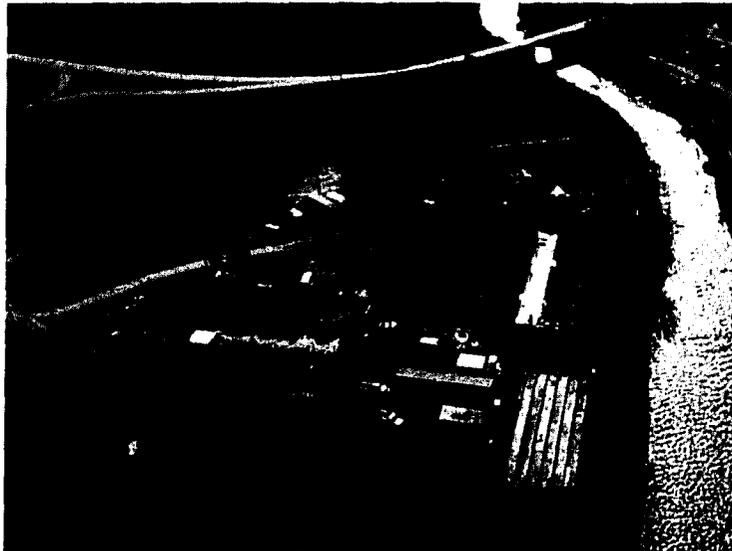




OXBOW FISH HATCHERY

**2003 Steelhead Brood Year Report
2002 Spring Chinook Brood Year Report
2002 Fall Chinook Brood Year Report**



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ABSTRACT

The Oxbow Fish Hatchery (OFH) trap operated for 11 days between October 21 and November 6, 2002 and 2 days between April 8, and April 14, 2003. A total of 4,002 steelhead (*Oncorhynchus mykiss*) were trapped during these operating periods. This total consisted of 3,993 (99.8%) hatchery steelhead, and 9 (.2%) wild steelhead. During the fall of 2002 and the spring of 2003, 3,401 steelhead were out-planted for sport fisheries, supplementation programs, and tribal consumption.

Spawning consisted of 15 egg takes from March 20 to May 8, 2003. Eggs from 268 females were incubated. These females produced 1,720,666 green eggs were incubated to eye-up. Survival to eye-up was 80.2%, producing 1,338,404 eyed eggs. From these, 445,336 eyed-eggs and 451,438 fry were shipped to Niagara Springs Fish Hatchery (NSFH)

Eggs from 432 females were shipped from Pahsimeroi Fish Hatchery to OFH. These 432 females produced 2,190,402 green eggs and 1,813,202 eyed eggs. From these, 201,495 eyed eggs were shipped to Hagerman State Fish Hatchery and 561,030 were shipped to NSFH. The remaining eggs were raised to fry stage. Of the resulting button-up fry, 564,872 were shipped to NSFH. The remaining 359,118 fry were discarded.

Spring chinook were trapped 13 days between May 21 and July 2, 2002. A total of 34 spring chinook salmon were trapped, including 28 hatchery fish (all adults) and six wild fish (all adults). All wild or natural salmon were released below Hells Canyon Dam. The OFH had one adult hatchery male pond mortality.

Adults trapped at OFH were transported to Rapid River Fish Hatchery (RRFH) for spawning. Eggs from 469 were incubated at OFH. At eye-up, eggs from 107 females were culled based on bacterial kidney disease protocol. The remaining 362 females produced 1,202,177 eyed eggs from 1,319,489 green eggs. Overall eye-up was 91%. Eyed-eggs were transported back to RRFH for final incubation and rearing.

A total of 230,000 eyed fall chinook (*O. tshawytscha*) eggs were acquired from Lyons Ferry Hatchery and transported to the OFH on December 13, 2002. They were placed in Heath trays and incubated with 53.7° F water until button up. Fry were placed in the outside raceways on Feb 10 and 11, 2003 and raised on well water at a temperature of 56° 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. Deep clips resulted in a mortality increase of 600 fish. On May 22, 2003, 209,246 sub yearling smolts were released below Hells Canyon Dam. They averaged 46.6 fish/pound, 4.03 inches in length, and had a total weight of 4,490 pounds. The survival rate from eyed-egg stage to release was 95.4 %.

In addition to the fish reared at OFH, a group of 332,226 sub-yearling fall chinook were reared for Idaho Power Company at Umatilla Hatchery by the Oregon Department of Fish and Wildlife. Eggs for this program were also provided by Lyons Ferry Hatchery. These fish were released below Hells Canyon Dam on May 15 and 16, 2003 at an average size of 41.44 fish/pound.

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HATCHERY OVERVIEW

Introduction

Oxbow Fish Hatchery (OFH) is part of the Idaho Power Company (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). OFH was constructed to mitigate for losses of anadromous fish resulting from the construction of Brownlee, Oxbow and Hells Canyon dams on the Snake River. The OFH is a steelhead (*Oncorhynchus mykiss*) adult holding, spawning, and egg rearing station. In addition, spring chinook salmon (*O. tshawytscha*) are collected and held for transport to Rapid River Fish Hatchery (RRFH). In the fall of 2000, IPC constructed two raceways for the production of fall chinook salmon (*O. tshawytscha*). The OFH receives eyed fall chinook eggs from the Lyons Ferry Hatchery. The eggs are incubated at the hatchery until hatch, reared for four months, and then released as sub-yearling smolts below Hells Canyon Dam.

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 OFH has three main objectives:

1. Trap and spawn sufficient adult steelhead to provide Niagara Springs Fish Hatchery (NSFH) with approximately 1 million eggs and fry.
2. Trap adult spring chinook and transfer them to RRFH for spawning. The number of adults should be sufficient to produce approximately 1.2 million eggs.
3. Rear 1 million sub-yearling fall chinook smolts for release into the Snake River below Hells Canyon Dam.

Facility Description

The OFH consists of the following: A hatchery building which houses the office, shop, and an incubation room; four adult holding ponds including fish loading and off-loading facilities; an incubation water chilling unit; a spawning building; dormitory; Assistant Hatchery Manager's residence; two cement raceways; and an off-site fish trap. A more detailed description of the main facilities 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 a shop and office space, and the other half is for egg incubation. The incubation room has 384 Heath trays in 24 stacks, giving it the capacity to incubate 4 million eggs. Two 8-ft square 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 cubic feet of holding area. The two smaller divisions measure 55 ft x 35 ft x 5 ft, providing 19,250 cubic feet of holding space. Two electric crowding racks provide the ability to move the fish into a center raceway, which is 4.5 ft wide and 70 ft long. It has a small electric crowd rack used to move the fish into the spawning building.

The adult fish trap is located 23 road miles downstream from 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 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) chiller is used to regulate the temperature of well water 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 gallons per minute (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 and consists of a small fiberglass sided building. Part of it is recessed into the ground to provide holding areas for the fish that are to be spawned. The remaining portion is at ground level where the females are spawned and the eggs fertilized and processed.

In 2000, two cement raceways were constructed to provide rearing space for fall chinook. They are each 130 ft long, 6 ft wide, and 4 ft deep. A cement wall divides the first 30 ft of each raceway into two sections. The head-box and outlet end of the raceways reduce the useable length of rearing space to approximately 118 ft. The capacity of the raceways was designed for 250,000 sub-yearling smolts at 70 fish per pound (fpp). Well water and river water are plumbed to the raceways in order to achieve required flows and to aid in controlling 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 11 of the incubator stacks to provide warmer water if desired.

Staffing

One permanent Fish Hatchery Assistant Manager staffs OFH. Two four-month and two eight-month Biological Aides share 4,159 hours of temporary labor time budgeted for hatchery maintenance and operation.

Hatchery Improvements

Recent Hatchery Improvement

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) A rectangular tank was placed in the ground just out side the spawning building for holding adult fish that must be returned to the river below Hells Canyon Dam for releases
- 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 Hatchery Improvements

- 1) The spawning building should be enlarged and lowered four feet into the ground. This would increase worker safety by reducing the potential for falls or injuries while climbing ladders. It would enable release of unripe fish into ponds without dropping them over the fence decreasing the potential for injury and stress to the fish. Enlarging the space would also make fish health sample collection more efficient.
- 2) Both aeration towers need to be sand blasted and repainted.
- 3) A cement slab (approximately 15 ft x 40 ft) is needed in front of the hatchery building for doing truck maintenance and other hatchery projects.
- 4) A walk-in cooler should be placed in the outside storage area to provide storage for salmon food.
- 5) Six cinder block raceways located behind the office should be removed and the remaining hole filled or reconfigured into a settling basin. We should eliminate the existing safety hazard and incorporate an effluent control plan.

- 6) To increase operating efficiency and reduce the chance of chiller failure during the summer months we recommend three modifications. Build a shade structure over the chiller building. The building should be painted white. An air conditioner needs to be installed to reduce heat in the building
- 7) A 16-ft x 20-ft storage building should be constructed to provide additional storage space.
- 8) Fencing needs to be placed around the fall chinook raceways to eliminate the existing fall hazard.

STEELHEAD PRODUCTION

Adult Collection

Steelhead Returns

The OFH trap operated for 13 days during the trapping season. It operated 11 days between October 21 and November 6, 2002, and 2 days between April 8 and April 14, 2003. Staff from IPC removed hatchery fish from the trap each trap day and transported them to OFH. We processed the fish on arrival at the hatchery. Early in the season, we held all hatchery fish. After we trapped enough adults to meet production goals, the remaining adults were out-planted. After meeting release requests, the Department elected to discontinue trapping operations.

During the fall, we trapped 3,772 adult steelhead and another 230 entered the trap in the spring (Appendices 1 and 2). These 4,002 steelhead consisted of 3,993 (99.8%) hatchery steelhead and 9 (.2%) wild steelhead. The wild fish were released below Hells Canyon Dam.

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

We measured fork lengths and determined sex on all steelhead except 129 excess males that were not necessary for spawning and were released below Hells Canyon Dam. Age-classes were defined by length. One-ocean females were 65 cm and less and one-ocean males were 67 cm and less. Two-ocean females were 66 cm and greater, and two-ocean males were 68 cm and greater. Age-class and sex ratio by origin are as follows: For hatchery-origin steelhead; One-ocean fish consisted of, 1,486 males (52%) and 1,384 females (48%) for a total of 2,870 or 74% of the hatchery fish. Two-ocean fish consisted of 214 (22%) males and 780 (78%) females for a total of 994 or 26% of the hatchery fish. All wild steelhead were two-ocean fish consisting of 3 males (33%) and 6 females (67%) for a total of 9 wild fish. 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 2002 and the spring of 2003, 3,401 surplus adult steelhead were out-planted for sport fisheries, supplementation programs and tribal consumption. The surplus fish are divided by agreement between Idaho, Oregon, and the Nez Perce Tribe. The shares were divided as follows: 1,000 into the Boise River, 50 into the Payette River for Idaho, and 1,222 into Hells Canyon Reservoir for Oregon. The Nez Perce Tribe transported and released 700 into the Little Salmon River and 300 steelhead were given to the Nez Perce Tribe for subsistence. A total of 129 excess males were returned to the Snake River below Hells Canyon Dam. Disposition of adult steelhead can be seen in appendices 6 and 7.

Incidental Capture

Three rainbow trout (*O. mykiss*), five fall chinook (*O. tshawytscha*) and one brown trout (*Salmo trutta*) were trapped and transported to OFH. The rainbow trout were released into Hells Canyon Reservoir and the other two ancillary species were released below Hells Canyon Dam.

Marks, Fin Clips, Injuries

When they arrived at the hatchery the steelhead were checked for fin clips, tags and injuries. Fin clips consisted of 3,993 adipose fin (AD) clipped with 56 of those having only been partially clipped. Other clipped fins includes 63 with left pectoral clip, 14 with a right pectoral clip, 55 with a left pelvic clip, and 1 with a right pelvic clip. Other marks included 111 with coded-wire tags, 16 with

floy-tags, 6 with a radio tag and 7 with pit tags. The tagging agencies included the National Marine Fisheries Service, the University of Idaho, Oregon Department of Fish and Wildlife, and the Department. During spawning, snouts were removed from all coded-wire tagged fish and sent to the Department's marking lab in Lewiston. Injuries included, 10 fish with gill net scars, 8 with fresh body injuries, 49 with body scars, 52 with operculum or gill injuries, 43 with fin damage, 25 with eye damage, 22 with head injuries, and 8 with bloody gills.

Holding And Spawning

Pre-Spawning Mortality

Pre-spawning mortality numbers include all females that died prior to spawning and all males that died through the second week of spawning (April 4). Pre-spawn mortality consisted of 9 males and 6 females for a total of 15 adults.

Spawning Operations

Ponded steelhead were sorted by sex and separated into two ponds on March 3, 2003. Steelhead transported to the hatchery after March 3 were sorted upon arrival. On each spawn day, we checked all females for ripeness. Ripe females were spawned and unripe females were returned to the holding pond. Spawning consisted of 15 egg takes from March 20 to May 8, 2003 (Appendix 8). We spawned 277 females. Eggs from nine female were rejected for reasons of poor quality. This left eggs from 268 females to be incubated. Sperm from two or more males fertilized the eggs from each female, and then the eggs from two females were pooled. Eggs were water hardened in 100 ppm iodophore for at least 15 minutes. Each pooled bucket was decanted and the eggs placed in an incubator tray.

Disease Testing

During spawning, staff from the Department's Eagle Fish Health Laboratory tested 165 (60%) of the females for viruses, and 21 (8%) for Whirling Disease. All test results were negative for pathogens. These percentages are of total females spawned and include samples from females that were spawned but their eggs discarded.

Incubation

Egg Development

Incubation water was chilled to approximately 42°F and adjusted to about 5 gpm through each stack of 16 trays. The water was chilled to delay development of eggs and fry to achieve smolt target size. Eggs were treated with formalin three times each week during March and April, and three times each week during May and the first half of June to inhibit mycosis caused by *Saprolegnia*. Treatment was stopped on each lot as it neared hatching. All eyed eggs were shocked at 360 to 380 daily temperature units (TU) or about 30 days after spawn. This was accomplished by pouring the eggs from the Heath tray, from a height of 2 ft - 3 ft, into a bucket containing approximately 1 inch to 1.5 inches of water. The eggs were then poured back into the Heath tray and allowed to sit overnight to allow the dead eggs to turn white. Dead eggs were removed the day after shocking. This year some eggs were enumerated based on the average fecundity of their total egg-lot. This included: 51,360 eggs from 8 females that were culled because of poor egg quality from lots 7 and 10. The remaining 1,669,306 green eggs from 260 females these were enumerated using a Jensorter™ electronic counter. The total egg-take, including 51,360 that were culled, and 1,669,306 that were retained for rearing. Total green eggs was 1,720,666. Of the 1,669,306 eggs retained for rearing, 1,338,404 reached the eyed stage, constituting 80.2% eye-up success.

Pahsimeroi Fish Hatchery (PFH) transferred eggs from 12 spawn dates from March 20 to May 1. Eggs from 432 females were shipped from PFH to OFH. When they arrived, we processed them in the same manner as OFH eggs. These 432 females produced 2,190,402 green eggs. Eye-up was 82.8% resulting in 1,813,202 eyed eggs. The overall average fecundity was 5,070 eggs per female.

Fry Development

Some Egg were not shipped at the eyed egg stage and were reared to the button-up fry stage. These eggs hatched about 64 days after being spawned. Button-up was about 1058 TU, This year fry were shipped at about 1068 TU, which was 106 days after being spawned.

Egg and Fry Disposition

Egg Shipments

During May and June of 2003, 445,336 eyed eggs were shipped to NSFH. They were placed in 48-quart coolers for transport. 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 9).

The eyed eggs from PFH were shipped in the same manner as OFH eggs. A total of 201,495 eyed eggs were shipped to HSFH and 561,030 were shipped to NSFH
A total of 98,110 excess eggs were disposed

Fry Shipments.

After reaching approximately 1,050 TU, 451,438 OFH fry were shipped to NSFH in June and July. They were shipped in stainless steel tubes, each containing fry from 2-3 incubation trays. The tubes were loaded into a 1,000-gallon fish transport tanker filled with chilled well water. The remaining 117,303 fry were discarded (Appendix 10).

The PFH eggs that were raised to fry stage were shipped as described above. Of the resulting button-up fry, 564,872 were shipped to NSFH and 201,495 to HSFH. The remaining 359,118 fry were discarded

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 and disposal is included in Appendix 11.

SPRING CHINOOK SALMON PRODUCTION

Adult Collection

Salmon Returns.

The number of adult spring chinook returning to Idaho in 2002 was not as big as in 2001. The trap was operated for 13 days between May 21 and July 2, 2002. A total of 34 spring chinook were trapped during the operating period. They included 28 (82%) hatchery adults and 6 (18%) wild or natural adults. There were no jacks trapped. The wild or natural fish were peduncle fin punched to identify recaptures and then released below Hells Canyon Dam. No previously trapped wild or natural salmon returned to the trap a second time. Appendix 12.

Length-Frequencies and Age and Sex Ratios

Length-frequencies were taken on all fish trapped. The age class breakdown by fork length was as follows: 1-Ocean (three-year-olds ≤ 58 cm.), 2-Ocean (four-year-olds 59-80 cm.), and 3-Ocean (five-year-olds ≥ 81 cm). There were no One-ocean salmon trapped. Two-ocean fish accounted for 7 (20%) of the salmon trapped and consisted of 6 (86%) hatchery fish and 1 (14%) wild fish. Three-ocean fish accounted for 27 (79%) of the salmon trapped and consisted of 22 (81%) hatchery fish and 5 (19%) wild fish. 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. Length-frequencies can be seen in Appendix 13. Appendix 14 gives a brake down of age-classes.

Incidental Capture

Three rainbow trout and eleven steelhead trout were trapped and transported to the hatchery. The steelhead were released below Hells Canyon Dam. The Rainbow trout were all released into Hells Canyon Reservoir in a timely manner. For more information on the dates of interrogation, refer to Appendix 15.

Marks, Fin Clips, Injuries

All trapped chinook were checked for marks, consisting of fin clips, tags and injuries. Marked fish consisted of 27 with adipose fin clips. No partial adipose clips were found. OFH personnel checked for coded wire tags and pit tags with no tags being found during the trapping season. One radio tag was found. The tagging agencies included the National Marine Fisheries Service, the University of Idaho, Oregon Department of Fish and Wildlife, and the Idaho Department of Fish and Game. Injuries included one with body injuries and four with head injuries.

Holding and Spawning

Transport

IPC personnel transported spring chinook from the trap to the hatchery daily, making as many as three trips a day when the fish run was at its peak. Fish were processed immediately upon arrival. Wild or natural spring chinook were returned and released below Hells Canyon Dam the same day as trapped or the following morning. They were taken back to the release point in the IPC fish truck when possible and in the portable tank in the back of the Fish and Game truck when the IPC fish truck was not available. IPC personnel transported adults to RRFH weekly when the holding pond water was cold and as often as daily when the holding pond water reached temperatures in the 60-degree range. The hauling water was chilled with incubation well water and approximately 250 pounds of chlorine-free ice was added to the tank to maintain a temperature of 52°F. Two small bags of Clinoptilolite were placed in the tank to absorb ammonia secreted by the fish during transport. The fish were checked for signs of stress and water temperatures were checked at Cambridge and New Meadows. OFH personnel scanned for tags prior to transfer. PIT tag numbers were recorded and snouts removed from CWT tagged fish during spawning.

Holding

Upon arrival to the hatchery, the spring chinook were measured and checked for marks, including fin clips and injuries. All information was recorded for future use. The adult salmon were injected as described in the following section and placed in the northeast holding pond. Wild or natural fish

were released into the Snake River below Hells Canyon Dam. Holding pond water temperature ranged from 59°F to 73°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. Wild or natural fish were not injected.

Pre-spawning Mortality

A single pond mortality was recorded. One hatchery male adult jumped over the fence the day before transport to RRFH. Spring chinook adult disposition numbers can be seen (Appendix 16).

Spawning Operations

The salmon were transported to RRFH for spawning. OFH personnel assisted RRFH personnel with spawning operations. Refer to the RRFH 2002 Chinook Run Report for additional information.

Incubation

Egg Development

During August and September of 2002 OFH staff assisted with spawning of Rapid River returns at RRFH. Due to limited incubation space at RRFH, the eggs from 469 females covering five spawn dates were transported to OFH for incubation. The same day the eggs were spawned they were put into egg tubes and placed in coolers where they were water hardened for one hour in a solution of well water and 100 ppm of iodophore. Then they were rinsed and covered with fresh well water. Ice was added to the coolers to maintain the correct water temperature during the trip from RRFH to OFH. When they arrived at OFH, iodophore was added to the water in the coolers at a rate of 100 ppm for additional disinfecting. The water temperature was taken and the water warmed or cooled as necessary prior to the eggs being placed into the incubation trays. Incubation well water bypassed the chiller and entered the stacks at approximately 55°F. Flow was regulated to approximately 5 gpm. After the first two days of incubation, the eggs were treated three times each week with a 15-minute drip treatment of 1,667-ppm formalin to prevent mycosis.

The eggs were shocked at 500 TU to 530 TU. Shocking was accomplished by pouring the eggs from the Heath tray into a bucket that contained 1 inch of water from a height of approximately 2 ft - 3 ft. The eggs were then poured back into the Heath tray and allowed to sit overnight allowing the dead eggs to turn white. One or two days after shocking, the eggs were floated in a salt bath and the majority of the dead eggs were removed with a screen. The remaining dead eggs were removed by hand. The live and dead eggs were counted separately using a Jensorter™ Model BC egg counter. All females were sampled for bacterial kidney disease (BKD) at spawning. Based on the results of these tests, eggs from 107 females were culled due to high levels of BKD. The remaining 362 females produced 1,202,177 eyed eggs from 1,319,489 green eggs resulting in 91% eye-up. The average fecundates for each female was 3,645 eggs (Appendix 17).

Egg Disposition

Within a few days after sorting and counting, 1,202,177 eyed eggs were placed into egg-tubes and coolers and prepared for shipment. Ice was added to the coolers to lower the water temperature to approximately 46°F. Eggs were transported from OFH to RRFH in the hatchery pickup. Data can be seen in Appendix 18

FALL CHINOOK SALMON PRODUCTION

Egg Development

The Department obtained 230,000 eyed-eggs from the Washington Department of Fish and Wildlife's Lyons Ferry Hatchery located in Starbuck, Washington. They were picked up by OFH personnel and transported to the OFH on December 13, 2002. Approximately 23,000 eyed-eggs were placed in each of ten coolers for transport. Incubation water temperature at Lyons Ferry Hatchery is 54°F. Upon arrival at OFH, the temperature of the water in the coolers was measured and then warmed with well water back to 54°F before disinfection. They were disinfected for approximately 30 minutes in a solution of well water and 100 ppm of iodophore. After disinfection, the eggs were placed in 77 Heath trays. Each tray received approximately 2,987 eggs. These eggs were incubated with 53.7°F water at approximately 5 gpm. After two days of incubation, the eggs were treated three times each week with a 15-minute drip treatment of 1,667-ppm formalin to retard mycosis. Dead eggs were picked at 718 TU, 850 TU, and 936 TU and 1,069 TU's. A total of 3,608 eggs were picked off before hatch. Survival from eyed egg to hatch was 98.4%.

Fry to Smolt Development

The OFH fall chinook raceways were designed to hold 125,000 sub-yearling smolts in each raceway to a size of 70 fpp. At the start of the project, it was not clear what the water temperature would be with a constant demand on the well or how soon river water would be required. The Integrated Hatchery Operations Team (IHOT) recommendations for a flow index of 1.0 and a density index of .30 were followed as closely as possible (Appendix 19). Growth was tracked each week and pound counts and lengths were recorded (Appendix 20). Fall chinook were fed Moore Clark feed from button up to release (Appendix 21). We used a combination of hand feeding and belt feeders to supply food to each raceway. The fish were raised in the outside raceways on well water until reaching 100 fpp on March 31 when 285 gpm of river water was introduced. The river water decreased the temperature in the raceways from 54°F to 53°F over the next couple days. During the rearing period, river water, well water, and mixed water temperatures were monitored (Appendix 22).

Moore Clark feed was used during this season to allow comparison with the data collected the previous year. There was not a drastic drop in feed consumption this year when the river water was introduced to the raceways (Appendix 23). Moore Clark feed containing beta glucan was fed for two weeks before to marking. Moore Clark's research suggests that beta glucan may help promote the immune system and combat the effects of stress such as fin marking. The fall chinook showed no increase in mortality after clipping. A total of 209,246 sub-yearlings, which averaged 46 fpp and 4.03 inches in length, were released into the Snake River at the U.S. Forest Service boat ramp one mile below Hells Canyon Dam. Sub-yearling production numbers for each month are shown in Appendix 24. This and water conditions related to a lower than normal snow pack suggested that an earlier release could improve survival. Indications that Snake River water temperatures would increase and flows decline led to the decision to move the release forward. The fish were released on May 22, which was approximately the same time as the previous year. The three brood cycles have helped us evaluate constraints in reaching target size. Depending on conditions, we will adjust release timing in 2004 for Brood Year 2003 smolts.

Predators

Known predators included one kingfishers and five mink, the mink were trapped and released down river. They did not return to the hatchery. Since it was impossible to trap the kingfishers, camouflaged netting was placed over the raceways as a deterrent. In addition, the netting provided shade for the fish and reduced the risk of sunburn.

Fish Marking

Fish marking commenced on April 14 and was completed on April 18, 2003. All fall chinook were adipose fin clipped. In addition to fin clipping, 10,000 were implanted with PIT tags. On May 16, 2003, a clip evaluation was performed on 500 fish. Two were found with deep clips, one with partial adipose fin.

Fish Health

Disease Testing

Staff from the Department's Eagle Fish Health Laboratory performed routine health inspections. The last inspection was just before release. No diseases were encountered in fall chinook during this brood year. Antibiotic medicated feeds were not used during this brood year.

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 2001 fall chinook are presented in Appendix 25.

Acute Losses

Neither acute nor chronic losses were experienced during the 2002-2003 rearing cycle.

Other Assessments

Fin clipping consisted of manual clipping and the use of one of the Departments' new automated trailers. Oxbows' fall chinook were the first fish to be clipped using the new trailer. Due to calibration problems, some of the fish were improperly clipped and resulted in the tearing off of the skin from the adipose fin to the tail. Oxbow staff monitored the results of the clipping and determined that approximately 700 died as a result of improper clipping. Fish health remained good. Since the addition of the degassing towers, gas bubble disease seems to be under control. *Ceratomyxa shasta* has still not been isolated from these fish.

Season Mortality

Mortalities were tracked daily and reported weekly (Appendix 26). This information was compared with mortality data for 2000 and 2001. We raised more fish in 2002 and the high mortality accrued in the first three weeks but it was still lower than in 2000. We did see a higher mortality during clipping but this was because of the new tagging trailer operation (Appendix 27).

Smolt Transport

The Niel Ring Trucking Company from Buhl, Idaho transported smolts to the release site in the Snake River below Hells Canyon Dam using a tank trailer owned by IPC. The fish were transported in a single load and no visible mortality occurred. For background information, historic releases into Hells Canyon are listed in Appendix 28.

ACKNOWLEDGEMENTS

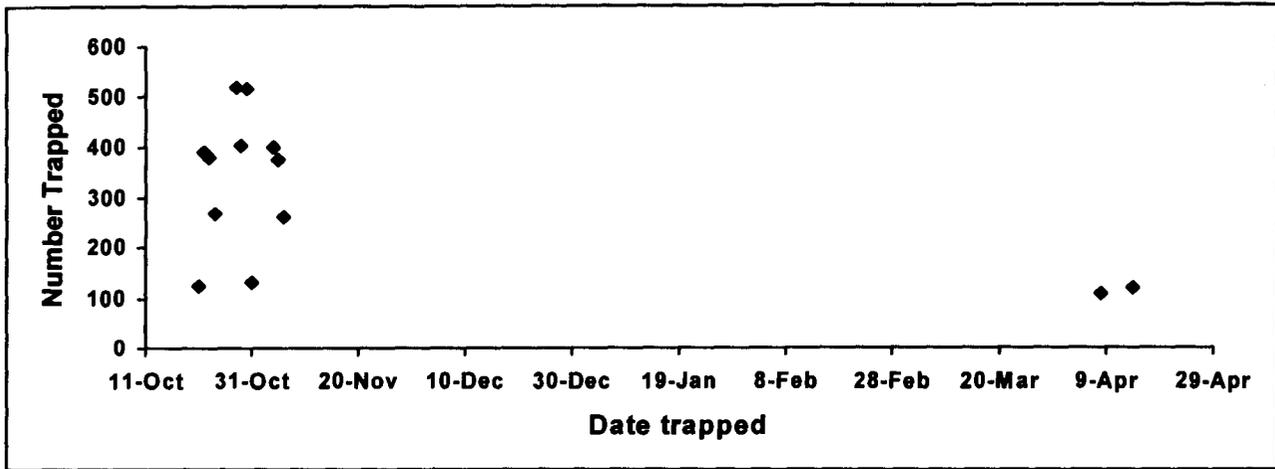
We would like to thank the staff from LFH, IPC and the Department that have contributed to the successful operation of OFH this year.

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

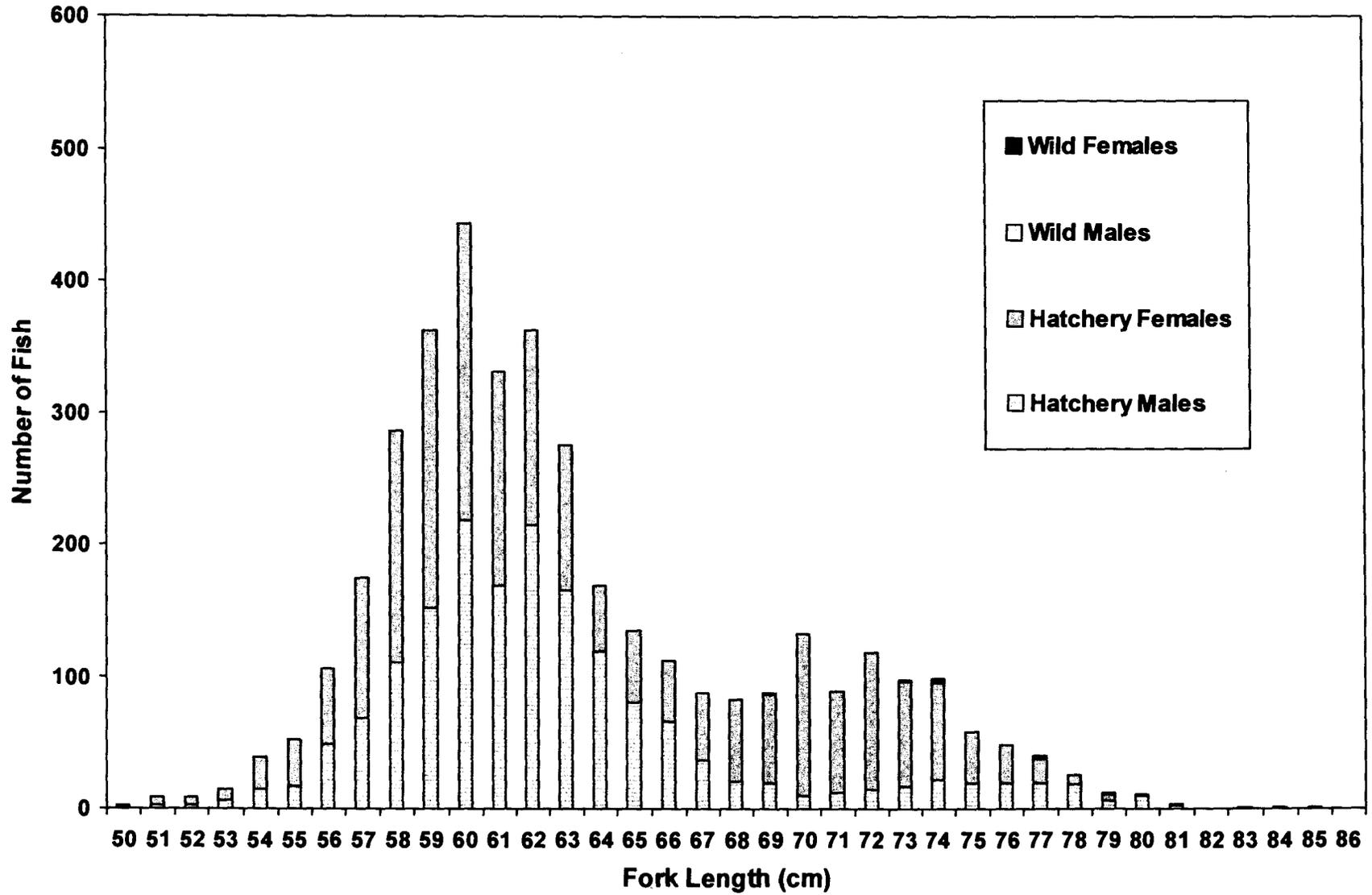
Appendix 1. Hells Canyon Dam steelhead trap counts for Brood Year 2003.



Appendix 2. Daily trap counts at Hells Canyon Dam during fall 2002 and spring 2003.

Fall 2002 Trapping		Spring 2003 Trapping	
Date	Number Of Fish	Date	Number Of Fish
October 21	124	April 8	109
October 22	391	April 14	121
October 23	380		
October 24	269		
October 28	519		
October 29	403		
October 30	516		
October 31	132		
November 4	400		
November 5	376		
November 6	262		
TOTAL	3,772	TOTAL	230

Appendix 3. Length-frequency of steelhead trapped at Hells Canyon Dam during fall 2002 and spring 2003.



Appendix 4. Lengths of steelhead trapped at Hells Canyon Dam during fall 2002 and spring 2003.

Fork Length (cm)	Total Fish	Hatchery Males	Hatchery Females	Wild Males	Wild Females
50	2	0	2		
51	9	3	6		
52	8	2	6		
53	15	6	9		
54	39	14	25		
55	52	17	35		
56	106	48	58		
57	174	68	106		
58	286	110	176		
59	363	152	211		
60	444	218	226		
61	331	169	162		
62	362	214	148		
63	275	165	110		
64	169	119	50		
65	134	80	54		
66	112	65	47		
67	87	36	51		
68	82	21	61		
69	87	20	66		1
70	132	10	122		
71	89	12	77		
72	118	14	104		
73	97	17	79		1
74	98	22	73		3
75	58	20	38		
76	49	20	28	1	
77	40	19	19	1	1
78	25	18	7		
79	12	6	5	1	
80	11	10	1		
81	4	2	2		
82	0	0	0		
83	1	1	0		
84	1	1	0		
85	1	1	0		
Total	3,873	1,700	2,164	3	6

Age-class	Male	Female	Total	Average Length
One-ocean	1,486	1,384	2,870	60.4 cm
Two-ocean	217	786	1,003	71.8 cm
Total	1,703	2,170	3,873	63.7 cm

This appendix does not include 129 excess males that were returned to the Snake River.

Appendix 5. Age and gender of steelhead trapped at Hells Canyon Dam during fall 2002 and spring 2003.

Age-Class	Hatchery Males	Wild/Natural Males	Hatchery Females	Wild/Natural Females	Total
1-Ocean	1,486	0	1,384	0	2,870
2-Ocean	214	3	780	6	1,003
Total	1,700	3	2,164	6	3,873

This appendix does not include 129 excess males that were returned to the Snake River.

Appendix 6. Disposition of Brood Year 2003 steelhead trapped at Hells Canyon Dam.

4,002	Total trapped (3,772-fall, 230-spring (Wild and Hatchery))
3,993	Ponded (ponded 3,864 & 129 excess males that were returned to Snake R.)
8	Trap Morts (found in trap prior to commencement of trapping operations and not transported to hatchery so not included in trap totals)
300	Nez Perce Tribe (subsistence)
3,101	Out-Planted
9	Wild/natural released

Appendix 7. Brood Year 2003 steelhead disposition by sex and origin.

MALES		FEMALES	
260	Spawned	268	Killed and spawned
0	Rejected and killed	9	Rejected and killed
150	Nez Perce Tribe	150	Nez Perce Tribe
23	Mortalities	32	Mortalities
3	Wild released	6	Wild released
1,396	Out-planted	1,705	Out-planted
1,832	Total males	2,170	Total females

Trap morts listed in Appendix 4 were not transported to the hatchery and are not included. Female morts includes 19 ripe females that were killed to recover CWT's and not spawned. This Appendix includes 129 excess males that were returned to the Snake River and are shown as out-plants.

Appendix 8. Brood year 2003 steelhead spawning summary for Oxbow Fish Hatchery.

Lot	Spawn Date	Females Spawned	Females Culled	Females Retained	Total Green Eggs Spawned	Surplus Green Eggs Culled	Green Eggs Retained	Eyed Eggs	Percent Eyed	Eggs/Female	Eyed Eggs Shipped	Fry Shipped
1	3/20/03	10	0	10	73,103	0	73,103	55,902	76	7,310	0	12,125
2	3/24/03	6	0	6	45,808	0	45,808	29,829	65	7,635	0	28,934
3	3/27/03	8	0	8	54,414	0	54,414	37,483	69	6,802	0	36,359
4	3/31/03	13	1	12	89,831	0	89,831	78,901	88	7,486	0	76,534
5	4/03/03	14	0	14	95,582	0	95,582	76,276	80	6,827	0	73,988
6	4/07/03	21	1	20	145,034	0	145,034	121,157	84	7,252	0	50,173
7	4/10/03	25	1	24	164,209	0	164,209	131,129	80	6,842	0	119,341
8	4/14/03	40	0	40	250,988	0	250,988	212,460	85	6,275	13,122	53,984
9	4/17/03	42	2	40	239,730	0	239,730	207,857	87	5,993	207,857	0
10	4/21/03	32	0	32	204,824	0	204,824	165,114	81	6,401	74,234	0
11	4/24/03	21	1	20	118,798	0	118,798	92,997	78	5,940	61,831	0
12	4/28/03	21	1	20	101,908	0	101,908	81,657	80	5,095	55,736	0
13	5/01/03	8	0	8	51,642	0	51,642	30,820	60	6,455	20,671	0
14	5/05/03	7	1	6	33,435	0	33,436	16,822	50	5,573	11,885	0
15	5/08/03	9	1	8	51,360	51,360				6,420		0
Total		277	9	268	1,720,666	51,360	1,669,306	1,338,404	81	6,420	445,336	451,438

Appendix 9. Brood year 2003 steelhead egg and fry disposition from Oxbow Hatchery.

Number	Disposition
1,720,666	Green eggs
51,360	Green eggs culled
322,648	Initial pick off
8,254	Secondary pick off
1,338,404	Eyed eggs
445,336	Eyed eggs shipped to Niagara Springs
306,737	Eyed eggs disposed of
586,331	Eyed eggs remaining on station
17,590	Eyed eggs to fry loss (3%)
568,741	Fry on station
451,438	Fry shipped to Niagara Springs
117,303	Excess fry disposed of

Appendix 10. Pahsimeroi Brood year 2003 steelhead egg and fry disposition from Oxbow Hatchery.

Number	Disposition
2,190,402	Green eggs
0	Green eggs culled
369,390	Initial pick off
7,810	Secondary pick off
1,813,202	Eyed eggs
201,495	Eyed eggs shipped to Hagerman State
561,030	Eyed eggs shipped to Niagara Springs
98,110	Excess eyed eggs disposed of
952,567	Eyed eggs remaining on station
28,577	Eyed eggs to fry loss (3%)
923,990	Fry on station
564,872	Fry shipped to Niagara Springs
359,118	Excess fry disposed of

Appendix 11. Oxbow Hatchery steelhead trapping and disposition summary.

Fish Trapped ^a		Age-classes ^b	
Males	1,703	1 Ocean	2,870
Females	2,170	2 Ocean	1,003
Total	3,873	Total	3,873

Fish Disposition	Males	Females	Total
Pre-spawn mortality	9	6	15
Pond mortality	14	26	40
Spawned only	260	277 ¹	537
Released	3	6	9
Out planted	1,396 ³	1,705	3,101
Other	150 ²	150 ²	300
Total	1,832	2,170	4,002

Carcass disposition	Males	Females	Total
Hauled to landfill	283	309	592

^a Does not include 8 trap mortalities that were not measured or sexed

^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 9 rejects. ²Includes 150 to the N.P. tribe. ³includes 129 excess males returned to the Snake River. They are also listed in Appendix 7.

Appendix 12. Spring Chinook Run Timing.

Date	Total trapped	Trapped hatchery	Trapped wild	Released wild	Morts	Hauled
5/21/02	8	7	1	1		
5/22/02	1	1				
5/28/02	1	1				
5/29/02	1		1	1		9
6/3/02	1	1				
6/4/02						
6/5/02	4	3	1	1		
6/6/02					1	3
6/10/02	2	2				
6/11/02	9	9				
6/12/02	2	1	1	1		12
6/17/02	2	2				
6/18/02						2
7/2/02	3	1	2	2		
7/05/02						1
Total	34	28	6	6	1	27

Hauled fish were transferred to Rapid River Fish Hatchery.

Appendix 13. Spring Chinook Length-Frequencies.

Fork length (cm)	Totals	Hatchery adults	Wild Adults	Hatchery jacks	Wild jacks
64	1	1			
71	1	1			
76	1	1			
79	1	1			
80	3	2	1		
81	2	1	1		
83	3	3			
84	2	2			
86	4	4			
87	1	1			
88	4	4			
89	4	2	2		
90	2	1	1		
91	3	2	1		
94	1	1			
97	1	1			
Total Fish	34	28	6	0	0

1-Ocean (3-year-old, ≤58 cm)

2-Ocean (4-year-old, 59-80 cm)

3-Ocean (5-year-old, ≥81 cm)

Appendix 14. Spring Chinook Age-Class Breakdown.

Age Class	Hatchery	Wild/Natural	Total
1-Ocean			
2-Ocean	6	1	7
3-Ocean	22	5	27
Total	28	6	34

1-Ocean (3-year-old, ≤ 58 cm)

2-Ocean (4-year-old, 59-80 cm)

3-Ocean (5-year-old, ≥ 81 cm)

Appendix 15. Incidental Capture.

Date	Steelhead	Rainbow trout
5/21/02	7	1
5/22/02	3	1
5/28/02		1
6/3/02	1	
Total	11	3

Appendix 16. Spring Chinook Disposition.

Disposition	Hatchery	Wild / Natural
Trapped – Oxbow	28	6
Mortalities – Oxbow	1	0
Released – Oxbow	0	6
Transferred to RR	27	0
Transferred to Seniors	0	0
Transferred to Tribe	0	0

Appendix 17. Summary of Brood Year 2002 Rapid River spring chinook eggs incubated at Oxbow Fish Hatchery.

Lot Number	Spawn Date	Females Spawned	Females Culled ^a	Females Retained	Fecundity	Green Eggs Culled ^b	Green Eggs Retained	Eyed Eggs	Eye-up Rate
12	8/30/02	156	24	132	3,708	33,855	489,504	455,649	93.1%
13	9/2/02	156	34	122	3,613	54,475	440,819	386,344	87.6%
14	9/3/02	74	26	48	3,572	16,880	171,430	154,550	90.2%
15	9/05/02	57	15	42	3,572	8,887	150,023	141,136	94.1%
16	9/06/02	26	8	18	3,762	3,215	67,713	64,498	95.3%
Total/ Avg.		469	107	362	3,645	117,312	1,319,489	1,202,177	91.1%

^aFemales were culled due to high levels of BKD (100) or poor egg quality.

^bNumber of eggs culled is based on fecundity.

Appendix 18. Spring Chinook Egg Disposition.

1,319,489	Green eggs left after culling an estimated 390,015 for disease management
117,312	Eggs picked during primary pick-off
1,202,177	Eyed eggs shipped to Rapid River Fish Hatchery (eye-up = 91%)
0	Eyed eggs remaining at Oxbow

Appendix 19. Weekly flow and density indices during rearing of Brood Year 2002 fall chinook at Oxbow Fish Hatchery.

Date	Volume	Flow	Flow index	Density index
2/10/03	616	160	0.81	0.21
2/17/03	616	200	0.83	0.27
2/24/03	1198	300	0.78	0.19
3/3/03	1198	300	0.99	0.25
3/10/03	1198	375	0.95	0.30
3/17/03	1636	375	1.22	0.28
3/24/03	1636	375	1.39	0.32
3/31/03	2671.1	650	1.01	0.25
4/7/03	2671.1	650	1.06	0.26
4/14/03	2671.1	650	0.99	0.24
4/21/03	2671.1	850	0.84	0.27
4/28/03	2671.1	850	0.95	0.30
5/5/03	2671.1	990	0.92	0.34
5/12/03	2671.1	990	1.0	0.37
5/19/03	2671.1	990	1.13	0.42

Appendix 20. Weekly length and weight data for Brood Year 2002 fall chinook reared at Oxbow Hatchery.

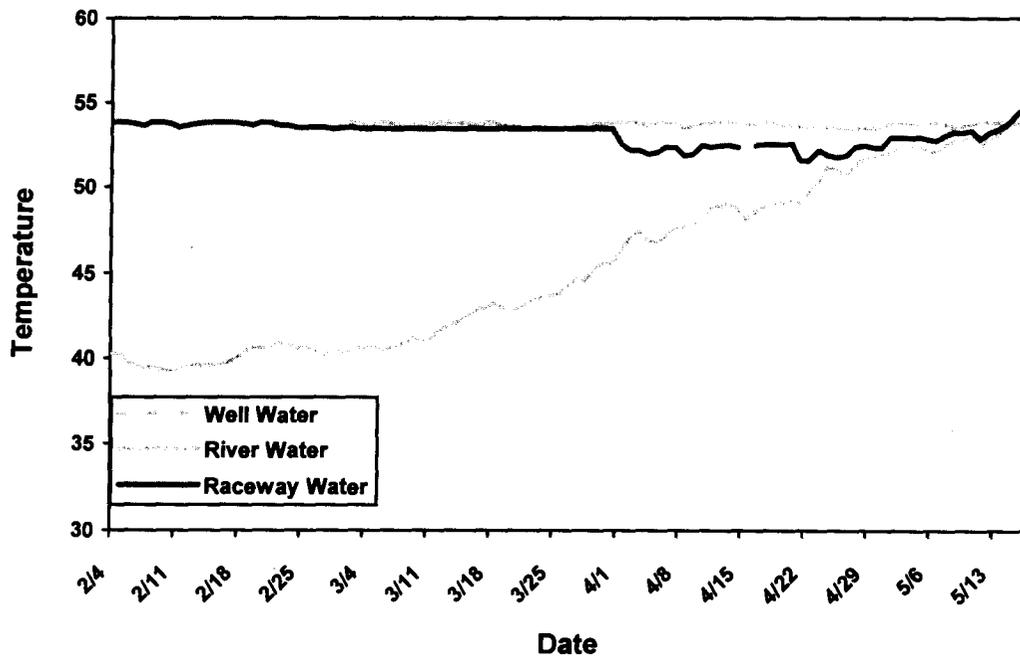
Date	Number of fish	Weight (g)	Weight (lb.)	Fish/g	Fish/lb	Average (mm)	Minimum (mm)	Maximum (mm)	Standard Deviation
2/10	370	142	0.31	2.61	1182.9	37.72	35.0	42.0	1.81
2/17	328	180	0.40	1.82	827.29	40.92	38.0	45.0	1.81
2/24	318	276	0.61	1.15	523.09	46.06	42.0	51.0	2.13
3/3	313	384	0.85	0.82	370.06	50.96	46.0	57.0	2.45
3/10	332	550	1.21	0.60	274.06	56.82	53.0	62.0	2.22
3/17	334	778	1.71	0.43	194.90	62.58	56.0	70.0	3.17
3/24	390	1096	2.41	0.36	161.55	65.86	60.0	73.0	3.66
3/31	328	1286	2.83	0.26	115.79	73.58	68.0	80.0	3.16
4/7	329	1506	3.32	0.22	99.18	78.62	70	88.0	4.44
4/14	382	1686	3.71	0.23	102.86	80.68	70.0	92.0	5.38
4/21	384	1872	4.12	0.21	93.13	79.92	72.0	95.0	4.65
4/28	323	1902	4.19	0.17	77.10	85.80	78.0	99.0	5.11
5/5	394	2804	6.18	0.14	63.79	92.16	81.0	107.0	5.60
5/12	351	2976	6.56	0.12	53.55	100.24	90.0	116.0	6.44
5/19	311	3030	6.67	0.10	46.60	102.60	90.0	114.0	6.13

Appendix 21. Feed used during Brood Year 2002 fall chinook rearing.

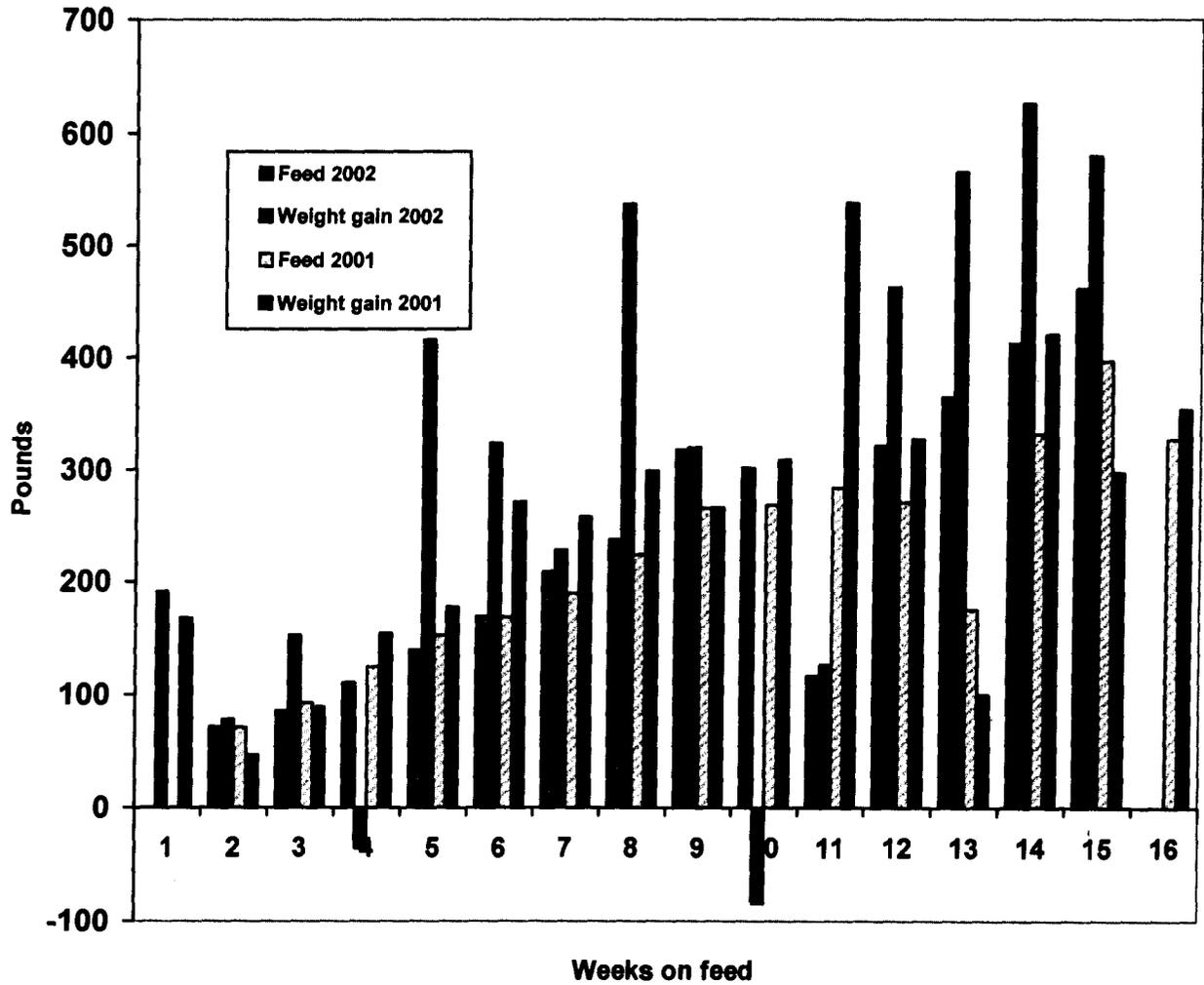
Month	# 0 starter	#1 starter	#2 starter	1.2 mm	1.2 mm med	1.5 mm
Feb	88 lb	145.5 lb				
Mar		118.5 lb	660 lb		34 lb	
Apr				504 lb	670 lb	
May				728 lb		502 lb
Total	88 lb	264 lb	660 lb	1232 lb	704 lb	502 lb

Appendix 22. Well, river, and mixed water temperatures measured at Oxbow Fish Hatchery, February through May, 2003.

Fall Chinook water temps 2003



Appendix 23. Comparison of pounds of food fed and weight gained during production of Brood Years 2001, and 2002 fall chinook at Oxbow Fish Hatchery.



Appendix 24. Brood year 2002 fall chinook production summary.

Month	Fish on hand at end of month				Mortality		Fish Feed		Weight Gain		Feed Conversion	
	Number	Weight	Length	Fish/Lb	Monthly	To Date	Monthly	To Date	Monthly	To Date	Monthly	To Date
Feb	220,351	537.4	1.94	410	5,352	5,352	233.5	233.5	346.4	346.4	0.67	0.67
Mar	219,470	1,892	2.89	116	881	6,233	812.5	1063	1,354.5	1,700.9	0.60	0.62
Apr	209,591	2,722	3.40	77	1,107	7,340	1,174	2,220	830	2,375	1.41	0.93
May	209,246	4,490	4.03	46.6	345	7,685	1,230	3,450	1,768.3	3,916.7	0.70	0.88

Eggs were received December 13, 2002.

Appendix 25. Brood Year 2002 fall chinook autopsy summary.

Accession No:	03-177	Location:	Oxbow Hatchery
Species:	Chinook Fall	Autopsy Date:	05/7/2003
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	40	0	60	N	60	A	23	0	0
B1	0	F	0	S	0	1	0	1	13	R	20	1	0	S	0	B	37	1	0
B2	0	C	0	L	0	2	0	2	29	G	0	2	0	M	0	C	0	2	0
E1	0	M	0	S&L	0			3	11	ON	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											OT	0		
M1	0							Mean=0.00 Mean=2.07				Mean=0.00						Mean=0.00	
OT	0																		

Summary of normals

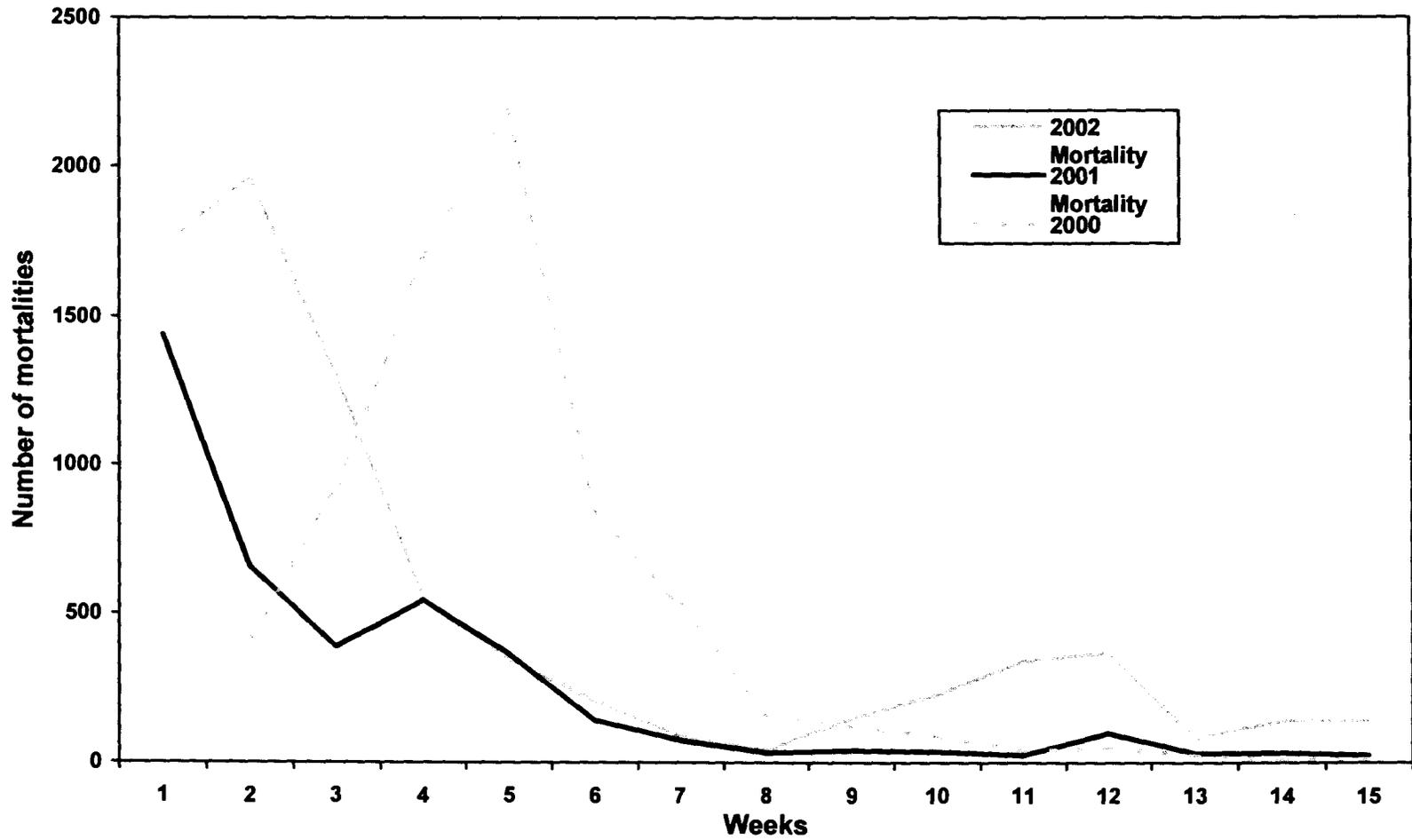
60	60	60	60	60	60	60	60	60	60	60	0
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N = normal
 OT = other
 Thymus: 0 = no hemorrhage
 Mesenteric fat: 0 = none, 1 = < 50% coverage, 2 = 50%, 3 = > 50%, 4 = 100%
 Spleen: R = red, E = enlarged (EIBS enlarges spleens)
 Hind gut: 0 = no inflammation
 Liver: B = pail red
 Bile: 0 = yellow bile < full bladder

Appendix 26. Mortality of Brood Year 2002 fall chinook at Oxbow Fish Hatchery.

Week	2/10	2/17	2/24	3/3	3/10	3/17	3/24	3/31
Mortality	1,737	1,965	1,306	547	346	204	86	42
Week	4/7	4/14	4/21	4/28	5/5	5/12	5/19	5/22
Mortality	146	225	340	368	79	139	140	15

Appendix 27. Comparison of mortality in fall chinook for brood years 2000, 2001 and 2002.



Appendix 28. Snake River release and returns to Oxbow Fish Hatchery 1966 - 2004.

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			

Prepared by:

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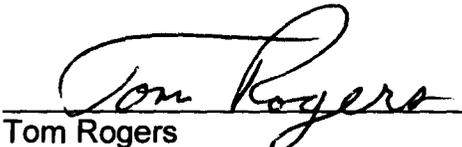
Gene Zachary
Biological Aide

Approved by:

IDAHO DEPARTMENT OF FISH AND GAME



Edward B. Schriever, Chief
Fisheries Bureau



Tom Rogers
Hatchery Supervisor