

OXBOW FISH HATCHERY

**2004 Steelhead Brood Year Report
2003 Spring Chinook Brood Year Report
2003 Fall Chinook Brood Year Report**



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ABSTRACT

The Oxbow Fish Hatchery (OFH) trap operated for 11 days between October 27, and November 20, 2003 and 3 days between April 14, and April 28, 2004. A total of 3,833 steelhead trout (*Oncorhynchus mykiss*) were trapped during these operating periods. They consisted of 3,811 (99%) hatchery and 22 (1%) wild steelhead. During the fall of 2003 and the spring of 2004, 3,178 steelhead were out-planted for sport fisheries, supplementation programs and Tribal consumption.

Spawning consisted of 18 egg takes from March 15 to May 13, 2004. A total of 251 females were spawned. Eggs from 241 females were retained resulting in 1,397,284 green eggs, which were incubated to eye-up. Survival to eye-up was 81%, producing 1,131,413 eyed eggs. From these, 433,951 eyed-eggs and 463,158 fry were shipped to Niagara Springs Fish Hatchery (NSFH), 55,341 eyed eggs were shipped to Hagerman State Fish Hatchery (HSFH), 148,721 excess fry were released into Cascade Reservoir and 10,978 fry escaped due to a faulty tray.

Eggs from 558 females were shipped from Pahsimeroi Fish Hatchery to OFH. Eggs from six females were culled prior to counting and the remaining 552 females produced 2,386,200 green eggs and 1,781,843 eyed eggs. From these, 132,227 eyed eggs were shipped to HSFH and 345,559 were shipped to NSFH and . The remaining eggs were raised to fry stage. Of the resulting button-up fry, 760,994 were shipped to NSFH, 493,900 were released into Cascade Reservoir, and 10,739 escaped due to a faulty tray.

Spring chinook were trapped 10 days between June 10 and July 9, 2003. A total of 141 spring chinook salmon were trapped, including 131 hatchery jacks, 5 hatchery adults, 2 wild jacks, and 3 wild adults. Both wild or natural jacks and 2 wild or natural adults were released below Hells Canyon Dam. The third wild or natural adult died at OFH and was given to the Nez Perce Tribe. with

Five hatchery adults were transported to Rapid River Fish Hatchery (RRFH) for spawning. The hatchery jacks were killed and given to the Nez Perce Tribe, with the exception of 2 jack pond morts.

A total of 200,000 eyed fall chinook (*O. tshawytscha*) eggs were acquired from Lyons Ferry Hatchery and transported to the OFH on December 22, 2003. They were placed in Heath trays and incubated with 54° F water until button up. Fry were placed in the outside raceways on February 10 and 11, 2004 and raised on well water at a temperature of 54° F. They were fed Moore Clark feed starting with mash and ended with 1.5-mm pellets. Two weeks before fin clipping, they were fed Moore Clark enhanced beta glucan feed. On May 3, 2004, employees of the Nez Perce Tribe transported 166,623 sub-yearlings from OFH to Pittsburg Landing for acclimation. On May 24, 2004, 165,438 sub-yearlings were released at Pittsburg Landing. These fish were 54 fpp, with an average length of 3.7 inches and weighed 3,063 pounds. On May 28, 2004, 9,957 sub yearling smolts were released below Hells Canyon Dam. They averaged 48 fpp, 4.1 inches in length, and had a total weight of 207.5 pounds. The survival rate from eyed-egg stage to release was 87.6 %.

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HATCHERY OVERVIEW

Introduction

The Oxbow Fish Hatchery (OFH) is part of the Idaho Power Company (IPC) hatchery system and has been in operation since 1962. The OFH is owned and funded by IPC and operated by the Idaho Department of Fish and Game. The OFH was constructed by IPC as part of mitigation required by the Federal Energy Regulatory Commission for impacts to anadromous fish resulting from the construction of Brownlee, Oxbow, and Hells Canyon Dams on the Snake River. Steelhead (*Oncorhynchus mykiss*) are held, spawned, and the resulting eggs incubated at OFH. Eggs and button up fry are then transported to the Niagara Springs Fish Hatchery (NSFH) for final rearing before release. Adult spring chinook salmon (*Oncorhynchus tshawytscha*) are trapped and held at OFH until they can be shipped to Rapid River Fish Hatchery (RRFH) in Riggins, Idaho. Fall chinook (*O. tshawytscha*) are reared to sub-yearling smolts from eyed eggs received from the Washington Department of Fish and Wildlife's Lyons Ferry Hatchery (LFH). The sub-yearling smolts are released below Hells Canyon Dam. The OFH has completed the fifth year of rearing of fall chinook salmon.

Location

OFH is located in Eastern Oregon and is adjacent to the confluence of Pine Creek and the Snake River on the Oregon shore of the Snake River at the IPC village known as Oxbow, Oregon. It is located at the eastern most end of Oregon State Highway 86 and is approximately 67 highway miles east of Baker City, Oregon and approximately 150 highway miles northwest of Boise, Idaho. The Hells Canyon trap, which is used for interrogating adult fish for the OFH is located twenty three miles down stream at the base of Hells Canyon Dam on the Oregon shore line of the Snake River.

Objectives

The primary purpose for OFH is to meet the Hells Canyon mitigation requirements for adult anadromous fish returns to the upper Snake River. This involves three main objectives:

1. Trap and spawn adult steelhead to provide eggs and fry to NSFH to produce two hundred thousand pounds of smolts annually.
2. Trap adult spring chinook for transfer to RRFH to supplement broodstock needed to release three million smolts annually.

3. Rear one million sub-yearling fall chinook smolts annually for release into the Snake River.

The OFH has three main objectives:

Facility Description

The OFH facility consists of the following: A hatchery building which houses the office, shop, and incubation room; four adult holding ponds including fish loading and off-loading facilities; an incubation water chilling unit; a spawning building; dormitory; an Assistant Fish Hatchery Manager's residence; two concrete raceways; and an off-site fish trap. A more detailed description of the main components of the facility follows.

The hatchery building is a 28-ft x 60-ft, single-story metal structure partitioned into two main rooms. Half of the building consists of shop and office space, and the other half is for egg incubation. The incubation room has the capacity to incubate 4.6 million eggs, by placing eggs from two females in each of our 448 Heath trays. Two 64 ft² sheds provide storage.

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 35 ft x 5 ft providing 36,750 ft³ of holding space. The two smaller divisions measure 55 ft x 35 ft x 5 ft, providing 19,250 ft³ of holding space. Two electric crowding racks provide the ability to move the fish into a center raceway, which is 4.5 ft wide x 70 ft long. It has a small crowd rack that is used to move the fish into the spawning building.

The fish trap is located 23 road-miles downstream of OFH on the Oregon shore of the Snake River immediately below Hells Canyon Dam. It consists of an attraction channel with approximately 150 ft of fish ladder, the holding area (trap), and a loading hopper. During processing, the fish move from the trap into the loading hopper and are hoisted up 80 ft to a transport truck.

A 60 horsepower (hp) water chiller allows regulation of well water temperature for incubating eggs and fry. The chiller is enclosed by a 12-ft x 17-ft metal building to the west of the hatchery building. It has the capacity to chill 120 gal/min (gpm) of water from a well temperature of 52 °F or 54 °F to 40 °F.

The spawning building is located adjacent to the holding ponds. It consists of a small building, part of which is recessed into the ground to provide holding areas for fish that are to be spawned. The remaining portion is at ground level where the females are spawned and the eggs fertilized and processed.

Two concrete raceways provide rearing space for fall chinook. They each measure 130 ft long x 6 ft wide x 4 ft deep. A concrete wall divides the first 30 ft of each raceway into two smaller units. The head-box and outlet of the raceways reduce the useable length of rearing space to 109 ft. The capacity of the raceways is 156,309 sub-yearling smolts at 42 fish/pound (fpp). Well water and river-water are plumbed to the raceways in order to achieve required flows and to allow limited control of water temperature.

Water Supply

Outside Operation Water Source

Water for adult hatchery operations is pumped from the Snake River. A platform adjacent to the hatchery supports two 100-hp production pumps. They each produce 20 ft³/s. One pump is powered from the Pine Creek substation, and the second is powered from the Oxbow power plant substation. Only one pump operates at a time. The other pump serves as an emergency backup. Water from the production pumps passes over two aeration pump platforms before entering the four adult holding ponds. In the spring of 2001, a filtration system was installed at the north water inflow pipes to prevent debris from entering the adult holding ponds and salmon raceways. Water temperatures range from a winter low of 34°F to a late summer high of 72°F.

Water from well #2 is used for the fall chinook fry when they are placed in the outside raceways. Once they reach 100 fpp Snake River water is introduced. As the fry grow, more river water is added and raceway volume is increased to maintain targeted flow and density indices

Incubation Water Source

Two wells provide water for egg incubation. One well (#1) serves as a primary water source, while the other (#2) is an emergency backup with a separate power source. The primary well water is a constant 52°F, while the backup is a constant 54°F. Both wells have 10-hp pumps and together provide approximately 750 gpm for incubation and the salmon raceways. Water used for incubation is chilled to approximately 42°F before entering an elevated surge tank in the hatchery building, where it is distributed through two 4-inch PVC water lines to the 28 incubator stacks. Un-chilled well water is piped directly to 25 of the incubator stacks to provide warmer water if desired.

Staffing

One permanent Assistant Fish Hatchery Manager staffs OFH. Two four-month Biological Aides and two eight-month Biological Aides share 3,760 hours budgeted for temporary help to assist with hatchery operation and maintenance. One of the eight-month Biological Aide positions assists with steelhead production but is primarily assigned to fall chinook

Hatchery Improvements

Accomplished

Over the last few years, IPC Oxbow maintenance personnel have been responsible for work related to several hatchery improvements. Although the following projects may have been completed before this report and the list may not be all-inclusive, some items are included for informational purposes.

- 1) Two new pumps were purchased and installed for the river platform at the trap.
- 2) A slide gate was installed in the wall of the upper tank in the spawning building to pass fish from one tank to the other with out netting.
- 3) New drain platform was poured for the MS222 tank in front of the spawning building.
- 4) The trap stairs and the mezzanine were painted.
- 5) A replacement fish transport truck was purchased and placed in operation.
- 6) Both river water pumps, have been replaced with pumps that don't require oil this has cleaned up the river.

Recommended

Several improvements to equipment and structures at OFH are recommended to improve the overall operation of the facility. These recommendations include:

1. The spawning building needs to be enlarged and lowered four feet. This would reduce potential a potential safety hazard from falls or injuries while climbing ladders. It would also enable release of unripe fish into the ponds without dropping them over a fence lowering potential for injury and stress to the fish. An enlarged space would make the collection of fish health samples more efficient.
2. The hatchery needs more maintenance space. The current office building contains the office, a workshop, a freezer, and a small conference area. The result is very limited space for working on equipment and projects. Construction of a shop and removal of shop items from the office and conference area would solve this. The addition of a concrete slab (approximately 15 ft x 40 ft) is needed in front of the hatchery building for performing vehicle maintenance and other hatchery projects.

3. The holding ponds need to be modified to create a better holding environment and to reduce fish stress and injuries during routine handling.
4. The hatchery alarm system should be modified to directly sense the holding pond water level and to be able to register multiple alarm signals.
5. Both aeration towers need to be sand blasted and repainted.
6. The hatchery needs gravel on the driveways and application of a dust abatement material.
7. A walk-in cooler should be placed in the outside storage area to provide storage for salmon food.
8. Six cinder block raceways located behind the office should be removed and the remaining hole filled.
9. A fence needs to be installed around the salmon raceways.
10. To increase operating efficiency and reduce the chance of chiller failure during the summer months, we recommend two modifications. Build a shade structure over the chiller building and paint it white.

STEELHEAD PRODUCTION

Adult Collection

Steelhead Returns

The OFH trap operated for 14 days during the trapping season. It operated 11 days between October 27 and November 20, 2003, and 3 days between April 14 and April 28, 2004. During the pre-season trap inspection, 81 mortalities were discovered in the ladder. They are not included in the trap numbers in this report because their deaths were not associated with trapping operations. This season we trapped 3,833 steelhead. During the fall of 2003, 3,594 were trapped and another 239 were trapped in the spring of 2004 (Appendices 1, 2). They consisted of 3,811 (99.4%) hatchery and 22 (0.6%) wild steelhead. Wild fish were released below Hells Canyon Dam and hatchery fish were he

ld for spawning or out-plant. Personnel from IPC removed hatchery fish from the trap each day of trap operation and transported them to OFH. They were processed when they arrived at the hatchery. Early in the season, all hatchery fish were ponded. After sufficient adults were trapped to

meet production goals, the remaining adults were out-planted. After out-plant requests were met trapping was discontinued.

Analysis of trapping, hauling, ponding, and out-planting the hatchery fish, and returning the wild fish to the river, revealed that we could process about 10.9 fish/hour/employee or about 0.1 man-hours/fish. This does not include the time required for transporting and releasing fish in other locations.

Length Frequencies and Age and Sex Ratios

Lengths were measured on all 3,833 steelhead trapped. Age-classes are defined by length. One-ocean females were ≤ 65 cm and one-ocean males were ≤ 67 cm. Two-ocean females were ≥ 66 cm and two-ocean males were ≥ 68 cm. The age-class ratio for the hatchery fish was 3,077 (81%) one-ocean and 734 (19%) two-ocean. The sex ratio by age was 1,651 males (54%) and 1,426 females (46%) for one-ocean fish, and 163 (22%) males and 571 (78%) females for two-ocean fish. All 22 wild steelhead were one-ocean fish. Their sex ratio was 10 (45%) males and 12 (55%) females. All data on steelhead length frequency, age and gender by origin are summarized in appendices 3, 4 and 5.

Out Planting

During the fall of 2003 and the spring of 2004, 2,178 steelhead were out-planted for sport fisheries or supplementation programs. This number includes 33 fish that were unaccounted for but believed to have been miscounted onto the out-plant trucks. Their destination location is unknown. Of the remaining 2,145 adult steelhead, 950 were released into the Boise River, 50 into the Payette River, 1,072 into Hells Canyon Reservoir, and 73 excess males were returned to the Snake River below Hells Canyon Dam. In addition to out-plants, 1,000 were killed and given to the Nez Perce Tribe for subsistence and 4 were given to the local High School for biology class (Appendices 6, 7).

Incidental Capture

During the trapping season, 6 hatchery fall Chinook jacks, 1 wild fall Chinook jack, 7 hatchery spring Chinook adults, 1 wild spring Chinook adult, 1 brown trout (*Salmo trutta*) and 14 rainbow trout (*Salmo Gardner*) were trapped and transported to OFH. The chinook and brown trout were released below Hells Canyon Dam. The rainbow trout were released into Hells Canyon Reservoir (Appendix 8).

Marks, Fin Clips, Injuries

When they arrived at the hatchery, all steelhead were checked for marks e.g. fin clips, tags, and injuries. There were 3,811 with adipose fin clips including 78 with partial clips and 14 with a left pectoral clip, 5 with a right pectoral clip, and 61 with a left pelvic clip. Tagged fish included 136 with coded-wire-tags, 7 with floy-tags, 7 with radio-tags, and 13 with PIT-tags. During spawning, snouts were removed from coded-wire-tagged fish. They were collected and sent to the Department's Fish Marking Lab. Injuries included 1 fish with gill net scars, 16 with fresh body injuries, 22 with head injuries, 48 with body scars, 104 with operculum injuries, 46 with fin damage, 21 with eye damage, 19 with bloody gills, and 26 with jaw damage. Fishhooks were found in 11 fish.

Holding And Spawning

Pre-Spawning Mortality

Pre-spawn mortality totaled 16 adult steelhead and was comprised of 2 males and 14 females. Pre-spawn mortality numbers include females that died before spawning began (March 15) and all males that died through the second week of spawning (April 1). All carcasses were checked for tags and disposed of.

Spawning Operations

The steelhead were sorted by sex on March 1, 2004, and separated into two ponds. Steelhead transported to the hatchery after March 1 were sorted on arrival. On each spawn day, all females were checked for ripeness. Ripe females were retained and green females were returned to the holding pond. A pre-determined number of females were spawned each spawn day and the remaining ripe females were out-planted into Hells Canyon Reservoir. Spawning consisted of 18 egg takes from March 15 to May 13, 2004 and included a total of 251 females. Eggs were culled from 2 females because they were green, and from 8 females because they were over-ripe, leaving eggs from 241 females to be incubated (Appendicies 7, 9). Sperm from two or more males fertilized the eggs from each female, and then the eggs from two females were pooled together. Eggs were water hardened in 100 ppm iodophore for at least 15 minutes. Each egg bucket was decanted and

the eggs placed in an incubator tray. In an attempt to reduce the number of excess eggs, 27 fewer females were incubated this year than in 2003. That and a lower fecundity resulted in 323,382 fewer green eggs.

Disease Testing

During the spawning process, staff from the Department's Eagle Fish Health Laboratory tested 177 (71%) females for viruses, 20 (8%) for Whirling Disease, and 91 (36%) for bacterial kidney disease (BKD). Three fish tested positive for BKD and all other test results were negative for pathogens.

Incubation

Egg Development

Incubation water was chilled to approximately 42 °F and adjusted to flow through each stack (16 trays) at about 5 gpm. To assist management at the rearing facility incubation water was chilled to delay development of eggs and fry. The delay allows rearing to targeted release size without withholding feed before smolt release. Water temperature was adjusted by mixing water from the well with water from the chiller. Temperature was regulated to consolidate lots. By ensuring that cumulative temperature units (TU) and thus embryonic development were nearly the same for adjacent lots, several lots could be transferred together. For example, Lots 1-6 were shipped together. Lots 2-6 were each warmed a different number of days so that the cumulative TU for each of lots 2-6 would catch up with the TU for lot 1. Eggs were treated 3 times each week with formalin at 1,667 ppm for 15 minutes, until just before to hatching to inhibit mycosis. All eyed eggs were shocked at 360 to 380 TU or about 30 days after spawn. This was accomplished by pouring the eggs from the Heath tray, from a height of 2-3 feet, into a bucket containing approximately 1 inch to 1.5 inches of water, then pouring them back into the Heath tray. They were allowed to sit overnight so undeveloped or infected eggs turned white. Undeveloped or infected eggs were removed the day after shocking and were enumerated using a Jensorter™ electronic counter. The 241 females had an average fecundity of 5,798 eggs/female and produced 1,397,284 green eggs. A total of 1,131,413 eggs reached the eyed stage, constituting 81% eye-up success (Appendix 9). In an attempt to reduce the number of excess eggs, eggs from 27 fewer females were incubated than in 2003. That and a lower fecundity resulted in 323,382 fewer green eggs.

Eggs from 558 females from Pahsimeroi Fish Hatchery were flown to OFH on 10 separate spawn dates. When they arrived, the eggs were disinfected and processed in the same manner as OFH eggs. The eggs from 6 females were culled prior to counting. Based on the average fecundity of each of the lots involved, these 6 females produced 26,026 green eggs. The remaining 552 females produced 2,386,200 green eggs. The average fecundity was 4,323.

Eye-up was 75%, resulting in 1,781,843 eyed eggs. Pahsimeroi egg and fry data is shown in appendix 10.

Fry Development

To facilitate management flexibility at the rearing facility, some eggs were held after eye-up to be transferred as fry. Eggs that were not shipped at the "eyed" stage or culled as excess were reared to the button-up stage. The eggs hatched approximately 64 days after being spawned. Button-up was approximately 1040 TU. This year fry were shipped at approximately 1032 TU, which was approximately 103 days after the spawning.

Egg and Fry Disposition

Egg Shipments

During May and June of 2004, 433,951 OFH eyed eggs were shipped to NSFH and 55,341 excess-eyed eggs were shipped to Hagerman State Fish Hatchery (HSFH). They were transported in 48-quart coolers filled with water chilled to 42° F. Each cooler was loaded with eggs from pre-defined trays in order to achieve the number/spawn and number/cooler requested by the receiving-hatchery managers. The coolers were transported by OFH staff. The remaining eggs were raised to fry stage (Appendix 11).

During May and June of 2004, 345,559 PFH eyed eggs were shipped to NSFH and 132,227 were shipped to HSFH. The remaining eggs were raised to the fry (Appendix 12).

Fry Shipments

In July, 463,158 fry were shipped to NSFH and 148,721 surplus fry were released into Cascade Reservoir. The fry that were shipped to NSFH were put into screened tubes (fry tubes) that were placed in a 1,000-gallon tank filled with water chilled to 42° F. The fry that were shipped to Cascade Reservoir were also placed into fry tubes but were transported in the small hatchery tank in the bed of the hatchery pickup. Ten thousand nine hundred seventy eight fry escaped due to a faulty incubation tray (Appendix 11).

In July, 760,994 PAH fry were shipped to NSFH and 493,900 were released into Cascade Reservoir. The fry shipped to NSFH and Cascade Reservoir were put into fry tubes that were placed in a 1,000-gallon tank filled with water chilled to 42° F. Ten thousand seven hundred thirty nine fry escaped due to faulty incubation trays (Appendix 12).

Carcass Disposition

All carcasses were checked for tags then picked up once a week by the local sanitation company and hauled to a Department of Environmental Quality approved landfill. A summary of steelhead distribution is included in Appendix 13.

SPRING CHINOOK SALMON PRODUCTION

Adult Collection

Salmon Returns

Spring Chinook salmon returning to the Hells Canyon trap were from smolt releases in 2000, 2001, and 2002. The trap was operated for 10 days between June 10 and July 9, 2003. A total of 141 spring chinook were trapped. They included 131 (93%) hatchery jacks, 5 (4%) hatchery adults, 2 (1%) wild jacks and 3 (2%) wild adults. The wild fish were released below Hells Canyon Dam. None of them returned to the trap. Days of trap operation and trap numbers can be seen in Appendices 14 and 15.

Length-Frequencies and Age and Sex Ratios

Length-frequencies were taken on all fish trapped (Appendices 16 and 17). The age class breakdown by fork length is as follows: 1-Ocean (three-year-olds < 60 cm.), 2-Ocean (four-year-olds 60-86 cm.), and 3-Ocean (five-year-olds ≥86 cm). Fish trapped consisted of 133 (94%) 1-ocean salmon (jacks) of which 131 were hatchery (98%) and 2 wild (2%); 6 (4%) 2-ocean salmon consisting of 4 hatchery (66%) and 2 wild (34%); and 2 (2%) 3-ocean salmon consisting of 1 hatchery (50%) and 1 wild (50%) (Appendix 18). Due to the lack of distinguishing

characteristics at the time of trapping, the sex ratio was not determined and therefore there is no size differentiation between male and female 1,2, and 3 ocean fish.

Incidental Capture

Five rainbow trout (*O. mykiss*) and one steelhead trout were trapped and transported to the hatchery. The steelhead was released below Hells Canyon Dam. The Rainbow trout were all released into Hells Canyon Reservoir. Appendix 19.

Marks, Fin Clips, Injuries

All trapped chinook were checked for marks, consisting of fin clips, tags and injuries. Marked fish consisted of 136 with adipose fin clips. Of those, 23 were partial clips. OFH personnel checked for coded wire tags, pit tags, and radio tags. No tags were found. Injuries included 1 with operculum injuries, 2 with eye injuries, and 3 with body injuries.

Holding and Spawning

Transport

IPC personnel transported one load of spring chinook from the trap to the hatchery daily during the trapping period. Fish were processed immediately upon arrival. Pursuant to the endangered species act requirements, wild or natural spring chinook were returned and released below Hells Canyon Dam. They were released the same day as trapped or the following morning. Before release, they were caudal fin punched to identify recaptures. They were taken back to the release point in the 120 gallon portable tank in the back of the Fish and Game truck. Both wild jacks and 2 wild adults were released back into Snake River. One wild adult died at OFH and was given to the Nez Perce Tribe. Hatchery adults were transported to RRFH on June 19, June 27, and July 10. Staff from the Nez Perce Tribe picked up a portion of their 129 hatchery jacks on June 26 and the remainder on July 10. No jacks were transported to RRFH.

The disposition of fish is shown in Appendix 20

Holding

Upon arrival to the hatchery, the spring chinook were measured and checked for marks, injuries, and tags. All information was recorded for future use. The adult hatchery salmon were injected as described in the following section and placed in the northeast holding pond. The hatchery jacks were not injected and were placed into the southeast holding pond. Wild or natural fish were released into the Snake River below Hells Canyon Dam, with the exception of the one given to the Nez Perce Tribe. Holding pond water temperature ranged from 59°F to 67°F during the trapping season.

Adult Treatments

All adult hatchery fish were given an intraperitoneal injection of Gallimycin (Erythromycin 200 mg/ml) prior to transfer to RRFH. They were injected at the rate of 20 mg/kg of body weight as determined using a length to weight ratio. Hatchery jacks and wild or natural fish were not injected.

Pre-spawning Mortality

Two hatchery jacks died in the holding pond. A wild adult jumped out of a covered tank and died. After receiving approval from the Boise office, it was given to the Nez Perce Tribe. (Appendix 20).

Spawning Operations

Five adult salmon were transported to RRFH for spawning. OFH personnel assisted RRFH personnel with spawning operations. Refer to the RRFH 2003 Chinook Run Report for additional information.

Incubation

Egg Development

During August and September of 2003, OFH staff assisted with spawning operations at RRFH. Eggs were not shipped to OFH this year, therefore there is no egg data in this report.

Egg Disposition

Eggs were not shipped to OFH this year, therefore there is no egg data in this report.

FALL CHINOOK SALMON PRODUCTION

Egg Development

The Department received 200,000 eyed-eggs from the LFH in Starbuck, WA. Eyed eggs, with 882 temperature units (TU), were picked up by OFH personnel and transported to the OFH on December 22, 2003. Eight coolers were used to transport approximately 25,000 eyed eggs per cooler. Well-water from LFH was used for transporting the eggs at 52° F. When they arrived at OFH, they were disinfected for approximately 30 minutes in a solution of well water and 100 ppm iodophore. After disinfection, the temperature of the water in the coolers was measured and warmed with well water as needed. Then the eggs were placed in 59 Heath trays. Each tray received approximately 3,390 eggs. The eggs were incubated with 54° F water at 5 gpm. Dead eggs were picked at 912 TU, and again at 1,061 TU. A total of 2,331 dead eggs were removed before hatching. Survival from eyed egg to hatch was 98.8%.

Fry to Smolt Development

This year fall chinook eggs were received seven days later than in 2002. In the first year of production, button-up fry were placed in the raceways and started on feed January 30. In 2004 we started them on feed February 11. Rearing flows and density were lower in 2004 than in 2003. The Integrated Hatchery Operations Team (IHOT) recommends a maximum flow index of 1.0 lb/gpm /in and a maximum density index of 0.30 lb/ft³/in. These recommendations were followed as closely as possible however, the recommended indices were both exceeded during the final month of the rearing cycle (Appendix 21). Growth was tracked weekly, and pound counts and lengths were recorded (Appendix 22). Fall chinook were fed Moore Clark feed from button up to release (Appendix 23). We used a combination of hand feeding and belt feeders to supply food to each raceway. Smolts were raised in the outside raceways on well water until reaching 100 fpp on April 12, then 200 gpm of river water was introduced. The water temperature decreased from 54 °F to 53 °F. During the rearing period, water temperatures were monitored at the hatchery head box for river water, at the well for well water, and at the raceway head box for mixed water (Appendix 24).

Moore Clark feed was fed this season to evaluate growth and for comparison with data collected the past two years (Appendix 25). This year river water was added gradually and there was not a drastic drop in feed consumption. This is believed to be caused by milder winter air and water temperatures. Moore Clark feed that contained beta glucan was fed for two weeks prior to marking. Moore Clark's research indicates that beta glucan helps promote activation of the fish's immune system and may reduce infection due to stress such as fin-clipping or marking.

On May 3, 2004, staff working for the Nez Perce Tribe picked up 166,623 sub-yearling smolts, which averaged 88.0 fpp and 3.5 inches fork length, and transported them to Pittsburgh Landing on the Snake River for final acclimation. On May 24, 2004, they released 165,438 sub-yearlings into the Snake River at an average fork length of 3.7 inches and an average of 54 fpp. At OFH, 10,000 sub yearlings were marked with Passive Integrated Transponders (PIT tags) and reared until release. On May 28, OFH released 9,957 sub-yearlings at 4.1 inches average fork length and 48 fpp. They were released into the Snake River at the US Forest Service boat ramp one mile below Hells Canyon Dam. Fish distribution is shown in appendix 26 and a summary of production data is shown in Appendix 27. The release weight in 2004 was slightly lower than in 2003 due to receiving eggs later in the season. Low snow pack and reduced flow in the Snake River corridor may have influenced Snake River water temperatures. In response to warmer than expected water temperatures, the release target date of June 1, which was used for preliminary project design, was not used. Depending on conditions next year, we will adjust release timing as we become more familiar with the affect water temperature has on movement of sub-yearling smolts down the migration corridor.

Predators

Hatchery staff observed predation by a kingfisher and a mink. The mink was trapped and released down river. It did not return to the hatchery. It was not possible to trap the kingfisher. Camouflaged netting was placed over the raceways as a deterrent. In addition, the netting provided shade for the fish, reducing risk of sunburn.

Fish Marking

Marking operations commenced on April 26 and were completed on April 30, 2004. All fall chinook were adipose-fin-clipped. Once all the smolts were clipped and counted, hatchery numbers were adjusted from 182,342 to 176,594 (Appendix 26). A total of 10,000 PIT tags were placed in the sub-yearlings that were to be released into the Snake River below Hells Canyon Dam. The remaining sub-yearlings were implanted with coded-wire-tags. On May 2, 2004, a clip evaluation was performed on 500 fish. The results were 3 with deep clips (0.6%) and 1 with a partial fin clip (0.2%). The remaining 496 (99.92%) were clipped satisfactorily. A total of 300 PIT tagged fish were evaluated for tag loss. Tags were found in 100% of the surveyed fish.

Fish Health

Disease Testing

Personnel at the Department's Eagle Fish Health Lab performed health tests on these fish prior to release. Disease events were not encountered during the reporting period. Treatments were not applied to Brood Year 2003 fall chinook salmon at OFH.

Organosomatic Index

The Organosomatic Index in this context is a measure of fish health developed as part of the Autopsy-Based Fish Health/Condition Assessment System (Goede, R. W., and S. Houghton. 1987) Results of organosomatic scoring for Brood Year 2003 fall chinook are presented in Appendix 28.

Acute Losses

Neither acute nor chronic losses were experienced during the 2003-2004 rearing cycle.

Other Assessments

The eggs this year were from a later spawn than we have received before, and the eggs were from IHN positive parents. We observed elevated early mortality through the seventh week on feed. Pathology staff did not find a cause for this mortality.

Well water was degassed before use on the eggs in the incubation room this year. All eggs were disinfected when they arrived at OFH and eggs were isolated into small groups during incubation to limit IHN transmission as much as possible.

Ceratomyxa shasta (CS) has not been isolated from these fish. In April 2004, the Eagle Fish Health Laboratory initiated a series of exposure trials to establish the onset of parasitism by CS. This myxosporean parasite has been established as a main source of mortality for migrating chinook salmon and it is present in the Snake River. Since OFH utilizes Snake River water to rear fall chinook salmon, it is imperative that the Department and IPC are informed about the timing of CS in this portion of the river. The objectives of this research project are to obtain data pertaining to timing of emergence and prevalence of CS. We will make recommendations about timing of release for the fall chinook salmon and investigate increasing the availability of well water at this facility.

Season Mortality

Mortalities were tracked on a daily basis. As previously stated, 2,331 dead eggs were removed prior to hatch. After hatch, 2,272 dead sac fry were removed. After being placed in the raceways, 13,069 fry died and were removed. Mortality by the week, after being placed in the raceways, is listed in Appendices 29 and 30.

Smolt Transport

Of the 10,000 sub-yearlings marked with PIT-tags, 9,957 survived to release and were transported by IPC personnel using the adult fish truck at the OFH. These sub-yearlings were released into the Snake River below Hells Canyon Dam.

ACKNOWLEDGEMENTS

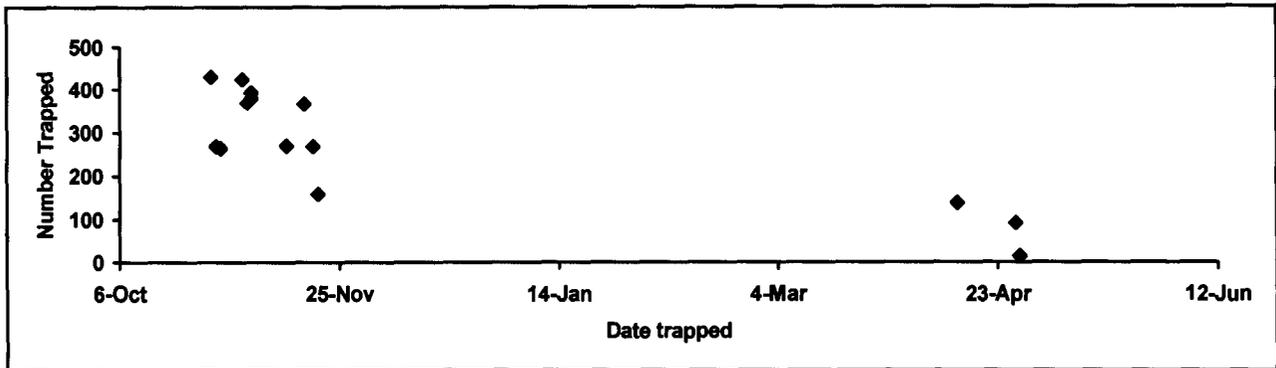
The OFH staff would like to thank the staff from LFH, IPC and the Department that have contributed to the successful operation of OFH this year.

LITERATURE CITED

Goede, R. W., and S. Houghton. 1987. ASUM: A Computer Program For The Autopsy-Based Fish Health/Condition Assessment System. Utah Division of Wildlife Resources Fisheries Experiment Station, 1465 West 200 North, Logan, Utah 84321.

APPENDICES

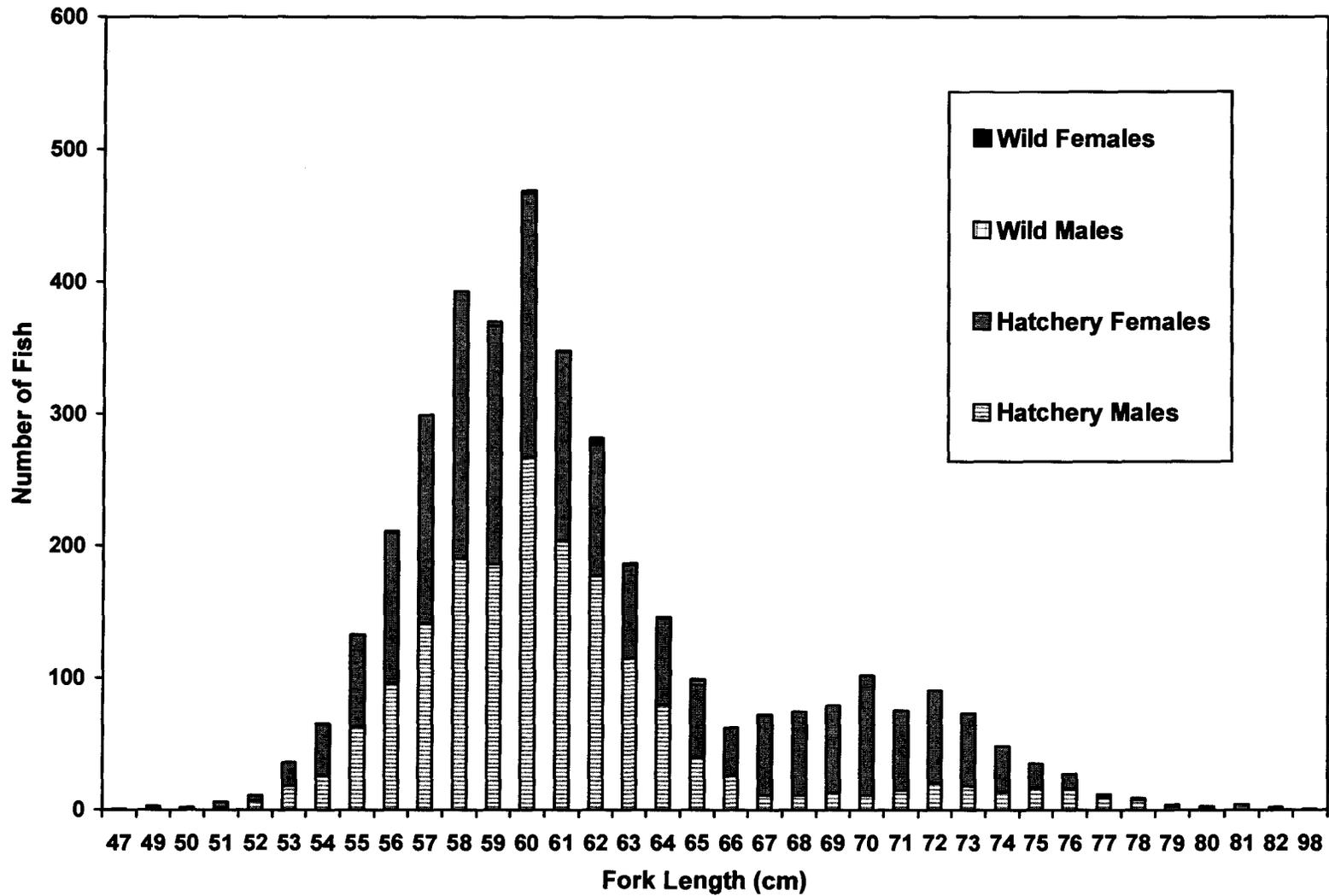
Appendix 1. Hells Canyon Dam steelhead trap counts for Brood Year 2004.



Appendix 2. Daily trap counts at Hells Canyon Dam during fall 2003 and spring 2004.

Fall 2003 Trapping		Spring 2004 Trapping	
Date	Number Of Fish	Date	Number Of Fish
October 27	430	April 14	136
October 28	268	April 27	90
October 29	264	April 28	13
November 3	425		
November 4	369		
November 5	393		
November 10	380		
November 13	270		
November 17	367		
November 19	269		
November 20	159		
Total	3,594	Total	239

Appendix 3. Length-frequency of steelhead trapped at Hells Canyon Dam during fall 2003 and spring 2004.



Appendix 4. Lengths of steelhead trapped at Hells Canyon Dam during fall 2003 and spring 2004.

Fork Length (cm)	Total Fish	Hatchery Males	Hatchery Females	Wild Males	Wild Females
47	1		1		
49	3	2	1		
50	2		2		
51	6	2	4		
52	11	7	4		
53	36	18	18		
54	65	26	38		1
55	133	63	69	1	
56	211	96	114		1
57	299	141	158		
58	393	190	203		
59	370	186	181	3	
60	469	267	200		2
61	348	204	143		1
62	282	177	100	2	3
63	187	115	70		2
64	146	80	65		1
65	99	40	55	3	1
66	62	26	36		
67	72	11	60	1	
68	74	11	63		
69	79	13	66		
70	102	11	91		
71	75	15	60		
72	90	20	70		
73	73	18	55		
74	48	14	34		
75	35	17	18		
76	27	16	11		
77	12	9	3		
78	9	8	1		
79	4	3	1		
80	3	2	1		
81	4	4			
82	2	2			
98	1		1		
Total	3,833	1,814	1,997	10	12
Age-class	Male	Female	Total	Average length	
^a One-ocean	1,661	1,438	3,099	59.5 cm	
^b Two-ocean	163	571	734	71.1 cm	
Total	1,824	2,009	3,833	61.7 cm	

^aOne-ocean: males ≤67 cm, females ≤65 cm

^bTwo-ocean: males ≥ 68 cm, females ≥ 66 cm

Appendix 5. Age and gender of steelhead trapped at Hells Canyon Dam during fall 2003 and spring 2004.

Age-Class	Hatchery Males	Wild/Natural Males	Hatchery Females	Wild/Natural Females	Total*
1-Ocean	1,651	10	1,426	12	3,099
2-Ocean	163	0	571	0	734
Total	1,814	10	1,997	12	3,833

Appendix 6. Distribution of Brood Year 2004 steelhead trapped at Hells Canyon Dam.

3,833	Trapped (3,594-fall, 239-spring) (Wild and Hatchery) (includes 1 trap mort)
3,811	Ponded (ponded 3,738 & 73 excess males that were returned to Snake R.)
4	High School Biology Class
1,000	Nez Perce Tribe
2,178	Out-Planted
22	Wild/natural released

Appendix 7. Brood Year 2004 steelhead disposition by sex and origin.

MALES		FEMALES	
261	Spawned	241	Spawned and incubated
0	Killed and rejected	10	Spawned and rejected
32	Mortalities	85	Mortalities
10	Wild released	12	Wild released
2	Given to High School	2	Given to High School
1,519	Out-planted	1,659	Out-planted
1,824	Total males	2,009	Total females

One male trap mort is included in the mortality total.

Female morts include 15 ripe females that were killed to recover a CWT and not spawned.
 Outplants include 1,000 to the Nez Perce Tribe.

Appendix 8. Incidental Capture during Brood Year 2004 at Hells Canyon Trap.

Length	Rainbow Trout	Brown Trout	Fall Chinook	Spring Chinook
31	1			
38	1			
40	1			
42	3		1 H 1 W	
44	2		1 H	
45	2		1 H	
46	2			
47	1			
48	1			
49			2 H	
53			1 H	
57		1		
67				2 H
68				1 H
72				1 H
73				2 H
74				1 W
76				1 H
Total	14	1	7	8

Appendix 9. Brood Year 2004 steelhead spawning summary for Oxbow Fish Hatchery.

Lot	Spawn Date	Females Spawned	Females Culled	Females Retained	Green Eggs Spawned	Eggs Culled	Green Eggs Retained	Eyed Eggs	Percent Eyed	Eggs/ female	Eyed Eggs Shipped	Fry Shipped
1	3/15/04	4	0	4	25,455	0	25,455	21,334	84	6,364	0	8,479
2	3/18/04	4	0	4	24,989	0	24,989	9,997	40	6,247	0	5,343
3	3/22/04	10	2	8	50,054	0	50,054	34,429	69	6,257	0	8,460
4	3/25/04	8	0	8	58,016	0	58,016	43,079	74	7,252	0	20,580
5	3/29/04	12	0	12	83,394	0	83,394	73,910	89	6,950	0	71,692
6	4/01/04	25	1	24	162,028	0	162,028	133,129	82	6,751	0	119,503
7	4/05/04	19	1	18	115,510	0	115,510	106,930	93	6,417	0	44,931
8	4/08/04	21	1	20	122,634	0	122,634	109,235	89	6,132	0	77,394
9	4/12/04	22	0	22	137,504	0	137,504	110,078	80	6,250	0	106,776
10	4/15/04	18	0	18	121,468	0	121,468	109,230	90	6,748	109,230	0
11	4/19/04	19	1	18	108,963	0	108,963	93,259	86	6,054	93,259	0
12	4/22/04	21	1	20	106,356	0	106,356	86,520	81	5,318	86,520	0
13	4/25/04	10	0	10	46,087	0	46,087	40,041	87	4,609	40,041	0
14	4/29/04	29	2	27	120,396	0	120,396	80,121	67	4,459	80,121	0
15	5/03/04	12	0	12	55,153	0	55,153	37,640	68	4,456	37,640	0
16	5/06/04	10	1	9	35,369	0	35,369	25,348	72	3,930	25,348	0

17	5/10/04	4	0	4	12,145	0	12,145	7,096	58	3,036	7,096	0
18	5/13/04	3	0	3	11,763	0	11,763	10,037	85	3,921	10,037	0
Total		251	10	241	1,397,284	0	1,397,284	1,131,413	81	5,798	489,292	463,158

Appendix 10. Brood Year 2004 steelhead egg and fry incubation for Pahsimeroi Hatchery.

Lot	Spawn Date	Females Spawned	Females Culled	Females Retained	Green Eggs Spawned	Eggs Culled	Green Eggs Retained	Eyed Eggs	Percent Eyed	Eggs/female	Eyed Eggs Shipped Fry	Eggs Shipped
4	4/2/04	48	0	48	223,750	0	223,750	145,769	65	4,661	0	141,396
5B	4/5/04	48	4	44	228,483	17,576	210,907	148,401	70	4,760	0	143,949
6B	4/7/04	36	0	36	165,803	0	165,803	121,072	73	4,606	0	117,440
8	4/12/04	33	0	33	140,941	0	140,941	119,085	85	4,271	0	115,512
9	4/15/04	60	0	60	257,084	0	257,084	201,339	78	4,285	0	195,299
10	4/10/04	60	0	60	252,094	0	252,094	201,014	80	4,202	0	194,984
11	4/22/04	60	0	60	245,309	0	245,309	194,572	79	4,088	132,227	61,172
12	4/26/04	48	2	46	202,806	8,450	194,356	142,102	73	4,225	0	133,264
13	4/29/04	110	0	110	454,923	0	454,923	347,715	77	4,136	184,785	151,878
14	5/3/04	55	0	55	241,033	0	241,033	160,774	67	4,382	160,774	0
Total		558	6	552	2,412,226	26,026	2,386,200	1,781,843	75	4,323	477,786	1,254,894

Appendix 11. Brood Year 2004 steelhead egg and fry disposition from Oxbow Hatchery.

Number	Disposition
1,397,284	Green eggs
0	Green eggs culled
265,871	Dead eggs
1,131,413	Eyed eggs
433,951	Eyed eggs shipped to Niagara Springs
55,341	Eyed eggs shipped to Hagerman State
642,121	Eyed eggs remaining on station
19,264	Eyed eggs to fry loss (3%)
622,857	Fry on station
463,158	Fry shipped to Niagara Springs
148,721	Fry shipped to Cascade Reservoir
10,978	Escapees (fish escaped because of leaking trays)
0	Excess fry disposed of

Appendix 12. Pahsimeroi Brood Year 2004 steelhead egg and fry disposition from Oxbow Hatchery.

Number	Disposition
2,412,226	Green eggs including culled eggs
26,026	Green eggs culled prior to counting (based on fecundity)
2,386,200	Greens eggs after culling
604,357	Dead eggs
1,781,843	Eyed eggs
345,559	Eyed eggs shipped to Niagara Springs
132,227	Eyed eggs shipped to Hagerman State
1,304,057	Eyed eggs remaining on station
38,424	Eyed eggs to fry loss (3%)
1,265,633	Fry on station
760,994	Fry shipped to Niagara Springs
493,900	Fry shipped to Cascade Reservoir
10,739	Escapees (fish escaped because of leaking trays)
0	Excess fry disposed of

Appendix 13. Oxbow Hatchery steelhead trapping and disposition summary.

Fish Trapped ^a		Age-classes ^b	
Males	1,824	1 Ocean	3,099
Females	3,009	2 Ocean	734
Total	3,833	Total	3,833

Fish Disposition	Males	Females	Total
Pre-spawn mortality	2	14	16
Pond mortality	30	71	101
Spawned only	261	251 ¹	502
Released	10	12	22
Out planted	1,519 ³	1,659	3,178
Other	2 ²	2 ²	4
Total	1,824	2,009	3,833

Carcass disposition	Males	Females	Total
Hauled to landfill	293	336	629

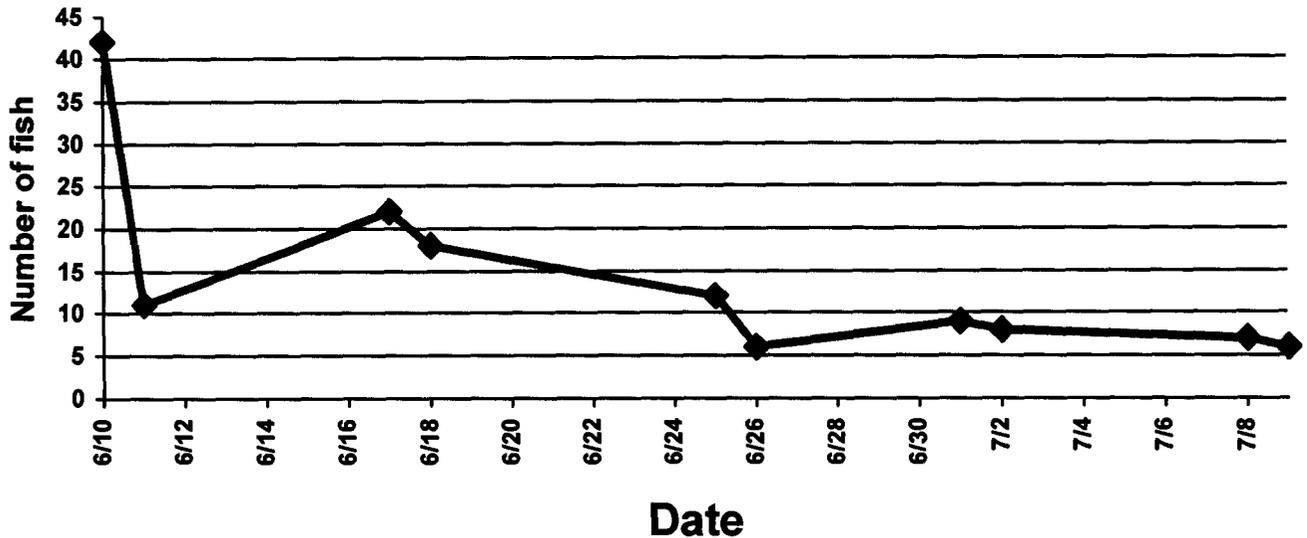
^a One male trap mort is included in the mortality total.

^b Age Class Breakdown: 1 Ocean: males ≤ 67 cm (1,486), females ≤ 64 cm (1,384)
2 Ocean: males ≥ 68 cm (217), females ≥ 65 cm (786)

¹Includes 10 rejects. Female morts include 15 ripe females that were killed to recover a CWT and not spawned. Outplants include 1,000 to the Nez Perce Tribe.

Appendix 14. Spring Chinook Run Timing

Spring Chinook trap Timing (Oxbow 03)



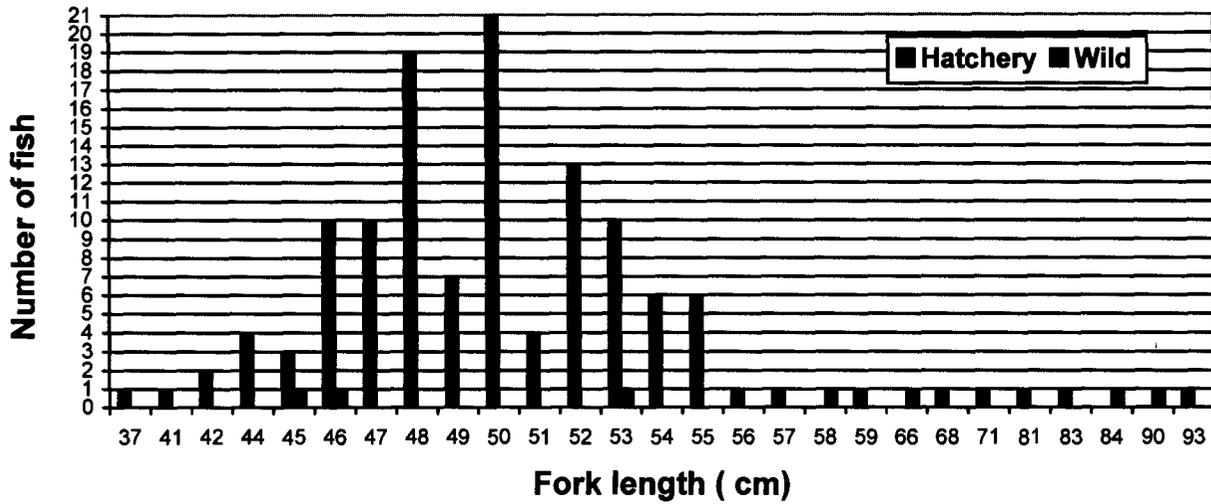
Appendix 15 Oxbow Spring Chinook Operations for brood year 2003

Date	Total Trapped	Trapped Hatchery	Trapped Wild	Released Wild	Pond Mortalities	Hauled
6/10/03	42	41	1	1		
6/11/03	11	11			1	
6/17/03	22	22				
6/18/03	18	18				
6/19/03						2
6/25/03	12	11	1	1		
6/26/03	6	5	1	1		99
6/27/03						1
7/01/03	9	9				
7/02/03	8	8				
7/08/03	7	7				
7/1-9/03	6	4	2	1	2	
7/10/03						32
Total	141	136	5	4	3	134

Five of the hauled fish were transferred to Rapid River Fish Hatchery and 129 were killed and given to the Nez Perce Tribe for consumption. Two of the pond mortalities were hatchery jacks and one was a wild adult.

Appendix 16. Spring chinook length-frequencies.

Spring Chinook Length-Frequencies (Oxbow 03)



Appendix 17 Spring chinook length-Frequencies.

Fork length (cm)	Totals	Hatchery Adults	Wild Adults	Hatchery Jacks	Wild Jacks
37	1			1	
41	1			1	
42	2			2	
44	4			4	
45	3			3	
46	10			10	
47	10			10	
48	19			19	
49	7			7	
50	21			21	
51	13			13	
52	11			10	1
53	15			15	
54	6			6	
55	6			6	
56	1			1	
57	1			1	
58	1				1
59	1			1	
66	1		1		
68	1	1			
71	1	1			
81	1	1			
83	1	1			
84	1		1		
90	1		1		
93	1	1			

Total Fish	141	5	3	131	2
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1-Ocean (3-year-old, <60 cm)

2-Ocean (4-year-old, 60-86 cm)

3-Ocean (5-year-old, >86 cm)

Appendix 18 Spring Chinook Age-Class Breakdown.

Age-class	Hatchery	Wild	Total
1-Ocean	131	2	133
2-Ocean	4	2	6
3-Ocean	1	1	2
Total	136	5	141

1-Ocean (3-year-old, <60 cm)

2-Ocean (4-year-old, 60-86 cm)

3-Ocean (5-year-old, >86 cm)

Appendix 19 Incidental Capture.

Date	Steelhead	Rainbow trout
7/02/03	1	2
7/09/03		3
Total	1	5

Appendix 20 Spring Chinook Disposition.

Disposition	Hatchery	Wild
Trapped – Oxbow	136	5
Mortalities – Oxbow	2	1*
Released – Oxbow	0	4
Transferred to RRFH	5	0
Transferred to Tribe	129	1*

* One wild adult-mortality was transferred to the Nez Perce Tribe.

Appendix 21. Weekly flow and density indices during rearing of Brood Year 2003 fall chinook at Oxbow Fish Hatchery

Date	Raceway Volume	Flow	Flow Index	Density Index
2/11/04	616	120	0.98	0.19
2/23/04	616	200	0.82	0.27
3/01/04	1198	250	0.86	0.18
3/8/04	1198	300	0.90	0.23
3/15/04	1198	375	0.88	0.28
3/22/04	1638	375	1.12	0.26
3/29/04	1638	375	1.39	0.32
4/05/04	1638	375	1.53	0.35
4/12/04	2671	575	1.17	0.25
4/19/04	2671	575	1.13	0.24
4/26/04	2671	575	1.24	0.27
5/03/04	300	350	0.09	0.11
5/10/04	300	350	0.14	0.16
5/17/04	300	350	.16	0.18
5/24/04	300	350	.16	0.18

Appendix 22. Weekly length and weight data for Brood Year 2003 fall chinook reared at Oxbow Hatchery.

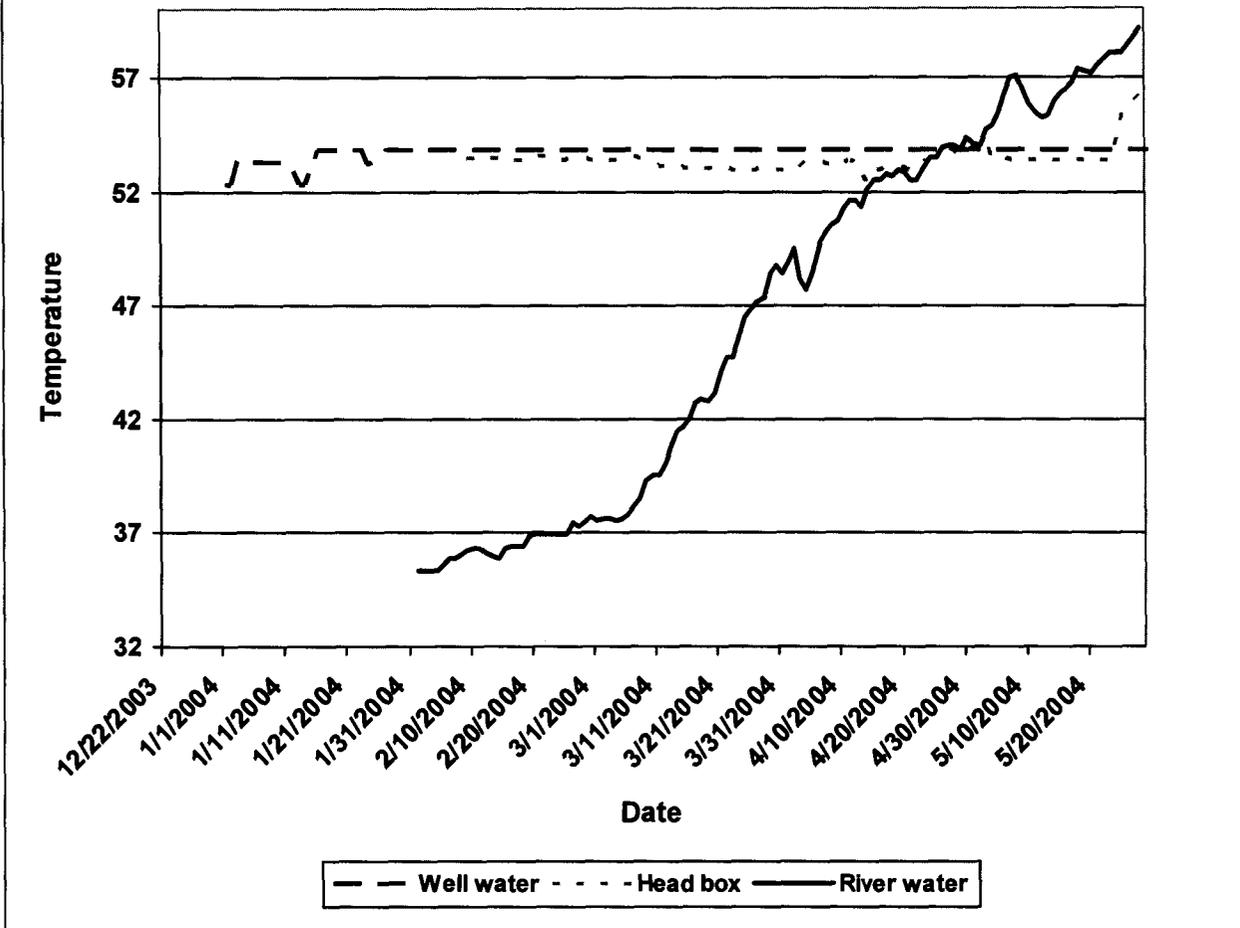
Date	Number	Weight (lbs)	Fish/ Pound	Average Length (mm)	Minimum Length (mm)	Maximum Length (mm)	Standard Deviation (mm)
2/13/04	309	0.30	1039.16	39.5	37	42	1.25
2/23/04	316	0.47	670.39	42.92	38	47	2.07
3/01/04	287	0.63	452.42	48.04	40	53	2.91
3/08/04	314	0.96	328.47	52.24	44	59	3.33
3/15/04	312	1.28	244.22	57.54	59	64	3.43
3/22/04	306	1.78	171.94	64.14	55	71	3.10
3/29/04	308	2.41	127.82	70.24	56	89	5.34
4/05/04	331	3.02	109.53	73.4	50	86	5.90
4/12/04	291	3.34	87.15	78.86	66	94	5.73
4/19/04	315	3.67	85.94	83.42	67	098	6.35
4/26/04	287	3.91	73.45	88.32	74	108	8.02
5/03/04	367	4.14	88.63	91.65	77	113	8.75
5/10/04	310	5.72	54.17	94.98	80	118	9.48
5/17/04	300	6.21	48.3	98.64	85	115	7.50
5/24/04	315	7.22	43.60	104.78	84	121	8.81

Appendix 23. Feed used during Brood Year 2003 fall chinook rearing program

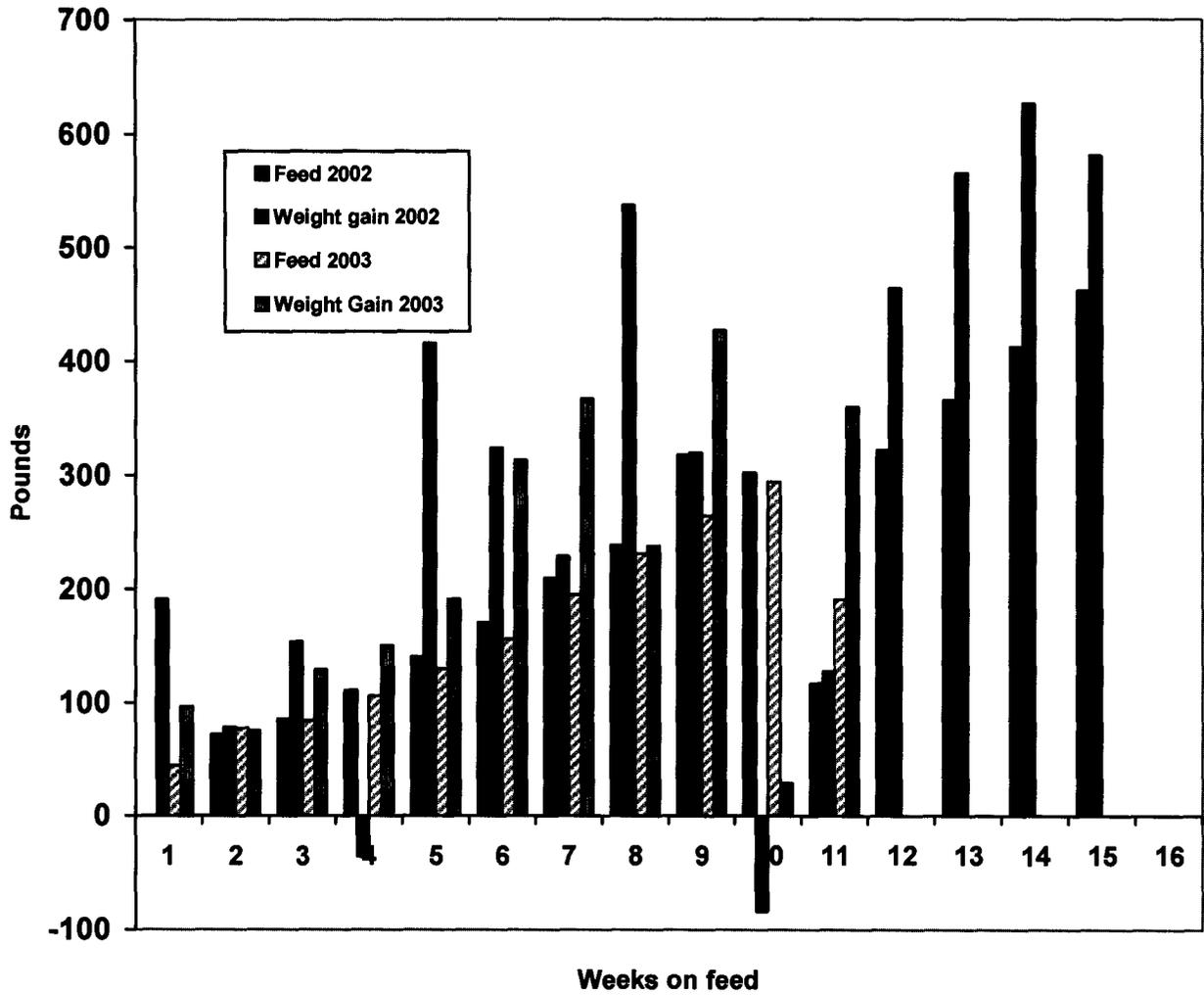
Month	#0 Starter	#1 Starter	#2 Starter	1.2 mm	1.2 mm Beta Glucan	1.5 mm
Feb	88	103.8				
Mar		160.2	488.8			
Apr			391.2	33.8	572	
May					44	19
Total	88	264	880	33.8	616	19

Appendix 24. Well, river, and mixed water temperatures measured at Oxbow Fish Hatchery, February through May, 2004

Water temperatures 03-04



Appendix 25. Comparison of pounds of food fed and weight gained during production of Brood Years 2002, and 2003 fall chinook at Oxbow Fish Hatchery.



Appendix 26. Brood year 2003 fall chinook distribution

Number	Disposition
200,000	Eyed eggs received from Lyons Ferry
-4,603	Dead eggs and sac-fry picked from incubation trays
195,397	Fry placed in raceways
-13,055	Morts picked through April
182,342	Fry on station
-5,748	Adjustment from hatchery count to actual clipping counts
176,594	Fry remaining on station
-166,623	Fry shipped to the Nez Perce Tribe
9,971	Fry on station at the end of April
-14	Morts picked in May
9,957	Fry remaining on station
-9,957	Fry planted below Hells Canyon Dam in May
0	Fry remaining on station

Appendix 27. Brood year 2003 fall chinook production summary

Fish on hand at end of month					Mortality		Fish Feed		Weight Gain		Feed Conversion	
Month	Number	Weight	Length	Fish/ lb.	Month	To Date	Month	To Date	Month	To Date	Month	To Date
Feb	184,807	408.49	1.89	452.4	10,520	10,520	191.8	1991.8	225.5	225.5	0.85	0.85
Mar	182,577	1,489.5	2.80	122.6	2,230	12,750	649.0	840.8	1,081	1,306.5	0.60	0.64
Apr	182,272	2,056.5	3.55	88.6	305	13,055	997.0	1,851	750	2,056.5	1.33	0.90
May	9,957	207.4	3.81	48.0	14	14	63	63	97.4	97.4	0.65	0.65

Eggs were received December 22, 2003

Appendix 28. Brood Year 2003 fall chinook autopsy summary

Accession No:	04-175	Location:	Oxbow Hatchery
Species:	Chinook Fall	Autopsy Date:	0422/2004
Strain:	Lyon's Ferry	Age:	Fry
Unit:Reason for Autopsy:	Prelib	Sample Size:	60
Investigator:	Munson		

Values As Percents Of Total Sample

Eyes		Gills		Pseudo-branches		Thymus		Mesen. Fat		Spleen		Hind gut		Kidney		Liver		Bile	
N	60	N	60	N	60	0	60	0	0	B	5	0	60	N	60	A	20	0	60
B1	0	F	0	S	0	1	0	1	13	R	55	1	0	S	0	B	31	1	0
B2	0	C	0	L	0	2	0	2	29	G	0	2	0	M	0	C	6	2	0
E1	0	M	0	S&L	0			4	11	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0			4	7	E	0			U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0		
H2	0			O	0			Mean 2.2								OT	0		
M1	0																		Mean=0.00
OT	0																		

Summary of normals

60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
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N = normal

OT = other

Thymus: 0 = no hemorrhage

Mesenteric fat: 0 = none, 1 = < 50% coverage, 2 = 50%, 3 = > 50%, 4 = 100%

Spleen: R = red, E = enlarged (EIBS enlarges spleens)

Hind gut: 0 = no inflammation

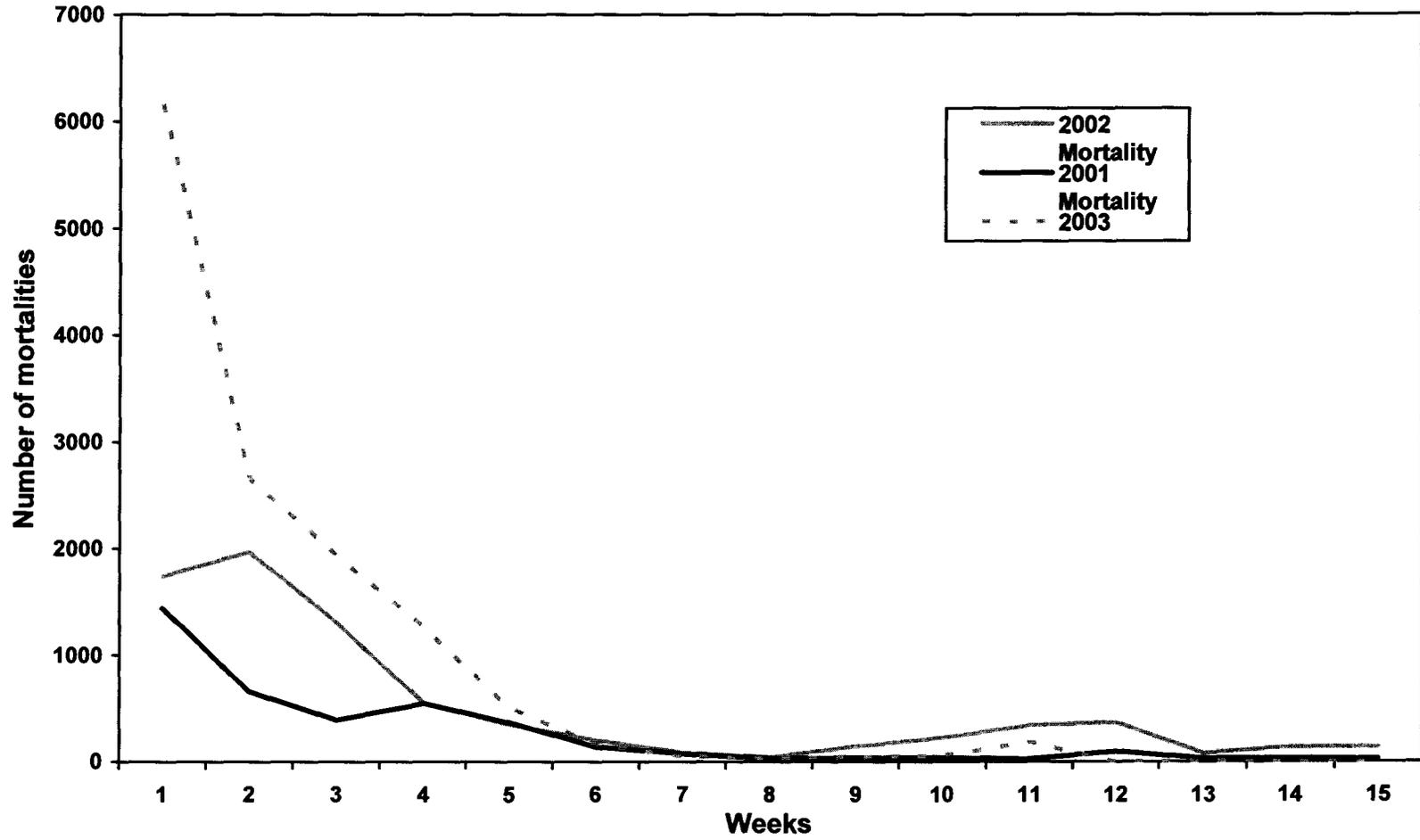
Liver: B = pail red

Bile: 0 = yellow bile < full bladder

Appendix 29. Weekly mortality of Brood Year 2003 fall chinook reared at Oxbow Fish Hatchery

Week	2/11	2/16	2/23	3/1	3/8	3/15	3/22	3/29
Mortality	0	6,171	2,655	1,937	1,264	497	162	51
Week	4/5	4/12	4/19	4/26	5/3	5/10	5/17	5/22
Mortality	33	40	57	188	0	13	1	0

Appendix 30. Comparison of mortality in fall chinook for brood years 2001, 2002 and 2003



Appendix 31. Snake River historic release and return data

Year	Rapid River Hatchery Spring Chinook Released	Steelhead Spring Releases	Steelhead Fall Releases	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		36
1980		348,520	191,900	1	339
1981	1,001,700	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	103,000	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	550,500	243,900		912	1,714
1993	200,300	660,500		431	1,259
1994	380,504	609,115		29	1,403
1995	499,536	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
2000		601,220		1,174	2,250
2001		579,467	115,220		3,256
2002	500,195	526,168	171,483	34	3,781
2003	299,854	541,472	209,246	141	4,002
2004	500,000	525,000			

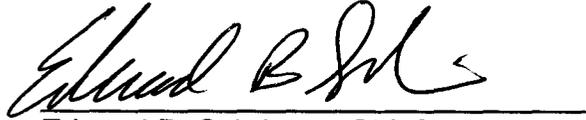
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