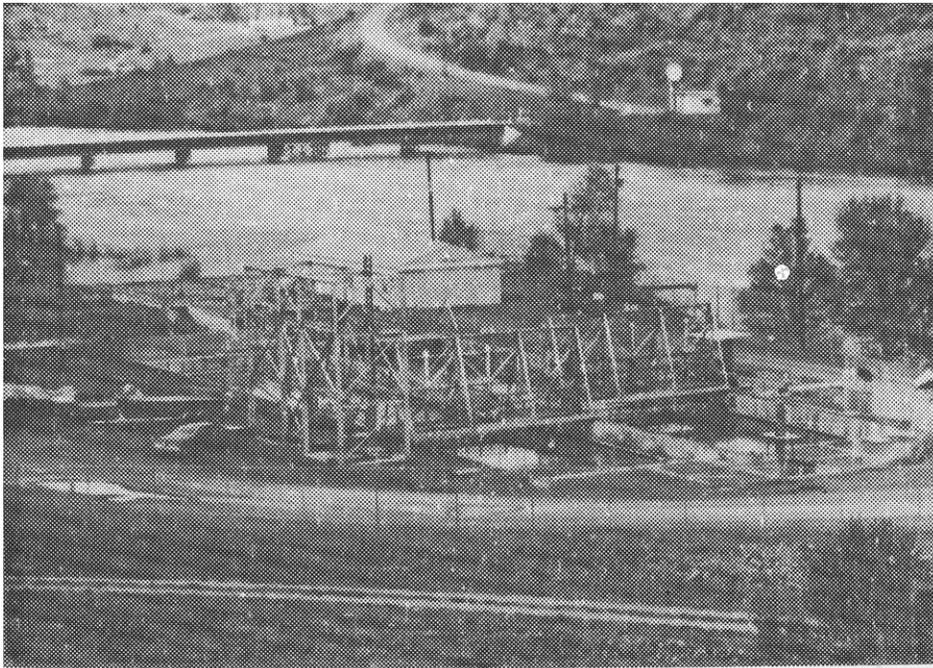




OXBOW FISH HATCHERY

**1995 Steelhead Brood Year Report
1994 Spring Chinook Brood Year Report**



**Julia Rensel Hislop
Assistant Fish Hatchery Manager**

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ABSTRACT

For brood year 1995, the steelhead trout *Oncorhynchus mykiss* run totaled 1,597 (755 males and 842 females) fish entering the Hells Canyon Dam fish trap. Fall trapping (October 27, 1994 to December 08, 1994) collected 1,083 fish. Of these fish, 502 were males and 581 were females. The trap was operated during the spring from March 3 through April 6, 1995, collecting 514 steelhead. The spring component of the run comprised 253 males and 261 females.

Age-class breakdown of the run was 1,405 one-ocean fish and 192 two-ocean fish. Wild fish made up 2.63% (42 fish) of the run. Of the 151 marked fish collected, 141 were left (or right) ventral clipped with coded-wire tags (CWT) and 10 with various other jaw tags, visual implant tags or floy tags.

A total of 28 surplus adult steelhead were released into Hells Canyon Reservoir on May 11, 1995. No fish were released into the Payette or Boise rivers this year.

No fall Chinook salmon *O. tshawytscha* were incidentally trapped during the fall steelhead trapping this year.

Pre-spawning mortality totaled 73 steelhead adults (4.57%). Spawning consisted of 16 egg takes from March 14 until May 09, 1995. A total of 697 females were spawned with an average fecundity of 4,528 eggs per female. These fish produced 3,156,929 green eggs. The percent eye-up was 83.93%, leaving a total of 2,649,527 eyed eggs.

Niagara Springs Fish Hatchery received 745,001 eyed eggs and 652,102 swim up fry. In addition, eyed eggs were shipped to Hagerman National Fish Hatchery (679,465), Hagerman State Fish Hatchery (530,723), and the Morrison-Knudsen Nature center (500).

During the spring of 1996, 630,152 steelhead smolts were hauled from Niagara Springs fish Hatcheries and were released below Hells Canyon Dam.

For brood year 1994, spring chinook salmon were trapped from May 23 through July 14, 1994. The run totaled 29 fish; one jack, nine two-ocean fish, and 19 three-ocean fish. A total of 29 fish (12 males, 16 females, one jack) were transferred to Rapid River Hatchery.

Pre-spawning mortality included zero salmon while on station and six mortalities after transfer to Rapid River Fish Hatchery. A total of 13 females were spawned for a total of 54,808 green eggs. Eye-up was 90.8% for 49,766 eyed eggs.

A total of 67,818 spring Chinook salmon smolts from Rapid River Fish Hatchery were released during the spring of 1996. These smolts were all marked with an adipose fin (AD) clip.

Author:

Julia Rensel Hislop
Hatchery Assistant Manager

1995 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 OFH facility is owned and funded by IPC and operated by the Idaho Department of Fish and Game (Department). The hatchery is found 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* and spring chinook salmon *O. tshawytscha* adult holding and egg-taking station.

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. Idaho Power's mitigation goal is to produce 400,000 pounds of steelhead smolts at Niagara Springs Fish Hatchery. The OFH's goal is to produce 1.3 million eyed steelhead trout eggs. The OFH also traps spring chinook that are transferred to Rapid River Fish Hatchery for spawning.

Facility Description

Oxbow Fish Hatchery consists of a main hatchery building, four adult holding ponds, an incubation water-chilling unit, an off-station fish trap, and a single-family home. The facility has six cinder block raceways that have decayed beyond the ability to be repaired.

The hatchery building is a 28 ft x 60 ft, single-story metal structure partitioned into two main rooms. Half the building consists of 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 chiller has the capacity to chill 120 gallons per minute (gpm) of water to 40°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. The two larger divisions each measure 105 ft x 30 ft x 5 ft, providing 31,500 cubic feet of holding area. 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. The fish are removed from the trap when the loading hopper is hoisted the 80-ft to the fish transport truck. Oxbow's fish hauling truck is a 1981 GMC 2.5-ton, 10-wheeler with a bed-mounted 1,000-gallon fish tank. Up to 100 fish are then transported the 23 miles to OFH.

Water Supply

The Snake River provides most of the water for hatchery operations. A pumping platform next 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°F to a late summer high of 72°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 trout egg incubation. One well serves as a primary water source, while the other is an emergency backup with a separate power source. The primary well water was a constant 52°F, while the backup was a constant 54°F. Both wells pump a maximum of 20 gallons per minute. 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 trout started on October 27, 1994 and ended December 8, 1994 capturing a total of 1,083 steelhead. The trap was restarted during the spring from March 3 through April 6, 1995 collecting 514 steelhead (Appendix A). The 1995 brood year steelhead run of 1,597 fish comprised 755 females and 842 males. The broodstock strategy of 1,200 fish, one fourth of the egg take being from spring-run fish was met this year.

All trapped steelhead trout 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 less than 68 cm and those female fish less than 66 cm. Using these criteria, 1,405 steelhead were one-ocean and 192 steelhead were two-ocean (Appendix E).

Adult fish releases during the spring totaled 28 surplus adults consisting of six females and 22 males. All 28 were released into Hells Canyon Reservoir at OFH on May 11, 1995. There were no fish released into the Boise or Payette rivers this year.

Tag Recovery

This season, 151 steelhead trout were captured with some form of mark or tag. There were 141 fish with a left (or right) ventral fin clip, and 10 others with various combinations of jaw tags, radio tags, visual implant tags, dorsal spaghetti tags, and floy tags. There were three jaw tags, one radio with visual implant tag, and four fish with floy tags. The tagging agencies included the National Marine Fisheries Service, the University of Idaho, the Washington Department of Fisheries, the Oregon Department of Fish and wildlife, and the Idaho

Department of Fish and Game. The snouts of the ventral fin-clipped fish were shipped along with all jaw and floy tags to the Lewiston Tag Recovery Laboratory.

Of the 1,597 steelhead captured 42 were wild or natural fish (2.63%). Wild or natural steelhead were identified by having an AD and the remaining fins not eroded. These fish were ponded and combined in the broodstock.

Incidental Capture of Fish

The fall trapping effort resulted in the capture of no fall chinook salmon.

Holding and Spawning

Pre-spawning Mortality

Pre-spawning mortality consisted of all female steelhead that died before spawning and those male steelhead that died up to two weeks after the first spawning date (March 28, 1995). Pre-spawning mortality was 73 fish (4.57%) comprising 18 males and 55 females. There were an additional 81 trapping mortalities not included in the pre-spawn mortality. Due to a valve malfunction on the trap hopper, these fish were not loaded into the fish truck, but remained in the holding area without fresh water flow for the weekend, and were not discovered until Monday morning. Modifications have been made to the hopper area to eliminate this problem.

Spawning Operations

Steelhead trout spawning operations began on March 14 and ended on May 9, 1995. Females were sorted twice weekly for ripeness. Ripe females were killed with a blow to their head. Females were dry-spawned by incision, and the eggs collected in a colander to drain the ovarian fluid. Eggs from each female were placed into a spawning bucket, then fertilized with sperm from one male. The fertilized eggs from two females were poured together and remained in one cup of well water for up to five minutes to activate sperm. 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.

Twenty-eight female steelhead trout were killed for spawning, but their eggs were culled due to abnormal appearance of eggs or internal organs.

Incubation

Sixteen egg takes produced 3,156,929 green eggs from 697 females for a fecundity of 4,529 eggs per female (Table 1). The percent eye-up was 83.93% for 1,649,527-eyed-eggs. Egg numbers were determined by enumeration of eyed eggs with a Jentsort brand Model JH egg sorter with electronic counter.

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 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.

Egg Shipments

Eyed eggs were sent to Hagerman National Hatchery (679,465 from 5 lots), Hagerman State Fish Hatchery (530,723 excess from 9 lots), Niagara Springs Fish Hatchery (745,001 from 9 lots) and the Morrison-Knudsen Nature Center (500). The eggs were transported in 48-quart coolers with iced well water.

Fry Shipments

A total of 652,102 swim up fry were transported to Niagara Springs Fish Hatchery during July. These were reared in chilled 40°F water to delay their shipping. These fry were left in their screen incubation trays for transport. Three or four trays were banded together with an empty tray on top to keep the fry under water. These stacks were then floated in a 2-ton fish truck filled with chilled water, and were transported to Niagara Springs. These fry came from the first six egg takes (Table 2).

Carcass Disposition

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

Steelhead Smolt Releases

The 1995 brood year steelhead trout smolts were released in the spring of 1996. A total of 630,152 steelhead smolts averaging 5.24 per pound (123,300 pounds) were released into the Snake River below Hells Canyon Dam. Niagara Springs Fish Hatchery reared these smolts. For more information, see their annual report.

1994 SPRING CHINOOK BROOD YEAR REPORT

Spring Chinook Trapping

Spring chinook salmon returning to the Hells Canyon trap in 1994 were from smolt releases in 1991, 1992, and 1993 (Table 3).

Spring chinook salmon trapping began May 23, 1994 and ended July 14, 1994 (Figure 3). A total of 29 salmon were trapped, one jack, 12 males, and 16 females. The Hells Canyon salmon run comprised one one-ocean fish, 9 two-ocean fish, and 19 three-ocean fish. A fork length of ≤ 53 cm denoted one-ocean fish, 54-80 cm defined two-ocean fish, and ≥ 81 cm designated three-ocean fish (Figure 4 and Appendix C).

Holding and Spawning

Adult Treatments

Erythromycin 100 injections were given during the holding period at OFH according to the INAD protocol. Chinook were injected at two dosage rates: 14 fish received 20 mg/kg and were opercle punched, the other 15 fish received the lower dosage rate of 10 mg/kg and were not marked. A total of 29 spring chinook salmon were trapped in 1994. All 29 were transferred to Rapid River Hatchery (28 adults, one jack). These fish were hauled at the end of each week. Water in the transport truck was chilled by adding 44 blocks of ice. In addition, 33 grams of MS222 were added to the water to reduce fish stress during transport.

Pre-spawning Mortality

Pre-spawning mortality for 1994 spring chinook was six fish. No salmon died in the holding ponds at OFH and six salmon (3 males, 3 females) died after transfer to Rapid River Hatchery. Most of the mortality was attributed to fungus and Nitrogen blasting.

Spawning Operations

The Hells Canyon trapped fish were combined with Rapid River's broodstock this year. All numbers were based on a percentage of the total run from Rapid River Hatchery. A total of 13 female Hells Canyon chinook salmon were spawned, producing 54,808 green eggs. The percent eye-up was 90.8%, leaving 49,766 eyed eggs.

Chinook Smolt Releases

Brood year 1994 spring chinook salmon releases were conducted in the spring of 1996. These smolts were reared at Rapid River Hatchery. A total of 67,818 smolts were released into the Snake River below Hells Canyon Dam. All of these smolts were marked before their release. They were fin-clipped with an AD removed. See Rapid River Hatchery's annual report for more information.

HATCHERY IMPROVEMENTS

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

- Fabrication of visitor information signs.
- Alteration of the fish trap to reduce fish injury.
- Installation of safety fencing and grating around various hazards.

A major purchase for OFH was a chilling unit for the incubation water system. Its installation will enable the hatchery to adjust the development rate of eggs. Slowing the egg development will delay feeding and will help ensure the correct size at release without holding fingerlings off feed at final rearing facilities.

Another purchase consisted of 12 eight-tray FAL incubator stacks to replace the old stacks. Other purchases included a Micron Millennia personal computer with an HP Laser Jet 5L printer and the requisite software.

HATCHERY RECOMMENDATIONS

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

Another priority should be the renovation of the hatchery building. The incubation room needs waterproof paneling, adequate lighting, a heat source, and additional electrical outlets. The office space needs to be enlarged and arranged to provide a view of the fish holding ponds for fish monitoring and visitor safety. The dormitory needs major renovation, as it currently is inadequate for temporary employee housing.

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

TABLES

Table 1. Summary of steelhead spawning at Oxbow Fish Hatchery, 1995.

Lot #	Spawn Date	Number Females	Green Eggs	Eyed Eggs	Percent Eye-up	Eggs/Female
1	03/14/95	22	105,800	88,378	83.53	4,809
2	03/17/95	17	9,067	78,033	85.69	5,357
3	03/21/95	51	200,343	169,931	84.82	3,928
4	03/24/95	33	153,756	130,551	84.91	4,659
5	03/28/95	88	389,282	331,850	85.25	4,424
6	03/31/95	45	214,988	184,214	85.69	4,778
7	04/04/95	87	406,656	331,879	81.61	4,674
8	04/07/95	66	309,017	260,436	84.28	4,682
9	04/11/95	79	349,431	288,348	82.52	4,323
10	04/14/95	68	394,802	253,684	83.23	4,482
11	04/18/95	49	231,336	187,486	81.04	4,721
12	04/21/95	37	154,929	137,348	88.65	4,187
13	04/25/95	25	113,096	93,837	82.97	4,524
14	04/28/95	15	69,914	60,825	87.00	4,661
15	05/05/95	10	40,400	33,764	83.57	4,040
16	05/09/95	5	22,112	18,963	85.76	4,422
	TOTAL	697	3,156,929	2,649,527	83.93	4,529

Table 2. Disposition of Oxbow Fish Hatchery eggs, 1995.

3,156,929	green eggs
507,402	pick off – eggs
2,649,527	eyed eggs
20,499	culled eggs
679,465	eyed eggs shipped to Hagerman National
530,723	eyed eggs shipped to Hagerman State
745,001	eyed eggs shipped to Niagara Springs
500	eyed eggs shipped to M.K. Nature Center
12,237	pick off - fry
652,102	swim up fry shipped to Niagara Springs

Table 3. Spring chinook releases and returns for Oxbow Fish Hatchery, BY94

Release Year	Smolts Released	1994 Returns by Release Year	Previous Returns
1991	500,500	19	217
1992	500,500	9	2
1993	200,300	1	0
Totals	1,201,300	29	219

FIGURES

Figure 1. Steelhead run timing at Oxbow Fish Hatchery, BY95.

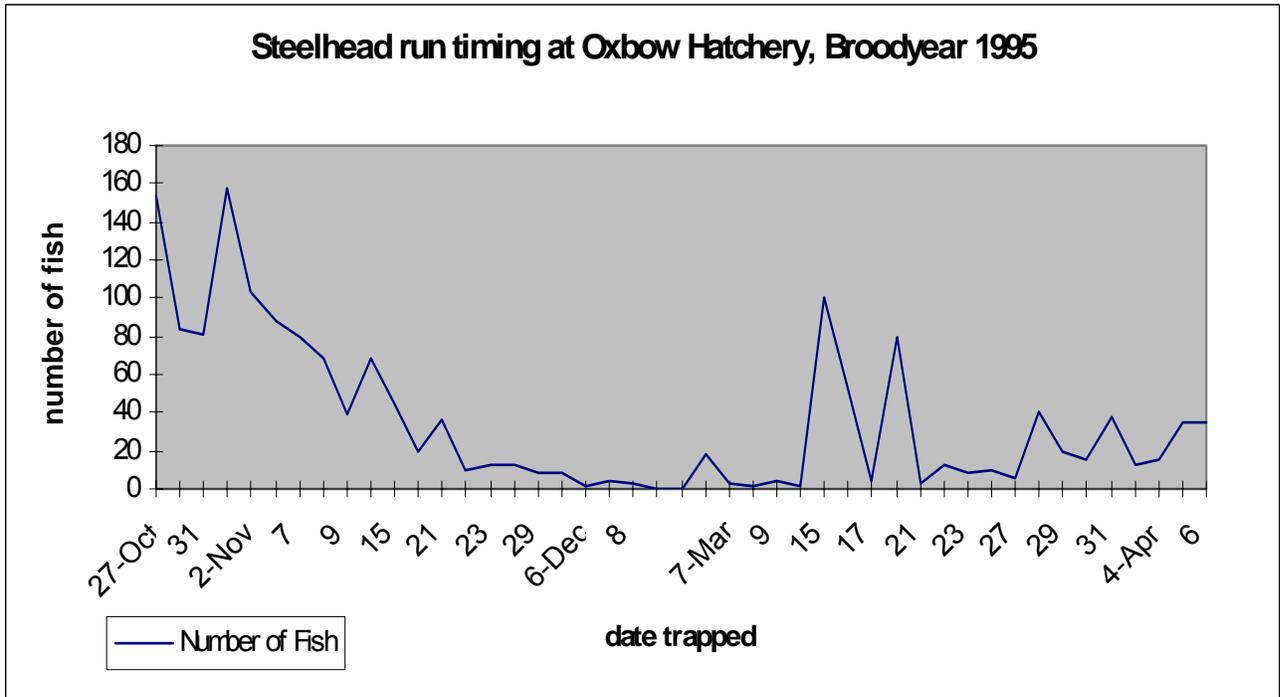


Figure 2. Oxbow Fish Hatchery steelhead length frequencies, BY95.

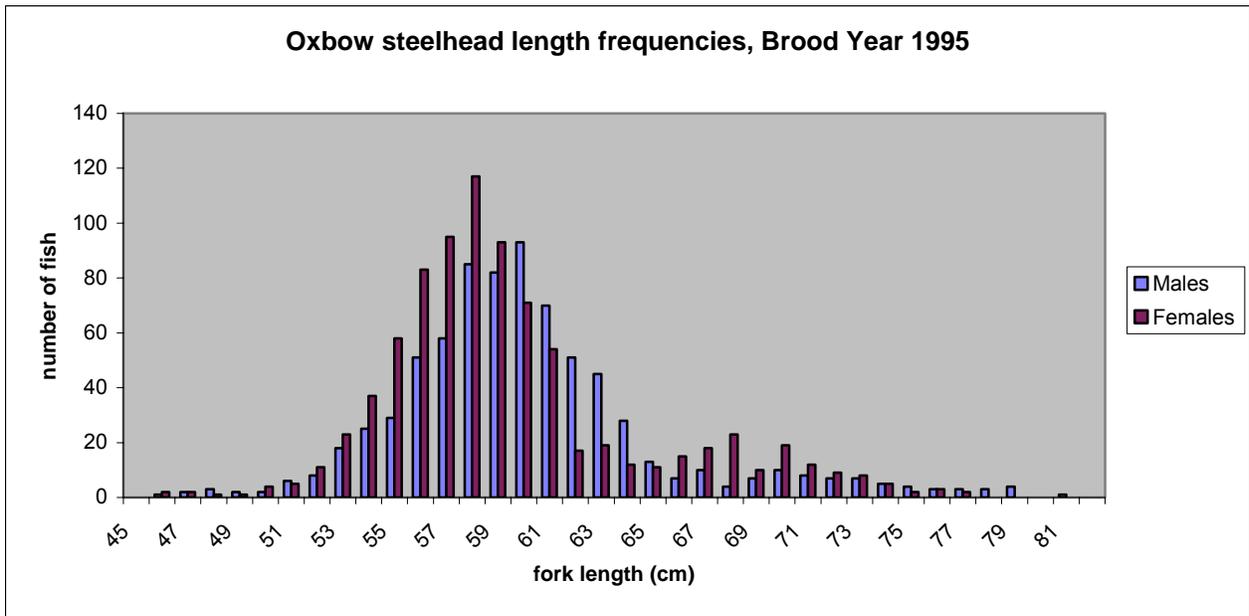


Figure 3. Spring chinook run timing at Oxbow Fish Hatchery, BY94.

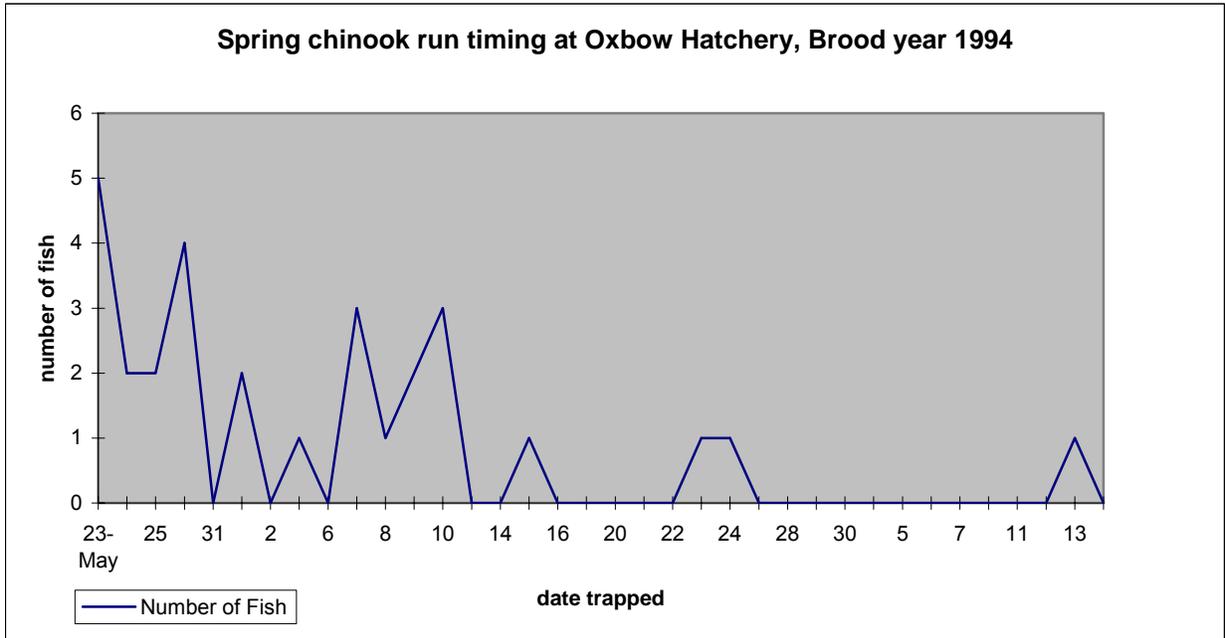
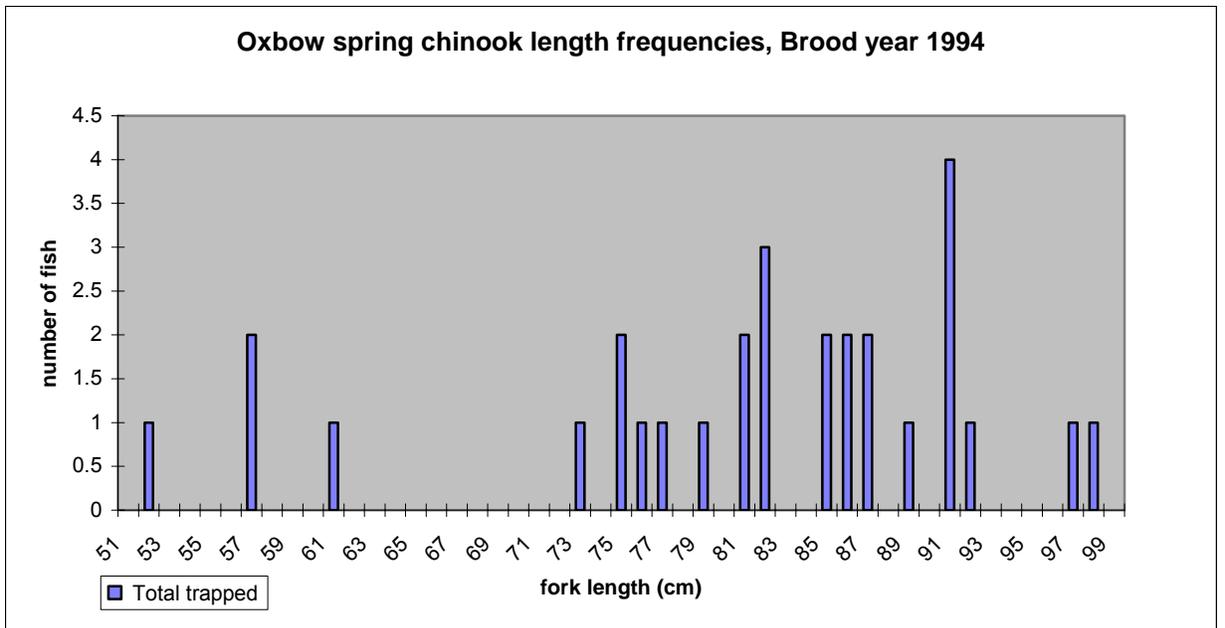


Figure 4. Oxbow Fish Hatchery spring chinook length frequencies, BY94.



APPENDICES

Appendix A. Run timing of steelhead trapped at Hells Canyon for Oxbow Fish Hatchery, Fall 1994 and spring 1995.

MONTH/DATE TRAPPED	NUMBER OF FISH	MONTH/DATE TRAPPED	NUMBER OF FISH
27-Oct	154	3-Mar	181
28	84	7	3
31	81	8	1
1-Nov	157	9	4
2	103	10	2
3	88	15	101
7	80	16	53
8	68	17	4
9	39	20	79
14	68	21	3
15	44	22	12
16	19	23	8
21	36	24	10
22	10	27	5
23	13	28	41
28	12	29	19
29	9	30	16
30	9	31	37
6-Dec	2	3-Apr	13
7	4	4	15
8	3	5	35
		6	35
TOTAL	1083	TOTAL	514

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

cm	TOTALS	MALES	FEMALES	INCHES
46	3	1	2	18.1
47	4	2	2	18.5
48	4	3	1	18.9
49	3	2	1	19.3
50	6	2	4	19.7
51	11	6	5	20.1
52	19	8	11	20.5
53	41	18	23	20.9
54	62	25	37	21.3
55	87	29	58	21.7
56	134	51	83	22.0
57	153	58	95	22.4
58	202	85	117	22.8
59	175	82	93	23.2
60	164	93	71	23.6
61	124	70	54	24.0
62	68	51	17	24.4
63	64	45	19	24.8
64	40	28	12	25.2
65	24	13	11	25.6
66	22	7	15	26.0
67	28	10	18	26.4
68	27	4	23	26.8
69	17	7	10	27.2
70	29	10	19	27.6
71	20	8	12	28.0
TOTAL	1531	755	842	

AGE CLASS	MALE	FEMALE	TOTAL	AVG LEN
ONE-OCEAN	689	716.0	1405	58.36
TWO-OCEAN	66	126.0	192	70.65
TOTAL	755	842.0	1597	59.83

Age Class Breakdown:

One-Ocean (males <68 cm, females<66 cm)

Two-Ocean (males ≥68 cm, females≥66 cm)

Appendix C: Fork length of spring Chinook for Oxbow Fish Hatchery, 1994.

LENGTH cm	3-Y-Olds	4-Y-Olds	5-Y-Olds	TOTAL
50				
51				
52	1			1
53				
57*		2		2
58				
59				
60				
61		1		1
62				
69*				
70				
71				
72				
73		1		1
74				
75		2		2
76		1		1
77		1		1
78				
79				
<u>80</u>				
81			2	2
82			3	3
TOTAL	1	9	19	29

AGE CLASS	TOTAL	AVG LEN (cm)
ONE-OCEAN	1	52
TWO-OCEAN	9	70
THREE-OCEAN	19	87.58
TOTAL	29	80.9

*Age-Class Breakdown:

One-Ocean (3-yr-olds, ≤53 cm)

Two-Ocean (4-yr-olds, 54-80cm)

Three-Ocean (5-yr-olds, ≥81cm)

Appendix D. Spring Chinook run timing at Oxbow Fish Hatchery, 1994.

MONTH/DATE TRAPPED	NUMBER OF FISH	MONTH/DATE TRAPPED	NUMBER OF FISH
23-May	5	20-Jun	0
24	2	21	0
25	2	22	0
26	4	23	1
31	0	24	1
1-Jun	2	27	0
2	0	28	0
3	1	29	0
6	0	30	0
7	3	1-Jul	0
8	1	5	0
9	2	6	0
10	3	7	0
13	0	8	0
14	0	11	0
15	1	12	0
16	0	13	1
17	0	14	0
		TOTAL	29

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

STEELHEAD BROOD YEAR 1998

<u>Fish Trapped</u>		<u>Age Class Breakdown *</u>	
Males	755	One-Ocean	1,405
Females	842	Two-Ocean	192
Total	1,597	Total	1,597

<u>Fish Disposition</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
Pre-spawn Mortality	18	55	73
Trapping mortality	40	41	81
Spawned only	675	697	1,372
Given to Clear Springs	*15	15	15
Released *	22	6	28
Killed but not used	<u>0</u>	<u>28</u>	<u>28</u>
Total	755	842	1,597

* 1:1 spawning ratio, all males were spawned at least once before being released.
15 males were stripped for Clear Springs Hatchery and returned to the ponds.

<u>Carcass Disposition</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
Buried	733	821	1,554

Age Class Breakdown:
One-Ocean (males ≤68 cm, females ≤66 cm)
Two-Ocean (males ≥68 cm, females ≥66cm)

SPRING CHINOOK SALMON BROOD YEAR 1994

females <66cm) females >66cm)

<u>Fish Trapped</u>		<u>Age Class Breakdown</u>	
Jacks	1	One-Ocean	
Males	12	Two-Ocean	9
Females	16	Three-Ocean	18
Total	29	Total	29

<u>Fish Disposition</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
Shipped to Rapid River	13	16	29
Pre-spawn Mortality	3	3	6

All pre-spawn mortalities were buried

** Age Class Breakdown:
One-Ocean (3-yr-olds, ≤53cm)
Two-Ocean (4-yr-olds, 54-80cm)
Three-Ocean (5-yr-olds, ≥81cm)

Appendix F. Snake River historic releases and returns data for Oxbow Fish Hatchery.

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

Submitted by:

Kent Hills
Hatchery Assistant Manager

Approved by:

Virgil K. Moore, Chief
Fisheries Bureau

Tom Rogers
Anadromous Fish Hatchery Manager