



OXBOW FISH HATCHERY

2006 Steelhead Brood Year Report 2005 Spring Chinook Brood Year Report



**Kent Hills
Hatchery Assistant Manager**

**Jennifer Nalder
Biological Technician**

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ABSTRACT

The Oxbow Fish Hatchery (OFH) trap operated for 10 days between October 24, and November 14, 2005. Due to high water flows during April of 2006, spring trapping could not occur. The trap was under water for the majority of the month. A total of 3,581 steelhead trout (*Oncorhynchus mykiss*) were trapped during the operating period. They consisted of 3,578 (99.92%) hatchery steelhead and 3 (.08%) wild steelhead. During the fall of 2005, 2,027 steelhead were out-planted for sport fisheries or supplementation programs.

Spawning consisted of 15 egg takes from March 9 to April 27, 2006. A total of 218 females were spawned. Eggs from 217 females were retained resulting in 1,399,162 green eggs, which were incubated to eye-up. Survival to eye-up was 81%, producing 1,133,376 eyed eggs. From these, 446,974 eyed-eggs and 469,396 fry were shipped to Niagara Springs Fish Hatchery (NSFH), 81,851 eyed eggs were shipped to Hagerman State Fish Hatchery (HSFH) and 117,018 fry were disposed of.

Eggs from 502 females were shipped from Pahsimeroi Fish Hatchery to OFH. These females produced 2,473,975 green eggs and 1,618,234 eyed eggs. From these, 595,362 were shipped to NSFH and 92,863 were shipped HSFH. The remaining eggs were raised to fry stage. Of the resulting button-up fry, 616,260 were shipped to NSFH, 134,392 were shipped to Magic Valley Fish Hatchery and the remaining 151,457 were disposed.

Spring Chinook were trapped 32 days between May 2 and July 18, 2005. A total of 671 Spring Chinook salmon were trapped, including 35 hatchery jacks, 620 hatchery adults, 16 wild adults. The wild or natural adults were released below Hells Canyon Dam.

A total of 613 hatchery adults and 7 jacks were transported to Rapid River Fish Hatchery (RRFH) for spawning. A total of 2 adult pond morts and 5 trap morts were disposed of. The remaining 28 jacks were donated to the local Senior Citizens for subsistence

Eggs from 394 females that were spawned at the RRFH were transported to the OFH for incubation. Eggs from 6 females were culled due to high levels of Bacterial Kidney Disease (BKD) and the eggs from 2 females were spilled while draining a cooler with broken hinges. Based on the average fecundity of each lot, 21,049 eggs were culled due to BKD and 7,268 were lost when spilled. The remaining 386 females produced 1,332,537 green eggs and 1,229,468 eyed eggs. These eyed-eggs were shipped back to the RRFH in three separate loads.

Authors:

Kent Hills
Assistant Hatchery Manager

Jennifer Nalder
Fishery Technician

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 when 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 10 days between October 24, and November 14, 2005. Due to high water flows during April of 2006, spring trapping could not occur. The trap was under water for the majority of the month. A total of 3,581 steelhead trout (*Oncorhynchus mykiss*) were trapped during these operating periods. They consisted of 3,578 (99.92%) hatchery and 3 (.08%) wild steelhead. Wild fish were released below Hells Canyon Dam and hatchery fish were held for spawning, out-plant, or subsistence. (Appendix 1). Staff from IPC removed the 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 3,581 steelhead trapped. Age-classes are defined by length. One-ocean females were ≤ 65 cm 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. The age-class ratio for the hatchery fish was 1,737 (48.5%) one-ocean and 1,841 (51.5%) two-ocean. The sex ratio by age was 914 males (52.6%) and 823 females (47.4%) for one-ocean fish, and 481 (26.1%) males and 1,360 (73.9%) females for two-ocean fish. Two wild steelhead were one-ocean fish and 1 was a two-ocean fish. Their sex ratio was 1 male (50%) and 1 female (50%) one-ocean fish and 1 male (100%) two-ocean 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 2005, 2,027 steelhead were out-planted for sport fisheries or supplementation programs. Of the 2,027 out-plants, 1,000 were released into the Boise River, and 1,027 into Hells Canyon Reservoir. In addition to out-plants, 1,012 were killed and given to the Nez Perce Tribe for subsistence (Appendix 6).

Incidental Capture

During the trapping season, 2 rainbow trout (*Salmo Gardner*) were trapped and transported to OFH. They were released into Hells Canyon Reservoir (Appendix 8).

Marks, Fin Clips, Injuries

When the steelhead arrived at the hatchery, they were checked for marks e.g. fin clips, tags, and injuries. There were 3,578 with adipose fin clips including 65 with partial clips, 59 with a left pectoral clip, 21 with a right pectoral clip, 26 with a left pelvic clip, and 6 with a right pelvic clip. Tagged fish included 20 with coded-wire-tags and 10 with floy-tags. During spawning, snouts were removed from coded-wire-tagged fish and sent to the Department's Fish Marking Lab. Injuries included 26 with fresh body injuries, 59 with head injuries, 136 with body scars, 90 with operculum injuries, 5 with fin damage, 16 with eye damage, 36 with bloody gills, and 6 with jaw damage. Fishhooks were found in 8 fish.

Holding And Spawning

Pre-Spawning Mortality

Pre-spawn mortality totaled 22 adult steelhead consisting of 12 males (includes 1 trap mort and 1 killed and rejected) and 10 females. Pre-spawn mortality numbers include females that died before spawning began (March 9) and all males that died through the second week of spawning (March 27). All carcasses were checked for tags and disposed of.

Spawning Operations

The steelhead were sorted by sex on March 6, 2006, and separated into two ponds. Steelhead transported to the hatchery after March 6 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. Spawning consisted of 15 egg takes from March 9 to April 27, 2006 and included a total of 218 females (Appendix 7,9). Eggs were culled from 1 female because they were green, leaving eggs from 217 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 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 157 (72%) females for viruses, 20 (9%) for Whirling Disease, and 60 (28%) for Bacterial Kidney Disease (BKD). All test results were negative for pathogens. In addition, OFH personnel collected fin samples from 86 females and 102 males for genetic testing.

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 directly 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 hatching to inhibit mycosis. All eyed eggs were shocked at approximately 360 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 dead eggs would turn white. Undeveloped or dead eggs were removed shortly after shocking and were enumerated using a Jensorter™ electronic counter. The 217 females had an average fecundity of 6,448 eggs/female and produced 1,399,162 green eggs. A total of 1,133,376 eggs reached the eyed stage, for 81% eye-up success.

Eggs from 502 females from PFH were flown to OFH on 10 separate spawn dates. When they arrived, the eggs were disinfected and processed in the same manner as OFH eggs. They were treated with Formalin and Argentine in the same manner as the Oxbow eggs. These 502 females produced 2,473,975 green eggs. The average fecundity was 4,928. Eye-up was 65.4%, resulting in 1,618,234 eyed eggs (Appendix 10).

Fry Development

To facilitate management flexibility at the rearing facility, some eggs were held after eye-up and transferred as fry. Eggs that were not shipped at the eyed stage were reared to the button-up stage. The eggs hatched approximately 58 days after being spawned. Button-up was approximately 1040 TU. This year fry were shipped at approximately 950 TU, which was approximately 95 days after the spawning.

Egg and Fry Disposition

Egg Shipments

During May and June of 2006, 446,974 OFH eyed eggs were shipped to NSFH and 81,851 were shipped to HSFH. They were transported in 48-quart coolers filled with water chilled to 42° F. Each cooler was loaded with eggs from pre-defined trays in order to achieve the number/spawn and number/cooler requested by the receiving-hatchery managers. The coolers were transported by OFH staff. The remaining eggs were raised to fry stage (Appendix 11).

During May and June of 2006, 595,362 PFH eyed eggs were shipped to NSFH and 92,863 were shipped to HSFH. The remaining eggs were raised to the fry (Appendix 12).

Fry Shipments

In July, 469,396 fry were shipped to NSFH and 117,018 surplus fry were disposed of. 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. (Appendix 11).

In July, 616,260 PAH fry were shipped to NSFH, 134,392 were shipped to Magic Valley Fish Hatchery, and 151,457 surplus fry were disposed of. The fry shipped to NSFH 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 in 2005 were from smolts released in 2002, 2003, and 2004. The trap was operated for 32 days between May 2 and July 18. A total of 671 Spring Chinook were trapped. They included 620 hatchery adults (includes 5 trap morts); 35 hatchery jacks and 16 wild adults. The wild adults were released into the Snake River below Hells Canyon Dam. One of them was trapped a second time (Appendices 14 and 15).

Length-Frequencies and Age and Sex Ratios

Lengths were measured on all fish trapped. Age-class was defined by fork length as follows: 1-ocean (three-year-olds) < 60 cm, 2-ocean (four-year-olds) 60-86 cm, and 3-ocean (five-year-olds) >86 cm). The age-class ratio for the 655 marked hatchery fish was: 35 (5.34%) 1-ocean (all jacks); 609 2-ocean (92.98%), and 11 (1.68%) 3-ocean. The wild Chinook age-class, determined by using the same lengths as for the hatchery Chinook, were as follows: 0 (0%) 1-ocean; 14 (87.5%) 2-ocean and 2 (12.5%) 3-ocean. Sex was not determined because dimorphism is not evident until later in the season. There was no size difference between males and females. (Appendix 16, 17 and 18).

Distribution

A total of 16 wild Chinook were returned to the Snake River below Hells Canyon Dam. One of them was trapped a second time and was once again released into the Snake River below Hells Canyon Dam. The remaining fish were distributed as follows: 613 adults and 7 jacks to RRFH, and 28 jacks to the local senior citizens. In addition, there were 2 pond mortalities and 5 trap mortalities.

Incidental Capture

Six rainbow trout and 349 hatchery and 1 wild steelhead trout were trapped. Three hundred thirteen of the steelhead were released at the trap. Thirty six were transported to the hatchery and then returned to the Snake River below Hells Canyon Dam. The trout were released into Hells Canyon Reservoir (Appendix 19).

Marks, Fin Clips, Injuries

All salmon collected were checked for marks, fin clips, tags, and injuries. There were 655 fish marked with adipose fin clips. Of those, 143 had partial clips (PAF fish). Sixteen wild salmon with unclipped adipose fins were trapped and released. No coded-wire-tags, radio-tags, or PIT-tags were detected. Injuries included 48 body scars, 56 body injuries, 12 damaged fins, 13 head injuries, 6 eye injuries, 2 operculum injuries, 1 jaw injury, and 2 fish with bloody gills. One had a right pelvic fin clip and 2 had fish hooks.

Holding and Spawning

Transport

Personnel from IPC transported all the fish from the trap to the hatchery on each of the 29 days that salmon were trapped. During the remaining 3 trap days, no fish entered the trap. This required one or two trips each day. Pursuant to the Endangered Species Act, all wild fish were released back into the Snake River below Hells Canyon Dam. Wild fish were caudal fin punched before they were released to identify recaptures. They were returned to the release point in a 120-gallon tank in the hatchery's pickup truck. Personnel from IPC transported 614 of the Chinook to RRFH in our 1000-gallon tanker and OFH personnel transported 6 in the pickup-mounted tank used to transport the wild fish. The jacks that were used for subsistence were delivered to local senior citizens by OFH personnel. 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. The fish held for broodstock were kept in our northeast holding pond. The jacks that were to be distributed for consumption were kept in the southeast holding pond pending being picked up by tribal personnel. Nez Perce Tribal Fisheries personnel notified OFH that they would not pick up less than 30 jacks at a time. Subsequently the jacks from the holding pond were given to local seniors and jacks caught on subsequent trapping days were killed and given to seniors the day they were trapped. When the arriving fish were sorted wild Chinook were placed in a small above ground holding tank before transport back to the Snake River. Holding pond water temperature ranged from 59 °F to 67 °F.

Adult Treatments

Hatchery Chinook transferred to RRFH for broodstock were all given an intra-peritoneal injection of Gallimycin-200 (Erythromycin 200 mg/ml). They were injected at the rate of 20 mg/kg of body weight. Weight was estimated using a length to weight ratio. The remaining hatchery and wild Chinook were not injected.

Pre-spawning Mortality

There were 2 holding pond mortalities and 5 trap mortalities at OFH during 2005. (Appendix 20).

Spawning Operations

Six hundred thirteen adult salmon and 7 jacks were transported to RRFH for spawning. Personnel from OFH traveled to RRFH seven times to assist with spawning. For more information about spawning and incubation, refer to the *Rapid River Fish Hatchery 2005 Run Report*.

Incubation

Egg Development

During August and September of 2005 OFH staff assisted with spawning of Rapid River returns at RRFH. Incubation space limitations at RRFH required that eggs from 394 females be returned to OFH for incubation to the eyed stage. During spawning, eggs were put into EggTube™ containers that were placed in EggBox™ coolers filled with well water. They were water hardened in a solution of well water and 100 ppm of iodophore. After water hardening for one hour they were rinsed and covered with fresh well water. Ice was added to the coolers to maintain a temperature of 45 °F for the trip to OFH. When they arrived at OFH, the eggs were disinfected with 100 ppm of iodophore in well water for 30 minutes and gradually adjusted to hatchery water temperature before they were placed in incubation trays. Incubation water bypassed the chiller and entered the incubation stacks at approximately 54 °F at a rate of 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 approximately 495 daily temperature units (DTU). Shocking was accomplished by pouring the eggs from the incubation tray into a bucket containing approximately 1 inch of water from a height of 2 feet, then the eggs were poured back into the incubation tray so the undeveloped or infected eggs turn white. Within 1-2 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 picking. The live and dead eggs were counted using a Jensorter™ Model BC egg counter. The eggs from 6 females were culled due to Bacterial Kidney Disease (BKD) and the eggs from 2 females were spilled while draining a cooler with defective hinges. The culled eggs were not counted with the counter, but based on the average fecundity of the lot from which they were spawned, the green BKD eggs numbered 21,049 and the green eggs spilled numbered 7,268. Lot fecundity data is compiled in Appendix 21. The remaining 386 females produced 1,332,537 green eggs. A total of 103,069 dead eggs were removed, leaving 1,229,468 eyed eggs. This yields a 92.3% eye-up and an average fecundity of 3,452 eggs/female. Within a few days after being counted, the eyed-eggs were returned to RRFH. Egg disposition is shown in Appendix 22.

Egg Disposition

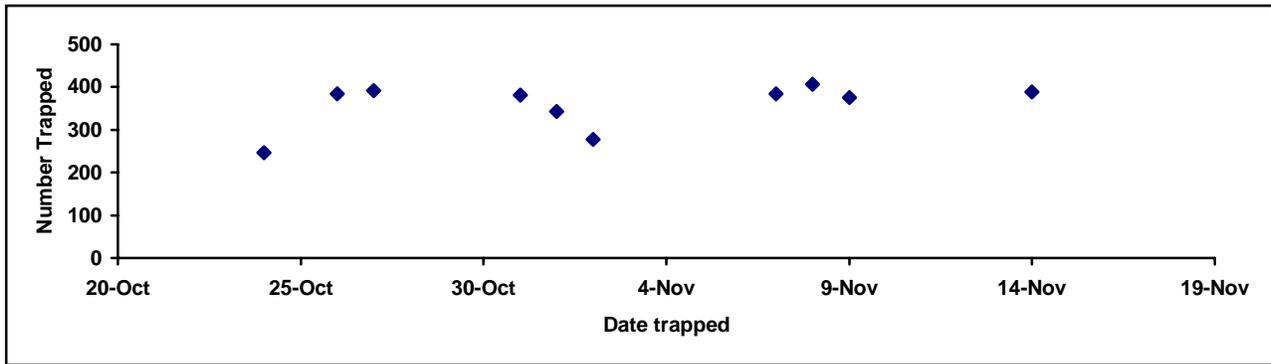
Within a few days after sorting and counting, 1,229,468 eyed eggs were placed into egg-tubes and coolers and prepared for shipment. Ice was added to the coolers to lower the water temperature to approximately 46°F. Eggs were transported from OFH to RRFH in the hatchery pickup. Data can be seen in Appendix 22

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.

APPENDICES

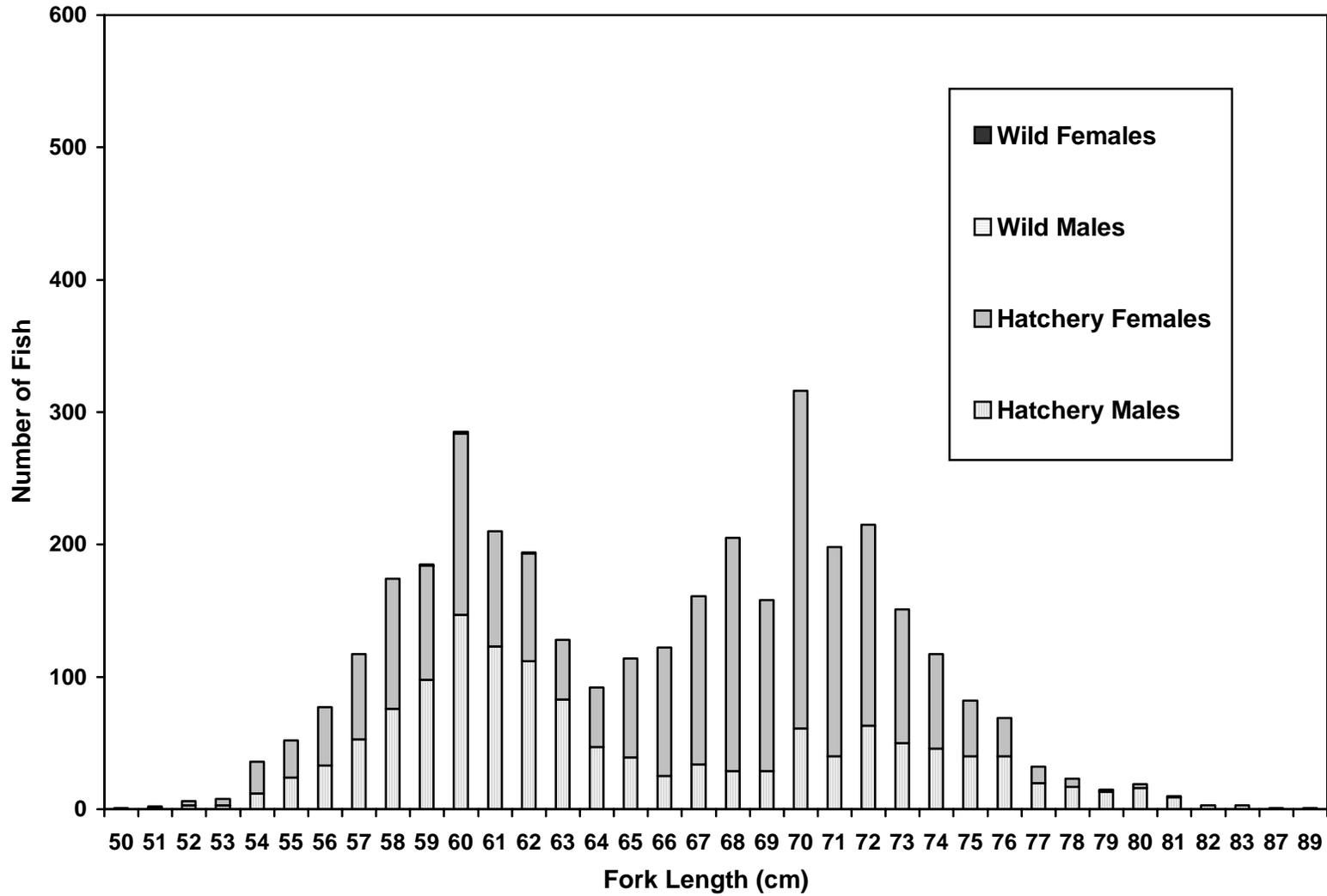
Appendix 1. Hells Canyon Dam steelhead trap counts for Brood Year 2006.



Appendix 2. Brood Year 2006 adult steelhead trapped at Hells Canyon Trap

Fall 2005 Trapping		Spring 2006 Trapping	
Date	Number Of Fish	Date	Number Of Fish
October 24	247		
October 26	385		
October 27	392		
October 31	382		
November 1	342		
November 2	277		
November 7	384		
November 8	407		
November 9	376		
November 14	389		
Total	3,581	Total	

Appendix 3. Length-frequency of steelhead trapped at Hells Canyon Dam during fall 2005 and spring 2006.



Appendix 4. Lengths of Brood Year 2006 steelhead trapped at Hells Canyon Trap

Fork Length (cm)	Total Fish	Hatchery Males	Hatchery Females	Wild Males	Wild Females
50	1	1			
51	2	1	1		
52	6	3	3		
53	8	3	5		
54	36	12	24		
55	52	24	28		
56	77	33	44		
57	117	53	64		
58	174	76	98		
59	185	98	86	1	
60	284	147	137		
61	210	123	87		
62	194	112	81		1
63	128	83	45		
64	92	47	45		
65	114	39	75		
66	122	25	97		
67	161	34	127		
68	205	29	176		
69	158	29	129		
70	316	61	255		
71	198	40	158		
72	215	63	152		
73	151	50	101		
74	117	46	71		
75	82	40	42		
76	69	40	29		
77	32	20	12		
78	23	17	6		
79	15	13	1	1	
80	19	16	3		
81	10	9	1		
82	3	3			
83	3	3			
87	1	1			
89	1	1			
Total	3,581	1,395	2,183	2	1
Age-class	Male	Female	Total	Average length	
^a One-ocean	915	824	1,739	60.3 cm	
^b Two-ocean	482	1,360	1,842	71.1 cm	
Total	1,397	2,184	3,581	65.9 cm	

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

^bTwo-ocean: males ≥ 68 cm and greater; females ≥ 66 cm and greater

Appendix 5. Age and sex of steelhead returns to Oxbow Hatchery for Brood Year 2006

Age-Class	Hatchery Males	Wild/Natural Males	Hatchery Females	Wild/Natural Females	Total*
1-Ocean	914	1	823	1	1,739
2-Ocean	481	1	1,360	0	1,842
Total	1,395	2	2,183	1	3,581

Appendix 6. Distribution of Brood Year 2006 steelhead from Oxbow Hatchery

3,581	Trapped (3,581-fall, 0-spring) (Wild and Hatchery) (includes 1 trap mort)
3	Wild/natural released
3,578	Ponded
1,012	Nez Perce Tribe
2,027	Out-Planted
539	Retained for spawning (subtract 1 trap mort)

Appendix 7. Disposition of Brood Year 2006 steelhead at Oxbow Hatchery

MALES		FEMALES	
262	Spawned	217	Spawned and incubated
1	Killed and rejected	1	Spawned and rejected
12	Mortalities	46	Mortalities
2	Wild released	1	Wild released
1,120	Out-planted	1,919	Out-planted
1,397	Total males	2,184	Total females

Male mortalities include 1 trap mort.

Outplants include 1,012 to the Nez Perce Tribe.

Appendix 8. Incidental Capture during Brood Year 2006 at Oxbow Hatchery

Length	Rainbow Trout	Brown Trout	Fall Chinook	Spring Chinook
36	1			
40	1			
Total	2			

Appendix 9. Oxbow Hatchery steelhead spawning summary for Brood Year 2006

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	3/9/06	7	0	7	49,244	0	49,244	23,351	47	7,035		14,330
2	3/13/06	6	0	6	37,183	0	37,183	28,877	78	6,197		28,011
3	3/16/06	4	0	4	28,732	0	28,732	25,936	90	7,183		25,158
4	3/20/06	11	0	11	68,232	0	68,232	57,018	84	6,203		55,308
5	3/23/06	15	1	14	84,264	0	84,264	67,863	81	6,019		51,087
6	3/27/06	9	0	9	60,733	0	60,733	52,572	87	6,748		50,995
7	3/30/06	13	0	13	85,547	0	85,547	67,098	78	6,581		34,886
8	4/3/06	23	0	23	156,231	0	156,231	129,064	83	6,793		82,012
9	4/6/06	28	0	28	185,190	0	185,190	152,772	83	6,614		127,609
10	4/10/06	21	0	21	137,210	0	137,210	110,950	81	6,534	110,950	
11	4/13/06	29	0	29	191,954	0	191,954	162,112	85	6,619	162,112	
12	4/17/06	27	0	27	169,307	0	169,307	135,581	80	6,271	135,581	
13	4/20/06	20	0	20	119,994	0	119,994	97,585	81	6,000	97,585	
14	4/24/06	3	0	3	17,272	0	17,272	15,466	90	5,757	15,466	
15	4/27/06	2	0	2	8,069	0	8,069	7,131	88	4,035	7,131	
Total		218	1	217	1,399,162	0	1,399,162	1,133,376	81	6,448	528,825	469,396

**Appendix 10. Pahsimeroi Hatchery steelhead spawning summary at Oxbow for Brood
Year 2006**

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	3/30/06	19	0	19	89,959	0	89,959	43,332	48	4,735	0	9,566
2	4/6/06	60	0	60	298,543	0	298,543	108,315	36	4,976	0	105,066
3	4/11/06	52	0	52	250,218	0	250,218	213,275	85	4,812	0	206,877
4	4/18/06	60	0	60	305,106	0	305,106	164,896	54	5,085	0	49,897
5	4/25/06	60	0	60	296,395	0	296,395	195,017	66	4,940	0	189,166
6	4/27/06	72	0	72	360,324	0	360,324	234,853	65	5,005	234,853	0
7	5/01/06	60	0	60	283,191	0	283,191	229,354	81	4,720	229,354	0
8	5/04/06	60	0	60	304,718	0	304,718	219,299	72	5,079	23,340	190,080
9	5/08/06	30	0	30	151,224	0	151,224	116,198	77	5,041	116,198	0
10	5/11/06	29	0	29	134,297	0	134,297	93,695	70	4,631	84,480	
Total		502	0	502	2,473,975	0	2,473,975	1,618,234	65	4,928	688,225	750,652

Appendix 11. Oxbow Hatchery steelhead eggs and fry for Brood Year 2006

Number	Disposition
1,399,162	Green eggs
265,786	Dead eggs
1,133,376	Eyed eggs
446,974	Eyed eggs shipped to Niagara Springs
81,851	Eyed eggs shipped to Hagerman State
604,551	Eyed eggs remaining on station
18,137	Eyed eggs to fry loss (3%)
586,414	Fry on station
469,396	Fry shipped to Niagara Springs
117,018	Fry disposed of
0	Fry remaining on station

Appendix 12. Pahsimeroi Hatchery steelhead eggs and fry at Oxbow Hatchery for Brood Year 2006

Number	Disposition
2,473,975	Green eggs
855,741	Dead eggs
1,618,234	Eyed eggs
595,362	Eyed eggs shipped to Niagara Springs
92,863	Eyed eggs shipped to Hagerman State
930,009	Eyed eggs remaining on station
27,900	Eyed eggs to fry loss (3%)
902,109	Fry on station
616,260	Fry shipped to Niagara Springs
134,392	Fry shipped to Magic Valley
151,457	Excess fry disposed of
0	Fry remaining on station

Appendix 13. Oxbow Hatchery steelhead trapping and disposition summary.

Fish Trapped ^a		Age-classes ^b	
Males	1,397	1 Ocean	1,739
Females	2,184	2 Ocean	1,842
Total	3,581	Total	3,581

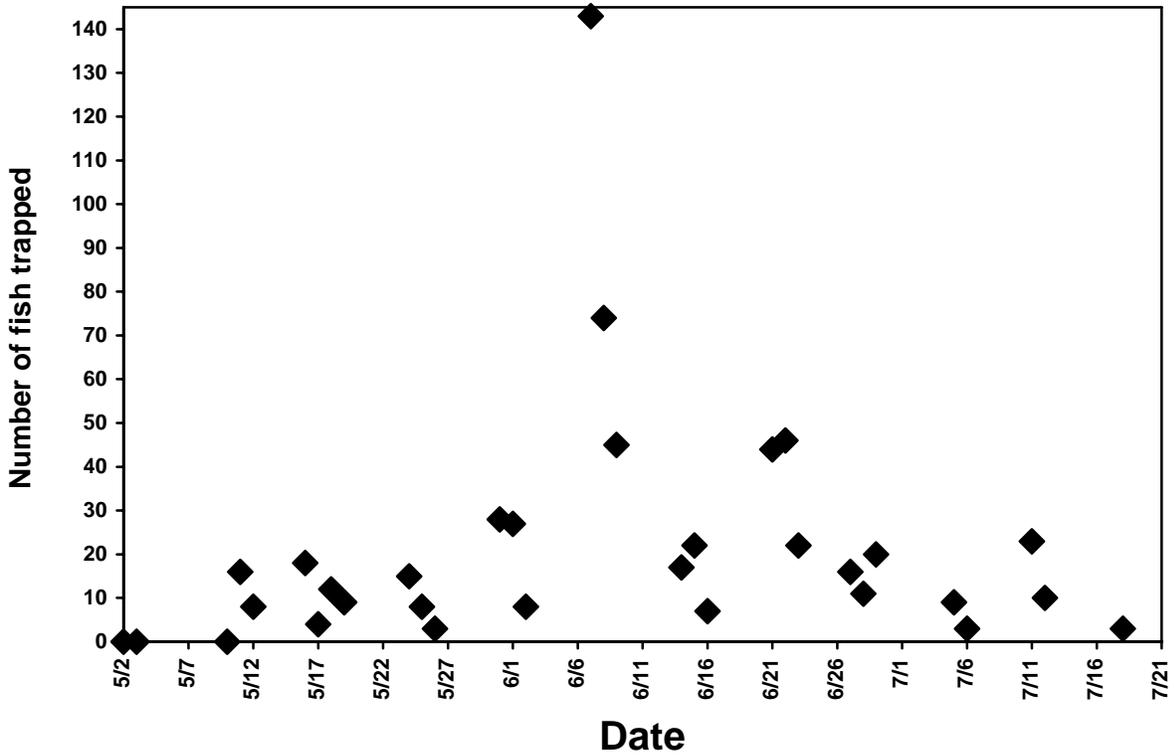
Fish Disposition	Males	Females	Total
Mortalities	13	47	60
Spawned	262	217	479
Wild Released	2	1	3
Out planted ^a	1,120	1,919	3,039
Total	1,392	2,184	3,581

Carcass disposition	Males	Females	Total
Hauled to landfill	275	264	539

^a Outplants include 1,012 fish given to the Nez Perce Tribe.

^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)

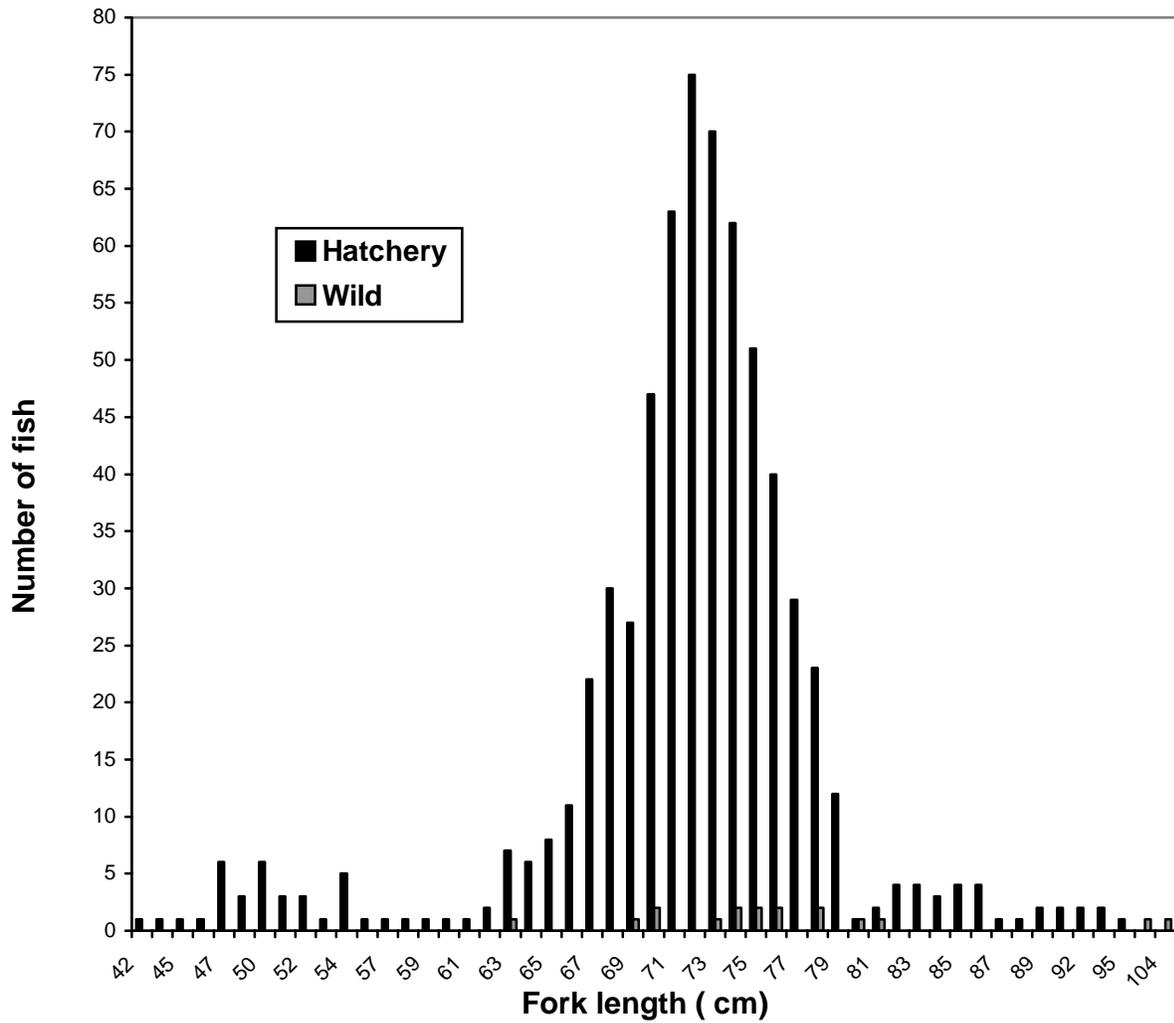
Appendix 14. Spring Chinook run timing to Hells Canyon Trap during 2005.



Appendix 15 Spring Chinook trapping record at Hells Canyon Trap for 2005.

Date	Number Of Fish	Date	Number Of Fish
May 2	0	June 8	74
May 3	0	June 9	45
May 10	0	June 14	17
May 11	16	June 15	22
May 12	8	June 16	7
May 16	18	June 21	44
May 17	4	June 22	46
May 18	12	June 23	22
May 19	9	June 27	16
May 24	15	June 28	11
May 25	8	June 29	20
May 26	3	July 5	9
May 31	28	July 6	3
June 1	27	July 11	23
June 2	8	July 12	10
June 7	143	July 18	3
Total	299		372
GRAND TOTAL		671	

Appendix 16. Spring chinook length-frequencies in 2005.



Appendix 17 Spring Chinook lengths in 2005.

Fork Length (cm)	Total Fish	Hatchery Adults	Wild Adults	Hatchery Jacks	Wild Jacks
42	1	0	0	1	0
43	1	0	0	1	0
45	1	0	0	1	0
46	1	0	0	1	0
47	6	0	0	6	0
49	3	0	0	3	0
50	6	0	0	6	0
51	3	0	0	3	0
52	3	0	0	3	0
53	1	0	0	1	0
54	5	0	0	5	0
55	1	0	0	1	0
57	1	0	0	1	0
58	1	0	0	1	0
59	1	0	0	1	0
60	1	1	0	0	0
61	1	1	0	0	0
62	2	2	0	0	0
63	8	7	1	0	0
64	6	6	0	0	0
65	8	8	0	0	0
66	11	11	0	0	0
67	22	22	0	0	0
68	30	30	0	0	0
69	28	27	1	0	0
70	49	47	2	0	0
71	63	63	0	0	0
72	75	75	0	0	0
73	71	70	1	0	0
74	64	62	2	0	0
75	53	51	2	0	0
76	42	40	2	0	0
77	29	29	0	0	0
78	24	23	1	0	0
79	12	12	0	0	0
80	2	1	1	0	0
81	3	2	1	0	0
82	4	4	0	0	0
83	4	4	0	0	0
84	3	3	0	0	0
85	4	4	0	0	0
86	4	4	0	0	0
87	1	1	0	0	0
88	1	1	0	0	0
89	2	2	0	0	0
90	2	2	0	0	0
92	2	2	0	0	0
94	2	2	0	0	0
95	1	1	0	0	0
102	1	0	1	0	0
104	1	0	1	0	0
Total	671	620	16	35	0

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

Appendix 18 Spring Chinook age-class in 2005.

Age-class	Hatchery	Wild	Total
1-Ocean	35	0	35
2-Ocean	609	14	623
3-Ocean	11	2	13
Total	655	16	671

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 at Hells Canyon Trap in 2005.

Date	Steelhead	Rainbow trout
5/02/05	116	0
5/03/05	91	0
5/10/05	106	0
5/11/05	13	0
5/12/05	9	1
5/16/05	3	0
5/24/05	1	0
5/25/05	1	0
5/31/05	1	1
6/01/05	1	2
6/14/05	1	0
6/23/05	0	1
6/29/05	0	1
7/06/05	1	0
7/11/05	1	0
7/12/05	2	0
7/18/05	2	0
Total	349	6

Appendix 20. Spring Chinook distribution.

Number	Disposition
671	Trapped (Wild and Hatchery) (includes 5 trap morts)
16	Wild – Returned to Snake River
620	RRFH for Spawning
28	Local Senior Citizens (Subsistence)
7	Mortalities

Appendix 21. Spring Chinook egg numbers per lot.

Lot Number	Females Kept	Females Culled	Fecundity	Eyed-Eggs	Dead Eggs	Green Eggs
6	160	2	3,298	500,496	27,161	527,657
8	83	1	3,685	280,629	25,197	305,826
9	80	4	3,634	264,267	26,420	290,687
10	45	1	3,500	141,469	16,029	157,498
11	18	0	2,826	42,607	8,262	50,869
Total	386	8	3,452	1,229,468	103,069	1,332,537

Eggs from culled and spilled females are not included in this table.

Appendix 22. Spring Chinook egg disposition.

Number	Disposition
1,360,854	Total Green Eggs (includes culled eggs)
21,049	Culled (BKD)
7,268	Spilled
103,069	Dead Eggs
1,229,468	Eyed Eggs Shipped to RRFH
0	Eyed Eggs Remaining at Oxbow

Appendix 23. Snake River historic release and return data

Year	R RFH 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
2005	300,000	526,024		655	3,578
2006	400,000	520,476		586	3,581