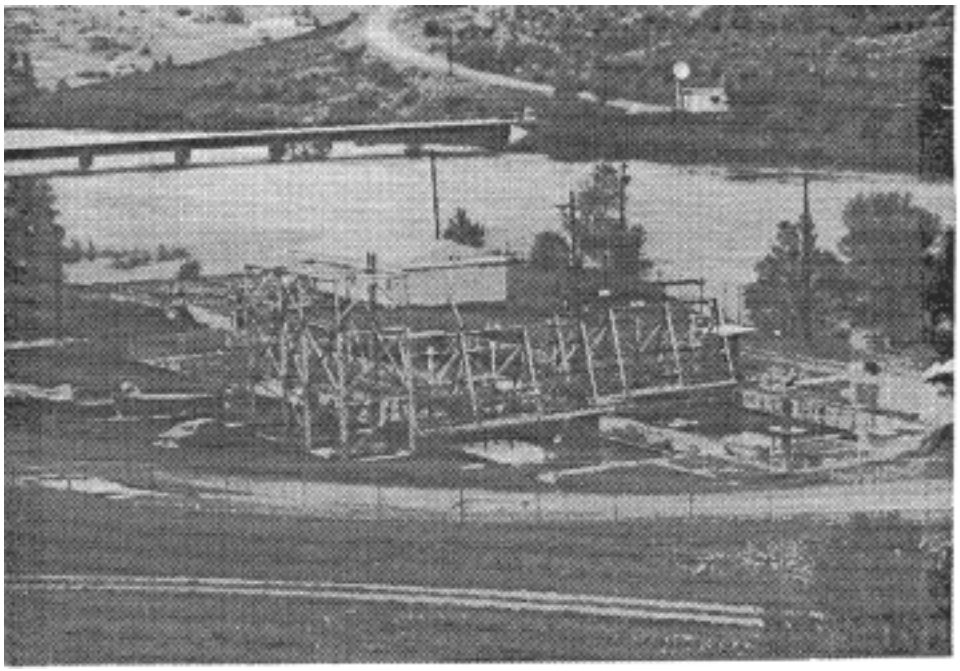
OXBOW FISH HATCHERY

1998 Steelhead Brood Year Report
1997 Spring Chinook Brood Year Report



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ABSTRACT

For brood year 1998, the steelhead trout *Oncorhynchus mykiss* run totaled 2,407 fish entering the Hells Canyon Dam fish trap. Fall trapping (October 21, 1997 to December 3, 1997) collected 2,091 fish. The trap was put back into operation on March 9 and shut down on March 25, 1998. There were 316 steelhead trapped during the spring, bringing the total to 2,407 for the season. Of these, 1,070 were males and 1,337 were females.

Age-class breakdown of the run was 1,527one-ocean fish and 880 two-ocean fish. There was only one wild/natural one-ocean male trapped. There were no wild /natural females trapped this season. There were 216 marked fish collected, 193 coded-wire tags (CWT), 5 radio tags and 18 floy tags.

A total of 1,112 surplus adult steelhead were outplanted into surrounding waters for additional sport fisheries. During the fall, a total of 1,030 were released: 480 into Hells Canyon Reservoir, 100 into the Payette River, and 450 into the Boise River. An additional 82 were released into Hells Canyon Reservoir during the spring.

Five fall chinook salmon *O. tshawytscha* were incidentally trapped. These fish were measured, checked for marks, and returned to the Snake River below Hells Canyon Dam. All fish had adipose fin clips, and their lengths were 43, 45, 47, 49, and 55 cm. One wild/natural steelhead (64 cm male) was trapped during the fall, and was also returned to the Snake River below Hells Canyon Dam.

Prespawning mortality totaled 311 steelhead adults. Spawning consisted of 13 egg-takes from March 16 until April 27, 1998. A total of 527 females were spawned with an average fecundity of 5,311 eggs per female. These fish produced 2,798,775 green eggs. The percent eye-up was 83.32%, leaving a total of 2,331,850 eyed-eggs.

Niagara Springs Fish Hatchery received 833,610 eyed-eggs during May, and 600,125 swim-up fry in July 1998. Magic Valley Fish Hatchery received 123,540 eyed-eggs and Hagerman National Fish Hatchery received 572,052 eyed-eggs.

For BY97, a total of 944 spring chinook salmon were trapped from May 19 through June 11, 1997. Due to high water flows, the trap was shut down early on June 11 and was not restarted. The run was comprised of 943 adults and one jack. Idaho Power Company transferred 789 fish to Rapid River Fish Hatchery (RRFH).

Prespawning mortalities totaled 118 trap mortalities and 10 holding pond mortalities prior to transfer to RRFH. Combined holding pond mortalities at RRFH were 10.42 %. This amounts to 82 (51 females, 31 males) of the 789 Hells Canyon chinook held at RRFH. A total of 372 females were spawned for a total of 1,209,000 green eggs. Eye-up was 93.1% for 1,125,579 eyed-eggs.

1998 STEELHEAD BROOD YEAR REPORT

INTRODUCTION

Oxbow Fish Hatchery (OFH) is part of the Idaho Power Company's (IPC) hatchery system and has been in operation since 1962. The Oxbow facility is owned and funded by IPC and operated by the Idaho Department of Fish and Game (Department). The hatchery is located on the Oregon shore of the Snake River at mile marker 270, approximately one-quarter mile below IPC's Oxbow Hydroelectric Plant. The OFH is a steelhead trout *Oncorhynchus mykiss* adult holding, spawning, and egg rearing station. Spring chinook salmon *O. tshawytscha* are collected and held for transport to Rapid River Fish Hatchery (RRFH).

OBJECTIVES

The primary purpose of OFH is to trap enough returning adult steelhead and spring chinook to meet the Hells Canyon mitigation requirements for adult anadromous fish returns on the Upper Snake River. The mitigation goal is to produce 400,000 pounds of steelhead smolts at NSFH. The OFH goal is to produce 1.3 million eyed steelhead eggs. The OFH also traps spring chinook that are transferred to RRFH for spawning.

Facility Description

The OFH consists of a main hatchery building, four adult holding ponds, two incubation water-chilling units, an off-station fish trap, and a single-family residence. The facility has six cinder block raceways that have deteriorated to a point of not being useable.

The hatchery building is a 28-ft x 60-ft, single-story metal structure partitioned into two main rooms. Half of the building is devoted to shop space, office space, and sleeping quarters, while the other half is for egg incubation. Two 8-ft square sheds attached to the main building provide storage.

The incubation room has the capacity to eye-up 3.4 million eggs. The 24 incubation stacks provide the hatchery with 384 incubation trays (FAL and Heath trays).

The chiller refrigeration units are enclosed in a 12-ft x 17-ft metal building to the side of the hatchery building. The chillers have the capacity to chill 120 gallons per minute (gpm) of water to 40^{o}F.

Adult holding and production facilities include four holding ponds, a fish trap, and a fish transport truck. The four holding ponds are actually two large ponds separated into four sections. The two larger divisions each measure 105-ft x 30-ft x 5-ft, providing 31,500 cubic feet of holding area. The two smaller divisions measure 55-ft x 30-ft x 5-ft, providing 16,500 cubic feet of holding

space. Two electric crowding racks provide the ability to consolidate the fish for handling. Six outside raceways (3-ft x 6-ft x 100-ft) could provide 10,800 cubic feet of rearing space after reparations. The adult fish trap consists of an attraction pool, the fish ladder, two weirs, a fish trap, and a loading hopper. Fish are removed from the trap by hoisting the hopper 80-feet up to the fish transport truck. The fish truck is a 1981 GMC 2.5-ton, 10-wheeled truck with a bed-mounted 1,000-gallon fish tank. Up to 100 fish are then transported per load to OFH.

Water Supply

The Snake River provides a major portion of the water for hatchery operations. A pumping platform adjacent to the hatchery holds two production pumps. These production pumps (100-hp each) produce 20 cubic feet per second (cfs). Only one pump operates at any given time. The other pump acts as an emergency backup and has a separate power source. Water temperatures range from a winter low of 34^{o}F to a late summer high of 72^{o}F. Water from the production pumps passes through two aeration pump platforms before entering the four holding ponds.

Two wells provide the water for steelhead egg incubation. One well serves as a primary water source, while the other is an emergency backup with a separate power source. The primary wellwater is a constant 52^{o}F, while the backup is a constant 54^{o}F. Both wells pump a maximum of 120 gpm. Incubation water enters an elevated surge tank in the hatchery building before distribution through two 4-inch PVC water lines to the 24 incubator stacks.

Staffing

The OFH is staffed by one permanent Fish Hatchery Assistant Manager. Two temporary Bio-aides and two laborer positions share the 2,400 hours budgeted for extra help.

Adult Collection

Fall trapping for steelhead started on October 21, and was shut down for the season on December 3, 1997. After trapping 600 fish during the first week, the trap was operated three days per week. A total of 2,091 steelhead were trapped during the fall. The trap was put back into operation on March 9 and shut down on March 25, 1998. There were 316 steelhead trapped during the spring, bringing the total to 2,407 for the season (Figure 1). The 1998 brood year steelhead run of 2,407 fish was comprised of 1,337 females and 1,070 males. The broodstock strategy of 1,283 fish, one fourth of the egg take being from spring-run fish was met this year.

All trapped steelhead were measured for fork length to the nearest centimeter. This procedure allowed for the age-class designation of one-ocean steelhead being the male fish 67 cm and less, and those female fish 64 cm and less. Two-ocean females are greater than 64 cm and two-ocean males are greater than 67 cm. Using these criteria, 1,527 steelhead were one-ocean and 880 steelhead were two-ocean (Figure 2).

Adult fish releases totaled 1,112. Releases consisted of 646 females and 466 males. A total of 480 were released into Hells Canyon Reservoir at OFH, 450 fish were released into the Boise River, and 100 were released into the Payette River. An additional 82 were released into Hells Canyon Reservoir in May 1998.

Tag Recovery

All trapped steelhead were checked for marks, fin clips, and injuries. Marked fish included 193 coded-wire-tag (CWT) fish, 5 with radio tags, and 18 with floy tags. The tagging agencies included the National Marine Fisheries Service (NMFS), the University of Idaho (UI), Oregon Department of Fish and Wildlife (ODFW), and the Idaho Department of Fish and Game (Department). Snouts were taken from all Coded-Wire-Tagged (CWT) fish and sent to the lab in Lewiston. Of the 2,406 hatchery fish trapped, 99 had adipose fins that were only partially removed, and 25 had full adipose fins but had CWTs or other fin damage to designate its hatchery origin. Injuries included 36 gillnet marks, 42 nitrogen blisters, 92 fresh body injuries, 133 body scars, and 36 opercle or gill injuries.

Of the 2,407 steelhead captured, there was only one wild or natural fish. Wild or natural steelhead are identified by having an adipose fin and the remaining fins not eroded. All wild fish were returned to the Snake River below Hells Canyon Dam.

Incidental Capture of Fish

Five fall chinook were incidentally trapped. These fish were measured, checked for marks, and were returned to the Snake River below Hells Canyon Dam. All fish had adipose fin clips, and their lengths were 43, 45, 47, 49, and 55 cm.

Holding and Spawning

Prespawning Mortality

Prespawning mortality consisted of all female steelhead that died prior to spawning and male steelhead that died up to two weeks after the first spawning date (March 30, 1998). Prespawning mortality was 311 fish (24.24%) comprised of 161 males and 150 females. There were eleven trapping mortalities.

Spawning Operations

Steelhead were initially sorted on March 2 and separated into two ponds by sex. Spawning operations began on March 16 and ended on April 27, 1998. Females were sorted twice weekly for ripeness. Ripe females were killed with a blow to the head. Females were dry-spawned by incision,

and the eggs were collected in a colander to drain the ovarian fluid. Eggs from each female were placed into a spawning bucket, and then fertilized with sperm from one male. The fertilized eggs from two females were poured together and were allowed to stand in one cup of well water for up to five minutes. The fertilized eggs were water-hardened in a minimum of 100 ppm buffered Argentyne for one hour. Ovarian fluid samples were collected from 150 spawned females for viral assay. The eggs were loaded into the incubator trays with two families per tray, maintaining the integrity of the disease samples. All disease samples proved to be negative.

Fourteen females were rejected and killed during spawning due to abnormal appearance of eggs or internal organs.

Incubation

Thirteen egg takes produced 2,798,775 green eggs from 527 females for a fecundity of 5,311 eggs per female (Table 1). The percent eye-up was 83.32% for 2,331,850 eyed-eggs. Egg numbers were determined by enumeration of eyed-eggs with a Jensorter brand Model JH egg sorter with electronic counter.

Eggs were incubated with pathogen-free wellwater that had been chilled to 40°F to 42°F for the majority of the rearing cycle. This was to extend the rearing cycle to make smolt target size without holding the fish off feed. After the first two days of incubation, daily 15-minute drip treatments of 1,667 ppm formalin were used to prevent fungus. Incubator water flows were 5 gpm. Eggs eyed-up after 350 temperature units (TUs) in the 40°F well water. Eyed-eggs were shocked by pouring a tray of eggs into a bucket half full of water and pouring them back into the egg tray. Fry were transported after reaching 950 TUs.

Egg Shipments

A total of 1,529,202 eyed-eggs were produced and sent to the following hatcheries: 833,610 eyed-eggs were sent to Niagara Springs Fish Hatchery (NSFH), 123,540 eyed-eggs were sent to Magic Valley Fish Hatchery (MVFH), and 572,052 eyed-eggs were sent to Hagerman National Fish Hatchery (HNFH). The eyed-eggs were shipped at the end of May in 48-quart coolers with iced well water.

Fry Shipments

A total of 799,059 swim-up fry were produced at OFH. Fry pick-off was 14,396, giving us a percent swim-up of 81.24%. This left 784,663 fry for shipment as follows: 600,125 fry were transported to Niagara Springs Fish Hatchery (NSFH) during July. These were reared in chilled 42°F water to delay their rate of development. These fry were transferred from their incubation trays into several stainless steel tubes for transport. Eggs from two or three trays were poured into the transport tube. These tubes were then placed in the bottom of a 2-ton fish truck filled with chilled

water and were transported to NSFH (Table 2). 184,538 excess fry were transported to Paddock Valley Reservoir (100,000), and Mountain Home Reservoir (84,538).

Carcass Disposition

Hatchery employees checked all carcasses for CWTs, other tags, signs of bacteria, and other diseases. The fish carcasses were taken to the Halfway Landfill for disposal.

Steelhead Smolt Releases

The BY97 steelhead trout smolts were released in the spring of 1998. Data for total steelhead smolts and total pounds of smolts released into the Snake River below Hells Canyon Dam can be found in the annual report for NSFH.

1997 SPRING CHINOOK BROOD YEAR REPORT

Spring Chinook Trapping

Spring chinook salmon returning to the Hells Canyon trap in 1997 were from smolt releases in 1994, 1995, and 1996 (Table 3).

Spring chinook salmon trapping began May 19, 1997 and ended June 11, 1997 (Figure 3). Due to high water flows, the trap was shut down early and was not restarted. A total of 944 salmon were trapped. Due to the lack of distinguishing characteristics at the time of trapping, the sex ratio was not determined at that time. Using the ratios of the combined broodstock at Rapid River, sex ratio, prespawn mortalities, and spawning information was calculated. Of the 944 fish trapped, one was a jack and 943 were adults. Of the adults, there were 437 males (422 hatchery, 15 wild) and 506 females (489 hatchery and 17 unmarked). Length frequencies were taken on all fish trapped. Using the same length frequency breakdowns as RRFH, the age-class breakdown by fork length was as follows: 1-ocean (3-yr-old $\leq$ 58 cm.), 2-ocean (4-yr-olds 59 - 85 cm.), and 3-ocean (4-yr-olds > 85 cm.). The run was comprised of one 1-ocean, 942 2-ocean and one 3-ocean fish (Figure 4).

Holding and Spawning

Adult Treatments

All marked hatchery fish were given an intraperitoneal injection (IP) injection of Erythromycin 100 in accordance with Investigational New Animal Drug (INAD) protocol while at OFH. There were 794 hatchery chinook injected at 20-mg/kg dosage rate. Wild fish were differentially caudal-marked and returned to the Snake River below the trap. After a wild/natural fish returned to the trap three times, they were kept and treated as hatchery fish. Five wild/natural chinook did return and were injected at 20-mg/kg dosage rate. All trapped hatchery and wild/natural fish were measured and examined for CWTs, Passive Integrated Transponder (PIT) tags, and all wound and external abnormalities were documented. A total of 799 fish received injections. There were 10 pond mortalities over the trapping season. A total of 789 fish were marked with a left opercle punch and transported to RRFH.

Transport

The OFH holding pond water temperatures ranged from 59°F to 67°F during the trapping season. Fish trapped early in the season were hauled at the end of the week. As the holding pond temperature rose, fish were transported daily from OFH to RRFH. Chilled water was placed in the transport truck and 700 pounds of chlorine-free ice was added. In addition, 33 grams of MS222 was added to the water to reduce fish stress during transport.

Prespawning Mortality

Prespawning mortality for 1997 spring chinook was 118 trap mortalities and 10 holding pond mortalities prior to transfer to RRFH. The majority of these mortalities occurred on the first day of trapping, and was due to overcrowding in the trap and fish truck and poor water quality. The trap was monitored for the remainder of the trapping season to restrict the number of fish entering the trap. The combined holding pond mortalities at Rapid River were 10.42%. This totals 82 (51 females, 31 males) of the 789 Hells Canyon chinook held at Rapid River. The majority of the mortalities were attributed to fungus and nitrogen blistering.

Spawning Operations

The Hells Canyon trapped fish were combined with Rapid River's broodstock this year. All numbers were calculated using a percentage of the totals from RRFH. A total of 372 Hells Canyon chinook salmon females were spawned with an average fecundity of 3,250 eggs per female. These fish produced 1,209,000 green eggs. The percent eye-up was 93.1%, leaving 1,125,579 eyed-eggs.

Refer to Rapid River Hatchery's BY97 Run Report for disease sampling carcasses disposition and further information.

Chinook Smolt Releases

The BY97 spring chinook salmon releases were conducted in the spring of 1999. A total of 300,000 smolts were released into the Snake River below Hells Canyon Dam. All of these smolts were marked prior to their release. They were fin-clipped with an adipose fin removed. See Rapid River and Clearwater hatcheries annual reports for more information.

HATCHERY IMPROVEMENTS

Idaho Power's Oxbow maintenance personnel were responsible for the work related to many hatchery improvements. The major improvements included:

* new variable speed control was installed on the crowders.
* hatchery building remodel new windows, fluorescent lights.
* Construction of a mezzanine for the pumps at the trap will make the trap useable in times of higher flow and eliminates disassembling of the trap during most high water.
* A septic holding tank and electrical hookups were installed for a trailer/dorm.
* Walkways in the east holding ponds were improved for employee safety.
* Vinyl-coated chain link was installed on the large adult pond crowder in the west pond.

HATCHERY RECOMMENDATIONS

The holding ponds need to be modified to create a better holding environment reduce fish stress, and to reduce injuries during routine handling. Efforts should also be made to improve quality of the water entering the holding ponds.

The dormitory needs major renovation, as it is currently inadequate for temporary employee housing.

The hatchery alarm system should be modified to directly sense the holding pond water level and to register more than one alarm signal at any given time.

TABLES

Table 1. Summary of steelhead spawning at Oxbow Fish Hatchery, 1998.

Lot #	Spawn Date	Number Females	Green Eggs	Eyed Eggs	Percent Eye-up	Eggs/ Female
1	3/16/98	70	369,217	306,163	82.92	5,275
2	3/19/98	25	131,652	102,864	78.13	5,266
3	3/23/98	53	274,607	216,399	78.80	5,181
4	3/26/98	73	384,921	334,608	86.93	5,273
5	3/30/98	57	311,464	261,150	83.85	5,464
6	4/02/98	67	385,068	325,615	84.56	5,747
7	4/06/98	56	330,072	261,934	79.36	5,894
8	4/09/98	29	151,925	131,295	86.42	5,239
9	4/13/98	43	210,925	184,784	87.61	4,905
10	4/16/98	17	82,776	69,407	83.85	4,869
11	4/21/98	21	94,931	78,739	80.40	4,521
12	4/23/98	7	30,696	27,875	90.81	4,385
13	4/27/98	9	40,521	31,017	76.55	4,502
	TOTAL	527	2,798,775	2,331,850	83.32	5,311

Table 2. Final disposition of Oxbow steelhead eggs, 1998.

2,798,775	green eggs
466,925	pick-off eggs (83.32% eye-up)
2,331,850	eyed-eggs
0	culled eggs
833,610	eyed-eggs shipped to Niagara Springs
123,540	eyed-eggs shipped to Magic Valley
572,052	eyed-eggs shipped to Hagerman National
14,396	pick-off fry (81.24% swim-up)
184,538	excess fry to Paddock and Mt Home Res
600,125	swim-up fry shipped to Niagara Springs

Table 3. Spring chinook releases and returns, BY97.

Release Year	Smolts Released	Hatchery Returns by Release Year	Previous Returns
1994	380,504	56	14
1995	499,986	860	46
1996	67,818	0	0
Totals	1,080,790	912	60

FIGURES

Figure 1. Steelhead run timing at Oxbow Fish Hatchery, BY98.

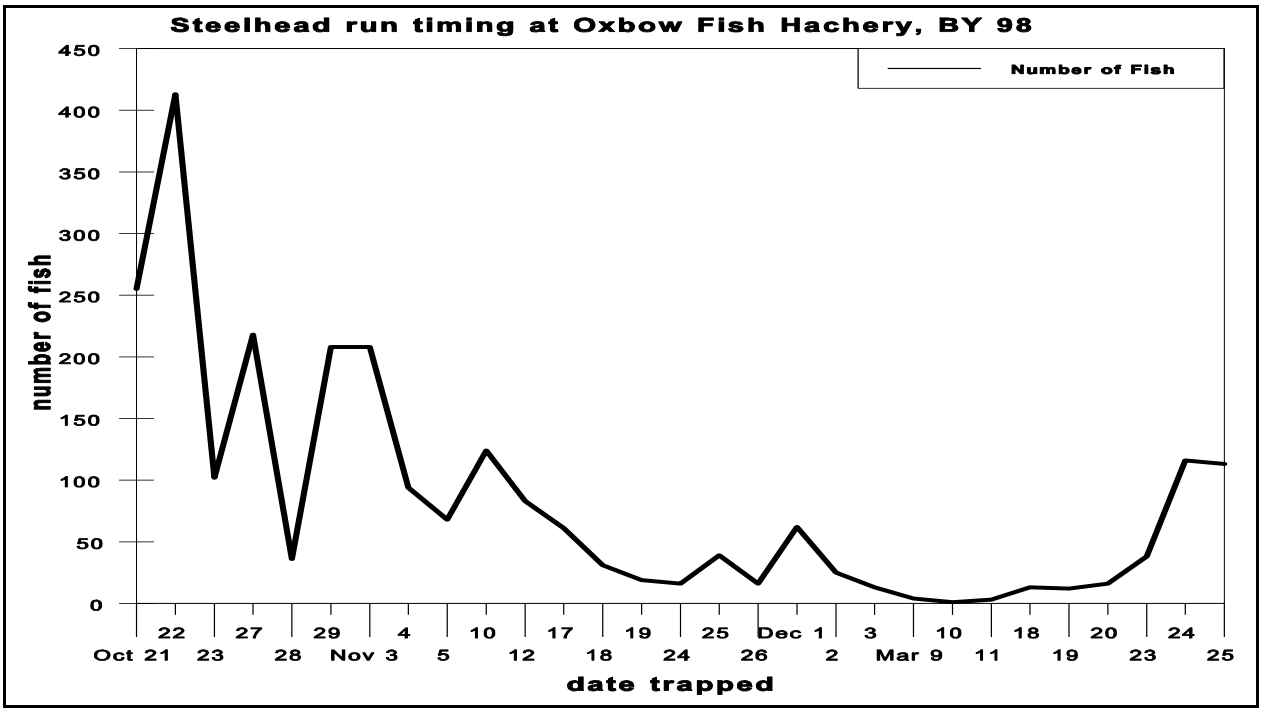


Figure 2. Oxbow Fish Hatchery steelhead length frequencies, BY98.

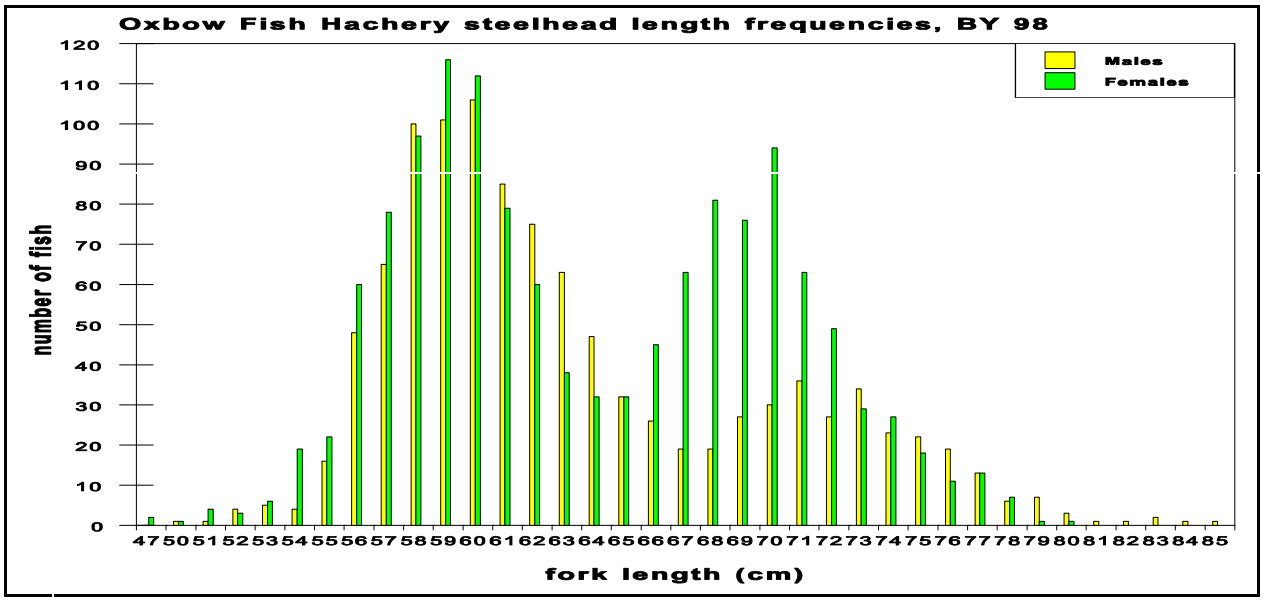


Figure 3. Spring chinook run timing at Oxbow Fish Hatchery, BY97.

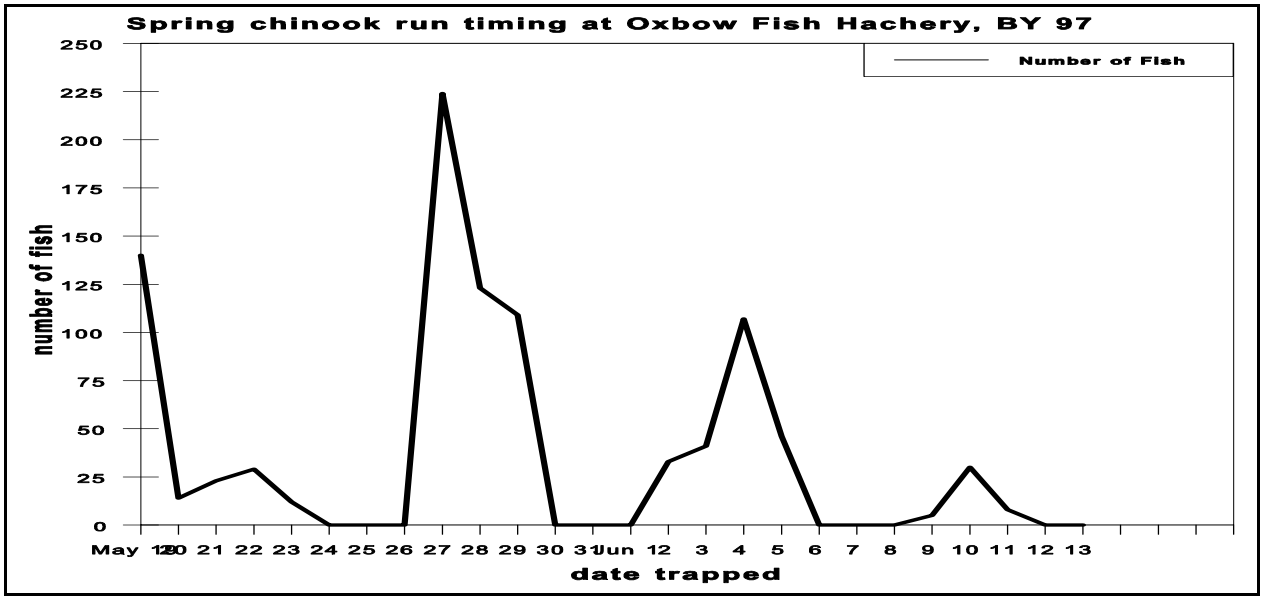
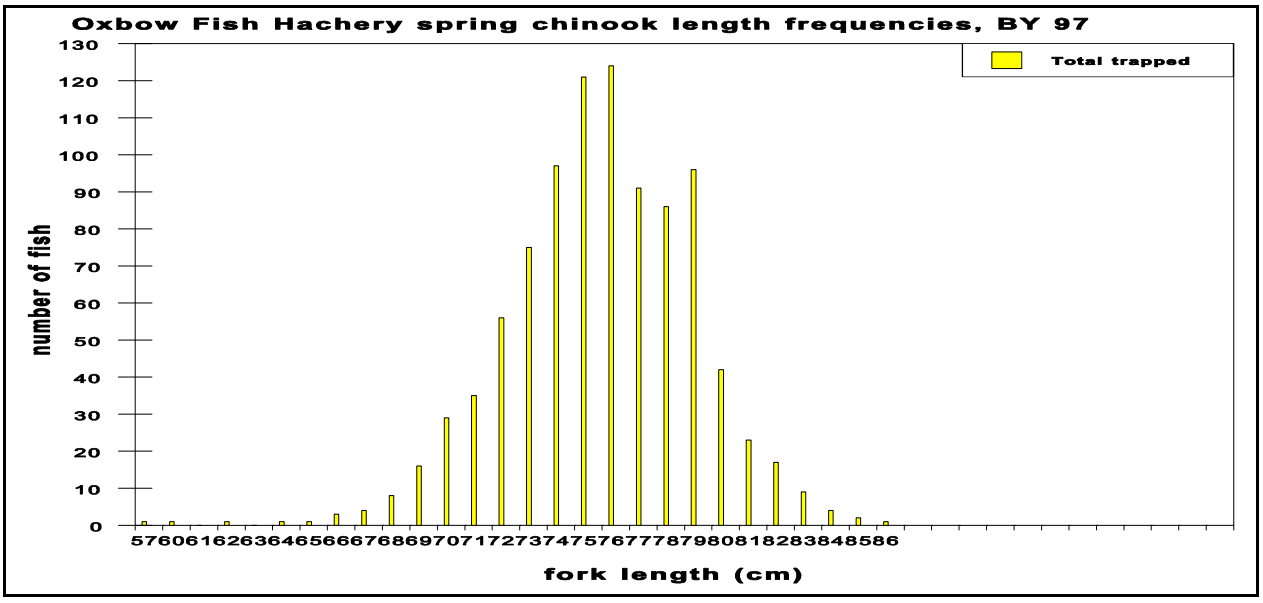


Figure 4. Oxbow Fish Hatchery spring chinook length frequencies, BY97.



APPENDICES

Appendix A. Run timing of steelhead trapped at Hells Canyon, Fall 1997 and Spring 1998.

MONTH / DATE TRAPPED	NUMBER OF FISH	MONTH / DATE TRAPPED	NUMBER OF FISH
OCTOBER 21	255	MARCH 9	4
22	413	10	1
23	102	11	3
27	218	18	13
28	36	19	12
29	208	20	16
NOVEMBER 3	208	23	38
4	94	24	116
5	68	25	113
10	124		
12	83		
17	61		
18	31		
19	19		
24	16		
25	39		
26	16		
DECEMBER 1	62		
2	25		
3	13		
TOTAL	**2,091**	**TOTAL**	**316**

Appendix B. Fork length (cm) frequency of steelhead, 1998.

cm	Total	Males	Females	Inches
47	2		2	18.5
50	2	1	1	19.7
51	5	1	4	20.1
52	7	4	3	20.5
53	11	5	6	20.9
54	23	4	19	21.3
55	38	16	22	21.7
56	108	48	60	22.0
57	143	65	78	22.4
58	197	100	97	22.8
59	217	101	116	23.2
60	218	106	112	23.6
61	164	85	79	24.0
62	135	75	60	24.4
63	101	63	38	24.8
64	78	*47	32	25.2
65	64	32	32	25.6
66	71	26	45	26.0
67	82	19	63	26.4
68	100	19	81	26.8
69	103	27	76	27.2
70	124	30	94	27.6
71	99	36	63	28.0
72	74	27	49	28.3
73	63	34	29	28.7
74	50	23	27	29.1
75	40	22	18	29.5
76	30	19	11	29.9
77	26	13	13	30.3
78	13	6	7	30.7
79	8	7	1	31.1
80	4	3	1	31.5
81	1	1		31.9
82	1	1		32.3
83	2	2		32.7
84	1	1		33.1
85	1	1		33.5
Totals	**2,407**	***1,070**	**1,337**	

AGE CLASS	MALE	FEMALE	TOTAL	AVG LEN
ONE- OCEAN	*798	729	1,527	59.62
TWO- OCEAN	272	608	880	71.58
TOTAL	**1,070**	**1,337**	**2,407**	**63.99**

* Age Class Breakdown: (* includes 1 wild 64 cm male)
One Ocean (males <67 cm, females <64 cm)
Two Ocean (males ≥67 cm, females ≥64 cm)

Appendix C. Length frequency of spring chinook, 1997.

LENGTH cm	3-Y-Olds		4-Y-Olds		5-Y-Olds		TOTAL
	Hat	Wild	Hat	Wild	Hat	Wild	
57			1				1
60			1				1
61							
62			1				1
63							
64			1				1
65			1				1
66			3				3
67			3	1			4
68			8				8
69			16				16
70			25	4			29
71			34	1			35
72			54	2			56
73			73	2			75
74			92	5			97
75			119	2			121
76			121	3			124
77			90	1			91
78			83	3			86
79			93	3			96
80			41	1			42
81					22	1	23
82					17		17
83					7	2	9
84					4		4
85					2		2
86						1	1
TOTAL	**0**	**0**	**860**	**28**	**52**	**4**	**944**

AGE CLASS	TOTAL	AVG LEN (cm)
ONE - OCEAN	1	0.0
TWO - OCEAN	942	75.20
THREE - OCEAN	1	82.07
TOTAL	**944**	**75.61**

Age Class Breakdown: One Ocean (3-yr-olds, ≤58 cm)
Two Ocean (4-yr-olds, 59-85 cm)
Three Ocean (5-yr-olds, >85 cm)

Appendix D. Spring chinook run timing at Oxbow Fish Hatchery, 1997.

MONTH/DATE TRAPPED	NUMBER OF FISH	MONTH/DATE TRAPPED	NUMBER OF FISH
MAY 19	140	JUNE 2	33
20	14	3	41
21	23	4	107
22	29	5	46
23	12	6	
24		7	
25		8	
26		9	5
27	224	10	30
28	123	11	8
29	109	12	
30		13	
31			
TOTAL	**674**	**TOTAL**	**270**

Appendix E. Oxbow Fish Hatchery, fish trapping summary and breakdown.

STEELHEAD BROOD YEAR 1998

Fish Trapped		**Age Class Breakdown ***	
Males	1,070	1 Ocean	1,527
Females	1,337	2 Ocean	880
Total	2,407	Total	2,407

Fish Disposition	**Males**	**Females**	**Total**
Pre-spawn Mortality	161	150	311
Trap & Sample Morts	0	0	0
Spawned only *	442	527	969
Released **	1	0	1
Out Planted	466	646	1,112
Killed but not used	0	14	14
Total	**1,070**	**1,337**	**2,407**

* 1 to 1 spawning ratio, all males were spawned at least once.
** includes 1,030 fall releases, 82 spring releases

Carcass Disposition	**Males**	**Females**	**Total**
Buried	603	677	1,280

* Age Class Breakdown: 1 Ocean (males ≤67 cm, females ≤66 cm)
2 Ocean (males >67 cm, females >64 cm)

SPRING CHINOOK SALMON BROOD YEAR 1997

Fish Trapped				**Age Class Breakdown ****			
	Total	**Hat**	**Wild**		**Total**	**Hat**	**Wild**
Jacks	1	1	0	1-Ocean	1	1	0
Males	437	422	15	2-Ocean	942	911	31
Females	506	489	17	3-Ocean	1	0	1
Total	**944**	**912**	**32**	**Total**	**944**	**912**	**32**

Fish Disposition	**Males**	**Females**	**Total**
Trap & Pond Mortality			128
Pre-spawn Mortality	31	51	82
Shipped to Rapid River *	366	423	789

* males include 5 wild fish shipped after being captured and released 3 times

All pre-spawn mortalities were buried

** Age Class Breakdown: 1 Ocean (3-yr-olds, ≤58cm)
2 Ocean (4-yr-olds, 59-85cm)
3 Ocean (5-yr-olds, >85cm)

Appendix F. Snake River historic releases and returns data.

Year	Chinook Released	Steelhead Spring	Released Fall	Chinook Returns	Steelhead Returns
1966			29,400		
1967		587,513			1,681
1968		342,114			1,609
1969		109,200	757,500	344	1,122
1970		385,900	670,960		136
1971			215,625		279
1972			630,900	3	650
1973				2	435
1974				1	125
1975			40,977	14	34
1976			85,510		224
1977		126,000	301,644		243
1978			344,944		186
1979			548,987	1	36
1980		348,520	191,900		339
1981	1,003,200	614,160			158
1982		354,150			203
1983	250,020	92,750	220,270	16	872
1984	500,850	458,917	630,500	3	1,116
1985	437,360	414,712	387,353	699	1,343
1986	140,000	819,495	39,995	395	2,438
1987	547,700	800,000	672,235	543	3,209
1988	400,600	877,400	75,814	458	2,524
1989	500,000	735,500	603,000	84	2,729
1990	551,200	947,200	351,400	30	2,728
1991	500,500	912,000		22	1,151
1992	500,500	243,900		912	1,714
1993	200,300	660,500		431	1,259
1994	380,504	609,115		29	1,403
1995	499,986	614,560		36	1,597
1996	67,818	630,152		78	1,383
1997	13,470	660,651		944	1,270
1998	304,096	653,276		74	2,407
1999	300,000	657,665		79	2,042

Submitted by:

Kent Hills
Hatchery Assistant Manager

Approved by:

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Virgil K. Moore, Chief
Fisheries Bureau

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Tom Rogers
Anadromous Fish Hatchery Manager