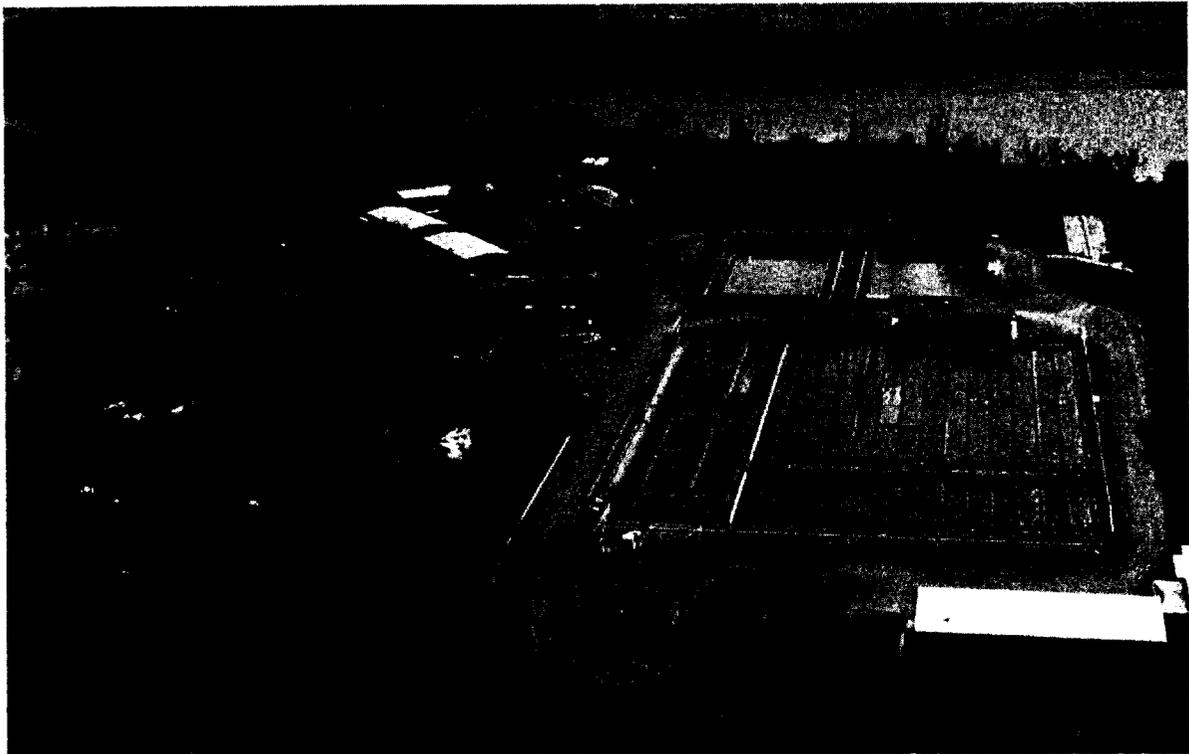


NIAGARA SPRINGS FISH HATCHERY

2007 Steelhead Brood Year Report



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ABSTRACT

Niagara Springs Fish Hatchery (NSFH) received 2,022,655 steelhead (*Oncorhynchus mykiss*) eggs and fry during the 2007 brood year. A total of 1,108,682 Pahsimeroi stock eggs and fry (580,985 eggs and 527,697 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. Approximately 47.6% of the Pahsimeroi egg lots were shipped to NSFH as first feeding fry. A total of 913,973 Hells Canyon stock eggs and fry (442,839 eggs and 471,134 swim-up fry) were received from Oxbow Hatchery. Just over half (51.5%) of the Hells Canyon egg lots were shipped to NSFH as first feeding fry.

Total production for the 2007 brood year at NSFH was 1,689,872 steelhead (376,800 lbs) for anadromous smolt releases. No excess fish were available to be stocked as fall releases.

A total of 1,689,872 steelhead smolts (376,800 lbs at 4.48 fish/lb) were released into the Snake and Salmon rivers from March 24 to April 29, 2008. A total of 830,894 smolts (194,750 lbs at 4.27 fish/lb) of Pahsimeroi stock were released in the Pahsimeroi River at the weir, and 48,700 smolts (12,600 lbs at 3.87 fish/lb) of Pahsimeroi stock were released in the Little Salmon River off the Pinehurst Bridge. A total of 537,371 smolts (110,000 lbs at 4.89 fish/lb) of Hells Canyon stock were released in the Snake River at Hells Canyon Dam, and 272,907 smolts (59,450 lbs at 4.59 fish/lb) of Hells Canyon stock were stocked in the Little Salmon River off the Pinehurst Bridge.

Mortalities from pathogens increased this year. For this brood year, NSFH vaccinated 64.3% of the total steelhead production for furunculosis (*Aeromonas salmonicida*). NSFH did not vaccinate for enteric redmouth disease (ERM-*Yersinia ruckerii*) during this brood year. Furunculosis, ERM, IPN, and IHN were not isolated during the 2007 brood year. An epizootic caused by bacterial coldwater disease, *Flavobacterium psychrophilum*, occurred in July 2007. NSFH implemented an oxytetracycline feed treatment with good results. *F. psychrophilum* was detected again in January 2008 during a routine fish health inspection.

A total of 379,515 lbs of Rangen fish feed was fed at a cost of \$209,712.50 to produce 376,800 lbs of steelhead for a conversion rate of 1.007:1.

Authors:

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INTRODUCTION

The NSFH is owned and funded 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 consist of an indoor nursery area, outdoor rearing raceways, and two flow-through settling ponds. The indoor nursery area consists of 42 upwelling incubators and 21 rectangular vats for the hatching and early rearing of fry. The nursery tanks provide 749.61 ft³ of hatching and early rearing space. The nursery tanks are supplied by constant temperature, gravity flow, spring water.

The outdoor rearing space consists of nineteen raceways (300-ft x 10-ft), (142,500 ft³), 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/ft³/in as recommended by Piper (1982).

Two flow-through settling ponds (150-ft x 60-ft), (72,000 ft³) 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 daily to augment the air blower system and a power scrubber is also employed on a regular basis to remove excessive algal growth.

Buildings on the NSFH grounds include five residences. Three are wood-frame houses, one is a doublewide modular home, and one is a 16-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 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 the 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 November 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 personnel staff the NSFH. Jerry Chapman, Fish Hatchery Manager II, Jarrett Page, Fish Hatchery Assistant Manager, Doug Young, and Morgan Fife, Fish Culturists, handle most operational duties. During peak work activities there are several Bio Aides throughout the year: Lonnie Medina, Sam Van Liew, Jeremy Keeler, and Zach Welch who assist the permanent staff with fish culture, maintenance, and other assignments. This year permanent personnel staff changes included Kevin Yelton transferring to the new Fish Culturist position at Pahsimeroi Hatchery, and Morgan Fife hired as new Fish Culturist.

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 yet have a chiller unit for this purpose. The NSFH received both eggs and fry for the 2007 brood year (Appendix 4). Of the Pahsimeroi stock eggs incubated at Oxbow Hatchery and destined for NSFH, approximately one-half (50.61%) were delivered to NSFH as eyed eggs while the remaining (49.39%) 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 a 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. This tank/trailer configuration also eliminated the transportation bottleneck created when NSFH wanted to use HSFH transport trucks during their busy "catchable" stocking season.

The NSFH received 580,985 eyed-eggs of Pahsimeroi stock on June 8, 2008. This shipment came from lots 9-11. A total of 527,697 Pahsimeroi stock swim-up fry, from egg lots 1-8, were received from June 14 through July 13, 2007. The fry received June 14 were placed directly in the outdoor nursery raceways, while fry received on July 12 and 13 were placed into indoor vats. A total of 1,108,682 Pahsimeroi stock eggs and fry were received at NSFH for the 2007 brood year.

A total of 442,839 eyed-eggs of Hells Canyon stock (lots 10-15) were shipped to NSFH on May 24, 2007. Egg lots 1-8 were transported to NSFH as swim-up fry (471,134) between June 5 and June 25, 2008, 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, and was approximately the same as the prior brood year. A total of 913,973 eggs and fry of Hells Canyon stock were received at NSFH for the 2007 brood year. NSFH's steelhead survival for brood year 2007 is summarized in Appendix 4.

Upon arrival at NSFH, all eggs were tempered and disinfected with Ovadine at 100-ppm for 30 minutes and placed in upwelling incubators (25,250 per incubator average) inside the vats. All fry shipping containers were disinfected prior to shipping. Upon arrival at the hatchery, 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 reduced survival of Pahsimeroi stock received as eyed eggs and swim up fry. Survival of fry to fingerling was 84.69% in Pahsimeroi steelhead and 93.45% in Hells Canyon steelhead. Acute losses caused by bacterial coldwater disease, *Flavobacterium psychrophilum*, hit two vats at swim up (eggs delivered on June 8). Two fry deliveries (July 12 and 13) received from Oxbow Hatchery arrived sick with bacterial coldwater disease and suffered substantial mortality. Overall, fry to fingerling survival was 88.65%.

Nursery sections in the raceways 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 thus decreasing the 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. The CWT raceways have 60,000 to 70,000 untagged steelhead per raceway, depending on the stock and tagging requests. In the production cycle, these 60,000 to 70,000 fish require less or more than the normal 100-ft key-way sections depending on the number and size of the fish. This allows for better cleaning, feeding and density control. Fish are given more room before they attain a density index of 0.30. All of these fish culture practices are standard protocol.

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 steelhead reached 75 fish/lb, all NSFH fish were switched to a Rangen 470 exsl slow sink diet. The switch to Rangen bulk 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 100-ft of the raceway, while the other half are clipped into the upper 100-ft section of the adjacent even-numbered raceway. Brood Year 2007 marked the first time all the fish on station were marked using the new Mobile Automated Tagging System (MATS). Fin-clipping operations started on August 28 and were completed by September 12, 2007. Utilizing the MATS system during brood year 2007 resulted in the following benefits; fish were ad-clipped earlier in the rearing cycle (ad-clipping usually began in mid-September for prior brood years), and the process was completed faster (a 3-week decrease in clipping time compared to brood year 2006).

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, 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.

Pahsimeroi steelhead were held off feed for 6 days to slow their growth, and 14 days for other fish culture reasons. Hells Canyon steelhead were off feed for 11 days to slow their growth and 12 days for other fish culture reasons. These reasons include; off feed prior to handling for vaccination, sample counts, adipose fin clipping, CWT and PIT-tagging programs, and off feed prior to shipping. This is a dramatic decrease from prior years, since it was not uncommon to have fish off feed for up to 45 days. Although early growth rates exceeded 0.033 inches per day, growth rates were slowed to 0.026 inches per day. Slowing the growth rates has been accomplished through feeding practices and reducing the amount of feed fed per raceway per day, but still continually feeding the fish.

A total of 379,515 lbs of Rangen was fed over the course of the brood year (Appendix 5). The Rangen feed total includes 200 lbs of Aquaflor top dressed feed, and 32,900 lbs of Oxytetracycline (OTC) medicated feed used for two OTC-medicated feed treatments 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 Aquaflor feed was \$214.12, the OTC feed was \$29,778.01, and the total cost of regular feed was \$179,720.37. A total of 376,800 lbs of fish were produced on 379,515 lbs of feed for a conversion rate of 1.007:1. Total NSFH production costs incurred by IPC during the 2007 brood year were \$1,115,654.30 which includes IPC overhead, smolt hauling, and shop expenditures, but does not include capital outlay expenditures. The cost/lb of fish produced was \$2.96 (Appendix 7).

Fin quality assessments using methods developed by the NSFH personnel was done in March to allow NSFH staff time to meet the FDA required guidelines for withdrawal periods on fish treated with MS-222 anesthetic. Fins of steelhead reared at NSFH were compared to fins of wild, outmigrating steelhead collected from the Salmon and Pahsimeroi Rivers over a two-year period. The resulting fin index (0.1185) will be used for all fin quality measurements at NSFH. Twenty fish were sampled from four CWT-tagged raceways (80 total), 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 steelhead. Results indicate that the fin quality index from fish raised at NSFH was 69.2% of that of wild fish (Appendix 8). This was a 9.2% increase from brood year 2006 releases using the fin index based on wild steelhead. This brood year feeding was reduced from 8 times per day down to 4 times per day (once every 2 hours) beginning in December. This could have been partially responsible for the increase in fin quality over the previous year.

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). One hundred fish were sampled from four of the CWT-tagged raceways (400 total). 93.5% of the sample size (374 of 400) fell within release guidelines. The average length of CWT-tagged fish sampled from four raceways in March was 206.3 mm (8.12 inches).

Fish Distribution

The IPC contracted with Neil Ring Trucking of Buhl, Idaho, to transport steelhead smolts to release sites using three IPC tank trailers. Transport of steelhead from NSFH began on March 24 and ended on April 29, 2008. Seventy-six loads of steelhead (376,800 lbs at 4.48 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 off of the Pinehurst Bridge (Hells Canyon stock and then Pahsimeroi stock), then to the Pahsimeroi River below the weir, and finally back to the Little Salmon River to meet requests. The Pinehurst Bridge release site was utilized because of extremely high snow levels at Stinky Springs. 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): 537,371 fish (110,000 lbs at 4.89 fish/lb); Little Salmon off of Pinehurst Bridge (Hells Canyon stock): 272,907 fish (59,450 lbs at 4.59 fish/lb); Pahsimeroi River below the weir (Pahsimeroi stock): 830,894 fish (194,750 lbs at 4.27 fish/lb); and the Little Salmon off of Pinehurst Bridge (Pahsimeroi stock): 48,700 fish (12,600 lbs at 3.87 fish/lb) (Appendix 6). Total Pahsimeroi production was 207,350 lbs, or 879,594 steelhead smolts at 4.24 fish/lb, and total Hells Canyon production was 169,450 lbs, or 810,278 steelhead smolts at 4.78 fish/lb. Total NSFH production for the year was 376,800 lbs, or 1,689,872 fish.

Total survival to release was 79.34% for Pahsimeroi steelhead, while total survival to release for Hells Canyon steelhead was 88.65%. Overall, combined survival to release for NSFH steelhead smolts was 83.55% (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, ERM, 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.

Just over 64 percent of the brood year 2007 fish were vaccinated with an autogenous *Aeromonas salmonicida* bacterin obtained from Aqua Health Limited. Fish were dipped in an oxygenated, vaccination solution of 18 liters of water to 2 liters of vaccine with a one-percent (1%) salt solution incorporated into the vaccine. 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 40 seconds.

The vaccination program started on August 13 and ended on October 8, 2007. Average fish size at the time of vaccination was 90.33 fish/lb. Furunculosis was a problem in brood year 2006 when vaccine was unavailable due to high demand from commercial hatcheries in Chile. NSFH decided to vaccinate over 50% of the brood year 2007 steelhead population. There were no outbreaks of furunculosis, and the pathogen was not detected in any fish sampled this brood year, so it may be inferred the vaccination was a success. Due to the furunculosis outbreak during brood year 2006, and the lack of outbreaks during years at least 50% of the population is vaccinated, NSFH will continue to vaccinate at least 50% of all future brood years. Mortalities were recorded on all the raceways each month after vaccination until shipping (Appendix 12). Burton (2005) suggests that hatchery staff reinstate 100% vaccination to protect steelhead at NSFH due to Rim View Hatchery discontinuing the use of all antibiotics to market their product as organic.

Mortality for the year was above normal. Acute losses due to infectious agents were experienced very early in the rearing cycle. Two groups of Pahsimeroi fry received in July exhibited signs of coldwater disease on arrival to NSFH. One group of Hells Canyon stock received as eggs in June broke with bacterial coldwater disease just after starting on feed. The warm water line to the Pahsimeroi fry was turned off for approximately 30 minutes during chiller

maintenance at Oxbow. This was possibly the stress event which caused the early epizootic of bacterial coldwater disease in the Pahsimeroi stock. The Hells Canyon fry broke with bacterial coldwater disease shortly after starting on feed. The stress event for the Hells Canyon stock was most likely caused by high densities in the vats when the fry were removed from the incubators. With the current early rearing strategy in the nursery rooms, fish are above a DI of .3 until they can be ponded into the outside raceways. Brood year 2007 marks consecutive years swimup fry have broke with bacterial coldwater disease. This trend is likely to continue until an adequate indoor early rearing room can be constructed to provide rearing units with enough space to keep fish densities below a density index of .3, thus removing this type of stress to steelhead. Treatment with OTC-medicated feed was administered to both stocks with good results. Treatment of Aquaflor was administered to one group of Hells Canyon stock with favorable results. An application of OTC - medicated feed was administered prior to release to reduce mortality due to CWD being detected during a routine fish health inspection in January. The treatment was done to prevent predictable outbreaks of bacterial coldwater disease which has a history of causing acute losses just prior to releases when raceway densities are highest and the fish are the most vulnerable. Fish were treated for 10 days with 8,000g/ton 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 also taken on both stocks of steelhead at NSFH. Parameter levels for leukocrit and serum protein were normal for the Hells Canyon stock. Mean hematocrit levels and serum protein for the Hells Canyon raceway sampled were 41.7% and 6.1% respectively (Burton 2008). Mean hematocrit levels and serum protein for the Pahsimeroi raceway sampled were 38.74% and 6.44% respectively (Burton 2008). The condition of fish from both Hells Canyon and Pahsimeroi stocks at liberation was good.

Furunculosis, IHN, IPN, and ERM were not isolated at this facility during the 2007 brood year. A continuing aggressive disease management program at this facility has been effective in controlling mortality due to these etiological agents. As NSFH continues to follow strict fish culture practices a reduction in losses due to infectious agents 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 will continue current vaccination protocol or resume 100% vaccination.

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. Steelhead were adipose-fin clipped at NSFH between August 27 and September 12, 2007.

Brood year 2007 steelhead were implanted with CWTs from August 27 to August 31, 2007. A total of 161,587 steelhead received CWTs (63,333 Hells Canyon stock, and 98,254 Pahsimeroi stock). Each tag group was held in an individual 100-ft raceway section so that separate mortality information could be gathered. The fish with CWTs (Hells Canyon and Pahsimeroi stock) that were destined for the Little Salmon River were again 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 was shipped approximately a month later than the Hells Canyon stock fish. This continued 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. The first fish that could be evaluated were the returning adults in 2006.

A total of 154,985 CWT-tagged fish were released at three release sites (Appendix 10). A total of 30,561 CWT-tagged fish were released in the Snake River at Hells Canyon Dam from March 28 through March 31, 2008, while 64,335 CWT-tagged fish were released at the Pahsimeroi weir (Pahsimeroi River) between April 11 and April 16, 2008. Both Hells Canyon and Pahsimeroi stock were released in the Little Salmon River off of the Pinehurst Bridge for the 2007 brood year. A total of 29,647 CWT-tagged Hells Canyon stock were released in the Little Salmon River between April 7, and April 9. The Pahsimeroi stock was released in the Little Salmon River on April 9, 2008 and totaled 30,442 CWT- tagged fish.

In addition to the CWT-tagged fish, 1,195 fish were tagged with PIT tags on February 26, 2008 (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 one mortality of PIT-tagged fish occurred after the tagging was completed and prior to release. Consequently, a total of 1,194 PIT-tagged fish were released from NSFH for the 2007 brood year. Of these, a total of 300 PIT-tagged fish were released below Hells Canyon Dam (Hells Canyon stock), while 298 PIT-tagged fish (Hells Canyon stock) and 301 (Pahsimeroi stock) were released in the Little Salmon River off the Pinehurst Bridge. In addition, 295 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 (Appendix 14).

Approximately 36% of the eggs shipped to NSFH from early spawning adults (3/31-4/10) were utilized for smolt production destined for the Pahsimeroi River, while 0.9% of eggs from the middle of the spawn (4/11-4/24) and 63.1% of eggs from late spawning fish (4/25-5/14) were utilized for smolt production at the Pahsimeroi River. At Oxbow Hatchery, 28.4% of early spawning fish (3/12-4/10) were utilized for smolt production back to Hells Canyon Dam, while 53.7% of the middle of the spawn (4/11-4/24) and 17.9% of eggs from late spawning fish (4/25-4/30) were utilized. Six lots of fish were spawned and retained for NSFH at Oxbow Hatchery

during March, while only two lots from March were retained for NSFH at the Pahsimeroi Hatchery. Since fish from Oxbow Hatchery are the first to be stocked in the spring, it isn't as critical to move their spawn timing date to a later time to reduce the number of days on feed.

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. 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 improvement projects were completed this past year. IPC entered a cost-share agreement with State Parks and Clear Springs Feed Company to apply a Dust-Gard solution again this year to the main spring road to minimize dust and reduce road "washboards". A rule variance was applied for and received from the Idaho Dept. of Building Safety to install new catwalks on the raceway walls to improve employee safety by greatly reducing the risk of falls. The birdnetting was repaired several times. The interior of residence one was painted and all interior carpets were professionally cleaned. A new dishwasher was purchased for residence three. A new satellite system was purchased from HughesNet for faster internet service. A new Polaris 4x4 was purchased through the fleet system for quick trips around the hatchery. The fry-hauling trailer was painted, along with the park picnic tables and the chiller baffle plates. New air lines were purchased and installed to replace one-third of the old air lines in the raceways. New damboards were purchased to eliminate the 50-foot quiescent zones and improve effluent water quality. The consent order with the Department of Environmental Quality was terminated after 14 years of data collection by hatchery employees.

IPC shop personnel repaired the bridge feeder electrical problems and tightened the bridge cable reel, in addition to routine bridge maintenance work. They also installed a new water-cooling system for the blower motors and replaced over 100 feet of broken intake water line. They also repaired a broken water line around the west settling basin.

Several landscaping projects were also completed this past year. All trees along the entrance and spring roads were trimmed for better visibility. Numerous live elm trees were professionally removed around the intake to reduce the leaves and seeds that plug our raceway intake screens. Numerous sprinkler heads were replaced for better lawn coverage. Redwood stain was applied to all the parking barrier logs in the park, and the yellow bollards around the property were repainted. Soil-pep was added around all the trees and bushes on the property, and wildflowers were planted on the border with Rimview Trout Company. Grass and flowers were replanted in many areas. Weeds were sprayed in the spring and fall, and fertilizer was

applied to all the grounds and park in the spring. New trees were sprayed to prevent coddling moth infestations.

Hatchery personnel hosted numerous school tours in addition to private tours requested by visitors. Hatchery personnel also mentored two students from Magic Valley Alternative High School and one student from the College of Southern Idaho. Personnel held fishing clinics for the Idaho School of the Deaf and Blind and the Twin Falls Bridge Academy. A television segment about outgoing smolts was filmed at the hatchery and aired locally. Hatchery personnel endured a lengthy EPA inspection with folks from the Seattle EPA office, and gave tours to dignitaries from Colorado, Wyoming, Utah, Montana, Washington, Oregon and Idaho.

Needed Improvements

Early Rearing and Incubation

A new nursery facility 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. This building would protect fry from bird predation, reduce loading densities in vats, and provide them with shade from the sun.

Final Rearing

Concrete repair work needs to be completed at 300' on all the raceways, with additional repairs on some raceway walls. Stainless steel keyways should be installed to replace the severely rusted steel keyways in the raceways. The birdnetting will have to be replaced in the near future because it requires more maintenance and is starting to deteriorate. The large bridge needs to be professionally sandblasted and painted, and a diesel-powered compressor needs to be purchased so hatchery personnel don't have to borrow the IPC shop compressor or rent one once per month. A new water chiller will be needed sometime. The existing chiller is badly rusted and could break at any time.

Adipose fin clipping equipment needed includes a hydraulic pump unit and 4-inch pump with associated intake basket, and 200-feet of 4-inch flexible line with cam locks on both ends.

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. Trash racks should also be installed at the entrance to the discharge canal to Rimview Hatchery and in front of the two intake pipes to the settling basins.

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

An intake-traveling screen is badly 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 the 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. A three-stall garage for the trucks and mowers would be beneficial to protect these items from vandalism and weather.

Sliding glass doors should be installed in the living rooms of the three wood frame houses to allow another access to the outside for fire safety. Bathroom remodeling in all the wood-frame houses is needed.

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 November 2007 to May 2008.

Month	Hatchery Inflow	Flow to Rimview	Discharge Flow to Niagara Springs Crk.
November	70 cfs	0 cfs	70 cfs
December	90 cfs	22 cfs	68cfs
January	100 cfs	38 cfs	62 cfs
February	110 cfs	50 cfs	60 cfs
March	120 cfs	67 cfs	53 cfs
April	48 cfs	0 cfs	48 cfs
May	0 cfs	0 cfs	0 cfs

Appendix 5. NSFH brood year 2007 feed usage.

Manufacturer	Type and Size	Dates Received	Total Pounds Received	Total Pounds Used	Total Feed cost (\$)
Rangen	Trout and Salmon Starter #0	6/04/07	1,250	1,250	\$791.69
Rangen	Aquaflor Medicated Feed #0	7/10/07	200	200	\$214.12
Rangen	Trout and Salmon Starter #1	6/04/07	2,250	2,250	\$1,425.05
Rangen	TM Medicated Feed 4000g #1	7/19-7/24/07	100	100	\$72.36
Rangen	Trout and Salmon Starter #2	7/09-8/15/08	4,150	4,150	\$2,818.02
Rangen	TM Medicated Feed 4000g #2	7/13/07	100	100	\$69.70
Rangen	Trout and Salmon Starter #3	7/23-10/02/07	10,950	10,950	\$7,718.67
Rangen	Bulk 470 exsl. 2.0mm slow-sink	8/30-11/30/07	81,920	81,920	\$41,056.23
Rangen	Bulk 470 exsl. 3/32 slow-sink	12/07-12/31/08	67,780	67,780	\$34,019.47
Rangen	Bulk 470 exsl. 1/8 slow-sink	1/09-4/14/08	178,880	178,605	\$92,118.60
Rangen	Sack Medicated feed TM (8000g) 1/8 pellet	2/06-3/27/08	32,700	32,700	\$20,636.01
Rangen	Credit "exsl" bulk / sack	5/07/08	-275		-\$142.10
Rangen	Fines credit "exsl" Bulk	11/19-5/07/08	-490	-490	-\$85.27
Grand Total			379,515	379,515	\$209,712.50

Appendix 6. NSFH brood year 2007 steelhead smolt distribution.

Destination	Stock	Weight	Dates	Number Per Pound	Number Released
Hells Canyon (Snake R.)	H.C.	110,000	3/24-4/02	4.89	537,371
Pinehurst Bridge (Little Salmon R.)	H.C.	59,450	4/02-4/09	4.59	272,907
Pahsimeroi (Pahsimeroi R.)	Pah.	194,750	4/10-4/29	4.27	830,894
Pinehurst Bridge (Little Salmon R.)	Pah.	12,600	4/5-4/7, 4/26-4/27	3.87	48,700
Total		376,800		4.48	1,689,872

Appendix 7. NSFH production costs for brood year 2007.

Number of Fish	Lbs of Feed	Cost of Feed	Pounds of Fish	Feed Conversion	Total Cost	Cost per 1,000	Cost per Pound
1,689,872	379,515	\$209,712.50	376,800	1.007	\$1,115,654.30	\$660.20	\$2.96

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

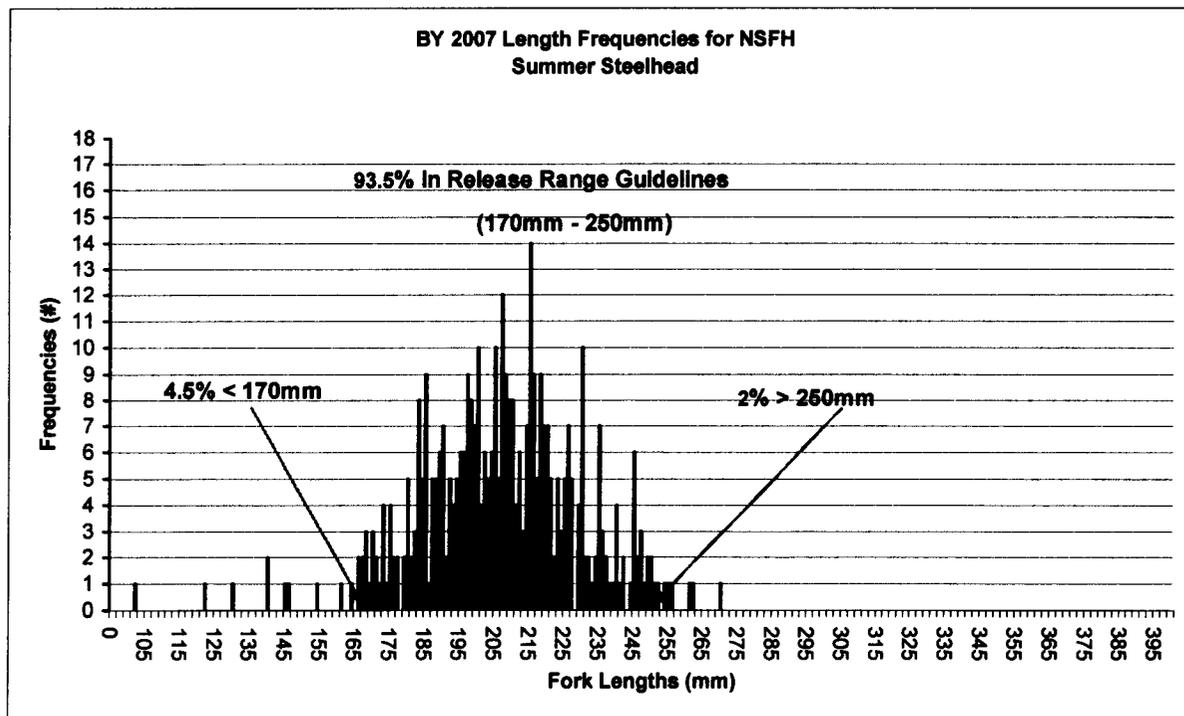
Appendix 8. Fin lengths of NSFH steelhead; March 2008.

Raceway	Fork Length	Right Pectoral	Left Pectoral	Dorsal	Ave. Fin Length	Fin Quality Index	Wild Fin Quality Index	Percent of Wild FQI
4	192.8	18.5	20.7	11.5	16.9	.088	0.1185	74%
8	209.3	19.4	19.5	10.8	16.5	.079	0.1185	67%
9	206.7	21.5	19.4	10.7	17.2	.083	0.1185	70%
12	210.5	18.9	17.8	13.1	16.6	.079	0.1185	66%
Average	204.8	19.8	19.3	11.5	16.8	.082	0.1185	69.2%

Appendix 9. Fork length frequencies at release for four Coded Wire-tagged raceways;
March 2008.

Raceway #	H.C. 4	H.C. 8	Pah. 9	Pah. 12
Sample Size	100	100	100	100
Ave. Frk. Length	193.96	206.05	217.22	207.88
Lower Range (mm)	100.00	140.00	140	148.00
Upper Range (mm)	242.00	249.00	270	265.00

	(mm)	(Inches)
Hells Canyon Average Length	200	7.87
Pahsimeroi Average Length	212.55	8.37
Overall Average Length	206.3	8.12



Appendix 10. CWT summary for brood year 2007 steelhead at NSFH.

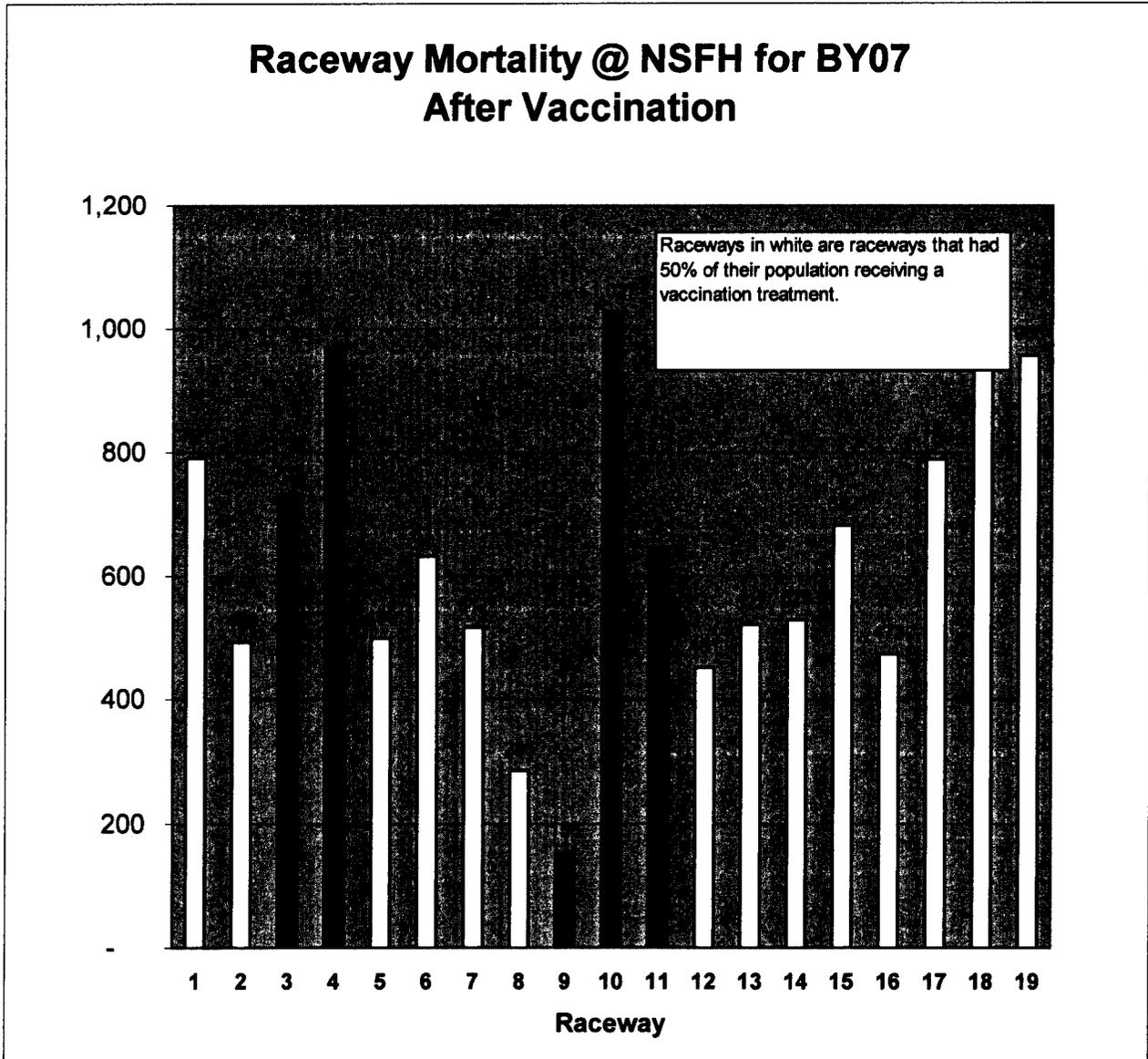
Raceway	Release Site	CWT Number	Number Tag	Mortality to Release	Number Shed	CWT Number Released	Untagged	Total Tagged Group Release	Total Site Release
Snake River									
4	Hells Canyon Dam	10-36-81	32,202	353	1,288	30,561	75,519	30,561	
Total			32,202	353	1,288	30,561	75,519	30,561	537,371
Salmon River									
8	Little Salmon River	10-37-81	31,131	136	1,348	29,647	44,263	29,647	
Total			31,131	136	1,348	29,647	44,263	29,647	272,907
Pahsimeroi River									
11	Pahsimeroi Trap	10-08-81	27,058	280	449	26,329	64,130	26,329	
12	Pahsimeroi Trap	10-08-81	38,878	227	645	38,006	60,502	38,006	
Total			65,936	507	1,094	64,335	124,632	64,335	830,894
Salmon River									
9	Little Salmon River	10-26-81	32,318	163	1,713	30,442	1,713	30,442	
Total			32,318	163	1,713	30,442	1,713	30,442	48,700

Total CWT Release: 154,985
Total Site Releases: 1,689,872
Total Smolt Releases: 1,689,872

Appendix 11. PIT tag summary for brood year 2007 steelhead at NSFH.

Raceway	Release Site	Number Tagged	Number Released	Mortality
4	Hells Canyon Dam Snake River	300	300	0
8	Hazard Creek Little Salmon River	298	298	0
9	Hazard Creek Little Salmon River	301	301	0
12	Pahsimeroi Weir Pahsimeroi River	296	295	1
Totals		1,195	1,194	1

Appendix 12. Comparison of mortality in vaccinated and non-vaccinated raceways at NSFH for brood year 2007.



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	166,840	352,990	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	1,578,303	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	1,268,025	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	408,800	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	858,000	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
	Wallowa	812,000	812,000	394,936	48.64	0		417,064	417,064	72,786			5.73
1992-93	1,131,951	1,013,848	2,145,797				761,800	353,600		235,075			
1992-93	Babington		<u>*Babington</u>	<u>Release</u>	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	157,800	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	680,651	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
2004-05	1,133,186	924,927	2,058,113	353,035	17.15	0	1,179,054	526,024	1,705,078	369,600	368,040	0.99	4.61
2005-06	1,129,690	891,760	2,021,450	208,576	10.32	0	1,282,416	520,458	1,812,874	402,306	364,435	0.95	4.51
2006-07	1,211,622	916,380	2,128,002	263,248	12.37	0	1,337,054	527,700	1,864,754	384,850	372,470	0.97	4.85
2007-08	1,108,682	913,973	2,022,655	332,783	16.46	0	1,152,501	537,371	1,689,872	376,800	379,638	1.01	4.48

Appendix 14. Oxbow and Pahsimeroi stock spawn timing manipulations at NSFH for brood year 2007.

Hells Canyon Stock Eggs Used for Production Purposes				Pahsimeroi Stock Eggs Used for Production Purposes			
Lot Number	Spawn Date	Percent of Eggs Available Utilized for Smolt Production	Percent of Total Smolts Utilized for Production Back to Rack	Lot Number	Spawn Date	Percent of Eggs Available Utilized for Smolt Production	Percent of Total Smolts Utilized for Production Back to Rack
1	03/12/07	23%	1.7%	1	03/26/07	0%	0.0%
2	03/15/07	46%	1.7%	2	03/29/07	11%	7.5%
3	03/19/07	61%	5.6%	3	04/02/07	0%	0.0%
4	03/22/07	68%	6.0%	4	04/03/07	0%	0.0%
5	03/26/07	70%	11.7%	5	04/05/07	13%	6.5%
6	03/29/07	14%	1.7%	6	04/09/07	71%	22.0%
7	04/02/07	50%	0.0%	7	04/10/07	0%	0.0%
8	04/05/07	0%	0.0%	8	04/12/07	8%	0.7%
9	04/09/07	0%	0.0%	9	04/16/07	12%	0.2%
10	04/12/07	42%	18.4%	10	04/17/07	0%	0.0%
11	04/16/07	68%	17.7%	11	04/23/07	17%	0.0%
12	04/19/07	39%	8.8%	12	04/24/07	0%	0.0%
13	04/23/07	41%	8.8%	13	04/30/07	10%	0.6%
14	04/26/07	41%	8.8%	14	05/03/07	29%	3.1%
15	04/30/07	65%	9.1%	15	05/07/07	69%	19.0%
				16	05/10/07	76%	20.6%
				17	05/14/07	89%	19.8%

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