



OXBOW FISH HATCHERY

**2005 Steelhead Brood Year Report
2004 Spring Chinook Brood Year Report**



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February 15, 2007

**IDFG
08-112**

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ABSTRACT

The Oxbow Fish Hatchery (OFH) trap operated for 11 days between November 1, and November 23, 2004 and 2 days between March 29, and April 6, 2005. A total of 3,811 steelhead trout (*Oncorhynchus mykiss*) were trapped during these operating periods. They consisted of 3,809 (99.95%) hatchery and 2 (.05%) wild steelhead. During the fall of 2004 and the spring of 2005, 2,159 steelhead were out-planted for sport fisheries, supplementation programs and Tribal consumption.

Spawning consisted of 15 egg takes from March 14 to May 15, 2005. A total of 282 females were spawned. Eggs from 273 females were retained resulting in 1,540,577 green eggs, which were incubated to eye-up. Survival to eye-up was 78%, producing 1,207,526 eyed eggs. From these, 433,987 eyed-eggs and 447,773 fry were shipped to Niagara Springs Fish Hatchery (NSFH), 55,341 eyed eggs were shipped to Hagerman State Fish Hatchery (HSFH), 191,329 excess fry were released into Cascade Reservoir and 101,531 fry were disposed of.

Eggs from 507 females were shipped from Pahsimeroi Fish Hatchery to OFH. These females produced 2,177,734 green eggs and 1,739,277 eyed eggs. From these, 555,023 were shipped to NSFH. The remaining eggs were raised to fry stage. Of the resulting button-up fry, 574,667 were shipped to NSFH, 574,059 were released into Cascade Reservoir.

Spring chinook were trapped 12 days between May 10 and July 7, 2004. A total of 1,445 spring chinook salmon were trapped, including 88 hatchery jacks, 1,338 hatchery adults, 19 wild adults. The wild or natural adults were released below Hells Canyon Dam.

A total of 385 hatchery adults and 1 jack were transported to Rapid River Fish Hatchery (RRFH) for spawning. This year 683 were out-planted to the following locations: 243 to the Powder River (by the Oregon Department of Fish and Wildlife) for fishermen access, 440 fish to the Boise River (by the Idaho Department of fish and Game) for fisherman access. The remaining 330 were donated for subsistence to the following groups: 104 to the Shoshone-Bannock Tribe, 165 to the Nez Perce Tribe, 40 to the Idaho Food Bank, and 21 fish to local Senior Citizens.

Eggs from 385 females that were spawned at the RRFH were transported to the OFH for incubation. Eggs from 23 females were culled due to high levels of Bacterial Kidney Disease (BKD) and from 6 females due to a high rate of egg mortality. Based on the average fecundity of each lot, 76,109 eggs were culled due to BKD and 19,613 were culled due to egg mortality. The remaining 356 females produced 1,145,804 green eggs and 1,053,701 eyed eggs. These eyed-eggs were shipped back to the RRFH in three separate loads.

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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 sixth 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.

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, one eight-month Biological Aide, and one eight-month Fishery Technician

share 3,760 hours budgeted for temporary help to assist with hatchery operation and maintenance. The eight-month Biological Aide position assists with steelhead production but is primarily assigned to fall chinook production.

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 100-hp pumps were purchased and installed on the platform that supplies Snake River water to the hatchery. These pumps do not require lubrication. This eliminated the potential for oil spills into the river.
- 2) Wooden dam boards were replaced with aluminum ones in the adult pond out-flow.
- 3) A new cement slide was built at the trap to replace the pipe that was broken off during high water flows so that fish that fell through the grader bars to enter the river.
- 4) Well water control valves were moved from above ground to a cement control box under ground to prevent freezing.
- 5) The road to the hatchery has been graveled and the old dirt adult ponds were filled in.
- 6) A fence has been installed around the salmon raceways.

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. 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. 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 11 days during the trapping season. It operated 9 days between November 1 and November 23, 2004, and 2 days between March 29 and April 6, 2005. This season we trapped 3,811 steelhead. During the fall of 2004, 3,635 were trapped and another 176 were trapped in the spring of 2005 (Appendices 1, 2). They consisted of 3,809 (99.95%) hatchery and 2 (0.05%) wild steelhead. Wild fish were released below Hells Canyon Dam and hatchery fish were held 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 3,811 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 2,821 (74%) one-ocean and 988 (26%) two-ocean. The sex ratio by age was 1,428 males (51%) and 1,393 females (49%) for one-ocean fish, and 303 (31%) males and 685 (69%) females for two-ocean fish. Both wild steelhead were one-ocean fish. Their sex ratio was 1 (50%) male and 1 (50%) female. 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 2004 and the spring of 2005, 2,159 steelhead were out-planted for sport fisheries or supplementation programs. Of the 2,159 adult steelhead, 1,042 were released into the Boise River, and 1,117 into Hells Canyon Reservoir. In addition to out-plants, 1,049 were killed and given to the Nez Perce Tribe for subsistence (Appendices 6, 7).

Incidental Capture

During the trapping season 1 rainbow trout (*Salmo Gardner*) was trapped and transported to OFH. 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 3,809 with adipose fin clips including 37 with partial clips and 54 with a left pectoral clip, 12 with a right pectoral clip, 12 with a left pelvic clip, and 1 with a right pelvic clip. Tagged fish included 80 with coded-wire-tags, 10 with floy-tags, 9 with radio-tags, and 1 with a PIT-tag. During spawning, snouts were removed from coded-wire-tagged fish. They were collected and sent to the Department's Fish Marking Lab. Injuries included 0 fish with gill net scars, 15 with fresh body injuries, 14 with head injuries, 66 with body scars, 66 with operculum injuries, 10 with fin damage, 29 with eye damage, 16 with bloody gills, and 16 with jaw damage. Fishhooks were found in 10 fish.

Holding And Spawning

Pre-Spawning Mortality

Pre-spawn mortality totaled 25 adult steelhead and was comprised of 13 males and 12 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 7, 2005, 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 15 egg takes from March 14 to May 5, 2005 and included a total of 282 females. Eggs were culled from 2 females because they were green, and from 7 females because of poor egg quality, leaving eggs from 273 females to be incubated (Appendices 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.

Disease Testing

During the spawning process, staff from the Department's Eagle Fish Health Laboratory tested 239 (85%) females for viruses, 20 (7%) for Whirling Disease, and 60 (21%) for bacterial kidney disease (BKD). Two 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 273 females had an average fecundity of 5,643 eggs/female and produced 1,540,577 green eggs. A total of 1,207,526 eggs reached the eyed stage, constituting 78% eye-up success (Appendix 9).

Eggs from 507 females from Pahsimeroi Fish Hatchery were flown to OFH on 9 separate spawn dates. When they arrived, the eggs were disinfected and processed in the same manner as OFH eggs. These 507 females produced 2,177,734 green eggs. The average fecundity was 4,295. Eye-up was 79.9%, resulting in 1,739,277 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 2005, 433,987 OFH eyed eggs were shipped to NSFH. 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 2005, 555,023 PFH eyed eggs were shipped to NSFH. The remaining eggs were raised to the fry (Appendix 12).

Fry Shipments

In July, 447,773 fry were shipped to NSFH and 191,329 surplus fry were released into Cascade Reservoir. In addition, 101,531 fry were disposed of due to advanced development and transportation scheduling conflicts. 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 (Appendix 11).

In July, 574,667 PAH fry were shipped to NSFH and 574,059 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 (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 2001, 2002, and 2003. The trap was operated for 12 days between May 10 and July 7, 2004. A total of 1,445 spring chinook were trapped. They included 88 (6%) hatchery jacks, 1,338 (93.%) hatchery adults and 19 (1%) 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 \geq 86 cm). Fish trapped consisted of 88 (6.1%) 1-ocean salmon (jacks) all were hatchery; 1,337 (92.5%) 2-ocean salmon were all hatchery adults; and 20 (1.4%) 3-ocean salmon consisting of 1 hatchery (5%) and 19 wild (95%) (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.

Distribution

In 2004, 21 hatchery adults were returned to the Snake River below Hells Canyon Dam before a decision was made regarding what to do with fish that had partial or regenerated adipose fins (PAF). Eventually the Fisheries Bureau notified the hatchery that fish with a PAF should be retained for broodstock so later fish with a PAF were held for transfer. A total of 19 wild chinook were returned to the Snake River below Hells Canyon Dam. The remaining fish were distributed as follows: 385 adults and 1 jack to RRFH; 243 adults to the Powder River in Oregon; 428 adults and 12 jacks to the Boise River in Idaho; 165 adults to the Nez Perce Tribe for subsistence; 90 adults and 14 jacks to the Shoshone-Bannock Tribe for subsistence; 40 jacks to the Idaho Food Bank for subsistence and 21 jacks to the Halfway, Oregon senior citizens. In addition, there were 5 pond mortalities and 1 trap mortality (Appendix 20).

Incidental Capture

Two rainbow trout (*O. mykiss*) and three 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 1,426 with adipose fin clips. Of those, 316 were partial clips. OFH personnel checked for coded wire tags and pit tags were found. One radio tag was found. Injuries included 47 body scars, 45 body injuries, 15 damaged fins, 11 head injuries, 11 eye injuries, 11 operculum injuries, 1 jaw injury, and 5 fish with bloody gills.

Holding and Spawning

Transport

IPC personnel transported one to three loads 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. Nineteen wild adults were released back into Snake River. Hatchery adults were transported to RRFH by IPC personnel. The fish that were out-planted or used for subsistence were transported by staff from the Department, Oregon Department of Fish and Wildlife, the Nez Perce Tribe, the Shoshone-Bannock Tribe, or Idaho Food Bank volunteers (see the previous Distribution section for the number received by each group). 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

There were 5 holding pond mortalities and 1 trap mortality at OFH during 2004. (Appendix 20).

Spawning Operations

Three hundred eighty five adult salmon and one jack were transported to RRFH for spawning. OFH personnel assisted RRFH personnel with spawning operations. Refer to the RRFH 2004 Chinook Run Report for additional information.

Incubation

Egg Development

During August and September of 2004 OFH staff assisted with spawning of Rapid River returns at RRFH. Due to limited incubation space at RRFH, the eggs from 385 females covering four 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 23 females were culled due to high levels of BKD and from 6 females due to an extremely high rate of egg mortality. The remaining 356 females produced

1,053,701 eyed eggs from 1,145,804 green eggs resulting in 92% eye-up. The average fecundates for each female was 3,218 eggs (Appendix 17).

Egg Disposition

Within a few days after sorting and counting, 1,053,701 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).

ACKNOWLEDGEMENTS

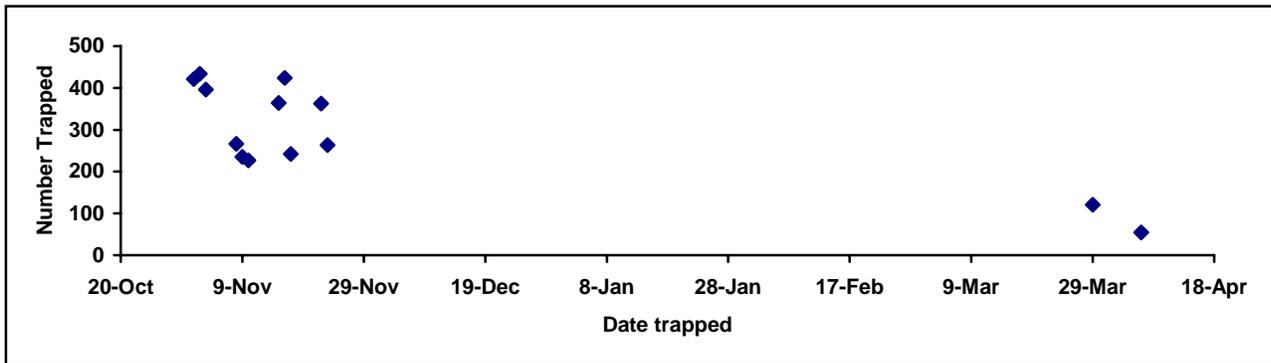
The OFH staff would like to thank the staff from LFH, IPC and the Department that have contributed to the successful operation of OFH this year.

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

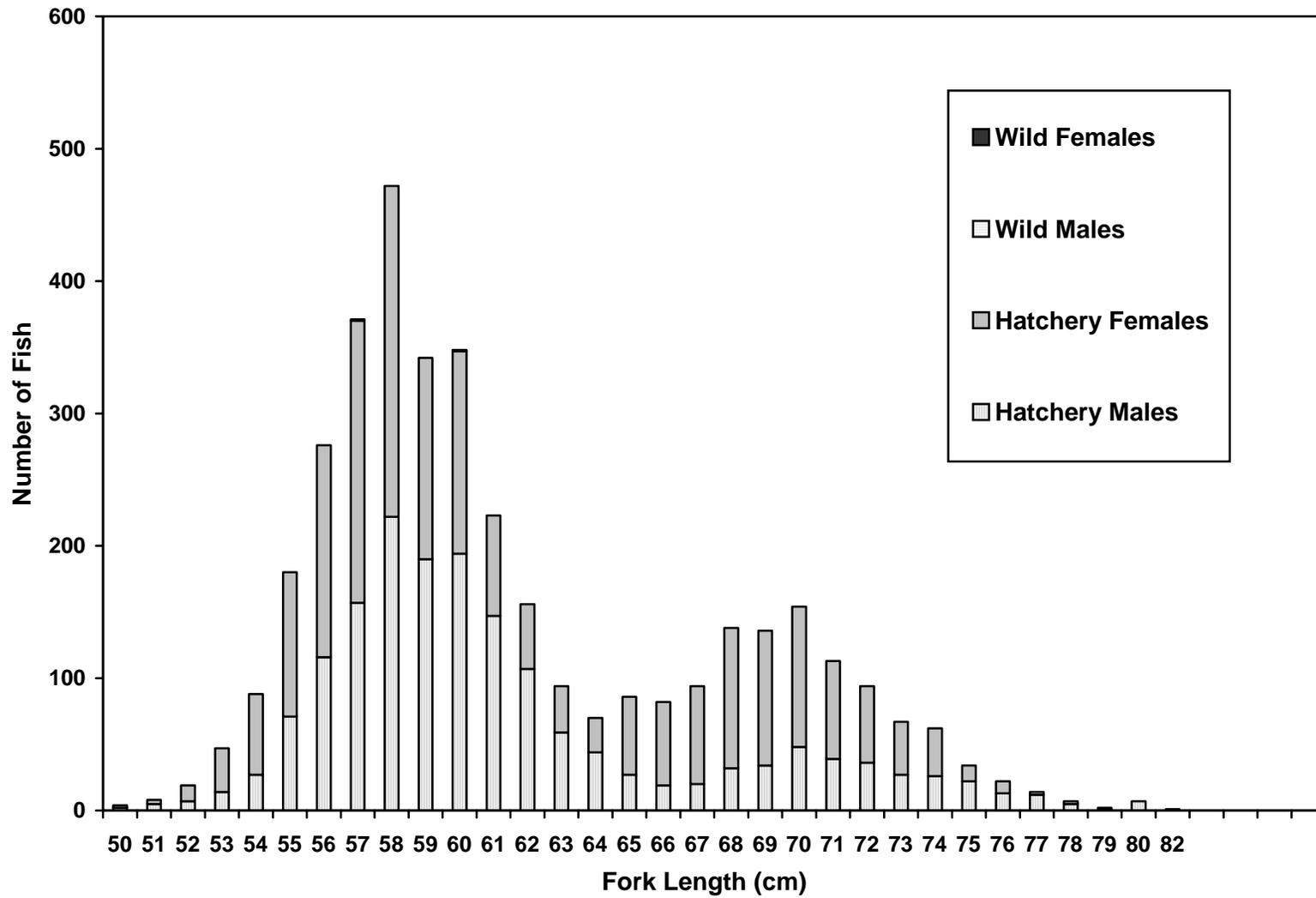
Appendix 1. Hells Canyon Dam steelhead trap counts for Brood Year 2005.



Appendix 2. Daily trap counts at Hells Canyon Dam during fall 2004 and spring 2005.

Fall 2004 Trapping		Spring 2005 Trapping	
Date	Number Of Fish	Date	Number Of Fish
November 1	421	March 29	121
November 2	434	April 6	55
November 3	396		
November 8	266		
November 9	235		
November 10	227		
November 15	364		
November 16	424		
November 17	242		
November 22	363		
November 23	263		
Total	3635	Total	176

Appendix 3. Length-frequency of steelhead trapped at Hells Canyon Dam during fall 2004 and spring 2005.



Appendix 4. Lengths of steelhead trapped at Hells Canyon Dam during fall 2004 and spring 2005.

Fork Length (cm)	Total Fish	Hatchery Males	Hatchery Females	Wild Males	Wild Females
50	4	2	2		
51	8	5	3		
52	19	7	12		
53	47	14	33		
54	88	27	61		
55	180	71	109		
56	276	116	160		
57	371	157	213		1
58	472	222	250		
59	342	190	152		
60	348	194	153	1	
61	223	147	76		
62	156	107	49		
63	94	59	35		
64	70	44	26		
65	86	27	59		
66	82	19	63		
67	94	20	74		
68	138	32	106		
69	136	34	102		
70	154	48	106		
71	113	39	74		
72	94	36	58		
73	67	27	40		
74	62	26	36		
75	34	22	12		
76	22	13	9		
77	14	12	2		
78	7	5	2		
79	2	1	1		
80	7	7	0		
82	1	1	0		
Total	3811	1,731	2,078	1	1
Age-class	Male	Female	Total	Average length	
^a One-ocean	1,429	1,394	2,823	58.7 cm	
^b Two-ocean	303	685	988	70.4 cm	
Total	1,732	2,079	3,811	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 2004 and spring 2005.

Age-Class	Hatchery Males	Wild/Natural Males	Hatchery Females	Wild/Natural Females	Total*
1-Ocean	1,428	1	1,393	1	2,823
2-Ocean	303	0	685	0	988
Total	1,731	1	2,078	1	3,811

Appendix 6. Distribution of Brood Year 2005 steelhead trapped at Hells Canyon Dam.

3,811	Trapped (3,635-fall, 176-spring) (Wild and Hatchery)
3,809	Ponded
1,049	Nez Perce Tribe
2,159	Out-Planted
2	Wild/natural released

Appendix 7. Brood Year 2005 steelhead disposition by sex and origin.

MALES		FEMALES	
225	Spawned	273	Spawned and incubated
0	Killed and rejected	9	Spawned and rejected
33	Mortalities	61	Mortalities
1	Wild released	1	Wild released
1,473	Out-planted	1,735	Out-planted
1,732	Total males	2,079	Total females

Female morts include 1 ripe females that were killed to recover a CWT and not spawned. Outplants include 1,049 to the Nez Perce Tribe.

Appendix 8. Incidental Capture during Brood Year 2005 at Hells Canyon Trap.

Length	Rainbow Trout	Brown Trout	Fall Chinook	Spring Chinook
36	1			
Total	1			

Appendix 9. Brood Year 2005 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	3/14/05	5	1	4	23,212	0	23,212	6,432	28	5,803	0	0
2	3/17/05	4	0	4	22,858	0	22,858	9,252	40	5,715	0	6,771
3	3/21/05	13	5	8	52,138	0	52,138	32,572	62	6,517	0	20,183
4	3/28/05	11	1	10	59,423	0	59,423	51,265	87	5,942	0	31,686
5	3/31/05	19	0	19	125,462	0	125,462	100,861	80	6,603	0	87,622
6	4/04/05	26	0	26	152,899	0	152,899	132,378	87	5,881	0	74,986
7	4/07/05	26	0	26	151,562	0	151,562	135,995	90	5,829	0	77,583
8	4/11/05	22	0	22	123,277	0	123,277	88,675	72	5,604	0	45,968
9	4/14/05	29	1	28	151,080	0	151,080	119,675	79	5,396	0	102,974
10	4/18/05	34	0	34	198,946	0	198,946	161,042	81	5,851	121,710	0
11	4/21/05	28	0	28	150,061	0	150,061	113,613	76	5,359	99,311	0
12	4/25/05	36	0	36	196,614	0	196,614	151,191	77	5,462	124,447	0
13	4/28/05	16	0	16	86,774	0	86,774	70,379	81	5,423	66,087	0
14	5/02/05	10	0	10	40,375	0	40,375	28,976	72	4,038	27,212	0
15	5/05/05	3	1	2	5,896	0	5,896	5,220	89	2,948	5,220	0
Total		282	9	273	1,540,577	0	1,540,577	1,207,526	78	5,643	443,987	447,773

Appendix 10. Brood Year 2005 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	Eyed Eggs Shipped
1	3/31/05	35	0	35	189,924	0	189,924	155,683	82	5,426	0	115,844
2	4/13/05	72	0	72	339,852	0	339,852	217,350	64	4,720	0	69,820
3	4/18/05	60	0	60	257,756	0	257,756	185,388	72	4,296	0	160,912
4	4/25/05	96	0	96	397,827	0	397,827	323,854	81	4,144	0	26,395
5	4/28/05	60	0	60	242,782	0	242,782	207,934	86	4,046	0	201,696
6	5/02/05	70	0	70	295,752	0	295,752	259,240	88	4,225	184,914	0
7	5/05/05	70	0	70	272,943	0	272,943	244,070	89	3,899	234,317	0
8	5/09/05	32	0	32	132,911	0	132,911	106,301	80	4,152	96,335	0
9	5/12/05	12	0	12	47,987	0	47,987	39,457	82	3,999	39,457	0
Total		507	0	507	2,177,734	0	2,177,734	1,739,277	80	4,295	555,023	574,667

Appendix 11. Brood Year 2005 steelhead egg and fry disposition from Oxbow Hatchery.

Number	Disposition
1,540,577	Green eggs
0	Green eggs culled
333,051	Dead eggs
1,207,526	Eyed eggs
443,987	Eyed eggs shipped to Niagara Springs
763,539	Eyed eggs remaining on station
22,906	Eyed eggs to fry loss (3%)
740,633	Fry on station
447,773	Fry shipped to Niagara Springs
191,329	Fry shipped to Cascade Reservoir
10,978	Escapees (fish escaped because of leaking trays)
101,531	Excess fry disposed of

Appendix 12. Pahsimeroi Brood Year 2005 steelhead egg and fry disposition from Oxbow Hatchery.

Number	Disposition
2,177,734	Green eggs
438,457	Dead eggs
1,739,277	Eyed eggs
555,023	Eyed eggs shipped to Niagara Springs
1,184,254	Eyed eggs remaining on station
35,528	Eyed eggs to fry loss (3%)
1,148,726	Fry on station
574,667	Fry shipped to Niagara Springs
574,059	Fry shipped to Cascade Reservoir
0	Excess fry disposed of

Appendix 13. Oxbow Hatchery steelhead trapping and disposition summary.

Fish Trapped ^a		Age-classes ^b	
Males	1,732	1 Ocean	2,823
Females	2,079	2 Ocean	988
Total	3,811	Total	3,811

Fish Disposition	Males	Females	Total
Pre-spawn mortality	13	12	25
Pond mortality	20	49	69
Spawned only	225	282 ^a	507
Released	1	1	2
Out planted	949	1,210	2,159
Killed for NPT	524	525	1,049
Total	1,732	2,079	3,811

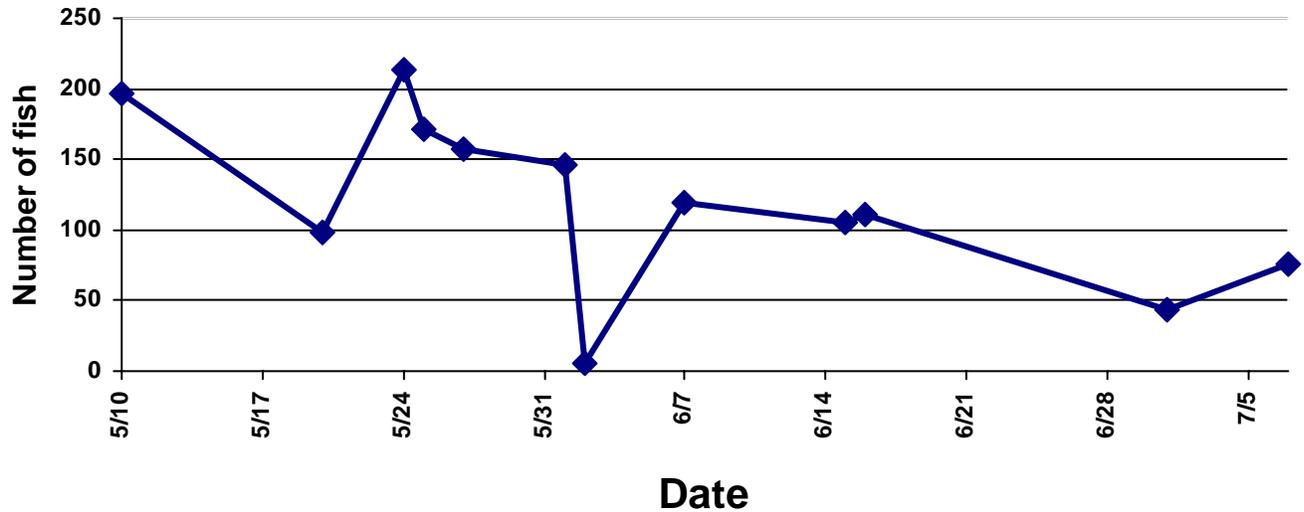
Carcass disposition	Males	Females	Total
Hauled to landfill	258	343	601

^a Females spawned was 282 and 9 of them were culled.

^b Age Class Breakdown: 1 Ocean: males ≤ 67 cm (1,429), females ≤ 65 cm (1,394)
2 Ocean: males ≥ 68 cm (303), females ≥ 66 cm (685)

Appendix 14. Spring Chinook run timing to Hells Canyon Trap during 2004.

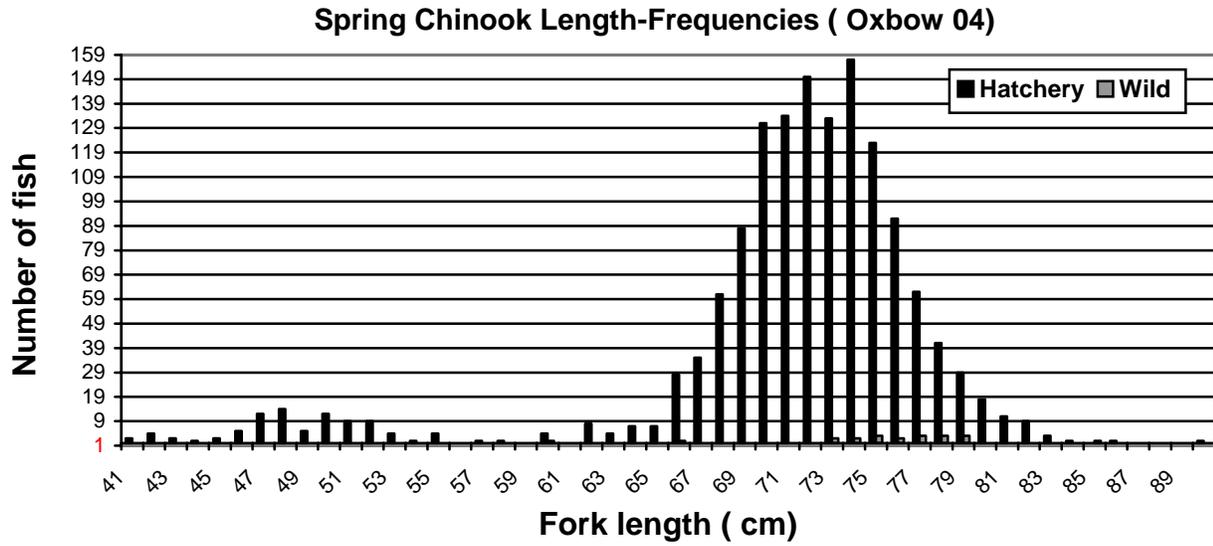
Spring Chinook trap Timing (Oxbow 04)



Appendix 15 Oxbow Spring Chinook Operations for brood year 2004

Date	Total Trapped	Trapped Hatchery	Trapped Wild	Released Wild	Mortalities	Hauled
5/10/04	197	194	3	3	0	21
5/20/04	98	98	0	0	0	165
5/24/04	214	209	5	5	1	0
5/25/04	171	170	1	1	0	0
5/26/04	0	0	0	0	0	220
5/27/04	157	156	1	1	0	0
5/28/04	0	0	0	0	0	204
6/01/04	146	145	1	1	0	0
6/02/04	5	5	0	0	0	0
6/03/04	0	0	0	0	0	298
6/07/04	120	119	1	1	0	0
6/10/04	0	0	0	0	0	75
6/14/04	0	0	0	0	0	111
6/15/04	106	104	2	2	0	2
6/16/04	111	109	2	2	0	13
6/17/04	0	0	0	0	0	140
6/21/04	0	0	0	0	0	57
6/22/04	0	0	0	0	2	0
7/01/04	44	43	1	1	0	2
7/06/04	0	0	0	0	0	35
7/07/04	76	74	2	2	0	4
7/08/04	0	0	0	0	1	70
7/09/04	0	0	0	0	2	3
TOTAL	1,445	1,426	19	19	6	1,420

Appendix 16. Spring Chinook Run Timing



Appendix 17 Spring Chinook length-Frequencies.

Fork Length (cm)	Total Fish	Hatchery Adults	Wild Adults	Hatchery Jacks	Wild Jacks
41	2	0	0	2	0
42	4	0	0	4	0
43	2	0	0	2	0
44	1	0	0	1	0
45	2	0	0	2	0
46	5	0	0	5	0
47	12	0	0	12	0
48	14	0	0	14	0
49	5	0	0	5	0
50	12	0	0	12	0
51	9	0	0	9	0
52	9	0	0	9	0
53	4	0	0	4	0
54	1	0	0	1	0
55	4	0	0	4	0
56	0	0	0	0	0
57	1	0	0	1	0
58	1	0	0	1	0
59	0	0	0	0	0
60	4	4	0	0	0
61	0	0	0	0	0
62	8	8	0	0	0
63	4	4	0	0	0
64	7	7	0	0	0
65	7	7	0	0	0
66	28	28	0	0	0
67	35	35	0	0	0
68	61	61	0	0	0
69	88	88	0	0	0
70	131	131	0	0	0
71	134	134	0	0	0
72	150	150	0	0	0
73	135	133	2	0	0
74	159	157	2	0	0
75	126	123	3	0	0
76	94	92	2	0	0
77	65	62	3	0	0
78	44	41	3	0	0
79	32	29	3	0	0
80	18	18	0	0	0
81	11	11	0	0	0
82	9	9	0	0	0
83	3	3	0	0	0
84	1	1	0	0	0
85	1	0	1	0	0
86	1	1	0	0	0
87	0	0	0	0	0
88	0	0	0	0	0
89	0	0	0	0	0
90	1	1	0	0	0
Total	1445	1338	19	88	0

- 1-Ocean (3-year-old, <60 cm)
- 2-Ocean77 (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	88	0	88
2-Ocean	1,337	19	1,356
3-Ocean	1	0	1
Total	1,426	19	1,445

1-Ocean (3-year-old, <60 cm)
 2-Ocean (4-year-old, 60-86 cm)
 3-Ocean (5-year-old, >86 cm)

Appendix19 Incidental Capture.

Date	Steelhead	Rainbow trout
5/10/04	2	0
5/20/04	1	1
7/01/04	0	1
Total	3	2

Appendix 20 Spring Chinook Disposition.

Number	Disposition
1,445	Trapped (Wild and Hatchery) (includes 1 trap mort)
21	Hatchery - Returned to Snake River (PAF)
19	Wild – Returned to Snake River
386	RRFH for Spawning
243	Out-Planted in Powder River (Oregon)
440	Out-Planted in Boise River (Idaho)
165	Nez Perce Tribe (Subsistence)
104	Shoshone-Bannock Tribe (Subsistence)
40	Idaho Food Bank (Subsistence)
21	Local Senior Citizens (Subsistence)
6	Mortalities

Appendix 21. Spring Chinook egg numbers by lot

Lot Number	Females Kept	Females Culled	Fecundity	Eyed-Eggs	Dead Eggs	Green Eggs
10	61	6	3,775	183,735	23,863	207,598
11	163	7	3,290	480,008	33,162	513,170
12	83	12	3,932	254,583	24,621	279,204
13	49	4	3,241	135,375	10,457	145,832
Total	356	29	3,504	1,053,701	92,103	1,145,804

Eggs from culled females are not included in this table.

Appendix 22. Spring Chinook egg disposition

Number	Disposition
1,241,526	Total Green Eggs (includes culled eggs)
76,109	Culled (BKD)
19,613	Culled (Poor Quality)
92,103	Dead Eggs
1,053,701	Eyed Eggs Shipped to RRFH
0	Eyed Eggs Remaining at Oxbow

Appendix 23. 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		1,338	3,811