NIAGARA SPRINGS FISH HATCHERY

2003 Steelhead Brood Year Report

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ABSTRACT

Niagara Springs Fish Hatchery (NSFH) received 2,073,711 steelhead (*Oncorhynchus mykiss)* eggs and fry during the 2003 brood year. A total of 1,151,911 Pahsimeroi stock eggs and fry (587,038 eggs and 564,873 swim-up fry) were received from Oxbow Hatchery. After spawning, Pahsimeroi stock eggs were shipped green to Oxbow Hatchery for incubation on chilled well water and then transferred to NSFH as eyed eggs or swim-up fry. Almost half (49.03%) of the earliest Pahsimeroi egg lots were shipped to NSFH as first feeding fry. A total of 921,800 Hells Canyon stock eggs and fry (470,355 eggs and 451,445 swim-up fry) were received from Oxbow Hatchery. Approximately 49% of the earliest Hells Canyon egg lots were shipped to NSFH as first feeding fry.

Total production for the 2003 brood year at NSFH was 1,888,308 steelhead (409,050 lbs) for anadromous smolt releases. No excess fish were available to be stocked as fall releases.

A total of 1,888,308 steelhead smolts (409,050 lbs at 4.61 fish/lb) were released into the Snake and Salmon rivers from March 22 to May 2, 2004. A total of 840,177 smolts (190,000 lbs at 4.42 fish/lb) of Pahsimeroi stock were released in the Pahsimeroi River at the weir, and 240,194 smolts (56,100 lbs at 4.28 fish/lb) of Pahsimeroi stock were released in the Little Salmon River near Stinky Springs. A total of 532,944 smolts (107,950 lbs at 4.94 fish/lb) of Hells Canyon stock were released in the Snake River at Hells Canyon Dam, and 274,993 smolts (55,000 lbs at 4.99 fish/lb) of Hells Canyon stock were stocked in the Little Salmon River near Stinky Springs.

Mortalities from pathogens were well below normal this year. For this brood year, fifty percent (50%) of the total steelhead production was vaccinated for furunculosis (*Aeromonas salmonicida).* No steelhead at NSFH were vaccinated for enteric redmouth disease (ERM-*Yersinia ruckerii)* during this brood year. Furunculosis, ERM, and Infectious Hematopoietic Necrosis Virus (IHNV) were not isolated during the 2003 brood year. Coldwater disease (*Flavobacter psychrophilum)* and *Aeromonas hydrophila* caused minor mortality just prior to release.

A total of 388,744 lbs of fish feed were fed (381,484 lbs of Rangen and 7,260 lbs of Skretting formerly known as Moore-Clark) at a cost of $147,631.46 to produce 409,050 lbs of steelhead for a conversion rate of 0.95:1.

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INTRODUCTION

The NSFH is owned and financed by Idaho Power Company (IPC), and operated and staffed by the Idaho Department of Fish and Game (Department). It is located in the Snake River Canyon, ten miles south of Wendell, Idaho. The NSFH is one of four hatcheries IPC owns and which the Department staffs and operates that fulfill IPC's mitigation requirement under the Federal Energy Regulatory Commission license #1971. The goal of NSFH is to rear 400,000 pounds (lbs) of steelhead smolts annually. Originally, these smolts were used to relocate a portion of the Snake River steelhead run into the Salmon River. Since 1980, 200,000 lbs of production are used to sustain a steelhead run below Hells Canyon Dam in the Snake River, and 200,000 lbs are stocked in the Salmon River drainage.

OBJECTIVES

The two major mitigation requirements that must be met at IPC's NSFH are to produce quality steelhead smolts to sustain steelhead trout runs in the Snake River below Hells Canyon Dam and in the Salmon River and its tributaries by successfully meeting these objectives:

1. Rear 200,000 lbs of quality steelhead smolts to be released in the Salmon River and its tributaries. The steelhead are to return as adults in sufficient numbers to provide quality sport fisheries in these waters and to supply sufficient broodstock (1,000 adults) to the Pahsimeroi Fish Hatchery for the collection of spawn for the next production cycle.

2. Rear 200,000 lbs of quality steelhead smolts to be released in the Snake River below Hells Canyon Dam. These are to return as adults in sufficient numbers to provide a quality sport fishery in the Snake River and to supply sufficient broodstock (1,000 adults) to the Hells Canyon Trap for the collection of spawn for the next production cycle.

IDAHO DEPARTMENT OF FISH AND GAME GOALS

1. Provide quality steelhead smolts to the Snake and Salmon rivers that will survive downstream migration and return as adults in sufficient numbers to provide a quality sport fishery in these waters and their tributaries.

2. Provide quality hatchery steelhead for supplementation where wild stocks of steelhead have diminished below desired levels and where managers feel quality hatchery steelhead would enhance the fisheries resource.

3. Enhance the genetic quality of hatchery stocks through management and hatchery practices that favor genetic variability.

FACILITY DESCRIPTION

Fish culture facilities at NSFH consists of an indoor nursery area, outdoor rearing raceways, and two flow-through settling ponds. Spring water supplies 21 upwelling incubators and 21 rectangular vats for the hatching and early rearing of fry. The nursery tanks provide 749.61 ft^3 of hatching and early rearing space.

The outdoor rearing space consists of nineteen raceways (300-ft x 10-ft), (142,500 $ft^{3)}$, which are supplied by constant temperature, gravity flow, spring water. This allows for the production of 400,000 lbs of steelhead at a density index of less than 0.35 $lbs/ft^3/in$ as recommended by Piper (1982).

Two flow-through settling ponds (150-ft x 60-ft) are provided to remove settleable solids from the NSFH effluent. The settling ponds handle all the flow from the raceways and meet Environmental Protection Agency (EPA) guidelines for aquaculture discharge.

Dissolved nutrients are monitored on a biweekly basis to comply with the terms of a consent order between IPC and the Idaho Division of Environmental Quality. Samples of inflow, raceway effluent, and settling pond discharges to Niagara Springs Creek and Rimview Trout Company are collected using Sigma automated water samplers and sent to Rangen Aquaculture Research Center for analysis. Additional water analysis is performed monthly in accordance with the EPA National Pollutant Discharge Elimination System permit. Samples are collected only on inflow and discharge water. The Rangen Aquaculture Research Center conducts nutrient analysis, while the Department's Eagle Fish Health Laboratory completes analysis for total suspended solids.

Swim-up fry are hand fed in all nursery areas with some supplementation from the use of Ziegler belt feeders. Once the fish reach approximately 75 fish per pound (fpp) they are transitioned to the automated feed delivery system. Two moveable bridges span the outdoor rearing area. A total of 19 Nielsen automatic feeders are mounted on the bridges. The fish are fed by moving the bridges down the length of the rearing area and energizing the individual feeders on the control panels. Bulk feed is dispensed to the feeders by a conveyor supplied by two 20,000-lb storage bins with an associated fines separator.

Raceway cleaning is accomplished with an automatic air blower system. Three blower motors supply approximately 10 psi of air to weighted, perforated, airlines on the bottom side corner of each raceway. The resulting bubble screen creates a vortex of water currents that keep waste material suspended along the length of the raceways. While this system saves many hours of labor sweeping raceways it is not completely efficient. Raceways are broomed as necessary to augment the air blower system and a power scrubber is also employed to remove excessive algal growth on a regular basis.

Buildings on the NSFH grounds include five residences. Three are wood-frame houses, one is a doublewide modular home, and one is a 14-ft wide mobile home. A 32-ft x 80-ft metal building contains an office, two incubator rooms, garage, shop, and feed storage room. Additional buildings include: two screen storage buildings (14-ft x 24-ft and 10-ft x 12ft), an open front shed (10ft x 30ft), and a masonry block chiller building (70-ft x 45-ft) which contains the chiller and blower-electrical room, a heated shop, and garage.

The NSFH staff is also responsible for care of the IPC-owned two-acre park adjacent to Niagara Springs Creek. It has a public, handicapped-accessible restroom, picnic tables, BBQ grills, and refuse containers.

WATER SUPPLY

In addition to NSFH, Niagara Springs supplies water to Rimview Trout Company, Niagara Springs Wildlife Management Area, and Idaho State's Pugmire Park. Niagara Springs' total flow is 220 cubic feet per second (cfs), which is divided into water rights by the four users.

The IPC has entered into an agreement with the four other users of Niagara Springs water whereby NSFH will receive water according to a stepped flow chart (Appendix 1). The NSFH has a water right of 132 cfs. A diversion canal was built by IPC in 2001, allowing up to 75 cfs of water to be discharged to Rimview Trout Company from December through April. This canal crosses onto Rimview property and attaches at their second-use head-ditch. Three slide gates located in the east and west settling basins regulate the volume of water discharged to Rimview. The volume of water discharged to Rimview this season is summarized by month in Appendix 2.

Water from Niagara Springs is a constant 59°F and flows by gravity to the incubators, nursery vats, outdoor raceways, fire hydrants, and irrigation system. Water quality is checked annually during the spring at the NSFH for herbicides, pesticides, heavy metal contaminants and normal water chemistry parameters (Appendix 3).

STAFFING

Four permanent and up to three temporary personnel staff the NSFH. Jerry Chapman, Fish Hatchery Manager II, Paul Dorman, Fish Hatchery Assistant Manager, Travis Brown and Doug Young, Fish Culturists, handle most operational duties. During peak work activities there are three Bio Aides: Mike Anderson, Jake Higley, and Jeremy Kiser who assist the permanent staff with culture, maintenance, and other assignments.

FISH PRODUCTION

Egg Shipments and Early Rearing

Eggs and fry received at NSFH originate from broodstock trapping and spawning operations at IPC's Oxbow and Pahsimeroi hatcheries. To retard embryonic development, steelhead eggs spawned at Pahsimeroi Hatchery were transported by aircraft to Oxbow Hatchery for incubation in chilled wellwater (43°F) prior to delivery to NSFH. This procedure was done to control smolt size while minimizing the need to take fish off feed during the rearing cycle at NSFH. At the Oxbow Hatchery, a 70 horsepower chiller unit was utilized to chill 52°F wellwater to 43°F for incubation. Pahsimeroi Hatchery does not have a chiller unit for this purpose. The NSFH received both eggs and fry for the 2003 brood year (Appendix 4). Of the

Pahsimeroi stock eggs incubated at Oxbow Hatchery and destined for NSFH, approximately half (49. %) were delivered to NSFH as eyed eggs while the balance (51%) were delivered as first feeding fry. Eyed eggs were transported in conventional coolers while fry were transported in specially designed, perforated fry transport tubes; and placed inside an unused 500-gallon fish-stocking tank acquired by NSFH from Hagerman State Fish Hatchery (HSFH).

The 500-gallon tank is mounted to a trailer and towed by a 3/4-ton hatchery vehicle. The tank is equipped with Point-4 ceramic air stones and bottled oxygen. This tank and trailer design was created in 2002 to help prevent the possible transmission of disease pathogens between hatcheries, which formerly occurred when NSFH steelhead fry were transported in a 1,000 fish stocking tank truck borrowed from HSFH. This tank/trailer configuration also eliminated the transportation bottleneck created when NSFH wanted to use HSFH transport trucks during their "catchable" stocking season.

The NSFH received 587,038 eyed-eggs of Pahsimeroi stock between June 3 and June 12, 2003. A total of 564,873 Pahsimeroi stock swim-up fry from egg lots 1-4, were received from July 14 through July 18. A total of 1,151,911 eggs and fry of the Pahsimeroi stock were received at NSFH for the 2003 brood year.

A total of 470,355 eyed-eggs of Hells Canyon stock (lots 9-15) were shipped to NSFH from June 3 through June 5, 2003. Lots 1-9 were transported to NSFH as swim-up fry (451,445) between July 3 and July 22, 2003, and placed directly into outdoor nursery raceways. The timing of the fry shipments coincided with the swim-up timing of fish from the eyed-eggs that were received earlier at NSFH. A total of 921,800 eggs and fry of Hells Canyon stock were received at NSFH for the 2003 brood year. NSFH's steelhead egg to smolt survival for brood year 2003 is summarized in Appendix 4.

Upon arrival at NSFH, all eggs were tempered and disinfected with iodine at 100-ppm for 30 minutes and placed in upwelling incubators (53,400 per incubator) inside the vats. All fry were tempered in their shipping containers before ponding.

Fry were not inventoried from the nursery vats to the nursery raceways this brood year. Consequently, hatching success and mortality could only be estimated. The NSFH staff observed below-normal losses due to suffocation during the early rearing cycle. Survival of fry to fingerling was 96.94% in Pahsimeroi steelhead and 91.34% in Hells Canyon steelhead. Overall, fry to fingerling survival was 94.14%.

As was done last year, nursery sections were screened at both ends and remained expanded from 20-ft to 35-ft in length. This effectively prevented fry and fingerlings from getting into the headrace, and allowed the fry to be reared at lower starting densities. As densities increased, fry were given more rearing volume by relocating screens to 50-ft, 75-ft, and finally, to the end of the first section at 100-ft. In 2001, additional screen brackets were placed at 75-ft and 150-ft allowing for greater flexibility than the standard keyway distances of 100, 200, and 300-ft. This methodology reduces wasted feed and reduces cleaning times created by using the standard keyway distances, yet still allows densities to be lowered and greater management of inventories. This practice was expanded even more, during the 2003 brood year, by creating screen brackets at 250-ft for the Coded-Wire-Tag (CWT) raceways, which have approximately 60,000 untagged steelhead per raceway. Early in the production cycle, these 60,000 fish require more than the normal 100-ft key-way sections, but less than the 200-ft total. Fish are given more room when they attain a density index of 0.30. All of these fish culture changes will continue in future brood years.

Throughout the entire early rearing period, steelhead at NSFH, were fed Rangen dry feeds. Feed was dispensed by hand feeding and supplemented with Ziegler belt feeders in the indoor and outdoor nursery areas. When the fingerlings reached approximately 275 fish/lb they were fed Skretting's (formerly known as Moore-Clark) "Clarks Fry" (ProActive) dry feeds for 14 days. The purpose of feeding Skretting's ProActive feed was to stimulate the fry's immune system prior to the vaccination program. When they reached 75 fish/lb, all NSFH fish were switched to a Rangen extruded diet. The switch to Rangen bulk extruded feed allowed NSFH staff to utilize the bulk tanks, feed conveyor system, fines separator, and bridge feeders.

Final Production Rearing

Adipose fin-clipping operations are used to split the fish into even-numbered and odd-numbered raceway sections. During this program, fish are crowded to the lower 100-ft section of each odd-numbered raceway. Half the fish are clipped and put into the upper two-thirds of the raceway, while the other half are clipped into the adjacent even-numbered raceway. Fin-clipping operations started on September 29 and were completed by October 29, 2003.

Fish were given the final 100-ft of rearing space in early January. Hells Canyon fish were placed in raceways 1 through 8, while Pahsimeroi fish were placed in raceways 9 through 19. Normal fish culture techniques during this time include: feeding fish with the bridge, sweeping raceways, conducting sample counts, cleaning screens and air lines, removing mortalities, equipment maintenance, record keeping, nutrient sampling, pond scrubbing, supervising and running the adipose-marking trailer, length frequency and fin quality collection and reporting, assisting with CWT and passive integrated transponder (PIT) tagging operations, and conducting tag and mark retention checks.

Hells Canyon steelhead were kept off feed for 4 days to slow growth rates and a total of 20 days for other fish culture reasons. These reasons include; off feed prior to handling for vaccination, adipose fin clipping, CWT and Pit-tagging programs, and off feed prior to shipping. Pahsimeroi steelhead were kept off feed for 11 days to slow growth rates and an additional 20 days for the previously stated fish culture reasons, including four days for the small bridge to be repaired. Although early growth rates exceeded 0.033 inches per day, growth rates were slowed to 0.021 inches per day by taking the fish off feed for one week at a time.

A total of 381,484 lbs of Rangen and 7,260 lbs of Skretting were fed over the course of the brood year (Appendix 5). The Rangen feed total includes 34,000 lbs of Oxytetracycline (OTC) medicated feed used for a single medicated feed treatment during this brood year. OTC was fed allowing for a 21-day withdrawal time prior to stocking, meeting Food and Drug Administration (FDA) requirements.

The total cost of the OTC feed was $17,314.68. The total cost of regular feed was $130,316.78. A total of 409,050 lbs of fish were produced on 388,744 lbs of feed for a conversion rate of 0.95:1. Total NSFH production costs incurred by IPC during the 2003 brood year were $985,278.92, which includes IPC overhead, smolt hauling, and shop expenditures, but does not include capital outlay expenditures. The cost/lb of fish produced was $2.41 (Appendix 7).

Fin quality was assessed in March and April using methods developed by Chapman (1991). NSFH had previously performed fin quality measurements in May. However, alterations to the stocking schedule this year dictated that all fin quality measurements be taken in March and April.

Fins of steelhead reared at NSFH were compared to fins of wild rainbow trout collected from the Henrys Fork of the Snake River. A total of 80 steelhead, from all four of the CWT/PIT-tagged raceways, were used for this comparison. After measuring the lengths of the dorsal and pectoral fins, a fork length was taken from each fish. By comparing the average fin length to the average fork length, a fin quality index was calculated. This index was then compared to that of wild Henrys Fork rainbow trout. Results indicate that the fin quality index from fish raised at NSFH was 64.99% of that of wild fish (Appendix 8). This was a 9.23% increase from the 2002 releases. NSFH fish have averaged in the lower 60th percentile for 5 of the past 6 brood years.

NSFH staff, with help from Department and IPC personnel, has been working on a new fin index based on measurements from wild steelhead collected during the spring out-migration on the Salmon River. This would allow a comparison of hatchery-produced steelhead to wild steelhead rather than to wild Henry's Fork rainbow trout. Collection of wild steelhead fin measurements occurred during the 2003 and the 2004 smolt out-migrations. Implementation of this new fin quality index will occur brood-year 2004 steelhead at NSFH. The average mentioned above is not a reflection of the new steelhead index. If it had been used, it would have shown fish raised at NSFH during the 2003 brood-year had a fin quality index approximately 71.58% that of wild steelhead smolts.

A target smolt size of 170 to 250 mm fork length has been established by NOAA Fisheries to maximize smolt out-migration and minimize the potential for predation by hatchery steelhead on wild salmon. To demonstrate compliance with these criteria, length frequency data were collected prior to shipping to determine fish size at the time of release (Appendix 9). The average length of PIT tagged fish sampled from four raceways in March and April was 198.37 mm (7.81 inches).

Fish Distribution

The IPC contracted with Neil Ring Trucking of Buhl, Idaho, to transport steelhead smolts to release sites using two IPC tank trailers. Transport of steelhead from NSFH began on March 22 and ended on May 2, 2004. Eighty-two loads of steelhead (409,050 lbs at 4.61 fish/lb) were transported to the Snake and Salmon rivers (Appendix 6). The first fish were transported to Hells Canyon (Hells Canyon stock), then to the Little Salmon River near Stinky Springs (Hells Canyon stock and then Pahsimeroi stock), and finally to the Pahsimeroi River below the weir. Department biologists feel that Pahsimeroi fish do better if stocked after the second week in April (Kent Ball, personal communication).

Steelhead smolt release figures are as follows; Snake River at Hells Canyon Dam (Hells Canyon stock): 532,944 fish (107,950 lbs at 4.94 fish/lb); Little Salmon near Stinky Springs (Hells Canyon stock): 274,993 fish (55,000 lbs at 4.99 fish/lb); Pahsimeroi River below the weir (Pahsimeroi stock): 840,177 fish (190,000 lbs at 4.42 fish/lb); and the Little Salmon near Stinky Springs (Pahsimeroi stock): 240,194 fish (56,100 lbs at 4.28 fish/lb) (Appendix 6). Total Pahsimeroi production was 246,100 lbs, or 1,080,371 steelhead smolts and total Hells Canyon

production was 162,950 lbs, or 807,937 steelhead smolts. Total NSFH production for the year was 409,050 lbs, or 1,888,308 fish.

Total survival to release was 93.79% for Pahsimeroi steelhead, while total survival to release for Hells Canyon steelhead was 87.65%. Overall, combined survival to release for NSFH steelhead smolts was 91.06 (Appendix 4).

FISH HEALTH

Fish health is always a concern at NSFH. The location of NSFH, in the heart of the commercial trout industry, makes it vulnerable to the horizontal transmission of many etiologic agents. Disease problems from IHNV bacterial furunculosis, and bacterial coldwater disease (CWD) have caused significant losses in years past (Munson, 1996). In addition, the NSFH and its spring-water source are located directly below agricultural land, exposing both to toxic drift and runoff from chemical application to fields above NSFH. Stringent sanitation programs and fish culture practices are implemented to facilitate disease control.

A portion of the brood year 2003 fish were vaccinated with an autogenous *Aeromonas salmonicida* bacterin obtained from Aqua Health Limited. Fish were dipped in an oxygenated solution of 18 liters of water to 2 liters of vaccine with a one-percent (1%) salt solution incorporated into the vaccination solution. The salt solution was introduced to the vaccination protocol to reduce stress brought about by physical handling and to increase the uptake of vaccine by the fish. Vaccine was applied at a rate of 220 lbs of fish per liter of vaccine, for 30 seconds. The vaccination program started on August 26 and ended on September 23, 2003. Average fish size at the time of vaccination was 100.04 fish/lb. Because furunculosis has not been a problem in recent years (the last clinical diagnosis was brood year 1998), NSFH decided to vaccinate only 50% of the steelhead population during the 2003 brood year. Fish were chosen for vaccination that represented both egg and fry transfers to NSFH, from both stocks of fish. No conclusions were made about the non-vaccinated vs. vaccinated fish health since there was no epizootic during this brood year. Mortalities were recorded on all the raceways each month after vaccination until shipping (Appendix 12). Munson (2001) suggests that hatchery staff and Eagle Fish Health Laboratory personnel investigate the necessity of the furunculosis vaccination in future years.

Mortality for the year was below normal. Acute losses were not experienced at NSFH. The majority of losses occurred during incubation when smothering took place between the sac-fry and swim-up stages. Several nitrogen saturation events occurred on 4/5/03, 5/20/03 and again on 6/7/03 in the hatchery building, but losses were kept to a minimum do to staff diligence. Minor losses were attributed to Motile Aeromonad Septicemia (MAS), (*Aeromonas sp.),* and CWD caused by *Flavobacterium psychrophilum*. An application of OTC - medicated feed was administered prior to release to reduce mortality due to MAS. Fish were treated for 10 days with 4% OTC incorporated into the feed in accordance with FDA Investigational New Animal Drug #9332 requirements.

The organosomatic index showed normal values in all categories for both Pahsimeroi and Hells Canyon stocks. Blood work was taken on both stocks of steelhead at NSFH, and all parameter levels for serum protein, leukocrit, and hematocrit were excellent. CTL and KTL (metric and English condition factors) were not assayed for this brood year. The condition of fish from both Hells Canyon and Pahsimeroi stocks at liberation was excellent.

Furunculosis, IHNV, and ERM were not isolated again at this facility during the 2003 brood year. A continuing aggressive disease management program at this facility has been effective in controlling mortality due to these etiological agents. During the first 31 years of production at NSFH, (1966-1997), the yearly mortality averaged 30.70%. During the last seven years, 1997-2003, the yearly mortality averaged 14.83%. During the last 4 years of production at NSFH, the average yearly mortality has declined to 7.35%, a decrease of more than 4 times from the first thirty-one years of production (Appendix 13).

As NSFH reduces egg request numbers and the stated management practices of the inventory continue, a reduction in losses due to MAS and CWD should occur. Hatchery personnel will need to investigate some of the new feeds breaking into the market. These feeds might help fin quality, survival, or any number of fish health parameters while balancing gains verses costs (Munson 2003). Hatchery staff should also decide whether to continue to vaccinate or to discontinue this procedure (Munson 2004).

FISH MARKING

Fin Clipping, CWT, and PIT Tags

All hatchery-reared steelhead in the state are marked with an adipose fin clip. Adipose fin clipping is done so that anglers can differentiate between hatchery and wild steelhead. The clipping process also gives the NSFH staff an accurate inventory, since all fish are counted during clipping. Steelhead were adipose-fin clipped at NSFH between September 29 and October 27, 2003.

Brood year 2003 steelhead were implanted with CWTs from September 24 to September 27, 2003. A total of 156,124 steelhead received CWTs (62,512 Hells Canyon stock, and 93,612 Pahsimeroi stock). Each tag group was held in an individual raceway section so that separate mortality information could be gathered. The CWT groups of 30,000 fish were given a 100-ft section and the one raceway with 60,000 (RCWY 12) was given 200 ft as densities increased. The fish with CWTs (Hells Canyon and Pahsimeroi stock) that were destined for the Little Salmon River were moved into raceways closer together so that they could be shipped within days of each group. In prior years, the Pahsimeroi stock of fish that were destined for the Little Salmon River were shipped approximately a month later than the Hells Canyon stock fish. The new practice should allow better evaluation of stock performance, as well as some possible insight into travel times for each stock, and comparisons into prior years' downstream migration times.

A total of 148,003 CWT-tagged fish were released at three release sites (Appendix 10). A total of 29,441 CWT-tagged fish were released in the Snake River at Hells Canyon Dam from March 28 through March 30, 2004, while 58,591 CWT-tagged fish were released at the Pahsimeroi weir (Pahsimeroi River) between April 15 and April 17, 2004. Both Hells Canyon stock, and Pahsimeroi stock, were released in the Little Salmon River near Stinky Springs for the 2003 brood year. A total of 30,694 CWT-tagged Hells Canyon stock were released at Stinky Springs between April 5 and April 7. The Pahsimeroi stock were released at Stinky Springs between April 7 and April 9, 2004 and totaled 29,227 CWT- tagged fish.

In addition to the CWT-tagged fish, 1,192 fish were tagged with PIT tags on February 24, 2004 (raceways 4, 8, 9, and 12). These computer chips are injected into the body cavities of the fish and information can be accessed as to hatchery origin, length, weight, release watershed, date of release, downstream migration, timing, and travel rates. In this manner, an individual fish can be tracked on its seaward migration without sacrificing the fish.

All mortalities were scanned for PIT-tag detection after tagging had occurred, prior to release and during release. Only five (5) mortalities of PIT-tagged fish occurred after the tagging was completed and prior to release. Consequently, a total of 1,187 PIT-tagged fish were released from NSFH for the 2003 brood year. Of these, a total of 297 PIT-tagged fish were released below Hells Canyon Dam (Hells Canyon stock), while 298 PIT-tagged fish (Hells Canyon stock) and 300 (Pahsimeroi stock) were released in the Little Salmon River near Stinky Springs. In addition, 292 PIT-tagged fish were released at the Pahsimeroi weir in the Pahsimeroi River (Pahsimeroi stock) (Appendix 11).

SPAWN TIMING MANIPULATIONS

Several years ago, the Department consulted University of Idaho geneticist Dr. Madison Powell for recommendations on the proper methods to move the spawn timing back to historical spawning times. Dr. Powell suggested that 10% of early-spawning steelhead and 100% of late-spawning steelhead be spawned if Department personnel desire to move the spawn timing back without impacting the existing program. Department personnel at Oxbow and Pahsimeroi hatcheries attempted to employ these recommendations again this year and will continue to do so in future years. While a high percentage of the early spawn takes were kept, the numbers were small compared to the larger lots kept later.

Approximately 27% of the eggs shipped to NSFH from early spawning adults (4/3-4/8) were utilized for smolt production destined for the Pahsimeroi River, while 28% of eggs from the middle of the spawn (4/17-4/21) and 44% of eggs from late spawning fish (4/24-4/28) were utilized for smolt production at the Pahsimeroi River. At Oxbow Hatchery, 10% of early spawning fish (3/20-3/31) were utilized for smolt production back to Hells Canyon Dam, while 50% of the middle of the spawn (4/3-4/17) and 40% of eggs from late spawning fish (4/21-5/5) were utilized (Appendix 14).

Spawn timing may also be directly correlated to winter river water temperatures. Colder winter river temperatures may delay spawning by delaying egg development in the female based on the temperature unit philosophy. However, a correlation could exist to associate winter river water temperature with ensuing spawn timing in conjunction with artificially moving the spawn timing back by choosing eggs from later females. In the future, hatchery managers may be able to predict when the bulk of spawning will occur based on winter river water temperatures and spawn timing manipulations from preceding years.

RECOMMENDATIONS

Completed Improvements

Several hatchery construction projects were completed this past year. Dust-Gard solution was applied to the park entrance road and main springs road to minimize dust and

reduce road "washboards". A new 70-gallon pressure tank was installed to replace the broken 35-gallon tanks on the domestic water system. The hatchery building collection box water line was cleaned at the water source to allow more water to enter the line to prevent nitrogen supersaturation. The gram scale was repaired and two large pink vats were sold through the public bid process. New trim was installed on the trailer house and house decks were repainted. The interior of the park restroom was repainted to cover numerous vandalism inscriptions. The paths to the lower pool were blocked off to prevent vandalism and swimming in the pool.

IPC personnel poured two concrete walls between the new settling ponds and made numerous minor repairs to both bridges. They also sandblasted and painted the small bridge, welded additional bars on the trash rack at the intake pool and bolted the walkways in place, installed a 480 volt receptacle at the settling ponds, dug up and repaired a break in the main irrigation line, and replaced the drive motors on the small bridge.

A new copier was purchased to replace the broken one, and a new computer was also purchased as part of the IDFG replacement program. A new weed whip was purchased, along with three new shipping hoses, 52 aluminum dam boards, new steps for the clipping trailer, a new dissolved oxygen meter, and a new wagon.

Several landscaping projects were also completed this past year. All trees along the entrance road were trimmed for better visibility. Numerous sprinkler heads were replaced with larger heads for better lawn coverage. Redwood stain was applied to all the parking barrier logs in the park. Landscaping rock was applied to new areas around the hatchery to make mowing easier and added to existing rock areas. Soil-pep was added around all the trees and bushes on the property, and wildflowers were planted on the border with Rimview Trout Company. Dead trees were removed and replaced with live ones. Weeds were sprayed in the spring and fall, and fertilizer was applied to all the grounds and park in the spring.

Needed Improvements

Early Rearing and Incubation

An expansion of the present nursery facility to at least twelve times its present size is needed. The number of vats should be based on a desired density index of 0.30 at a fish size of 200 fish/lb or 2.5 inches in length. Using these criteria, there should be at least 15,120 ft^3 of rearing space to ensure adequate rearing space for fry. This system would protect fry from bird predation and provide them with shade from the sun.

Final Rearing

At least one more smolt-hauling truck and trailer are needed to ensure that smolts are released in a timely manner. Current hauling procedures require up to 45 days to haul fish to their respective release sites. Optimum release timing for smolts to minimize residualism and maximize downstream survival should involve fewer than half the 45 hauling days currently needed (Kent Ball, personal communication).

Concrete repair work needs to be completed at 300' on all the raceways, with additional repairs on some raceway walls. A fish counter is needed for better inventory accuracy and management. Electrical wiring from the chiller building to the feed bins should be replaced because of entrained water in housing and consequent rust on electrical lines.

Employee Safety

A trash rack needs to be installed in front of the intake gate at the upper pool to prevent access to the spring and injury to the public. A trash rack should also be installed at the entrance to the discharge canal to the Rimview Hatchery.

The bulk tank, conveyor line, and entrance gates to the outdoor raceways need to be raised. This is a safety issue as the low height of the conveyor line and gate doorways have caused numerous bumps and bruises.

Water Source

The water collection box, which supplies water to the incubator rooms, is located near the top of the spring and the amount collected is not enough to safely produce fry. Plans should be developed to enlarge the existing pipeline delivering water to the vats or utilize the hatchery head pool as a new supply source. For now, more water needs to be collected at the incubator headbox to utilize the capacity of the line. A degassing tower should also be installed on the existing hatchery-building pipeline because of the possibility of nitrogen gas toxicity. The line will hold 1,600 gpm of water, but only 1,100 gpm is useable because of nitrogen toxicity at 1,150 gpm.

An intake-traveling screen is needed to remove leaves and macrophytes from the water at our intake. Entire raceways are in jeopardy every fall when leaves plug head screens during the night. Weeds also break loose from the springs all year long that could plug our head screens.

Building Improvements

A new hatchery and incubation building with functional nursery vats is badly needed. The building should also include public restrooms that are handicapped accessible, an office, shop, meeting room, and an adequate feed storage space.

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APPENDICES

Appendix 1. NSFH monthly water use allocations.

Month	Max. Flow	Month	Max. Flow
May	50 cfs	November	70 cfs
June	50 cfs	December	90 cfs
July	50 cfs	January	100 cfs
August	50 cfs	February	110 cfs
September	50 cfs	March	120 cfs
October	60 cfs	April	120 cfs

Appendix 2. Volume of water discharged from NSFH to Rimview Trout Company by month from December 2003 to May 2004.

Month	Hatchery Inflow	Flow to Rimview	Discharge Flow to Niagara Springs Crk.
December	90 cfs	22 cfs	68 cfs
January	100 cfs	30 cfs	70 cfs
February	110 cfs	50 cfs	60 cfs
March	120 cfs	50 cfs	70 cfs
April	120 cfs	31 cfs	89 cfs
May	25 cfs	0 cfs	25 cfs

Appendix 3. Results of annual analysis of NSFH source water, 1994 through 2004.

	Yearly Results							
Analysis	**1994 (mg/l)**	**1998 (mg/l)**	**2000 (mg/l)**	**2001 (mg/l)**	**2002 (mg/l)**	**2003 (mg/l)**	**2004 (mg/l)**	**Maximum Allowable Contaminant Levels**
Alkalinity	166	160	170	180	170	170	160	10.0
Antimony	0.002	N/T*	N/D*	N/D*	N/D*	N/D*	N/D*	0.006
Arsenic	0.005	N/D*	N/D*	N/D*	N/D*	N/D*	N/D*	0.05
Barium	0.180	N/D*	N/D*	N/D*	N/D*	N/D*	N/D*	2
Beryllium	0.0002	N/T*	N/T*	N/T*	N/T*	N/T*	N/T*	0.004
Cadmium	0.00034	N/D*	N/D*	N/D*	N/D*	N/D*	N/D*	0.005
Chromium	0.002	N/D*	N/D*	N/D*	N/D*	N/D*	N/D*	0.1
Chloride	N/T	48	46	44	45	41	46	250
Copper	0.010	N/D*	N/D*	N/D*	N/D*	N/D*	N/D*	1.3
Cyanide	0.005	N/T*	N/T*	N/T*	N/T*	N/T*	N/T*	0.200
Fluoride	0.570	N/D*	0.6	0.7	N/D*	0.6	N/D*	4
Hardness	234	230	230	230	240	220	230	100
Iron	0.010	N/D*	N/D*	N/D*	N/D*	N/D*	N/D*	0.3
Lead	0.002	N/D*	N/D*	N/D*	N/D*	N/D*	N/D*	0.015
Manganese	N/T	N/D*	N/D*	N/D*	N/D*	N/D*	N/D*	0.05
Mercury	0.0002	N/D*	N/D*	N/D*	N/D*	N/D*	N/D*	0.002
Nickel	0.003	N/D*	N/D*	N/D*	N/D*	N/D*	N/D*	0.1
Nitrate as N	1.630	1.9	1.6	1.7	1.8	1.4	1.8	10
Nitrite as N	0.01	N/D*	N/D*	N/D*	N/D*	N/D*	N/D*	1
PH	8.00	8.3	8.4	8.2	8.2	7.9	8.1	6.5 - 8.5
Selenium	0.005	N/D*	N/D*	N/D*	N/D*	N/D*	N/D*	0.05

*N/D = Not detected
*N/T = Not tested

Appendix 4. NSFH brood year 2003 steelhead survival from egg to smolt .

Source	**Eggs Received**	**Fry Received**	**Total Received**	**Fingerlings Released**	**% Survival Fingerlings**	**Smolts Released**	**Total Release**	**% Survival To Release**
Pahsimeroi	587,038	564,873	1,151,911	0	*96.94%	1,080,371	1,080,371	93.79%
Oxbow	470,355	451,445	921,800	0	*91.34 %	807,937	807,937	87.65%
Totals	**1,057,393**	**1,016,318**	**2,073,711**	**0**	***94.14%**	**1,888,308**	**1,888,308**	**91.06%**

*Estimated percentages

Appendix 5. NSFH brood year 2003 feed usage.

Manufacturer	Type and Size	Dates Received	Total Pounds Received	Total Pounds Used	Total Feed cost ($)
Rangen	Trout and Salmon Starter Swimup	6/9/03 - 8/1/03	1,700	1700	1,218.45
Rangen	Trout and Salmon Starter #1	6/9/03 - 8/1/03	1,600	1,600	1,061.56
Rangen	Trout and Salmon Starter #2	7/16/03 - 8/17/03	2,800	2,800	1,475.71
Rangen	Trout and Salmon Starter #3	7/31/03 - 8/5/03	2,400	2,400	1,135.15
Moore Clark	Clark's Fry 1.5mm ProActive	8/5/03	7,260	7,260	3,702.60
Rangen	Bulk 470 exsl. 2.0mm slow-sink	8/13/03 - 10/27/03	41,760	41,760	15,290.77
Rangen	Bulk 470 exsl. 3/32 slow-sink	11/12/03 - 1/13/04	100,180	100,180	37,042.97
Rangen	Bulk 470 exsl. 1/8 slow-sink	1/20/04 - 4/21/04	196,660	196,660	69,322.94
Rangen	Bulk TM (4000g) 1/8 pellet	2/13/04 - 3/15/04	34,000	34,000	17,314.68
Rangen	Sack "Extr" 450 Pellets 1/8 floating	4/13/04	150	150	50.58
Rangen	Sack Trout Production Pellets 1/8	4/13/04	1,050	1,050	331.98
Rangen	Fines credit "exsl" bulk / sack	7/2/03	0	(140)	(69.75)
Rangen	Fines credit "TM-100" med. & "exsl" Bulk	11/21/03 - 4/30/04	0	(676)	(246.18)
	Grand Total		389,560	388,744	147,631.46

Appendix 6. NSFH brood year 2003 steelhead smolt distribution.

Destination		Stock	Weight	Dates	Number Per Pound	Number Released
Hells Canyon	(Snake R.)	H.C.	107,950	3/22 - 4/1/04	4.94	532,944
Stinky Springs	(Little Salmon R.)	H.C.	55,000	4/2 - 4/7/04	4.99	274,993
Pahsimeroi	(Pahsimeroi R.)	Pah.	190,000	4/10 - 4/29/04	4.42	840,177
Stinky Springs	(Little Salmon R.)	Pah.	56,100	4/30 - 5/2/04	4.28	240,194
Total			**409,050**		**4.61**	**1,888,308**

Appendix 7. NSFH production costs for brood year 2003.

Number of Fish	Lbs of Feed	Cost of Feed	Pounds of Fish	Feed Conversion	Total Cost	Cost per 1,000	Cost per Pound
1,888,308	388,744	$147,631.46	409,050	0.95	*$985,278.92	*$521.78	*$2.41

*Cost includes IPC cost for overhead, smolt hauling and shop expenditures and does not include capital outlay expenditures.

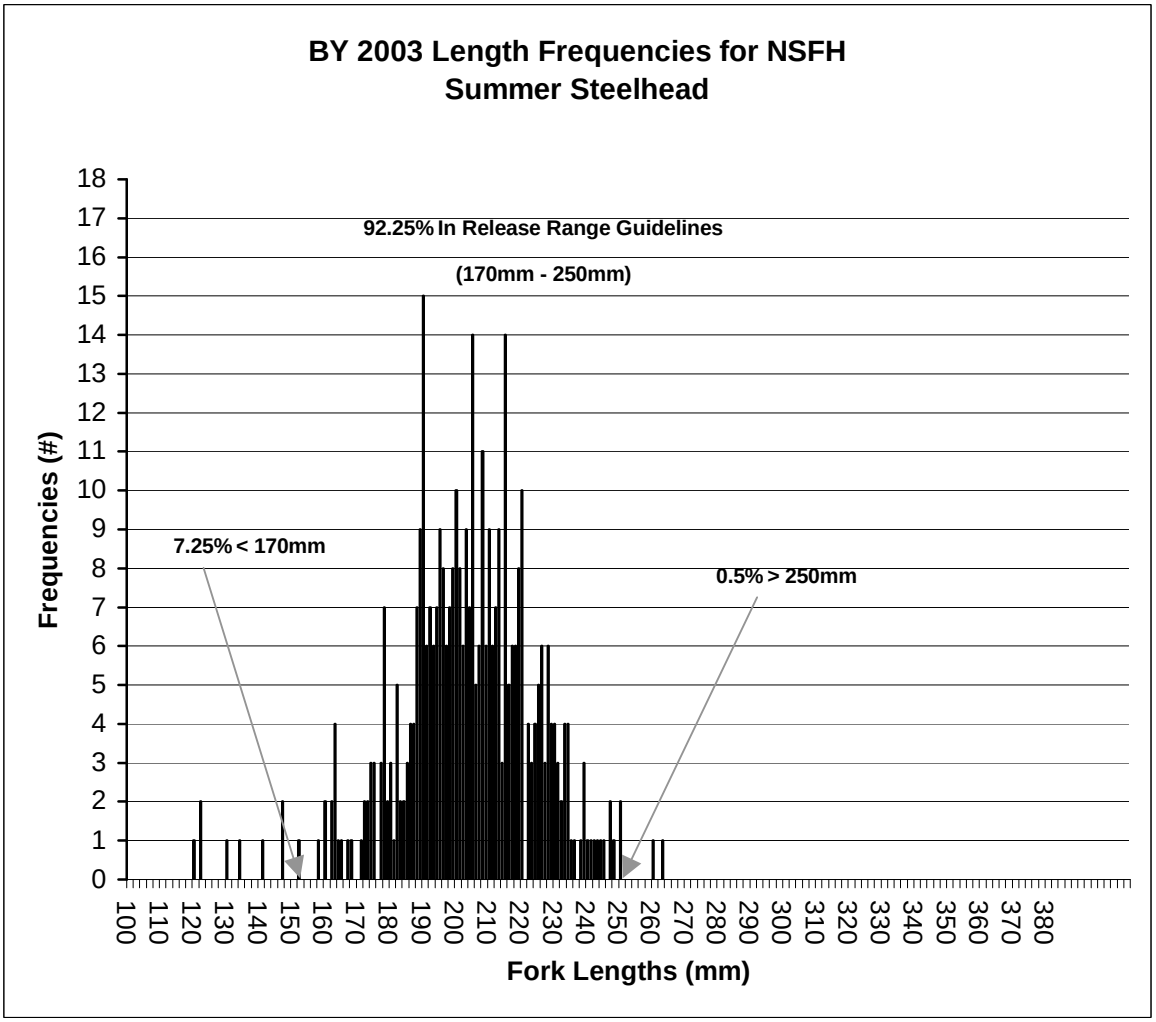
Appendix 8. Fin lengths of NSFH steelhead; March and April 2004.

Raceway	Fork Length	Right Pectoral	Left Pectoral	Dorsal	Ave. Fin Length	Fin Quality Index	Wild Fin Quality Index	Percent of Wild FQI
4	193.76	19.7	20.4	10.1	16.7	0.086	0.13	66.18%
8	184.55	19.6	19.5	11.4	16.8	0.091	0.13	70.09%
9	198.40	15.0	18.1	12.7	15.2	0.077	0.13	59.00%
12	213.70	20.75	20.55	12.5	17.95	0.084	0.13	64.61%
Average						0.085	0.13	64.99%

Appendix 9. Fork length frequencies at release for three PIT-tagged raceways, March and April 2004.

Raceway #	H.C. 4	H.C. 8	Pah. 9	Pah. 12
Sample Size	100	100	100	100
Ave. Frk. Length	193.76	190.51	200.43	208.74
Lower Range (mm)	136.00	117.00	115.00	117.00
Upper Range (mm)	243.00	236.00	245.00	258.00

	(mm)	(Inches)
Hells Canyon Average Length	192.14	7.56
Pahsimeroi Average Length	204.59	8.05
Overall Average Length	**198.37**	**7.81**



Appendix 10. CWT summary for brood year 2003 steelhead at NSFH.

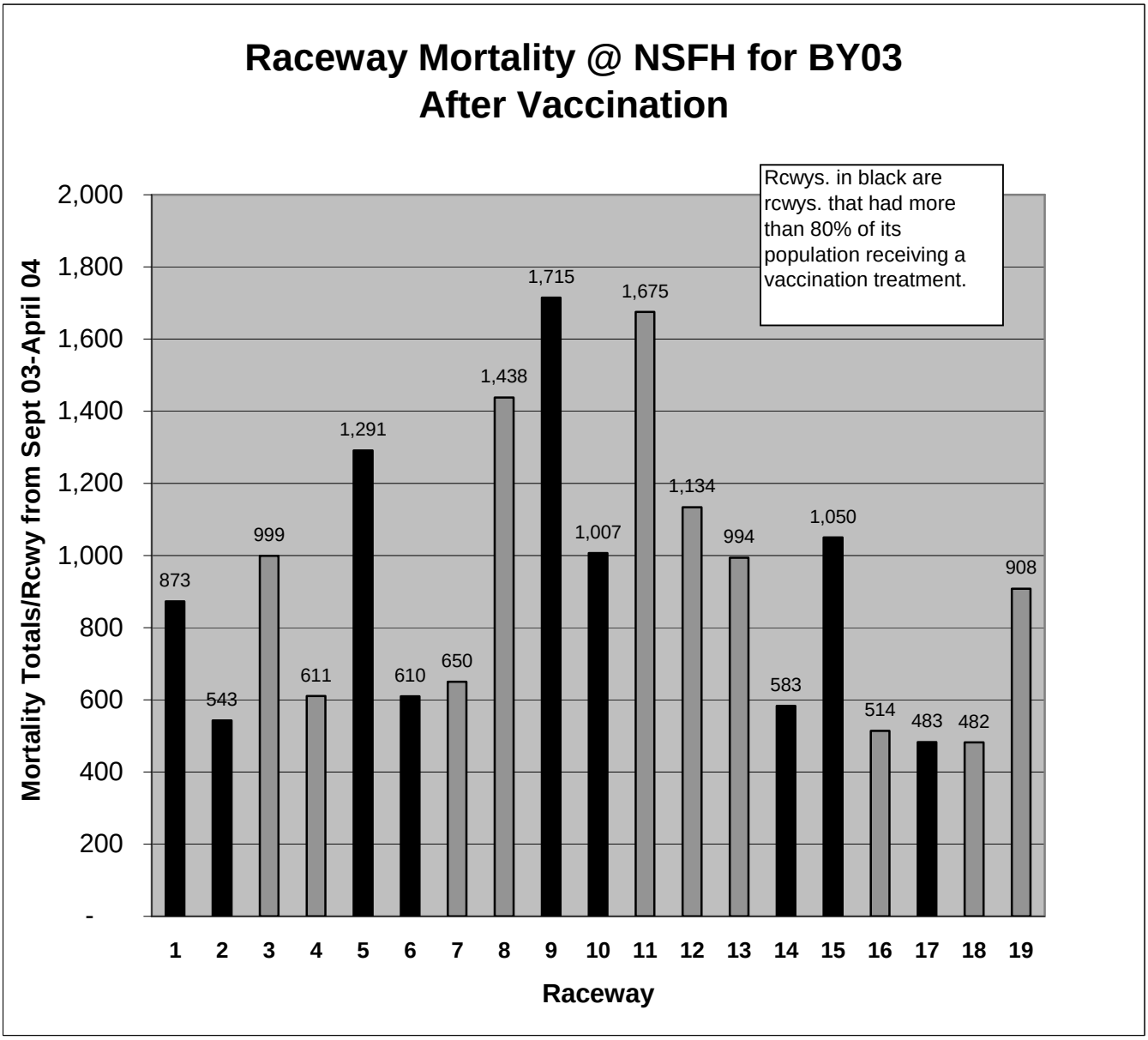
Raceway	Release Site	CWT Number	Number Tag	Mortality to Release	Number Shed	CWT Number Released	CWT Number Untagged	Total Tagged Group Release	Total Site Release
	Snake River								
4	Hells Canyon Dam	10-20-75	30,935	164	1,330	29,441	73,264	29,441	
Total			**30,935**	**164**	**1,330**	**29,441**	**73,264**	**29,441**	532,994
	Salmon River								
8	**Little Salmon River**	10-14-75	31,577	283	600	30,694	78,037	30,694	
Total			**31,577**	**283**	**600**	**30,694**	**78,037**	**30,694**	274,993
	Pahsimeroi River								
12	Pahsimeroi Trap	10-36-75	62,179	852	**2,736**	58,591	**35,743**	**58,591**	
Total			62,179	852	**2,736**	**58,591**	**35,743**	**58,591**	**840,177**
	Salmon River								
9	Little Salmon River	10-21-75	31,440	421	**1,792**	29,277	**70,593**	**29,227**	
Total			31,440	421	**1,792**	29,277	**70,593**	**29,277**	240,194

Total CWT Release: 148,003
Total Site Releases: 1,888,308
Total Smolt Releases: 1,888,308

Appendix 11. PIT tag summary for brood year 2003 steelhead at NSFH.

Raceway	Release Site	Number Tagged	Number Released	Mortality
4	Hells Canyon Dam Snake River	299	297	2
8	Stinky Springs Little Salmon River	299	298	1
9	Stinky Springs Little Salmon River	300	300	0
12	Pahsimeroi Weir Pahsimeroi River	294	292	2
Totals		**1,192**	**1,187**	**5**

Appendix 12. Comparison of mortality in vaccinated and non-vaccinated raceways at NSFH for brood year 2003.



Appendix 13. NSFH production history, BY66 to present.

NIAGARA SPRINGS HATCHERY
HATCHERY HISTORY BY66-PRESENT

YEAR	PAHSIM. Eggs/fry Received	OXBOW Eggs/fry Received	TOTAL Eggs/fry Received	TOTAL Yearly MORT.	% MORT Yearly	FALL Releases	Salmon R. SMOLT Release	Hells C. SMOLT Release	SPRING Releases	TOTAL LBS Released	Feed fed Total	Conv.	Fish/lb
1965-66	0	3,085,194	3,085,194	---	---	---	---	---	---	---	---	---	---
1966-67	0	2,605,288	2,605,288	623,533	23.93	29,400	1,364,842	587,513	1,952,355	153,552	305,890	1.99	12.71
1967-68	0	3,215,652	3,215,652	1,209,183	37.60	0	1,664,325	342,144	2,006,469	204,251	298,450	1.46	9.82
1968-69	0	2,469,536	2,469,536	695,219	28.15	0	1,665,117	109,200	1,774,317	184,186	280,430	1.52	9.63
1969-70	1,477,695	1,927,727	3,405,422	654,022	19.21	757,500	1,608,000	385,900	1,993,900	299,235	502,410	1.68	6.66
1970-71	1,330,494	1,480,150	2,810,644	305,176	10.86	670,960	1,630,002	0	2,444,860	202,025	384,040	1.90	12.10
1971-72	1,439,842	700,061	2,139,903	153,603	7.18	215,625	1,555,050	0	1,770,675	235,375	376,080	1.60	7.52
1972-73	8,850,764	1,819,721	10,670,485	3,105,637	29.10	3,008,664	1,543,349	0	4,556,184	163,839	266,800	1.63	27.81
1973-74	3,663,990	1,264,384	4,928,374	2,953,847	59.94	0	1,960,378	0	1,974,527	187,494	319,130	1.70	10.53
1974-75	3,160,144	280,098	3,440,242	2,108,426	61.29	0	1,331,280	0	1,331,816	166,640	352,890	2.12	7.99
1975-76	2,234,978	51,559	2,286,537	513,688	22.47	40,977	1,690,390	0	1,731,872	248,708	437,600	1.76	6.96
1976-77	2,487,824	730,862	3,218,686	1,642,383	51.03	0	1,433,675	141,005	1,576,303	251,835	454,762	1.81	6.26
1977-78	2,540,728	517,250	3,057,978	1,229,537	40.21	281,208	1,266,025	0	1,547,233	154,829	370,080	2.39	9.99
1978-79	2,048,350	441,069	2,489,419	426,977	17.15	344,944	1,372,454	0	1,717,498	244,887	643,680	2.63	7.01
1979-80	2,622,425	124,814	2,747,239	203,985	7.43	548,987	1,097,060	348,220	1,994,267	314,100	629,580	2.00	6.35
1980-81	1,697,010	498,416	2,195,426	720,172	32.80	0	862,494	612,760	1,475,254	316,330	622,930	1.97	4.66
1981-82	2,003,418	298,952	2,302,370	953,015	41.39	0	995,205	354,150	1,349,355	374,350	663,850	1.77	3.60
1982-83	2,313,339	253,776	2,567,115	1,431,975	55.78	500,000	542,390	92,750	635,140	181,150	448,860	2.48	3.51
1983-84	2,749,292	709,716	3,459,008	1,849,313	53.46	449,070	752,195	408,430	1,160,625	310,000	632,400	2.04	3.74
1984-85	2,333,760	598,404	2,932,164	613,771	20.93	630,500	1,273,181	414,712	1,687,893	314,650	541,198	1.72	5.36
1985-86	1,332,152	1,582,340	2,914,492	903,999	31.02	330,640	860,358	819,495	1,679,853	339,885	580,850	1.71	4.94
1986-87	1,339,176	935,195	2,274,371	422,476	18.58	39,995	1,011,900	800,000	1,811,900	419,000	557,960	1.33	4.32
1987-88	1,640,040	1,289,029	2,929,069	775,569	26.48	404,000	872,100	877,400	1,749,500	405,515	584,290	1.44	4.31
1988-89	1,256,289	1,213,399	2,469,688	803,488	32.53	0	930,700	735,500	1,666,200	406,800	574,770	1.41	4.10
1989-90	1,925,795	833,397	2,759,192	252,892	9.17	603,000	956,100	947,200	1,903,300	465,400	597,310	1.25	4.09
1990-91	1,966,434	113,190	2,079,624	311,624	14.98	0	856,000	912,000	1,768,000	484,025	632,030	1.28	3.65
1991-92	650,400	691,500	1,341,900	311,400	23.21	0	786,600	243,900	1,030,500	232,500	283,000	1.22	4.43
		812,000	812,00	394,936	48.64	0		417,064	417,064	72,786			5.73
	Wallowa												
1992-93	1,131,951	1,013,846	2,145,797				761,800	353,600		235,075			
1992-93	Babington		*Babington	Release	In Little	Salmon	*222,560	306,907	**47,089	131,090			
			**Brownlee	Reservoir									
1993-94	954,294	1,509,596	2,463,890	1,263,820	54.89	0	928,981	609,115	1,538,096	350,151	440,143	1.26	4.40
1994-95	1,042,728	1,099,915	2,142,643	281,034	13	160,000	741,180	960,429	1,701,609	376,060	489,960	1.29	4.52
1995-96	1,400,000	1,397,103	2,797,103	906,008	32.4	157,600	890,135	843,360	1,733,495	352,750	429,528	1.22	5.00
1996-97	1,297,250	1,303,599	2,600,849	698,156	26.84	149,040	1,093,002	660,651	1,753,653	370,520	421,144	1.14	4.79
1997-98	1,434,497	1,211,977	2,646,474	992,649	37.5	0	942,430	711,395	1,653,825	361,745	412,624	1.14	4.57
1998-99	1,412,000	1,393,383	2,805,383	759,809	27.08	60,634	1,185,535	657,665	1,843,200	444,455	484,110	1.09	4.63
1999-00	1,712,675	1,133,871	2,846,546	281,131	9.87	364,923	1,011,633	792,902	2,295,605	457,626	469,043	1.02	4.30
2000-01	1,416,442	1,045,825	2,462,267	100,330	4.07	431,133	1,351,337	579,467	1,930,804	459,580	473,540	1.03	4.29
2001-02	1,502,313	950,907	2,453,220	137,481	5.60	478,586	1,310,985	526,168	1,837,153	454,430	442,864	0.98	4.11
2002-03	1,161,547	919,416	2,080,963	224,277	10.78	0	1,330,802	525,884	1,856,686	417,275	415,155	0.99	4.45
2003-04	1,151,911	921,800	2,073,711	185,403	8.94	0	1,355,364	532,944	1,888,308	409,050	388,744	0.95	4.61

Appendix 14. Oxbow and Pahsimeroi stock spawn timing manipulations at NSFH for brood year 2003.

Hells Canyon Stock Eggs Used for Production Purposes				**Pahsimeroi Stock Eggs Used for Production Purposes**			
Lot Number	Spawn Date	Percent of Lot Utilized for Smolt Production	Percent of Total Smolts Utilized for Smolt Production	Lot Number	Spawn Date	Percent of Lot Utilized for Smolt Production	Percent of Total Smolts Utilized for Smolt Production
1	03/20/03	67%	1.0%	1	04/03/03	46%	20.9%
2	03/23/03	0%	0.0%	2	04/08/03	15%	6.7%
3	03/24/03	100%	2.2%	3	04/17/03	100%	9.4%
4	03/27/03	100%	2.9%	4	04/21/03	93%	19.1%
5	03/31/03	100%	6.0%	5	04/24/03	78%	21.9%
6	04/03/03	100%	6.2%	6	04/28/03	88%	22.0%
7	04/07/03	43%	0.7%				
8	04/10/03	94%	1.7%				
9	04/14/03	35%	2.6%				
10	04/17/03	100%	38.2%				
11	04/21/03	45%	12.7%				
12	04/24/03	66%	10.7%				
13	04/28/03	68%	9.6%				
14	05/01/03	67%	3.4**%**				
15	05/05/03	71%	2.1%				

Submitted by:

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