158	1995	5	1996	0.021
1991	1993	607,298	1994	70	1995	201	1996	37	1997	0.050
1992	1994	1,060,163	1995	101	1996	424	1997	166	1998	0.065
1993	1995	1,074,598	1996	738	1997	3,448	1998	555	1999	0.441
1994	1996	585,654	1997	45	1998	343	1999	817	2000	0.206
1995	1997	238,367	1998	76	1999	42	2000	0	2001	---
1996	1998	393,872	1999	115	2000	0	2001	0	2002	---
1997	1999	1,182,615	2000	0	2001	0	2002	0		---
1998	2000	*1,039,930		0						

\*Does not include Johnson Creek Stock

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

<b>Destination</b>	<b>Weight</b>	<b>Number/pound</b>	<b>Number released</b>
Knox Bridge	12,600	23.3	293,580
Knox Bridge	12,600	23.3	293,580
Knox Bridge	12,600	23.3	293,580
Knox Bridge	6,832	23.3	159,190
<b>Total Released</b>	<b>44,632</b>		<b>1,039,930</b>

Appendix 9. Brood year 1998 summer chinook survival from green eggs to released smolts.

<b>Number of Green Eggs</b>	<b>Number of Eyed Eggs</b>	<b>Percent Survival</b>	<b>Ponded</b>	<b>Percent Survival</b>	<b>Released Smolts</b>	<b>Percent Survival</b>
1,433,237	1,053,017	80.80%	1,048,092	80.50%	1,039,930	78.30%
**155,870	83,957	67.00%	82,207	60.70%	78,950	59.30%

*\*Totals do not include culled eggs from green egg total.*

*\*\*Johnson Creek stock.*

Appendix 10. Temperature range from August 1998 to April 2000.

<b>Date</b>	<b>Temperature</b>
Aug-98	51.9
Sep-98	50.7
Oct-98	46.3
Nov-98	43.7
Dec-98	39.7
Jan-99	38.5
Feb-99	38.0
Mar-99	38.5
Apr-99	38.0
May-99	40.7
Jun-99	44.5
Jul-99	52.9
Aug-99	51.8
Sep-99	48.2
Oct-99	45.7
Nov-99	44.6
Dec-99	40.5
Jan-00	38.5
Feb-00	37.5
Mar-00	37.5
Apr-00	39.0

Appendix 11. Water analysis at McCall Fish Hatchery.

98mccallsummerchinook

<b>Date</b>	<b>pH</b>	<b>Ammonia</b>	<b>Nitrate</b>	<b>Nitrite</b>	<b>Total Phosphate</b>	<b>Total Nitrogen</b>	<b>KJEL Hardness</b>	<b>CaCO<sub>2</sub> Saturation</b>	<b>Oxygen ppm</b>
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 1998 production cost table.

<b>Number of Fish</b>	<b>Pounds of Feed</b>	<b>Cost of Feed</b>	<b>Pounds of Fish</b>	<b>Conversion</b>	<b>Total Cost</b>	<b>Cost/1,000</b>	<b>Cost/Pound</b>
1,039,930	51,782.00	\$53,484	44,632	1.16	\$363,876	\$349.90	\$8.14

Appendix 13. Brood year 1998 marked fish released.

<b>Date</b>	<b>Number of Fish Marked</b>	<b>Mark</b>	<b>Purpose</b>	<b>Number Marked Fish Released</b>	<b>Site/group Released</b>
6/14-6/18/99	511,605	AD	Identification	462,899	845,244
7/12-7/16/99	336,798	AD/CWT	US-Canada	334,615	845,244
2/14-2/16/00	47,806	AD/PIT	Migration	47,730	845,244
7/12-7/16/99	196,530	RV	Supplementation	194,686	194,686
2/14/00	600	RV/PIT	Supplementation	*600	194,686
10/25-11/03/00	79,123	EL/CWT	NPT	78,950	78,950
<b>Total</b>	<b>1,172,462</b>			<b>1,118,880</b>	
<b><u>1,118,880</u></b>					

\*included in the 194,686 supplementation release.



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