



OXBOW FISH HATCHERY

**2001 Steelhead Brood Year Report
2000 Spring Chinook Brood Year Report**

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ABSTRACT

The Oxbow Fish Hatchery (OFH) trap operated for 21 days between October 23, 2000 and December 5, 2000 and for 5 days between March 19, 2001 and March 27, 2001. A total of 3,256 steelhead trout *Oncorhynchus mykiss* were trapped during these operating periods consisting of 3,223 (99%) hatchery steelhead (1,269 males (39%) and 1,954 females (61%) and 33 (1%) wild steelhead (8 males) (24%) and 25 females (76%). The wild fish were released below Hells Canyon Dam. The age and sex ratios for the hatchery steelhead are as follows: one-ocean fish totaled 1,908 (59%) and consisted of 868 males (45%) and 1,040 females (55%). Two-ocean fish totaled 1,315 (41%). Of these, 401 (30%) were males and 914 (70%) were females. The age and sex ratios for the wild steelhead are as follows: one-ocean fish totaled 7 (21%) and consisted of 2 males (29%) and 5 females (71%). Two-ocean fish totaled 26 (79%). Of these, 6 (23%) were males and 20 (77%) were females.

Spawning consisted of 13 egg takes from March 26, 2001 until May 7, 2001. A total of 341 females were spawned. Eggs from 3 females, 1 each from spawn 3, 6, and 12 were rejected, leaving eggs from 338 females to be incubated. The incubated eggs from all 6 females of the first spawn, all 17 females of the second spawn, 28 females from the third spawn, 14 females from the fourth spawn, and 12 females from the fifth spawn were culled to make room for eggs from later run fish. The disposed eggs were not enumerated and are not included in figures in this report. The remaining 261 females had an average fecundity of 6,054, totaling 1,580,117 green eggs. A total of 83% of the eggs survived to eye-up (1,315,789). A total of 446,386 eyed-eggs were shipped to Niagara Springs Fish Hatchery (NSFH) in southern Idaho. The remaining eggs were held and raised to fry stage; 492,766 fry were then shipped to NSFH. The remaining 350,555 fry were disposed.

During the fall of 2000 and the spring of 2001, 2,468 steelhead were out-planted for sport fisheries or supplementation programs. The Boise River and the Little Salmon River both received 803 steelhead. Hells Canyon Reservoir received 862 adult steelhead.

Pathology tested 127 females (38%) for virus; 3 (1%) were tested for whirling disease, and 43 (13%) were tested for bacterial kidney disease (BKD) by enzyme-linked immunosorbent assay (ELISA) by the Eagle Fish Health Laboratory (EFHL). All females tested were negative for pathogens. Note: these percentages are of total spawned females and include tests conducted on the steelhead that were spawned but whose eggs were disposed.

Oxbow Fish Hatchery eggs and fry were incubated from March 26 to July 17, 2001. In addition to OFH eggs and fry, eggs from 990 females were shipped from Pahsimeroi Fish Hatchery (PFH) to OFH. These eggs were flown to the hatchery over 15 trips and went through the same process as did the OFH eggs. The eggs from 369 of the females were culled to make room for eggs from later spawns. The remaining 621 females produced 2,834,515 green eggs with an eye-up of 72.5%, resulting in 2,054,147 eyed-eggs. The fecundity was 4,564. A total of 768,949 eyed-eggs were shipped to Magic Valley Fish Hatchery (MVFH) and 241,891 eyed-eggs were shipped to NSFH. The remaining eggs were held and raised to fry stage; 651,248 button-up fry were then shipped to NSFH. The remaining 360,760 fry were disposed. Since this report pertains to steelhead spawned at OFH, there is no other mention of PFH eggs.

The function of Oxbow Fish Hatchery (OFH) is to trap Chinook salmon and hold them until they are shipped to Rapid River Fish Hatchery (RRFH), where they are spawned. When the Chinook salmon arrive at OFH, they are measured and checked for marks and injuries. This data is recorded for future use. The adult hatchery fish are injected with Erythromycin to slow the growth of Bacterial Kidney Disease (BKD) and put into the northeast holding pond. Hatchery jack salmon were not injected with erythromycin and were put into the southeast holding pond. Wild adult and jack salmon were treated like hatchery salmon except they were not injected and were released back into the Snake River below Hells Canyon Dam. Some of the hatchery jacks were transported to RRFH and others were given to the Nez Perce Tribe for personal and ceremonial use. Jacks were also given to the senior citizens in Halfway, Oregon. The adult salmon are transported to RRFH weekly when the holding pond water is cold and as often as daily when the holding pond water reached temperatures in the 60-degree plus range.

The OFH trap was operated 23 days between May 9 and June 28, 2000. A total of 1,174 spring Chinook salmon *O. tshawytscha* were interrogated. A total of 1,159 hatchery fish were trapped consisting of 205 jacks and 954 adults. Fifteen wild fish (2 jacks and 13 adults) were interrogated. All wild or natural salmon were caudal fin punched and released below Hells Canyon Dam. Seven of the previously trapped wild or natural salmon returned to the trap a second time and three returned a third time. The salmon that returned a third time were considered hatchery fish and treated as such. There were 13 jack mortalities and 4 adult mortalities prior to transfer to RRFH. Because of the large number of returning adults, 159 jacks were given to the Nez Perce Tribe and 16 jacks were given to the senior citizens in Halfway. These jacks were killed by OFH personnel and scanned for tags prior to transfer. Any Passive Integrated Transponder (PIT) tag numbers were recorded and snouts removed from Coded Wire Tag (CWT) tagged fish. Idaho Power Company (IPC) personnel transported the remaining 17 jacks and 950 adults to RRFH.

As stated above, the salmon held at OFH are transported to RRFH for spawning. Normally OFH does not incubate salmon eggs, however, there was an abundance of salmon spawned and insufficient room at RRFH to incubate all the eggs. Therefore eggs from 403 females were incubated at OFH. The eggs from 16 females were culled and not counted. The remaining 387 females produced 1,520,333 green eggs. During the counting process, 77,238 dead eggs were removed, leaving 1,443,095-eyed eggs. This constitutes a 95% eye-up.

HATCHERY OVERVIEW

INTRODUCTION

Oxbow Fish Hatchery (OFH) is part of the Idaho Power Company's (IPC) hatchery system and has been in operation since 1962. The OFH facility is owned and funded by IPC and operated by the Idaho Department of Fish and Game (Department). The OFH was constructed to mitigate for losses of anadromous fish resulting from the construction of Hells Canyon Dam on the Snake River. The OFH is a steelhead trout *Oncorhynchus mykiss* adult holding, spawning and egg rearing station. Spring chinook salmon *O. tshawytscha* are collected and held for transport to Rapid River Fish Hatchery (RRFH).

LOCATION

Oxbow Fish Hatchery is located in Eastern Oregon and is adjacent to the confluence of Pine Creek and the Snake River (Oregon and Idaho border) at the Idaho Power village known as Oxbow, Oregon; located at the eastern-most end of Oregon State Highway 86. It is approximately 67 highway miles east of Baker City, Oregon and approximately 150 highway miles northwest of Boise, Idaho.

OBJECTIVES

The primary objective of OFH is to trap and spawn enough returning adult steelhead and to trap sufficient numbers of spring chinook, which are transported to RRFH for spawning, to meet the Hells Canyon mitigation requirements for adult anadromous fish returns on the upper Snake River. The mitigation objective for steelhead is to produce 1.3 million eyed eggs and ultimately produce 400,000 lbs of steelhead trout smolts annually. The mitigation objective for spring chinook is to produce 1,000,000 smolts annually.

FACILITY DESCRIPTION

The OFH consists of a hatchery building which houses the office, shop, overnight sleeping quarters, an incubation room; four adult holding ponds including fish loading and off-loading facilities; an incubation water chilling unit; a spawning building; bio-aide dorm; assistant hatchery managers' residence; and an off-site fish trap. In addition, the facility has six cinder-block raceways that are in need of renovation. 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 shop space, office space, and sleeping quarters, while the other half is for egg incubation. The incubation room has 384 Heath incubation trays in 24 stacks, giving it the capacity to incubate 3.4 million eggs. Two 8-ft square sheds attached to the main building provide storage space.

Adult holding and production facilities include four holding ponds, a fish trap, and a fish transport truck. The four holding ponds are actually two large ponds separated into four. The two larger divisions each measure 105-ft x 30-ft x 5-ft, and provide 31,500 cubic feet of holding area. The two smaller divisions measure 55-ft x 30-ft x 5-ft and provide 16,500 cubic feet of holding space. Two electric crowding racks provide the ability to consolidate the fish for handling. Six outside raceways (3-ft x 6-ft x 100-ft) could provide 10,800 cubic feet of rearing space if renovated. The adult fish trap consists of an attraction channel, the fish trap, and a loading hopper. The fish are removed from the trap after the loading hopper is hoisted 80 feet up to the fish transport truck.

The well water chiller refrigeration unit is enclosed in a 12-ft x 17-ft metal building located at the west side of the hatchery building. The chiller has the capacity to chill 120 gallons of water per minute (gpm) to 40°F.

The spawning building is approximately 13-ft x 18-ft and is located adjacent to two of the holding ponds. Part of the building 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 processed. The walls are made of fiberglass panel doors and can be opened so that most of the inside area is exposed to the outside.

WATER SUPPLY

Adult Operation Water Source

Water for adult hatchery operations is pumped from the Snake River. A pumping platform adjacent to the hatchery holds two 100hp production pumps, each producing 17 cubic feet per second (ft³/sec). 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, with the other pump acting as an emergency backup. Water from the production pumps passes over two aeration pump platforms; one on the south end of the adult ponds and one on the north end of the adult ponds, 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 fish parts and other undesirable items 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.

Incubation Water Source

Two wells provide the water for egg incubation. One well serves as a primary water source, while the other is an emergency backup with a separate power source. The primary well water is a constant 52°F, while the backup is a constant 56°F. Previously, both wells produced 120 gpm. The 3hp pump in well #2 was replaced with a 10hp pump in order to provide additional water so the incubation room could be supplied with the required 125 gpm and the additional amount of water (approximately 330 gpm) would be available for the salmon raceway. Water used for incubation is chilled to approximately 43°F prior to entering an elevated surge tank in the hatchery building, where it is distributed through two 4-inch PVC water lines to the 24 incubator stacks. By using the chillers, well water can be chilled to 40°F before it enters the hatchery building.

STAFFING

One permanent Fish Hatchery Assistant Manager staffs OFH. Two four-month temporary Bio-aides and two eight-month temporary Bio-aide positions share the 3,785 hours budgeted for hatchery maintenance and operation.

HATCHERY IMPROVEMENTS

ACCOMPLISHED

Over the last few years, Idaho Power's Oxbow maintenance personnel have been responsible for work related to several hatchery improvements. Although the following projects may have been completed prior to the report date and may not be all-inclusive, they are included for information purposes.

- 1) Fall chinook juvenile raceways were constructed and used for rearing.
- 2) A new concrete sorting tank was built in the spawning building.
- 3) A new ground drain was built outside the spawning building for draining the tricaine tank.
- 4) Additional gravel was applied to the compound.
- 5) New septic tank, lift station and drain line to the drain field have been installed for the office.
- 6) Vinyl coated chain link was installed on the large adult pond crowder in the west pond.
- 7) Replacement of most of the underground pipelines that feed the hatchery was accomplished in the summer and fall of 2000.
- 8) The office was remodeled with construction of walls to provide more separation between the office and the work/shop area.
- 9) A filtration system was installed at the north water inflow pipes to prevent fish parts and other undesirable items from entering the adult holding ponds and salmon raceways.
- 10) A significant leak was repaired in the northeast adult pond and several other large floor cracks were sealed.

RECOMMENDED

In addition to the projects completed by Idaho Power crews as identified in the preceding

section, there are several other items that should be addressed in the future. These include:

1. Reduce potential employee injuries due to falls from climbing ladders. An enlarged space would also make the collection of samples more efficient. Lowering the spawning portion of the building would enable unripe fish to be returned into the holding ponds without dropping them over the fence which would decrease fish stress.
2. With the installation of a 220-volt receptacle for a welder, hatchery personnel could be used to help accomplish hatchery maintenance.
3. The hatchery alarm system should be modified to directly sense the holding pond water level and be able to register more than one alarm system at any given time.
4. Both aeration towers need to be sandblasted and repainted.
5. A cement slab (approximately 15-ft x 40-ft) is needed in front of the hatchery building for truck maintenance and for other hatchery projects.
6. A walk-in cooler should be placed in the outside storage area to provide storage for salmon food.
7. A 16-ft x 20-ft storage building should be constructed to provide additional storage space.
8. Six cinder-block raceways located behind the office should be removed and the resulting hole backfilled.
9. Place fencing around the fall chinook raceways for safety purposes.

STEELHEAD PRODUCTION

ADULT COLLECTION

STEELHEAD RETURNS

The OFH trap, located at the base of Hells Canyon Dam was operated for 26 days during the trapping season. It was put into operation on October 23, 2000 and was shut down for the season on December 5, 2000, having operated 21 days during this period. It was put back into operation on March 19, 2001 and shut down March 27, 2001, having operated 5 days. During the fall operating period, 3,102 steelhead were trapped and 154 were trapped during the spring operating period, totaling 3,256 and consisted of 3,223 (99%) hatchery steelhead (1,269 males [39%]), (1,954 females [61%]), 33 (1%) wild steelhead (8 males [24%]) and 25 females (76%) (Figure 1 and Appendix 1). The wild fish were released below Hells Canyon Dam. Trapping was discontinued by the Department because spawning quotas and out-plant needs were met. The IPC personnel removed fish from the trap each day of operation and transported them to the OFH. Fish were processed upon arrival at the hatchery. Early in the season, all fish were held until quotas for the hatchery were met. At that time, some of the marked fish were used for out-planting.

LENGTH FREQUENCIES AND AGE AND SEX RATIOS

Fork lengths were taken on all trapped steelhead. One-ocean females are 64 cm and less; one-ocean males are 67 cm and less. Two-ocean females are greater than 64 cm; two-ocean males are greater than 67 cm. Age-class breakdown of the run is 1,915 one-ocean fish and 1,341 two-ocean fish. Age and sex ratios are as follows: one-ocean fish made up 59% of the run with a breakdown of 868 (45%) hatchery males; 2 wild males (.03%); 1,040 (54%) hatchery females and 5 (.07%) wild females. Two-ocean fish made up 41% of the run with a breakdown of 401 (30%) hatchery males, 6 (less than ½%) wild males, 914 (68%) hatchery females, and 20 (less than ½%) wild females (Figure 2 and Appendices 2 and 3).

RELEASE

During the fall of 2000 and the spring of 2001, 2,468 steelhead were released into surrounding waters for additional sport fisheries or supplementation programs. A total of 803 were transported and released into the Boise River; 803 were transported and released into the Little Salmon River; and 862 were released into Hells Canyon Reservoir (Appendices 4 and 5).

INCIDENTAL CAPTURE

A total of 16 rainbow trout, one brown trout, and one fall chinook jack salmon were trapped and transported to OFH. The trout were released into Hells Canyon Reservoir and the brown trout and jack salmon were released below Hells Canyon Dam. No other incidental trapping occurred.

MARKS, FIN CLIPS, INJURIES

Upon arrival at the hatchery, the steelhead were checked for marks, including fin clips, tags and injuries. Marked fish consisted of 3,223 adipose fin (AD) clipped with 86 of those having only been partially clipped. Marked fish included 99 with CWTs; three with floy tags and four with radio tags. The tagging agencies included the National Marine Fisheries Service (NMFS), the University of Idaho (UofI), Oregon Department of Fish and Wildlife (ODFW), and the Idaho Department of Fish and Game (Department). During the spawning process, snouts were removed from all CWT tagged fish and sent to the lab in Lewiston. Injuries included 12 fish with gill net scars, 5 with nitrogen blisters, 90 with fresh body injuries, 40 with body scars, and 52 with opercle or gill injuries or deformities. Other injuries included 6 that appeared to be seal bites and 2 that appeared to be lamprey bites.

HOLDING AND SPAWNING

PRE-SPAWNING MORTALITY

Pre-spawn mortality totaled 42 adults, 14 males and 28 females. Pre-spawning mortality numbers include all females that died prior to spawning and all males that died through the second week of spawning (April 8). All pre-spawned and spawned carcasses were picked up once a week by the local sanitation company and hauled to a Department of Environmental Quality (DEQ) approved landfill (Appendix 5).

SPAWNING OPERATIONS

Steelhead were initially sorted by sex on March 5, 2001 and separated into two ponds. On each spawn day, all females were checked for ripeness. The ones that were ripe were held for spawning, and the ones that were not were returned to the pond. Spawning consisted of 13 egg takes from March 26, 2001 until May 7, 2001. A total of 341 females were spawned (Appendix 6). Eggs from 3 females, 1 each from spawns 3, 6, and 12 were rejected due to poor egg quality, leaving eggs from 338 females to be incubated. All the eggs from lots 1 and 2 were culled along with 28 females from the third spawn, 14 females from the fourth spawn, and 12 females from the fifth spawn were culled to make room for eggs from later run fish.

The disposed eggs were not enumerated and are not included in figures in this report. Two males fertilized the eggs from the 261 remaining females. Eggs from two females were then pooled together. Due to lack of space in the incubation room, eggs from three females were pooled

together in the last two spawns. Eggs were water hardened in 100-ppm Iodophore for at least 15 minutes. Each pooled bucket was decanted and placed in an incubator tray.

DISEASE TESTING

During the spawning process, Department employees from the EFHL tested 127 (38%) females for viruses, 43 (13%) for Bacterial Kidney Disease and three (1%) for Whirling Disease. All females tested were negative for pathogens. Note: these percentages are of total spawned females and include tests conducted on the steelhead that were spawned but eggs disposed.

INCUBATION

EGG DEVELOPMENT

Throughout the spawning process, eggs from 77 females were culled to make room for eggs from later spawns. Eggs from 261 females were retained. Incubation water was chilled to 42° to 43°F for the majority of the rearing cycle and entered the stacks at approximately 5 gpm. The chilled water was to delay the rearing cycle development to achieve smolt target size without holding the fish off feed. After the first two days of incubation, the eggs were treated three times a week with a 15-minute drip treatment of 1,667-ppm formalin to prevent fungus *Saprolegnia* growth. All the eggs incubated at OFH were shocked at 360 to 380 daily temperature units (DTU). This is done to insure development of a strong eyespot. Shocking was accomplished by pouring the eggs from the Heath tray into a bucket containing 1 inch of water from a height of approximately 2 feet. The eggs were then poured back into the Heath tray and allowed to sit overnight so damaged eggs would harden and turn white. One to 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 eggs were counted using a Jensorter brand Model JH egg sorter with electronic counter. The 261 females had an average fecundity of 6,054 and produced 1,580,117 green eggs; of these 83% survived, leaving 1,315,789 eyed-eggs (Appendix 7). Eggs that were not shipped to NSFH were retained and raised to fry stage.

FRY DEVELOPMENT

After enumeration, eyed-eggs were shipped. The remaining eyed-eggs were placed back into the Heath trays to be reared to a swim-up stage. Swim-up stage is normally achieved at approximately 950 DTUs. This year fry DTUs at shipping averaged 1,003. The fry being held at 42°F for an extended period of time caused the increase in DTUs. As a result, it took more DTUs to achieve button-up so that fry could be shipped safely. The formalin treatments were discontinued prior to hatching. The fry that were not shipped to NSFH were held until both shipments arrived safely then the excess fry were disposed.

EGG AND FRY DISPOSITION

EGG SHIPMENTS

There were two shipments of eyed eggs during the second and third weeks of June. They were placed in 48-quart coolers. Each cooler was loaded with eggs from pre-determined trays in order to achieve the numbers per spawn and per cooler as requested by NSFH. The coolers were transported in the hatchery truck. NSFH received 446,386 eyed-eggs (Appendix 7).

FRY SHIPMENTS

After reaching approximately 1,000 DTUs, 492,766 fry were shipped to NSFH in two trips (Appendix 7). 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 after it had been filled with chilled well water.

CARCASS DISPOSITION

All carcasses were checked for tags. A portion of the carcasses from the early spawn dates were given to the senior citizens programs of Halfway and Baker counties; approximately 17 were given to Halfway and 60 to Baker. The remaining carcasses were picked up weekly by the local Sanitation Company and hauled to a Department of Environmental Quality approved landfill.

SMOLT RELEASES

Steelhead trout smolts were reared at NSFH. In the spring of 2001, Idaho Power contracted smolt transportation from NSFH to below Hells Canyon Dam where 579,467 smolts (124,550 lbs) were released into the Snake River (Appendix 14).

SALMON PRODUCTION

ADULT COLLECTION

SALMON RETURNS

Spring chinook salmon returning to the Hells Canyon trap were from smolt releases of 1997, 1998, and 1999. The trap was operated for 23 days between May 9, 2000 and June 28, 2000. The trap was not operated on Fridays because there were no IPC personnel available to transport fish. The trap was not operated on weekend days or on Memorial Day. A total of 1,174 spring chinook were trapped during the operating period. They included 1,159 (99%) hatchery fish consisting of 205 (18%) jacks and 954 (82%) adults and 15 (1%) wild or natural fish consisting of 2 (13%) jacks and 13 (87%) adults (Appendix 8). The wild or natural fish were peduncle fin punched and then released below Hells Canyon Dam. Seven of the previously trapped wild or natural salmon returned to the trap a second time and three returned a third time. The salmon that returned for the third time were considered hatchery fish and treated as such (Figure 3).

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 (3-yr-olds ≤ 58 cm), 2-ocean (4-yr-olds 59-80 cm), and 3-ocean (5-yr-olds ≥ 81 cm) One-ocean fish accounted for 207 (18%) of the chinook salmon trapped and consisted of 205 (99%) hatchery fish and 2 (1%) wild fish. Two-ocean fish accounted for 942 (80%) of the chinook salmon trapped and consisted of 930 (99%) hatchery fish and 12 (1%) wild fish. Three-ocean fish accounted for 25 (2%) of the salmon trapped and consisted of 24 (96%) hatchery fish and 1 (4%) wild fish (Figure 4 and Appendices 9 and 10). Due to the lack of distinguishing characteristics at the time of trapping, the sex ratio was not determined and therefore there is no size differentiation between male and female 1-, 2-, and 3-ocean fish.

INCIDENTAL CAPTURE

Six bull trout, two brown trout, 20 steelhead trout and seven rainbow trout were trapped and transported to the hatchery (Appendix 11). Six bull trout were trapped over four days and two of the bull trout were held overnight and released below Hells Canyon Dam the following morning. IPC fisheries personnel heard of the trapping and informed OFH personnel that they would like to tag other bull trout that were trapped. The third bull trout was trapped and IPC was notified. The following morning, the fish was implanted with a radio tag and released below Hells Canyon Dam after the surgical procedure. The next three bull trout were captured on the same day. Fisheries personnel from IPC were notified and planned to tag all three fish the following morning. During the night, a metal holding trough pulled away from the cement wall, allowing the bull trout to swim over the edge and become trapped between the wall and the trough. They were not discovered until the following morning and all three were dead. The proper agencies were notified. The carcasses were disposed of in the same manner as salmon. Two brown trout were trapped on the same day; both were held overnight and released below Hells Canyon Dam. Twenty steelhead were trapped

over a six-day period. They included 16 hatchery fish and 4 wild fish. The hatchery fish and the wild fish were released below Hells Canyon Dam. Seven rainbow trout were transported to the hatchery during trapping operations. They were all released into Hells Canyon Reservoir in a timely manner (Appendix 11).

MARKS, FIN CLIPS, INJURIES

All trapped chinook salmon were checked for marks, including fin clips, tags and injuries. Marked fish consisted of 1,159 adipose fin clips, however several were only partially clipped. While at OFH the following tags were found: six CWTs and 4 radio tags. The chinook salmon were not scanned for PIT and CWT tags upon arrival to the hatchery. Only the morts and the jacks that were transferred to the Tribe and seniors were scanned for PIT and CWT tags. Snouts were removed from all CWT fish and sent to the lab in Lewiston, while PIT tag numbers were recorded. The remaining chinook salmon were scanned at RRFH but the results are not known for this report. Tag information can be found in the RRFH 2000 Run Report. The tagging agencies included the National Marine Fisheries Service (NMFS), the University of Idaho (UofI), Oregon Department of Fish and Wildlife (ODFW), and the Idaho Department of Fish and Game (Department). Injuries included 6 fish with seal bites, 32 with body scars, 32 with body wounds, 8 with body injuries, 19 with gill net scars, 4 with head wounds, 1 with a jaw wound, 4 with lamprey bites, 4 with pectoral fin damage, 4 with dorsal fin damage, 1 with left eye damage, 5 with nitrogen blisters, 1 bleeding from the vent, 1 bleeding from the left gill, and 1 with trap injuries.

HOLDING AND SPAWNING

TRANSPORT

Idaho Power personnel transported chinook salmon 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 chinook salmon 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 jacks and 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 plus range. The hauling water was chilled with incubation well water and approximately 250 lbs 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. Seventeen jacks were transported to RRFH along with the adults. A total of 159 jacks were given to the Nez Perce Tribe and an additional 16 were given to the senior citizens in Halfway, Oregon (Appendix 12). The Tribe and seniors picked up the jacks at OFH. These jacks were killed by OFH personnel and scanned for tags prior to transfer. PIT tag numbers were recorded and snouts removed from CWT tagged fish.

HOLDING

Upon arrival at the hatchery, the chinook salmon 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. Jacks were treated in the same manner except they were not injected and were placed in the southeast pond. Wild or natural fish were measured, checked for marks and injuries, and checked for tags to ensure wild status. 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

Only one trap mortality was recorded. In addition, a second adult arrived at the Oxbow Hatchery in very poor condition and was not expected to live. It is uncertain if it lived or not but since it was alive upon arrival it was not classified as a trap mort but may have been included as one of the 16 holding pond mortalities at OFH. Three of the holding pond morts were adults and 13 were jacks. Four of the jack morts had jumped out of the holding pond. In addition to the chinook salmon morts, there were three bull trout morts (Appendix 12).

SPAWNING OPERATIONS

The salmon were transported to RRFH for spawning. OFH personnel assisted RRFH personnel with spawning operations. Refer to the RRFH 2000 Spring Chinook Run Report for additional information.

INCUBATION

EGG DEVELOPMENT

Chinook salmon spawning occurred at RRFH. Due to the number of females spawned and the lack of room in the RRFH incubation room, eggs from 403 females were sent to OFH for incubation. Prior to shipment (which was the same day the eggs were spawned), the eggs were put into egg tubes and placed in coolers. At that point, they were water hardened and disinfected for approximately one hour in a solution of well water and 100 ppm of Argentyne. Upon completion of

this process, the eggs 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. Upon arrival at OFH, the temperature of the water in the coolers was taken and warmed or cooled with well water as necessary prior to the eggs being placed in the incubation trays. Incubation well water bypassed the chiller and entered the stacks at approximately 55°F and was regulated to approximately 5 gpm.

After the first two days of incubation, the eggs were treated five times a week with a 15-minute drip treatment of 1,667 ppm Formalin to prevent fungus *Saprolegnia* from growing. The eggs were shocked at 500 to 530 DTUs. Shocking was accomplished by pouring the eggs from the Heath tray into a bucket containing 1 inch of water from a height of approximately 2 feet. The eggs were then poured back into the Heath tray and allowed to sit overnight so undeveloped or infected eggs would 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 using a Jensorter brand Model BC egg counter. The eggs from 14 females were culled due to Bacterial Kidney Disease and from 2 females due to an extremely high rate of egg mortality. The culled eggs were not counted and are not included in the figures in this report. Prior to shipment, the eggs were hand picked to remove any remaining dead eggs. The remaining 387 females produced 1,520,333 green eggs. A total of 77,238 dead eggs were removed leaving 1,443,095 eyed-eggs. This constitutes a 95% eye-up.

EGG DISPOSITION

Within a few days after the sorting and counting process, 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 in the hatchery pickup in three shipments, with the first two going to Clearwater Fish Hatchery (CFH), and the third going to RRFH. A total of 913,539 eyed-eggs were transported to CFH and the remaining 529,556 eyed-eggs were transported to RRFH.

CARCASS DISPOSITION

All carcasses were checked for tags. Carcasses were frozen and picked up weekly by the local sanitation company and hauled to a Department of Environmental Quality (DEQ) approved landfill.

ACKNOWLEDGEMENTS

The staff at Oxbow Fish Hatchery would like to thank Idaho Power Company and Idaho Fish and Game employees that have contributed to the successful operation of the hatchery.

FIGURES

Figure 1. Steelhead Run Timing

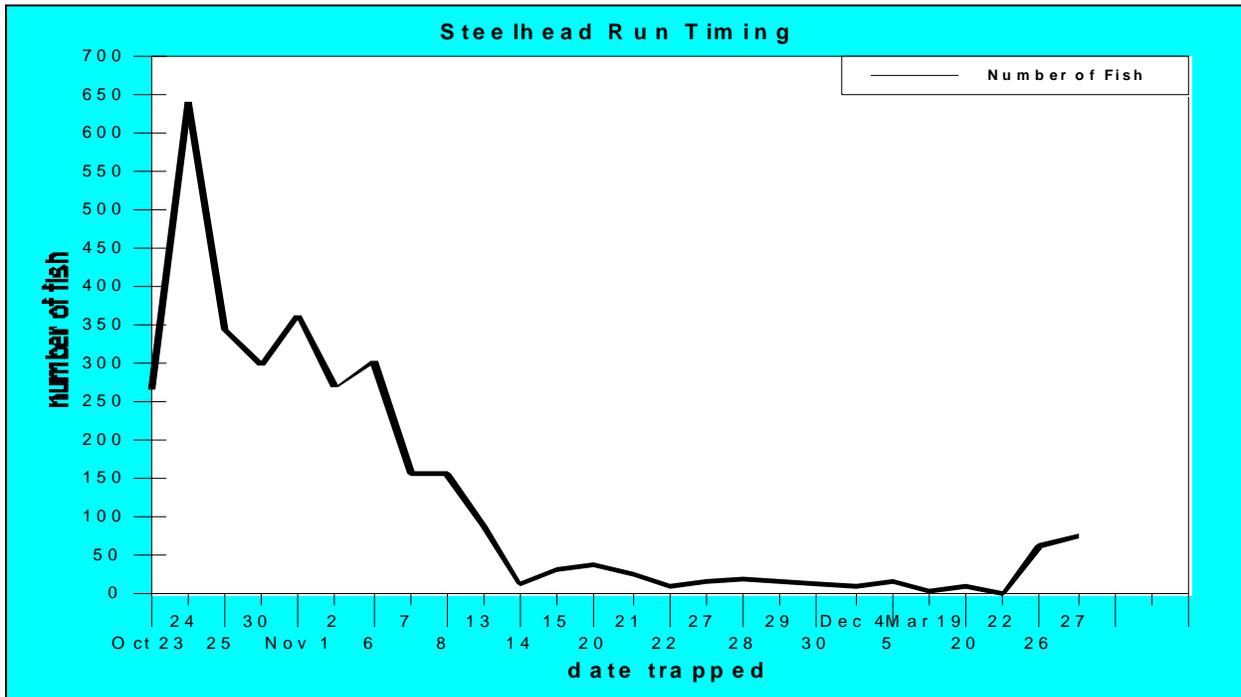


Figure 2. Steelhead Length-Frequencies

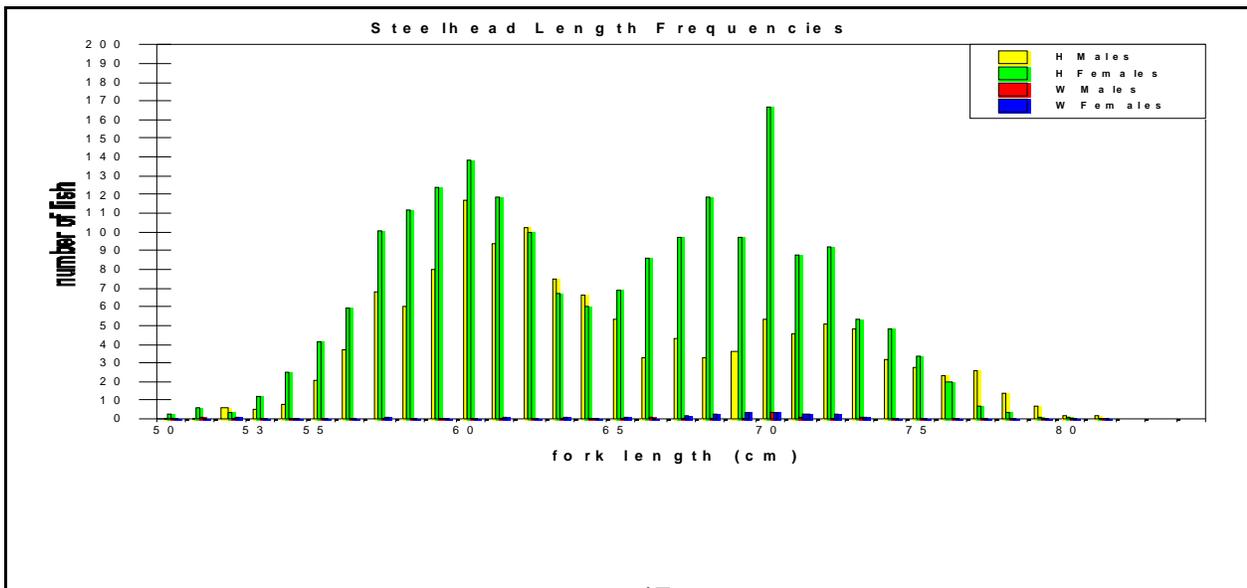


Figure 3. Spring Chinook Run Timing

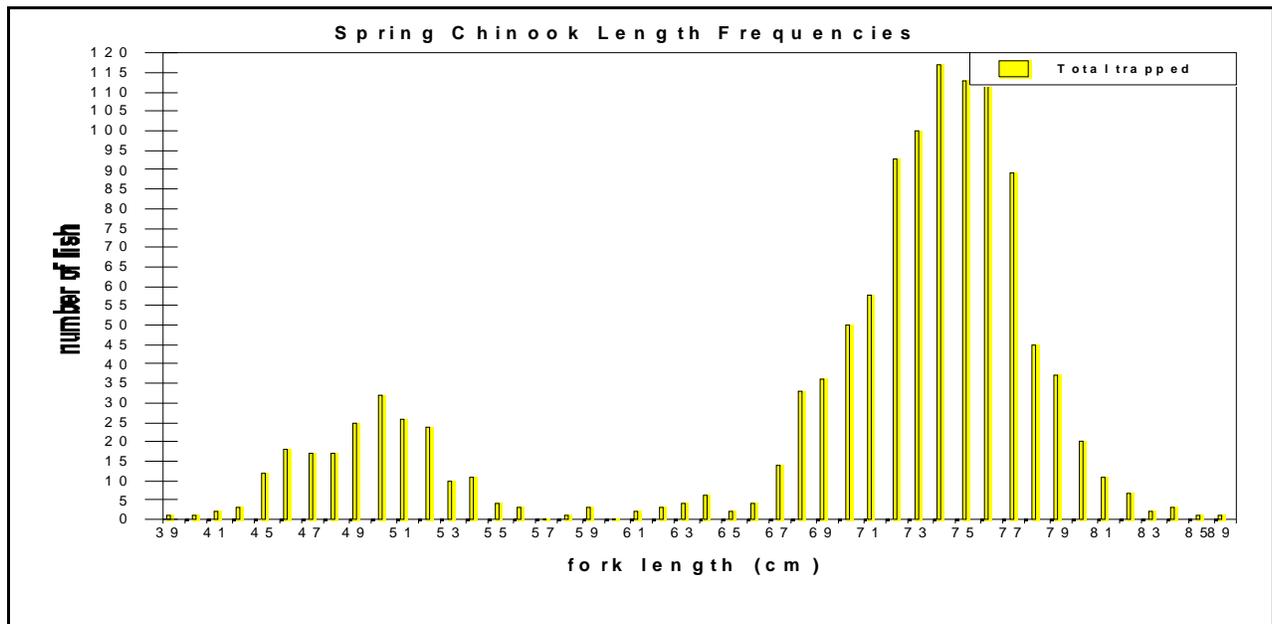
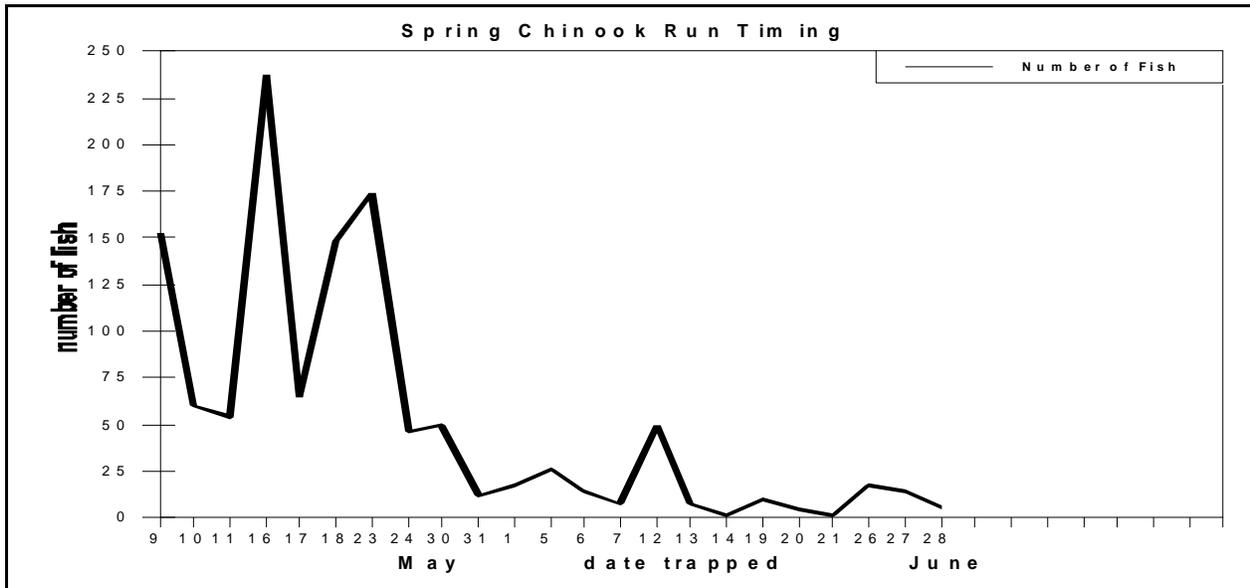


Figure 4. Spring Chinook Length-Frequencies

APPENDICES

Appendix 1. Steelhead Run Timing

Month / Date trapped	Number of fish	Month / Date trapped	Number of fish
OCTOBER 23	267	MARCH 19	4
24	640	20	9
25	345	22	1
30	298	26	63
NOVEMBER 1	364	27	77
2	268		
6	304		
7	157		
8	158		
13	88		
14	14		
15	32		
20	38		
21	26		
22	11		
27	17		
28	21		
29	17		
30	12		
December 4	9		
5	16		
TOTAL	3,102	TOTAL	154

Appendix 2. Steelhead Length Frequencies (cm)

Cm	Totals	H Males	H Females	W Males	W Females
50	3		3		
51	7		6	1	
52	11	6	4		1
53	17	5	12		
54	33	8	25		
55	62	21	41		
56	96	37	59		
57	170	68	101		1
58	172	60	112		
59	204	80	124		
60	255	117	138		
61	214	94	119		1
62	202	102	100		
63	143	75	67		1
64	126	66	60		
65	123	53	69		1
66	120	33	86	1	
67	142	43	97		2
68	155	33	119		3
69	137	36	97		4
70	228	53	167	4	4
71	138	46	88	1	3
72	146	51	92		3
73	103	48	53	1	1
74	80	32	48		
75	62	28	34		
76	43	23	20		
77	33	26	7		
78	18	14	4		
79	8	7	1		
80	3	2	1		
81	2	2			
Total	3,256	1,269	1,954	8	25
AGE class	MALE	FEMALE	TOTAL	AVG LENGTH	
ONE-ocean	870	1,045	1,915	60.22 cm	
TWO-ocean	407	934	1,341	68.54 cm	
TOTAL	1,277	1,979	3,256	63.65 cm	

H = Hatchery

W = Wild

Age Class Breakdown:

One-Ocean: males 67 cm and less; females 65 cm and less

Two Ocean: males 68 cm and greater; females 66 cm and greater

Appendix 3. Steelhead Age, Sex and Origin Ratios

BY01	Hatchery males	Wild/natural males	Hatchery females	Wild/natural females	Total
1-Ocean	868	2	1,040	5	1,915
2-Ocean	401	6	914	20	1,341
Total	1,269	8	1,954	25	3,256

Appendix 4. Steelhead Disposition

3,256	Trapped 3,102-fall, 154-spring (Wild and Hatchery fish)
2,468	Released (Out Planted)
755	Ponded (Hatchery Production Fish)
33	Wild/natural released

Appendix 5. Steelhead Male to Female Disposition

MALES		FEMALES	
287	Spawned	*338	Killed and Spawned
41	Rejected and killed	3	Killed and rejected
58	Mortalities	28	Mortalities
8	Wild released	25	Wild released
883	Out-planted	1585	Out-planted
1,277	Total males	1,979	Total females

*Eggs from 77 females from the early spawns were culled to make room for eggs from later run steelhead, leaving 261 spawned with eggs retained.

Appendix 6. Steelhead Spawning Summary

Lot #	Spawn date	# Females	# Culled	# Retained	Green eggs	Eyed eggs	% eyed	Eggs/ female
1	3/26/01	6	6	0	*	*	*	*
2	3/29/01	17	17	0	*	*	*	*
3	4/02/01	49	28	21	146,021	123,839	85	7,058
4	4/05/01	39	14	25	165,921	139,926	84	6,657
5	4/09/01	51	12	39	260,055	221,730	86	6,352
6	4/12/01	26	0	26	172,768	146,626	84	6,645
7	4/16/01	23	0	23	150,550	129,093	86	6,542
8	4/19/01	25	0	25	136,500	107,976	80	5,523
9	4/23/01	31	0	31	173,269	145,162	84	5,630
10	4/26/01	19	0	19	97,428	85,251	88	5,180
11	4/30/01	20	0	20	115,953	90,194	77	5,522
12	5/03/01	17	0	17	82,491	60,502	74	4,861
13	5/07/01	15	0	15	79,161	65,490	83	5,277
	Totals	338	77	261	1,580,117	1,315,789	83	6,054

The culled eggs from spawns 1, 2, 3, 4, and 5 were culled to make room for eggs from later spawns. Eggs from 261 females were retained. The 3 females that were spawned and rejected are not included in the numbers in this table. Average fecundity per female is 6,054.

Appendix 7. Steelhead Eggs and Fry Disposition

1,580,117	Green eggs
246,932	Initial pick off
17,396	Secondary pick off
1,315,789	Eyed eggs (83%)
446,386	Eyed eggs shipped to Niagara Springs
869,403	Eyed eggs remaining on station
26,082	Eyed eggs to fry loss (3%)
843,321	Fry on station
492,766	Fry shipped to Niagara Springs
350,555	Excess fry disposed

Appendix 8. Spring Chinook Run Timing

Date	Total trapped	Trapped hatchery	Trapped wild	Released	Morts	Hauled
5/09/00	153	152	1	1		
5/10/00	60	59	1	1		
5/11/00	54				1	RR 121
5/12/00						RR 55
5/15/00						RR 60
5/16/00	237	232	5	5		RR 63
5/17/00	65	63	2	2		RR 120
5/18/00	148					RR 104
5/19/00						RR 60
5/22/00					1	RR 61
5/23/00	174	169	5	5	9	NP 68
5/24/00	46	46				RR 60
5/26/00					1	RR 58
5/30/00	49	49			1	RR 60
5/31/00	12	12				
6/01/00	17	17				RR 35
6/05/00	26	25	1	1	2	NP 49
6/06/00	14	14			1	RR 10
6/07/00	8	8				
6/08/00						RR 15
6/12/00	50	50				
6/13/00	8	8				
6/14/00	1	1				
6/15/00					1	RR 40 NP 42
6/19/00	10	10				
6/20/00	4	4				
6/21/00	1	1				
6/22/00						RR 12
6/26/00	17	17				
6/27/00	14	14				SC 16
6/28/00	6	6				RR 33
Total	1,174	1,159	15	15	17	1,142

RR - Rapid River
 NP - Nez Perce Tribe
 SC - Senior Citizens

Appendix 9. Spring Chinook Length Frequencies

Fork Length (cm)	Totals	Hatchery Adults	Wild Adults	Hatchery Jacks	Wild Jacks
39	1			1	
40	1			1	
41	2			2	
44	3			3	
45	12			12	
46	18			18	
47	17			17	
48	17			17	
49	25			25	
50	32			32	
51	26			26	
52	24			23	1
53	10			10	
54	11			10	1
55	4			4	
56	3			3	
58	1			1	
59	3	3			
61	2	2			
62	3	3			
63	4	4			
64	6	6			
65	2	2			
66	4	4			
67	14	14			
68	33	32	1		
69	36	35	1		
70	50	49	1		
71	58	57	1		
72	93	90	3		
73	100	99	1		
74	117	117			
75	113	112	1		
76	113	112	1		
77	89	89			
78	45	44	1		
79	37	36	1		
80	20	20			
81	11	11			
82	7	7			
83	2	2			
84	3	3			
85	1	1			
89	1		1		
Total Fish	1,174	954	13	205	2

1-Ocean (3-yr-olds, ≤58 cm)
 2-Ocean (4-yr-olds, 59-80 cm)
 3-Ocean (5-yr-olds, ≥81 cm)

H = Hatchery
 W - Wild

Appendix 10. Spring Chinook Age Class Breakdown

Age Class	Hatchery	Wild/Natural	Total
1-Ocean	205	2	207
2-Ocean	930	12	942
3-Ocean	24	1	25
Total	1,159	15	1,174

1-Ocean (3-yr-olds, ≤ 58 cm)

2-Ocean (4-yr-olds, 59-80 cm)

3-Ocean (5-yr-olds, ≥ 81 cm)

Appendix 11. Incidental Capture

Length	Bull Trout	Brown Trout	Steelhead
42	1	1	1 H
43	1		
44	1		
45	1		
46	1		
48		1	
54	1		2 H
55			1 H
56			2 H 1 W
57			3 H
58			5 H
59			1 H 3 W
62			1 H

Note: Seven rainbow trout were trapped but not measured so they are not listed in this table.

Appendix 12. Spring Chinook Disposition

Disposition	Hatchery	Wild / Natural
Trapped – Oxbow	1,159	15
Mortalities – Oxbow	17	0
Released – Oxbow	0	15
Transferred to RR	967	0
Transferred to Seniors	16	0
Transferred to Tribe	159	0

Appendix 13. Oxbow Hatchery Fish Trapping Summary and Breakdown

STEELHEAD BROOD YEAR 2001

Fish Trapped		<u>Age Class Breakdown</u>	
Males	1,277	1 Ocean	1,915
Females	1,979	2 Ocean	1,341
Total	3,256	Total	3,256

<u>Fish Disposition</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
Pre-spawn Mortality	14	18	32
Trap & Pond Morts	44	10	54
Spawned only *	287	338	625
Released	8	25	33
Out Planted	883	1,585	2,468
Killed but not used	<u>41</u>	<u>3</u>	<u>44</u>
Total	1,277	1,979	3,256

<u>Carcass Disposition</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
Hauled	386	367	753

* Age Class Breakdown: 1-Ocean: males ≤ 67 cm (870), females ≤ 64 cm (1,045)
 2-Ocean: males ≥ 68 cm (407), females ≥ 65 cm (934)

SPRING CHINOOK SALMON BROOD YEAR 2000

	<u>Fish Trapped</u>			<u>Age Class Breakdown **</u>			
	Total	Hat	Wild		Total	Hat	Wild
Jacks	207	205	2	1-Ocean	207	205	2
Males	**	**	**	2-Ocean	942	930	12
Females	**	**	**	3-Ocean	25	24	1
Total	**	**	**		1,174	1,159	15

Due to the lack of distinguishing characteristics the sex was not determined, therefore the male and female numbers are not available.

<u>Fish Disposition</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
Trap & Pond Mortality			17
Pre-spawn Mortality	**	**	
Shipped to Rapid River *	**	**	967
Transferred to Nez Perce Tribe *	44	0	159
Transferred to seniors			16
Released	**	**	15

* Age Class Breakdown: 1-Ocean (3-yr-olds, ≤ 58 cm)
 2-Ocean (4-yr-olds, 59-80cm)
 3-Ocean (5-yr-olds, ≥ 81 cm)

** Data not known

Appendix 14. Snake River Historic Releases and Return Data

Year	Chinook Released	Steelhead Spring	Released Fall	Chinook Returns	Steelhead Returns
1966			29,400		
1967		587,513			1,681
1968		342,114			1,609
1969		109,200	757,500	344	1,122
1970		385,900	670,960		136
1971			215,625		279
1972			630,900	3	650
1973				2	435
1974				1	125
1975			40,977	14	34
1976			85,510		224
1977		126,000	301,644		243
1978			344,944		186
1979			548,987	1	36
1980		348,520	191,900		339
1981	1,003,200	614,160			158
1982		354,150			203
1983	250,020	92,750	220,270	16	872
1984	500,850	458,917	630,500	3	1,116
1985	437,360	414,712	387,353	699	1,343
1986	140,000	819,495	39,995	395	2,438
1987	547,700	800,000	672,235	543	3,209
1988	400,600	877,400	75,814	458	2,524
1989	500,000	735,500	603,000	84	2,729
1990	551,200	947,200	351,400	30	2,728
1991	500,500	912,000		22	1,151
1992	500,500	243,900		912	1,714
1993	200,300	660,500		431	1,259
1994	380,504	609,115		29	1,403
1995	499,986	614,560		36	1,597
1996	67,818	630,152		78	1,383
1997	13,470	660,651		944	1,270
1998	304,096	653,276		74	2,407
1999	300,000	657,665			79
	2,042				
2000	0	601,220		1,174	2,250
2001	0	579,467			3,256

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