ANNUAL REPORT

FISCAL YEAR 1994

DWORSHAK NATIONAL FISH HATCHERY

AHSAHKA, IDAHO

Wayne H Olson 12/9/94

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TABLE OF CONTENTS

PAGE

INTRODUCTION 1

PROGRAM HIGHLIGHTS 4
Photos 10

FISH CULTURE OPERATIONS 14
Steelhead Production 14
Brood Year 1993 14
Brood Year 1994 23

Spring Chinook Salmon Production 29
Brood Year 1992 29
Brood Year 1993 34
Brood Year 1994 38

Rainbow Trout Production 40

Hatchery Production Summary (Form 3-229) 42

Fish and Egg Distribution Summary (Form -3-2026) 43

Photos 46

REPAIRS/IMPROVEMENTS/NEW EQUIPMENT 52
Photos 55

MEETINGS/TRAVEL/TRAINING 66

STAFFING/ACTIVITIES 69

PUBLIC OUTREACH 74
Photos 76

COOPERATIVE PROGRAMS 84

INTRODUCTION

Unexpected visitors??

Dworshak National Fish Hatchery (DNFH) is located in north central Idaho downriver from Dworshak Dam, at the confluence of the North Fork and the main stem Clearwater River. Dworshak Dam was constructed by the Corps of Engineers (COE) in 1966-70. Operation of the hatchery by the Fish and Wildlife Service (FWS) was authorized by a 1969 COE Memorandum of Understanding. The hatchery has since served primarily as a mitigation hatchery for steelhead trout (*Oncorhynchus mykiss*); a unique run of the North Fork "B" strain threatened by the construction of Dworshak Dam. The FWS has endeavored over the past 25+ years to meet the "mitigation goal" of providing 20,000 adult steelhead to the Clearwater River and maintain the unique genetics of the stock.

DNFH consists of a complete up-to-date mechanical, electrical, water reuse and reconditioning system employing filtration, sterilization, biological nitrification, pollution control and monitoring facilities, alarm system, water chillers, heaters, and numerous pumps. Initial construction at DNFH included 84 Burrows ponds, 64 nursery tanks, and 9 adult holding ponds. Twenty-five Burrows ponds (System I) were operated on a heated recycled water flow, for rearing steelhead smolts to the required size of 180 mm in only one year. In 1973, System II (25 ponds) and System III (34 ponds) were converted from single-pass, 2-year rearing cycle, to water reuse and heating for accelerated production growth. This second phase construction, with added mechanical systems (biological filters, electric grid, sand filters, U.V. lamps, chillers, and boilers), increased production capacity and allowed all three water systems to be environmentally controlled.

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During the mid-1970's, with DNFH not meeting production goals nor meeting mitigation goals, major operational changes were made. Review and studies of the reuse systems, water temperature regime, water quality, and fish culture techniques were done by hatchery staff and university scientists. Corrective measures followed which removed the computerized pneumatic feed system, eliminated the ultra violet treatment of water reuse, redesigned the water flows to maximize single-pass use and a return to a more hands on basic fish culture. Selecting cooler water temperatures from Dworshak Reservoir during the summer, adding minerals (sodium chloride and potassium chloride) to a soft water supply, removing supersaturated nitrogen gas, along with other designed mechanical changes, and more involvement of hatchery staff in monitoring fish culture, all contributed positively towards improving the hatchery's program.

Column degassers, using "Koch" rings as a diffuser, were designed and tested and placed in operation for aeration and for protection from high nitrogen gas. The Dworshak hatching jar was developed for the nursery tanks for incubating eggs and allowing fry to swim directly to the tanks. Excellent results on trials of demand feeders warranted placing all steelhead production ponds on these types of feeders. DNFH personnel developed the concept of using overhead wire to support a net enclosure of nearly 130,000 square feet of rearing area from bird predation.

Further construction in the 1980's added 18,000 square feet of nursery building, doubling the number of inside rearing tanks to 128. A new concept of biological filtration, known as a fluidized sand filter, replaced the oyster shell media in System I. An additional thirty 8' x 80' raceways were constructed under the Lower Snake River Compensation Plan (LSRCP) to provide production facilities for spring chinook salmon (*Oncorhynchus tshawytscha*).

The uniqueness of DNFH's water systems provides several options for egg incubation and rearing. Three temperature schematics are available for egg development through the incubators. Three different temperature regimes are also available to the nursery tanks with ozone treated water to 32 of the 128 inside tanks. The outside steelhead ponds are furnished single-pass river water from May through November when desired temperatures can be obtained through selector gates at Dworshak Dam. A pump station on the North Fork, one mile downriver from the Dam, is capable of providing 75,000 gpm of water. Water reuse, used extensively during the colder months of December until fish are released in the spring, is made up from 10 percent new water to allow heating for desired fish growth. Each of the three outside ponding systems is independent of each other for temperatures when reuse and heated water are available. Beginning in 1992, the hatchery was supplied with an additional 6400 gpm of gravity flow Dworshak Reservoir water directly by pipeline. This "clean" water furnishing egg incubators and nursery rearing has afforded disease protection from Infectious Hematopoietic Necrosis (IHN) virus in the early production stages.

The Kooskia hatchery, 35 miles upriver from Dworshak on the Clearwater River, has operated as a Complex with Dworshak since 1978 to restore the spring chinook fishery in the Clearwater. The administrative headquarters for the Dworshak-Kooskia Complex is located at the Dworshak hatchery. The Dworshak Fish Health Center and the Idaho Fishery Resource Office are co-located at the Dworshak station.

The Dworshak hatchery has capacity for producing 2.3 million steelhead smolts; 1.4 million yearling chinook salmon smolts; and 200,000 sub-catchable rainbow trout for stocking Dworshak Reservoir. The hatchery's annual production capacity exceeds 550,000 pounds. Mitigation adult fish goals to the Clearwater River are 20,000 returning steelhead and 9,000 spring chinook. Steelhead goals are being satisfied, however, spring chinook returns continue to remain well below mitigation levels.

This report covers the period of hatchery activities from October 1, 1993 to September 30, 1994.

PROGRAM HIGHLIGHTS

Dworshak's Fiscal Year (FY) 1994 total funding package from the Corps of Engineers (COE), including overhead costs, was $1,690,900. This amount was later reduced $70,000 from savings identified through the remaining year. Revisions were noted in salaries, utilities, fish food, minerals, fin clipping, and equipment. These revisions resulted in nearly a $54,000 cut in operating dollars. This amount, along with added administrative overhead costs of $16,000, provided the COE District the necessary funds towards completing a major electrical rehab project at Dworshak. Operating funds, not including support costs, were $1,248,000 (1935 account). Another $9,500 was received from quarters rental reimbursements (8610 account) for a total of $1,257,500 from funding. Included in this figure was $50,000 budgeted to the Dworshak Fish Health Center (FHC) for their assistance and $50,000 to Idaho Fishery Resource Office (FRO) for continuation of their monitoring evaluation of Dworshak's steelhead smolt production.

The Lower Snake River Compensation Plan (LSRCP) provided $407,000 (4710 account) for production of spring chinook salmon. The Youth Conservation Corps (YCC), an eight-week summer work program, was also covered by LSRCP at a cost of $11,500 for salaries of six enrollees and one crew leader.

The hatchery received $33,000 in transfer costs from Idaho FRO for assistance on a Stewardship Project, "Interactions of hatchery and wild steelhead in the Clearwater River of Idaho." Two (2) temporary bio-aid positions were funded over a six-month period of study.

Total hatchery operation and maintenance (O&M) funding, excluding $100,000 for FHC and FRO assistance was $1.6 million. Salaries and benefits accounted for 54 percent.

Fish marking costs included $49,000 to ad-clip 2.4 million steelhead. Marking of spring chinook cost $28,000 for coded-wire tagging and $62,700 for adipose fin clipping.

Major costs were also distributed between eight cyclical projects ($32,300), purchase of new or replacement equipment ($78,900) and providing the COE reimbursement ($13,200) to Clearwater Power Company for new electrical line service to the hatchery.

Full-time staff years employed were 21.2; permanent employees 19.8 and temporaries 1.4 years. Thirty-seven (37) employees were represented in the staffing during the year. This number included YCC program participants and Older Worker Program employment.

Overall feed conversion was 1.62 (less than 2 pounds of food to produce 1 pound of fish gain); spring chinook 1.63, steelhead 1.63 and rainbow trout 1.21. Total feed cost per pound of fish produced was $0.56; chinook $0.81, steelhead $0.48 and rainbow trout $0.50. Costs remained comparable to recent years.

Production gain for steelhead was 278,223 pounds for the year (10/01/93 - 9/30/94) compared to last year's 332,705 pounds. IHN virus disease, followed later by ICH, caused devastating losses

in System II when operating on reuse. These losses resulted in fewer numbers of smolts in Spring 1994. Dworshak released 1,823,877 steelhead, weighing 280,327 pounds (193 mm), both off site and directly from the hatchery. This number compares to nearly 2.4 million the previous year.

Spring chinook production gain of 88,054 pounds was significantly higher than last year's 40,162 pounds. The program was at full capacity providing 1,302,687 smolts, weighing 75,386 pounds (147 mm), in April-May 1994.

Broodyear 1993 spring chinook spawning, completed September 1993, resulted in the hatchery carrying 1.4 million fish through 1994 in excellent health condition. The hatchery anticipates another good year of quality fish production assuming similar conditions continue through release in Spring 1995.

Broodyear 1994 steelhead spawning, completed in early May 1994, provided the hatchery with over 2.6 million fingerlings on station September 30, 1994. Projected smolt release in Spring 1995 is 2.3 million.

The hatchery was holding 1,437,803 spring chinook fingerlings (Broodyear 1993) at the end of the reporting year. A total of 1.4 million smolts are anticipated to be on hand for release in Spring 1995.

Broodyear 1993's steelhead program was planned with a very positive approach towards managing around IHN. Fish were exposed to the outside "contaminated" river supply at a later ponding date based upon the success of Brood Year 1992's program. At some time, however, the young steelhead must be moved from the cleaner inside reservoir water to the outside river supply due to increased space requirements. Again, Dworshak will continue to re-examine the entire production scenario and determine where new changes are possible to lessen the effects of IHN. Any changes in an effort to reduce stress related occurrences could be in temperatures, timing of marking programs, diets, feed size break overs, balancing reservoir water with river, tanking and ponding strategies, and reuse application.

The 1993 program escaped early IHN detection through nursery rearing and remained free of the virus until first noticed in October, a period of eight months. This year's ponding strategy maximized use of the cleaner reservoir water supply. The young steelhead were in the nursery tank for a longer period of time reaching a size of 75 fish per pound before transferring to the outside ponds on river water. No outbreaks from IHN were reported for the second year since the reservoir supply was available. It was then unusual to find high mortality in the systems later in the year. Holding fish longer on reservoir water, moving to outside ponds at a larger size (75 per pound versus 250); and ponding later on river water had appeared to only postpone the virus outbreak.

System II steelhead production took heavy losses in December 1993 and January 1994 from a combination of IHN and ICH. Losses through mid-January totaled 471,000 from an initial ponding of 840,000. The system was turned over to single pass from reuse in January and temperatures reduced from 54°F to 41°F in an effort to flush the ponds. Formalin treatments

were administered, however, mortality continued at a high rate with no evidence that treating and operating on single pass water improved conditions. The 25 pond system returned to heated reuse and the entire system treated during a 24 hour period with 35 ppm formalin. Several treatments over 2-3 weeks proved highly successful in eliminating the Ich parasite. System I and System III experienced few health problems. Dworshak's steelhead smolt release was reduced in Spring 1994 by 500,000 fish as the result of System II losses.

A contract for a 2500 gallon capacity fish distribution tank was completed and delivery made in February 1994. The truck, itself, was received in February 1991 with a tank to be constructed and mounted soon after. Award defaults and unexpected contract extensions caused delays and resulted in delivery three years later.

Pat Masterson, Regional Contracting Office (CGS), completed an Acquisition Management follow-up review at Dworshak on April 5-6. A previous review completed one year ago, identified several administrative changes to bring the station in full compliance to the rules and regulation of purchasing. Her findings were noted: "Station personnel are to be commended for the prompt and thorough way in which they corrected and modified procedures."

A scheduled annual power outage was completed at Dworshak on May 18 by Clearwater Power Company. This outage involved the hatchery switching from commercial power to standby generation to allow servicing of the substation. In the process of changing back to commercial power, an explosion followed by fire occurred in Boiler No. 2. Major damage took place resulting in a considerable expense to the Company. The boiler is expected to be in operation by November 1994.

The present flow scenario for drawing water from Dworshak Reservoir includes increased discharges beginning in late April and continuing 2-3 months. This was the second season for these flows which often included periodic spilling over Dworshak Dam when turbine capacity was exceeded. Colder water is drawn through the reservoir pipeline supplying water to the inside nursery tanks during spilling. The lower temperatures reduces growth of the young steelhead located in tanks. A minimum flow of 1300 cfs had been maintained through Dworshak Dam from August 13, 1993 until April 29, 1994. Flows were increased to 20,000 cfs with spilling for one week, reduced to no spill for a week, and back again to spilling on May 13. The on-again/off-again increased cooler flows over the next 10 weeks would result in an earlier projected steelhead smolt release size of 200 mm being reduced to 188 mm.

Increased flows from Dworshak Reservoir caused other problems. The debris barrier at the main river water intake broke loose, nitrogen gas levels increased, and dead kokanee were found outside the intake. The 110' drawdown prevents further flow increases for the early fall returning steelhead and may have an adverse effect on next year's flushing of migrating smolts if continued drought periods exist.

Reservoir water directly from Dworshak Dam has been available to Dworshak's incubators and nursery tanks since the pipeline installation was completed in November 1991. In previous years the inside production facilities were furnished water pumped directly from the river. It was this

water that was apparent cause for the high losses to IHN in steelhead since first discovered in 1982. The reservoir water, on the other hand, performed with remarkable success towards reducing IHN in the early rearing stages of steelhead. Until confirmed in two nursery tanks of young steelhead in June 1994, fish were protected for over three years from IHN while remaining on reservoir water. The virus had only been reported in the very first year on the new supply and only one tank of 25,000 early feeding steelhead was confirmed in March 1992 and immediately destroyed. Over 300 tankings had since been successfully reared in absence of the virus. The two tanks that broke in 1994 occurred within four days apart and losses remained low.

By September 30, 1994, Dworshak's IHN problems were confined to the two nursery tanks mentioned and to only 7 of 55 outside Burrows ponds. Losses were low, less than 1.5 percent, when considering the virus problem of past years.

Several changes in ponding were initiated this year which may prove beneficial in the future for minimizing IHN losses:

(1) Fish were held in the nursery to a larger size on heated water to allow full use of the "cleaner" reservoir supply.

(2) Production was moved to outside ponds earlier in anticipation of a longer acclimation period before marking and changing over to reuse.

(3) System I, without reuse capability, operates on single pass and in the past has out performed Systems II and III on reuse in reducing diseases. This system was ponded heavier, with this in mind, resulting in II and III having lighter loadings. Fish for System I were grown larger in the nursery to offset later colder rearing temperatures.

An amended budget was provided the Corps, Walla Walla District, for increased funding in FY 1996. This increase was necessary to assure funds are available to meet a 100,000 pound rainbow trout mitigation requirement for Dworshak Reservoir. Dialogue between IDFG and the Corps has continued over recent years to justify increasing resident fish production. To resolve this issue and provide the numbers requested by the State appears several years away. Dworshak's 10,000 pounds of rainbow production, due to disease concerns by IDFG, are presently being planted in other state waters with a trade for disease-free fish from elsewhere for planting Dworshak Reservoir.

Two major rehab projects, identified in the Corp's 1991 Reconnaissance Report of work proposals, were completed during the summer months by Dworshak's maintenance crew. These included: 1) Modification of System II filter beds for cleaning and transferring media, and 2) cutting and lowering six 30-inch pipelines and reducing in height 36 column degassers to relieve head pressure off six major pumps. The two projects, completed for $12,500, were originally estimated at $295,000. Revised design changes and station labor to perform the work resulted in a 96 percent savings from original cost estimates.

Another highly successful 4th annual Open House was held on June 18, 1994. The highlight, again, was a free fishing pond attracting 503 children to register and catch two rainbow trout each. Another 594 adults attended the popular activities in conjunction with National Fishing Week.

An eight-week Youth Conservation Corps (YCC) program ended on July 29. The program, staffed with six enrollees and one crew leader, performed numerous work projects with special attention to buildings and grounds maintenance. Dworshak has participated in the YCC program since 1982.

Broodyear 1994 spring chinook spawning, completed in mid-September 1994, provided 120,000 eggs for Dworshak and 355,000 for Kooskia. Only 126 females were available for spawning. The number of yearling smolts anticipated for release in Spring 1996, assuming an 85 percent green egg to smolt survival, forecasts to less than 20 percent of rearing capacity. Adult return numbers were the lowest in hatchery history. Next year's return also remains bleak when noting consistent poor ocean conditions and in-river passage problems continue to reduce fish numbers.

SNAKE AND COLUMBIA RIVERS

Steelhead spill hits the bends

■ Plan to speed steelhead smolts along ends up causing gas bubble disease

By Bill Loftus
of the Tribune

The National Marine Fisheries Service moved Friday to cut the amount of water spilling over Snake and Columbia River dams [illegible] fears the spill wa[illegible] helpi[illegible]

gressional briefing at Washington, D.C., to review the results of a monitoring program.

Smith, who is based at [illegible] a Thurs[illegible]

becomes supersaturated with dissolved gasses, mainly nitr[illegible] fishes' blood [illegible]

Snake River. Mor[illegible]

7-23-94

Orofino-area groups sue to stop releases

■ Suit says feds failed to fully consider economic costs, loss of kokanee fish

By Bill Loftus
of the Tribune

Orofino-based government and private groups and the Clearwater Power Co. at Lewiston have filed suit in federal court to stop water leases from nearby Dworshak R[illegible] The Clearwater County Co[illegible] Clearwater Soil and Water Conservation District, Orofino Chamber of Commerce and the Clearwater Coalition filed a petition asking for an emergency restraining order. The petition asks the National Marine Fisheries agency and U.S. Army Corps of Engineers to stop draining Dworshak Reservoir to flush young Nez Perce bas[illegible]

DWORSHAK

6/24/94

Reservoir levels could fall even farther, officials warn

■ 30 more feet won't make much difference, they say at meeting with a resentful public

By Bill Loftus
of the Tribune

OROFINO — The federal agencies that will decide Dworshak Reservoir's future came to town again Thursday evening with more bad news.

After warning Dworshak fans at a springtime visit their background could fall 20 [illegible] last year [illegible]

practor, interrupted Brown after he barely got started explaining his position. "Come on, that's enough. Let's stop the bullshit."

Brown's recitation of the news [illegible] faced by the fish [illegible] Dworshak, [illegible] ame[illegible]

NORTHWEST POWER PLANNING COUNCIL

Value of emergency spill is murky

6/9/94

■ Staff scientists say the effect on salmon will be difficult to measure

By Linda Ashton
of the Associated Press

SPOKANE — An emergency spill plan was put into effect to try to improve juvenile salmons runs on the Snake and Columbia Rivers this spring, but scientists said Wednesday it would [illegible] gauge [illegible]

The effectiveness of the spill will be difficult to measure for several reasons, [illegible] told the Northwest Power Planning Council at its meeting [illegible] By th[illegible] gan [illegible]

bubble disease, a potentially fatal ailment affecting fish not unlike "bends" that can sic[illegible]

speculating on the ... relationship between spill and fish [illegible]

Also [illegible]

Question: Is gain worth the pain?

Lewiston Tribune 7-30-94

■ Judge Lodge declines to issue temporary restraining order to immediately halt the drawdown

By Michael R. Wickline
of the Tribune

OROFINO — Jim Crouch of Orofino wonders whether drawing down Dworshak Reservoir actually helped flush young fall chinook [illegible]

"It is doing [illegible]

into Crouch's fishing and recreation season. This week is the first time he has been on the reservoir this month.

"We could live with a 30-foot drop," said Doug Donner, manager of the Glenwood IGA grocery store in O[illegible] The [illegible]

Tom Miller of the corps Walla Walla district.

The corps also agreed to take 12 more hours than originally planned to get down to the minimum discharge [illegible] after Sunday [illegible]

ronmental Quality (DEQ) concluded the corps violated state water quality standards by exceeding dissolved [illegible] limits during this [illegible] of the [illegible]

LEWISTON MORNING TRIBUNE

Wednesday, July 6, 1994

NORTHWEST

OBITUARIES
PAGE 7A

RECREATION VS. SALMON

Dworshak drawdown is under way

■ Popular reservoir is expected to be 110 feet below full by end of July

By Bill Loftus
of the Tribune

Dworshak Reservoir fans already queasy about what the future might hold got another dose of that sinking feeling Tuesday.

The U.S. Army Corps of Engineers announced that the reservoir level will begin dropping today as more water is released to help flush young salmon downstream.

The flow of water from Dworshak Dam will jump from 1,300 [illegible] per second to [illegible] morning [illegible] the [illegible]

By Friday, the flow from Dworshak is expected to double again to 20,000 cfs, said Russell George, Reservoir Control Center chief at Portland, Ore.

The reservoir level, now about 31 feet below full, is expected to drop nearly 80 additional feet by the end of the month, George said.

When the Dworshak [illegible] 20,000 cfs, the [illegible] River [illegible]

ness owners and those who like to boat and camp along the reservoir.

Sens. Dirk Kempthorne and Larry Craig, both R-Idaho, also [illegible] against the confirmation [illegible] Dworshak would [illegible] water th[illegible]

flush migrating spring and chinook, the Dwor[illegible] paused in m[illegible] water [illegible]

Kokanee victims of spill

■ Full impact on the fish may not be visible until next year

By Bill Loftus
of the Tribune

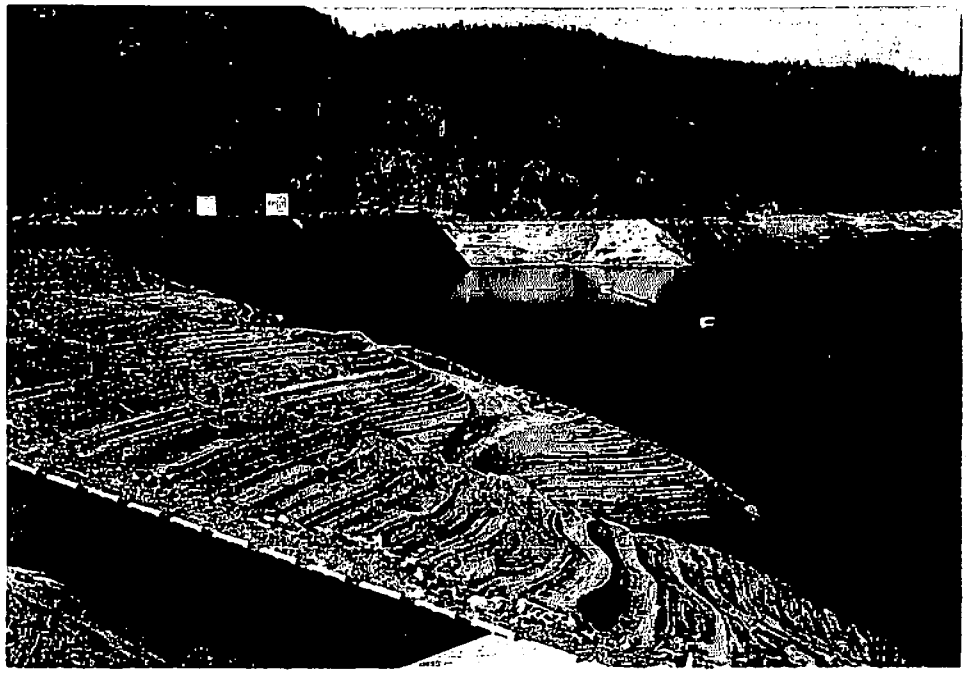
PECK — Dworshak Reservoir fans already in a froth that spilling water this summer to help migrating salmon is draining their [illegible] for the summer recreation season have a [illegible] of water spilling [illegible] through its [illegible]

on down the Clearwater, Snake and Columbia Rivers.

Dworshak along the Clearwater River's North Fork is the largest federally operated reservoir that can supply the water, according to federal officials.

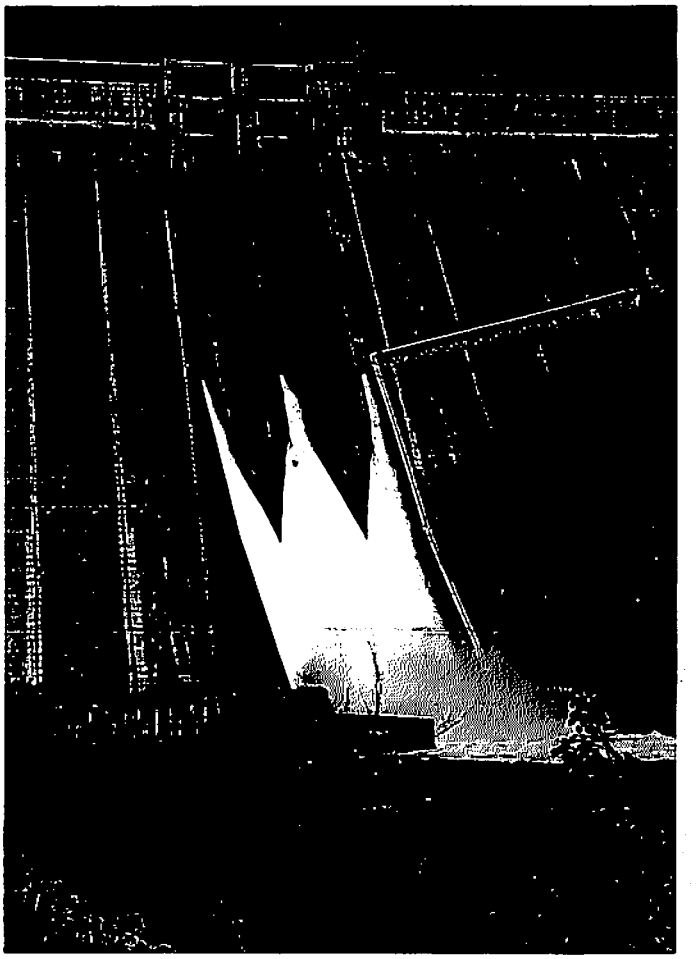
"The word up here is NMFS has a new mot[illegible] to," Bailey said. "We spill 'em and kill 'em."

One avid fisherman counted more than 130 silvery kokanee floating in eddies near Ahsahka last Friday shortly after the large-scale spill [illegible] hour of watching from the Ahsa[illegible] [illegible] to 75 kokanee float[illegible]

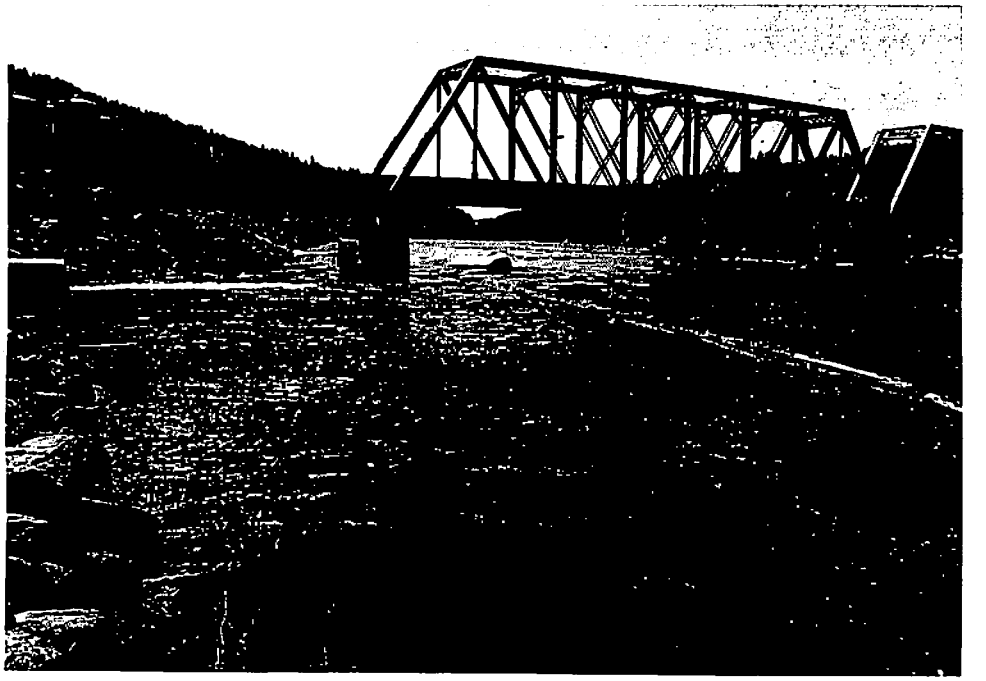


Dworshak Reservoir drawdown 110 feet - August 1994

Dworshak Reservoir drawdown at 1490' elevation (full pool 1600').

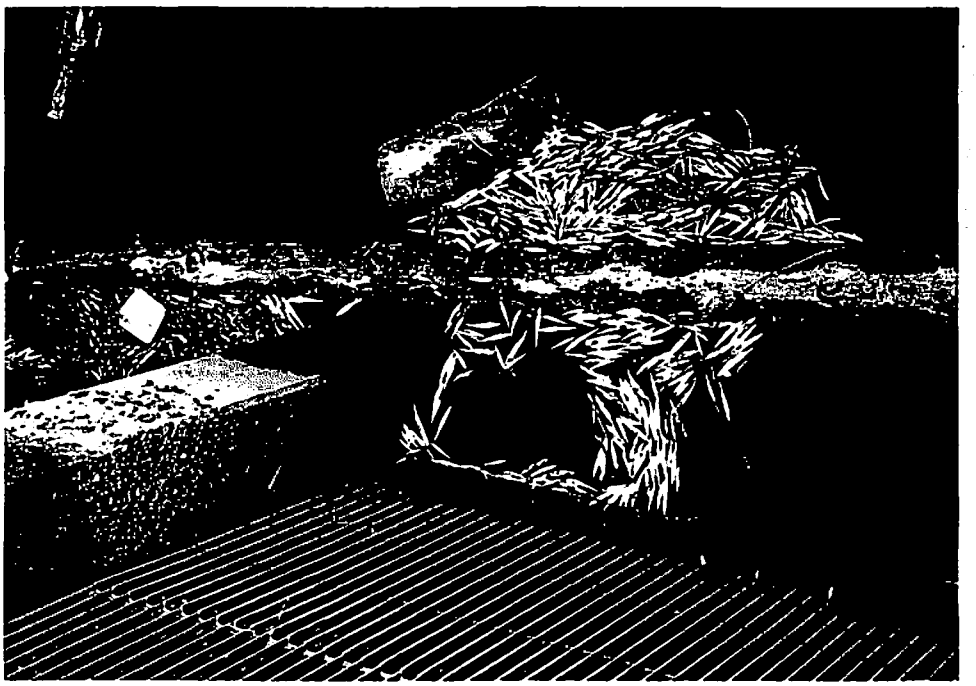


Spilling at 25,000 cfs thru Dworshak Dam - June 1994



High river flows in the N.F. Clearwater when spilling 25,000 cfs - July 1994

Dworshak Reservoir spill causes debris barrier at river intake structure to break loose.

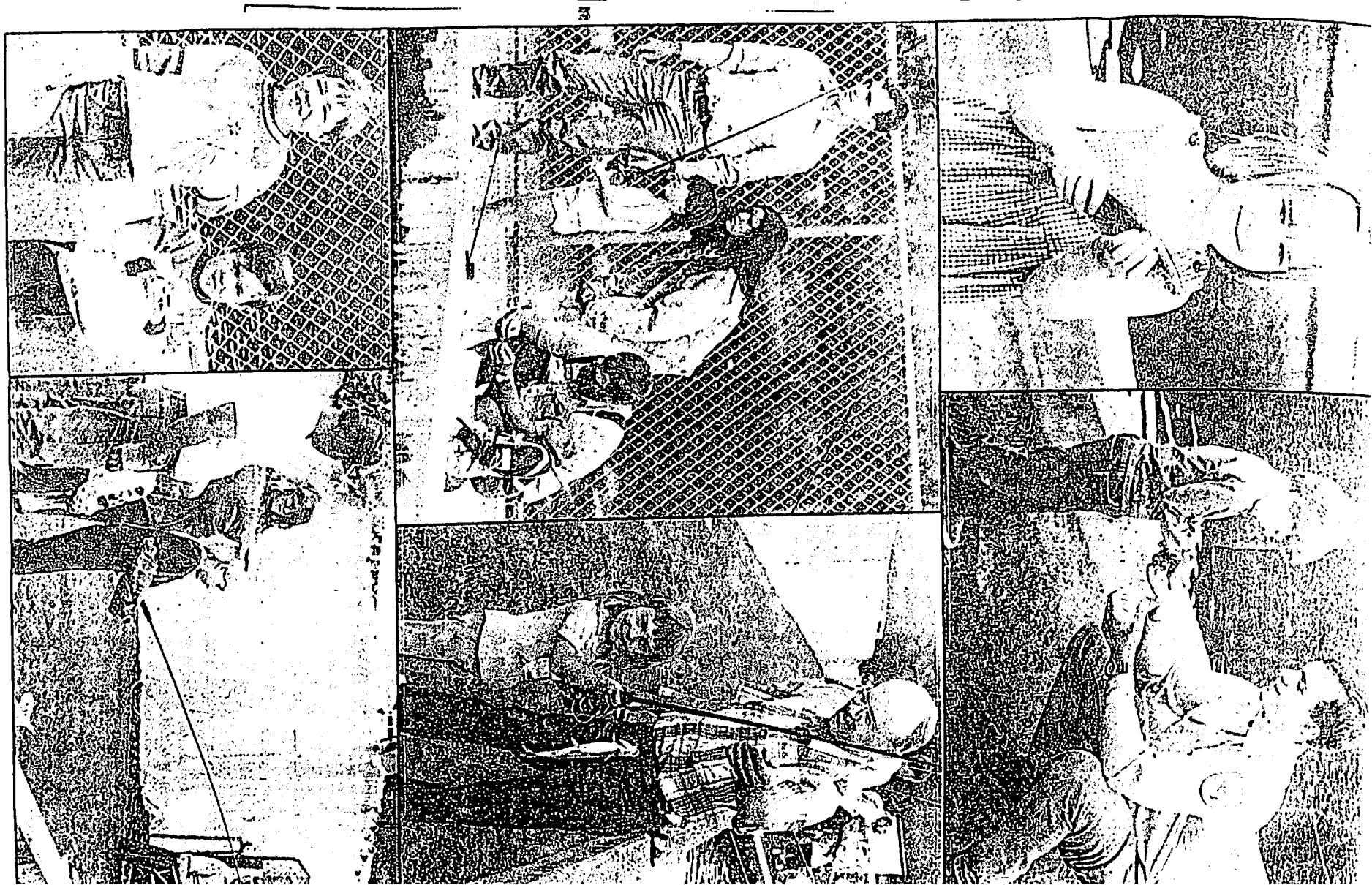


Dead kokanee at Dworshak's river intake caused from Reservoir spilling, May-July 1994

CLEARWATER

Thursday JUNE 23, 1994 Volume 81, Number 24 Published every Thursday at Orofino, Idaho 83

Dworshak childrens fishing pond



More than 480 children enjoyed the free fishing pond at Dworshak National Fish Hatc Saturday. The fishing pond was part of the fourth annual open house held at the hatcher Lauren Wheat, 2. Bryce Shriver, 3. Hatchery workers and others helped with baiting h and fishing savvy. 4. Kelsye Praest got a hand from her grandpa to catch fish. 5. Jeffrey Michael Donner had their fish on ice. 6. Adults enjoyed watching children catch the fish.

FISH CULTURE OPERATIONS

Steelhead Trout Production

- Brood Year 1993 STT -

Brood Year 1993 began Fiscal Year 1994 with over 2.6 million fingerlings on station (Table 1). With the exception of several tanks of study fish still in the nursery on October 1, 1993, all steelhead had been transferred to outside ponds.

Table 1. Inventory summary and program projection update - STT BY 1993 (09/30/93).

	Rls/Tnsfr	Balance				Projected	
Location	Date	Number	Wt.	FPP	L(in/mm)	Loss (%) Nur/Pond	Number At Rls/Tnsfr
Nurs.	1 May 94	90,281	1,223	73.8	3.38/86	7/10	75,565
Sys. 1	1 May 94	872,955	43,644	20.0	5.23/133	0/10	785,660
Sys. 2	1 May 94	668,069	9,965	67.0	3.50/89	0/10	601,262
Sys. 3	1 May 94	1,011,331	32,771	30.9	4.53/115	0/10	910,198
Totals		2,642,636	87,603	30.2	4.56/116		2,372,685

Dworshak's 1993 steelhead (STT) program exhibited a production gain of 278,223 pounds for the fiscal year (10/1/93 - 9/30/94), about 54,000 pounds less than the gain of Brood Year 1992 the previous fiscal year. While BY 1993 smolts averaged substantially larger, 6.51 fish per pound (FPP) versus BY 1992's 7.39 FPP average, only 1.82 million smolts were released in Spring 1994 compared to the 2.39 million smolts released a year earlier. Drastic losses of steelhead fingerlings in System 2 during the winter of 1993/1994 to a combination of IHNV and Ichthyophthirius (Ich) were to blame for the lower smolt release. The BY 1993 steelhead smolts released from the hatchery and also transported to offsite locations totaled 280,377 pounds and averaged 193 mm in length.

Despite the aforementioned losses, BY 1993 still achieved one of the highest green egg to smolt survivals of the past five programs (Table 2), just over 50 percent. Survival of this lot through initial ponding was the highest of recent years, due to Dworshak Reservoir water being supplied to the hatchery's nursery. No nursery tanks were affected by the IHN virus. No ponds in System 1 were confirmed with the virus during the 1993 to 1994 rearing season, and only 12 of the 34 System 3 ponds were confirmed with the virus. These ponds, however, generally suffered cumulative losses of under 20 percent on average.

Table 2. Survival summary - steelhead trout, Dworshak NFH.

BY	Percent Surviving from Previous Stage EYDegg	TANKfry	PONDfing	RLSDsmlt	Cumul. GRN>smlt Survival	Cumul. EYD>smlt Survival	Cumul. TANK>smlt Survival
1989	86.7	97.9	21.9	92.3	17.2	19.8	20.2
1990	84.1	97.0	71.1	89.1	51.7	61.4	63.4
1991	80.3	87.5	58.5	92.0	37.8	47.1	53.8
1992	81.0	90.9	82.2	81.2	49.1	60.7	66.7
1993	90.6	92.6	87.2	68.9	50.4	55.6	60.1
5YRavg	**84.5**	**93.2**	**64.2**	**84.7**	**41.2**	**48.9**	**52.8**
1994	91.5	89.5	87.4	0.0	na	na	na

Note: Data are only for STT reared entirely at Dworshak NFH.
* Data does not include eggs deliberately culled before eye-up.

Source: SRSM94ST.wk1 - RV 09/21/94

Successful treatment of Ich in System 2 with a one-day treatment of formalin promises hope for the BY 1994 program, with a high likelihood of eventually raising the green to smolt survival to 60 percent. This will also be dependent on continued success in developing ponding size and date guidelines that should further increase steelhead survival during pond rearing.

23 individual ponds received formalin treatments for parasite control, 12 for Ich and 11 for Trichodina. Initial standard treatment for Ich has been a one-hour standing bath of formalin at 167 mg/l. This procedure has had only limited success in controlling the parasite, so a one-day, 35 mg/l flow through treatment protocol was developed and tested. This proved to be a more effective control so this was made standard operating procedure for Ich treatments. A half hour to one hour treatment with formalin at 167 mg/l continues to be effective on treatments for Trichodina. The 11 treatments for this parasite were all given to ponds in System 1 from February through April 1994.

System 1

This system of 25 ponds of fish began the fiscal year with 872,955 steelhead (Table 1 above). The various populations contained fish from Take 1 through 7, with the offspring of early returning adults in Takes 1 through 4 and some in Take 7. Most of these fish were ponded between 70 and 100 FPP, although a few did go to ponds at 110 to 150 FPP. Ponding dates ranged from 6/29/93 through 8/2/93, with most in early July. What was remarkable, but not unique to this year, about System 1 this rearing program was the fact that not one of the ponds was ever confirmed with IHNV or exhibited IHN symptoms. This in a year in which System 2 and 3 populations both had close to half their ponds confirmed with the virus.

System 1 fish had a ponding to release survival of 84.1 percent, the best of all three systems. Aside from one pond treated for Ich and 11 ponds treated for Trichodina, the fish in this system remained fairly healthy, as indicated by the reasonable monthly growth increments and low monthly mortality in their performance through release (Table 3).

Table 3. System 1 steelhead performance (1993-1994) - BY 1993.

Month		--1st of Month-- Number	No/Lb	Growth (in.)	Mortality (%)	Temperature (°F)
October	93	872,955	20.0	0.85	0.48	53.1
November	93	787,864	12.8	0.24	1.12	47.7
December	93	771,405	11.4	0.20	0.68	43.4
January	94	761,089	10.3	0.21	0.83	41.3
February	94	754,786	9.40	0.19	0.36	40.5
March	94	751,990	8.67	0.31	0.35	41.1
April	94	750,360	7.59	0.14	0.46	42.2
Release		746,797	6.80	-	-	-

All the steelhead in the system were ad-clipped by IDFG marking crews during the month of October, except for three ponds left for CWT marking. These three ponds (BPs 5, 17, and 35) received CWT marks from 11/29 through 12/2/93 (20,000 fish per pond with the remainder ad-clipped only). A total of 31,996 fish from these same ponds, just over 10,000 fish per pond, received freeze brands for tracking both the outmigration of smolts from this system as well as the return of these fish as adults in later years. The 879,121 fish marked totaled 11,451 fish (1.3 percent) more than were then being carried on the books for these ponds, well within historical bounds of variation. In the first week of March 1994 fish in three ponds received PIT tags as part of a Stewardship Project intended to evaluate the impact of hatchery fish on wild steelhead populations in downriver streams. Fish from nearby ponds of the same take were tagged and moved into the designated ponds. Each pond received 250 tags.

The fish in System 1 averaged 190 mm in length (7.49 in) at release in Spring 1994, not quite the 200 mm targeted but just slightly above BY 1993's average 188 mm. 279,694 fish were outplanted from the system in April 1994, while the remaining 467,103 were directly releases from the hatchery on 5/4 and 5/5/94.

System 2

While 841,617 steelhead were initially ponded in this system in 1993, only 247,520 were released from it as smolts in Spring 1994, an overall survival of only 29.3. A deadly sequence of IHNV and Ich, aggravated by going onto reuse, combined to devastate System 2's steelhead population during December 1993 and January 1994.

The fiscal year, however, began well enough with the system being populated with 668,069 steelhead. These were mostly Take 12 through 15 fish, with one Take 11 pond and four ponds of heterozygotic hatchery stock steelhead involved in a study being conducted with the Northwest Biological Science Center (NBSC) of the National Biological Survey. These fish were all ponded between September 1 and October 29, with most fish going outside at 70 to 100 FPP. Three ponds of Take 13 were ponded at 266 FPP in July 1993, three in August at 145 FPP, and three in September at 92 FPP, all as part of a study intended to try to determine what the proper date and size of ponding is for fish in this system.

There were no health problems with the fish in this system until November, when four of the ponds were diagnosed with IHNV. Only limited notice had been made of Ich by November's end, and no treatments for that parasite had been recommended by the Dworshak FHC. On November 29 the system went on reuse, with a subsequent increase in IHN to some degree, while Ich - and mortality - both increased exponentially thereafter. December losses amounted to 25.7 percent (Table 4). Total losses by pond during December ranged from 3 to 91 percent, with near total losses in Takes 14 and 15.

Table 4. System 2 steelhead performance (1993-1994) - BY 1993.

Month		--1st of Month-- Number	No/Lb	Growth (in.)	Mortality (%)	Temperature (°F)
October	93	668,069	67.0	0.75	1.72	53.1
November	93	826,394	37.2	0.47	0.97	48.6
December	93	821,586	27.3	0.34	25.70	54.8
January	94	612,365	22.2	0.33	58.17	47.7
February	94	256,780	18.4	1.32	5.07	53.9
March	94	248,499	11.0	0.97	1.09	54.3
April	94	245,786	7.22	0.27	1.44	44.6
Release		247,520	5.54	-	-	-

There was no monthly sampling done during December or January 1994 due to the poor condition of the fish. The temperature in the system was taken down to ambient river temperature and the reuse system turned off on 1/11/94 in an attempt to disrupt the life cycle of the Ich protozoan. Reuse was then brought back on line on 1/24 and the temperature brought back to approximately 54°F. The entire system, including the filter beds, was then treated on 1/27 with formalin at 50 mg/L for 24 hours to reduce Ich throughout the system. This drastically reduced mortalities in the system as well dropping the numbers of the Ich organism. No treatments for the parasite were needed after this treatment. Despite going off reuse, water temperature reduction, and formalin treatments, the system nonetheless still lost 58 percent of its population during January.

Reasons for the outbreak are hard to clearly identify, although the prevalence of Ich in all ponds on December 31 points to the initiation of reuse operation on November 29. Discussions have also pointed out the cumulative stresses these later take fish experienced just prior to the Ich outbreak: changed from moist to dry diets, ad-clip and CWT marking in November, recent pondings for some fish, recent IHNV outbreaks in several ponds, in addition to the stresses of increased temperatures and changed water supply in conjunction with going on reuse.

One analysis of the survival of STT in ponds that went on reuse indicated that the longer the fish were on raw water before initiation of reuse, the better the fish survived. This was very evident in the results of the size and date of ponding study, using steelhead from Take 13. As Table 5 below indicates, the fish that were ponded at 266 FPP had a surprising 81 percent survival, while the ponds of fish that went outside at 92 FPP suffered considerable losses to Ich and averaged a meager 29 percent survival. While the reasons for the differences shown have not been proven, it may well be that the smaller fish ponded earlier

benefited by being exposed to the Ich present in the raw river water. The fish ponded later and larger likely saw fewer Ich organisms in the nursery's reservoir water supply, and so were decimated by it when reuse was implemented. One curious fact about the losses was how the overall length-frequency distribution became much narrower during the epidemic. Evidently, most of the smaller fish succumbed to the parasite.

Table 5. Size and date of ponding study - STT BY93.

Take	Size At Ponding (FPP)	Ponding Date	Avg. % Survival 9/1/93 - 2/1/94
13	266	7/26/93	81.0
	145	8/17/93	61.8
	92	9/15/93	28.6

Of course, there is a limit to how early the STT should be ponded, as seen in earlier steelhead programs, notably in BY 1992 when 30 percent of smaller fish populations ponded in May and June were lost to IHN. In any case, the various losses made evident the need to do the following in future System 2 programs: 1) reduce pre-reuse stresses (marking, feed changes, etc.), 2) pond fish early enough (September 1) to ensure 90 days on raw water is experienced by all fish, 3) pond fish late enough (after July 1) to avoid high losses to IHNV, and 4) treat the system with a 24 hour 35 to 50 mg/L level of formalin to reduce Ich numbers.

The steelhead in System 2 were ad-clipped from 11/10 through 11/18/93 by IDFG marking crews, with CWT marking taking place from 12/8 through 12/16/93. A total of 10,789 fish in two rearing units were also freeze branded during CWT marking operations. PIT tags were put into 750 fish in one pond in April 1994, with 250 being put into fish under 180 mm, 250 into fish from 180 to 200 mm in length, and 250 into fish larger than 200 mm. The marking inventory found 3,842 fish more than were being carried on the books (622,529 fish versus 618,687 fish). This 0.6 percent gain indicates that the crews responsible for moving and measuring the steelhead to outside ponds have been doing consistent, accurate jobs.

This system contained four ponds of NBSC study fish, heterozygotic hatchery stock steelhead. On station performance and adult returns were tracked in these groups to help evaluate the effect of selecting for genetic marking on fish performance.

System 2 was taken off heated water from 4/15 through 4/21 to help the fish being outplanted acclimate to the river temperatures at release time. The 247,520 fish released from System 2 in Spring 1994 averaged 204 mm in length, largely due to the smaller fish being lost to Ich. 96,571 were outplanted on 4/21 and 4/22, and 150,949 were directly released from the hatchery on May 6.

System 3

This system was comprised of Takes 8, 9, 10, and part of Take 11 this production program. System 3 began Fiscal Year 1994 with 1,011,331 steelhead in its ponds, with 16 of the 21 initially ponded rearing unit populations having been ponded

between 8/9 and 8/31/93 at between 71 and 87 FPP in size. The five other ponds of fish initially were transferred to outside ponds between 7/12 and 7/20/93 at 160 to 173 FPP as part of a size and date of ponding studies being conducted with Take 8 and Take 10 steelhead.

In general, the fish in this system did fairly well during this production season, with moderate health complications. Survival from initial ponding through smolt release averaged 80.2 percent, somewhat lower than historical averages. It should be noted, however, that prior to BY 1992 the steelhead that were brought outside had generally already run the IHN virus gamut, so to speak, during nursery rearing. Fish that made it to Burrows ponds in earlier programs had already passed a major winnowing process and so experienced reduced pond mortality. With all nursery rearing now using reservoir water, we may have to expect a drop in pond survival for steelhead on reuse systems until a better understanding of the dynamics of the present circumstances is achieved.

As seen in Table 6 below, monthly mortality rates ran from one to six percent from October 1993 through release in Spring 1994. These generally elevated levels can be attributed to a number of influences. A substantial contributor to overall losses was the IHN virus. Although one pond, BP 62, eventually lost 74 percent of its population (to a number of causes), most ponds confirmed with the virus lost only 12 to 35 percent. 26 of the 34 ponds initially receiving fish never did break with IHN, nonetheless, physiological stress and "pinheads" dying caused losses of approximately 10 to 15 percent.

Table 6. System 3 steelhead performance (1993-1994) - BY 1993.

Month		--1st of Month-- Number	No/Lb	Growth (in.)	Mortality (%)	Temperature (°F)
October	93	1,011,331	30.9	0.47	3.02	53.1
November	93	980,782	22.9	0.24	1.05	48.2
December	93	978,501	20.0	0.56	3.28	53.0
January	94	955,373	14.7	0.68	2.87	53.3
February	94	927,947	10.5	0.37	1.12	53.9
March	94	917,554	8.91	0.50	5.99	50.3
April	94	828,589	7.23	0.27	1.14	44.6
Release		829,560	6.59	-	-	-

The 12 ponds affected by IHN broke between 9/24 and 11/8/93. Mortality usually peaked within a couple of weeks, but chronic losses produced a tail on the mortality curves often stretching out several months. One surprise was the relatively low level of Trichodina this year, with no treatments for the parasite warranted. Only two treatments of formalin were given for Ich, both to BP 77 in January 1994. The table above shows elevated mortality in several months. The first came in October as a result of IHN. The second in December and January after going on reuse 11/29/93. Most of these were likely due to smaller fish dropping out of the populations. Then March 1994 saw a significant rise in mortality to six percent. Late winter losses in System 3 are often the results of accumulating biomass of fish, and the continued attempt to get substantial growth on them. Water quality usually drops, and environmental gill disease

manifests itself. The water temperature was dropped to 50°F during February when losses began to climb, which did help reverse the situation to a degree. Still, 9 of the 33 ponds lost 8 to 13 percent of their populations during the month.

These late chronic health problems have prompted a number of changes attempting to alleviate matters. Getting major growth earlier before reuse operation begins, greater attention paid to weekly cleanings, and more frequent examinations for health problems and prompt attention to them are among the solutions being tried. One additional change as a result of BY 1993's problems will be the shift of some of System 3's production into System 1. Moving Take 8 into System 1 should enable an overall reduction in System 3's pond densities. A drop to under 30,000 fish per pond at release time could help improve rearing conditions, and thus improve the quality of steelhead smolts released from this particular reuse system here.

Both Take 8 and Take 10 fish were involved in an evaluation intended to help determine the proper size and date at which fish should be transferred to Burrows ponds and raw river water. At eye-up the eggs from each take were thoroughly mixed, with six replicates resulting for each take. Half the replicates were moved to pond rearing at approximately 160 FPP and half were moved at approximately 80 FPP one month later. Table 7 below presents the actual ponding sizes, dates, and the resulting survivals of these different groups of fish.

Table 7. Size and date of ponding studies - STT BY93.

Take	Size At Ponding (FPP)	Ponding Date	Avg. % Survival 9/1/93 - Release*
8	166	7/12/93	97.0
	78.2	8/09/93	94.2
10	164	7/19/93	68.7
	84.6	8/20/93	77.7

Release dates: 4/18-5/04/94.

The study was designed to examine only differences between the two treatments (160 vs. 80 FPP) within each take. While statistical analyses of the data have not yet been conducted, there appears to be no difference between treatments for either Take 8 or Take 10. For Take 8, both test groups achieved close to 95 percent survivals. These fish were the top performers in System 3.

Take 10 ponds, on the other hand, all broke with the virus, albeit with only moderate losses resulting. Again, as in Take 8, the fish ponded earlier and smaller fared approximately the same as those ponded later and larger.

One explanation for the lack of differential survivals may be that both takes went into raw water during a possible "sweet spot" of ponding. This might be described as that time before which IHNV has been shown to devastate populations and after which Ich can cause considerable waste. The fact that all six Take 10 ponds broke with the virus yet none of the six Take 8 ponds broke may be

indicative of differences in fish cultural stresses (moist to dry feed changes, fish transfer handling, etc.) experienced by each take or in the genetic susceptibility of each take to the virus. Whatever the cause, continued use of these "canaries in a cage" will be employed to help guide future steelhead planning strategies.

Most fish in the system were ad-clipped by IDFG marking crews from 11/1 to 11/17/93. Just over 20,000 steelhead in BPs 56 and 64 received CWTs and left vent fin clips from 12/3 through 12/5/93, with any fish not receiving CWT marks in the ponds getting ad-clipped. An additional total of 10,915 fish in these rearing units received freeze brands for out-migration and adult return information. PIT-tag marking of 250 fish in each of BPs 56, 57, and 64 took place 3/2/94. 989,261 steelhead were inventoried during marking, a 16,168 fish surplus (1.7 percent) over the book value total of 973,093. This represents fairly good agreement and confirms that proper inventory and accounting procedures are being used.

In April and May 1994 the hatchery released 829,877 smolts from System 3, with 294,195 being outplanted from 4/18-21/94 and with the remaining 535,365 released directly from the hatchery on 5/2-4/94. The fish averaged 6.59 FPP at release, with a total weight of 125,560 pounds. Late cooler water temperatures reduced growth overall, with System 3 STT averaging only 192 mm. The system had been taken off reuse and put on raw water supply on 4/15/94.

A total of 34,000 STT averaging 7.49 FPP and 7.25 inches (184 mm) were shipped to NMFS to test the fish bypass facilities at McNary and Lower Monumental dams during March 1994. These fish are not included in the general release numbers.

Distribution

As a result of the severe losses in System 2, Dworshak NFH's smolt release in 1994 was just under 1.9 million fish (Table 8). Outplanting of Brood Year 1993 STT smolts began 4/18 and continued through 4/25/94. 670,000 smolts were transported to sites on the Mainstem of the Clearwater River at Kamiah, on the South Fork of the Clearwater River, and to Clear Creek. Three U. S. Corps of Engineers drivers and distribution tractor-trailers accomplished the fish hauling in 28 trips with no major incidents over the six-day period. The fish weighed a total of 100,753 pounds and averaged 192 mm in length.

Table 8. Distribution summary by water and site - STT BY 1993 (April 18 - May 6, 1994).

WATER	AT (Site)	No.	Wt.	No/Lb	-Length- in	mm
Outplants: (4/18-25/94)						
MAIN S. CLEARWTR. R.	KAMIAH BDG.	136,447	19,008	7.18	7.36	187
S.F. CLEARWTR. R.	COTTONWOOD CR.	86,951	12,277	7.08	7.39	188
S.F. CLEARWTR. R.	RIVER MILE 8.7	97,429	14,390	6.77	7.50	191
CLEAR CR.		349,633	55,078	6.35	7.66	195
Subtotal/average		670,460	100,753	6.65	7.55	192
Direct: (5/2-6/94)						
M.S. CLEARWTR. R.		1,153,417	179,624	6.42	7.63	194
Grand Total		**1,823,877**	**280,377**	**6.51**	**7.60**	**193**

From 5/2 through 5/6/94, an additional 1.15 million steelhead smolts were released directly from the hatchery into the Mainstem of the Clearwater River. This direct release of steelhead from Dworshak NFH was increased to five days this year to avoid swamping the smolt trap placed downriver where the Clearwater River enters Lower Granite Reservoir. These non-volitional releases all went quite smoothly, and were accompanied by high flows in the Clearwater River.

A total of 1.82 million steelhead were outplanted or released from Dworshak for this production program. The fish weighed a total of 280,377 pounds, and averaged 193 mm in length, an increase of 8 mm over Release Year 1993's STT smolts. Outplanted fish and directly released fish had approximately equal average release lengths. This year's STT, as was the case last year for Brood Year 1992, did not achieve the 200 mm target length. The primary reason this year was System 3 fish experiencing some health problems on reuse, and so did not grow the 0.7 to 0.9 inches per month in mid-winter as has been the case in earlier production programs. A deliberate reduction of System 2 and 3 water supply temperatures this past winter, initiated to address health concerns, also affected growth. At time of release, however, health assessments report that the steelhead were smolting and were generally in good health.

A summary of numbers of fish released from each system and average fish lengths is presented in Table 9 below.

Table 9. Distribution summary by system - STT
Brood Year 1992 (April 19 - May 4, 1993).

System	No.	Wt.	No/Lb	--Length-- in	mm
System 1	746,797	109,827	6.80	7.49	190
System 2	247,520	44,655	5.54	8.02	204
System 3	829,560	125,895	6.59	5.57	192
Grand Total	1,823,877	280,377	6.51	7.60	193

Smolt Quality Assessment

While the smolts from System 1, as in years past, were in pretty good physiological condition at release, those from Systems 2 and 3 had had their share of problems, as discussed in paragraphs above. Table 10 below presents a comparison of smolt quality between fish in the three systems, using four of the more significant assessment criteria. The comparison indicates a quantitative difference in quality between fish reared using different facilities here.

Table 10. Smolt assessment comparisons between systems just prior to release - Steelhead BY 1994.

System	No.Fish Sampled	Condition Factor(E-04)	Hematocrit (35+=good)	Gill Condition (Normal/Swelled)	Mesenteric Fat (Scale 0 to 4)
System 1	60	3.68	51.8	100%nrml- 0%swollen	1.6
System 2	60	4.01	53.5	25%nrml-72%swollen*	2.2
System 3	60	3.76	?	23%nrml-40%swollen	1.7

* Do not add to 100 because additional gill conditions are rated (not shown).

Source: Summaries of Fish Autopsy - DFHC 4/20/94-4/22/94

The smolts released from System 1 were again in generally better condition than those from reuse, although this year, in contrast with last year's release, System 1 STT did not take the top honors in all four categories. This system's fish had a healthy condition factor, 3.68, well within the general range of 3.5 to 4.0 that seems to be a satisfactory range. Hematocrits averaged 51.8 and mesenteric fat averaged 1.6, both quite acceptable values. On gill conditions these fish excel, with all the gills examined in good shape. This consistent historical pattern of gill condition being excellent in fish reared on raw water may have some correlation with the fact that fish from System 1 generally have better adult return rates as well.

One thing the IHN and Ich epidemic did for System 2 fish was to get rid of all the marginal fish (and then some) in this system. This is evident in these fish taking the gold when it came to condition factor, achieving a 4.01. Correlated with this is an average mesenteric fat index of 2.2. These indices do not necessarily indicate top-notch condition, because 72 percent of the gills examined from fish in System 2 were swollen. The average hematocrit of 53.2 was well into the satisfactory range.

System 3 smolts did not win any medals, judging by these four criteria alone. But while they may not have exceeded in any one category, they were still in fairly decent shape, with condition factor and mesenteric fat indices quite adequate. With only 23 percent normal gill conditions, however, and 40 percent swollen, the ravages of extended reuse rearing are evident. Going off of reuse in mid-April likely helped the condition of these smolts. With them averaging a good 10 mm in length less than the average System 2 smolt, only adult returns yet to occur will give clear proof which reuse system produced the better smolt this production cycle.

- Brood Year 1994 STT -

A thorough summary of Brood Year 1994's spawning season is provided in the report "Spawning Report - Steelhead Trout, Brood Year 1994", dated September 16, 1994.

Brood Year 1994 Steelhead Trout

Adult Run Summary

Adult steelhead trout (STT) for Brood Year 1994 were collected from October 28 through November 29, 1993, and again from January 11 through May 11, 1994. The 178 early adults and the 3,579 normal timing adults were sufficient to produce enough eggs to meet the various management programs.

The run was composed of 94.3 percent 2-salt fish, 4.1 percent 3-salt fish, and 1.6 percent 1-salt fish (Table 11). Males comprised 27.4 percent of the run and females comprised 72.6 percent. The peak return for BY 1994 STT occurred between mid-March and mid-April.

Table 11. Age and sex structure summary - BY 1994 STT.

	Male		Female		Total	
	No.	(%)	No.	(%)	No.	(%)
I-ocean	46	(1.2)	15	(0.4)	61	(1.6)
II-ocean	881	(23.4)	2,662	(70.9)	3,543	(94.3)
III-ocean	103	(2.8)	50	(1.3)	153	(4.1)
	1,030	(27.4)	2,727	(72.6)	3,757	(100.0)

Source: IFRO 93/94 Final Weekly Dw STT Count

One-hour formalin treatments were not administered to early returning fish as has been conducted in past years. Pre-spawning mortality was 11 percent (16 of 178 fish) which was relatively high when compared to pre-spawning mortality for BYs 1992 (4.4 percent) and 1993 (4.3 percent).

Spawning Procedures

Spawning began on Tuesday, January 25,and was conducted each Tuesday until May 3. The procedure was similar to past years: adults were moved from holding ponds to the crowding channel, into the channel basket, and then into an anesthetic bin. Adults were anesthetized using carbon dioxide. Ripe females had their spinal columns cut, and were then put into the bleeding rack. Males were stripped of milt into containers. The milt was placed into a cooler while the male was either sampled for diseases or was placed into a basket for shipment to the meat processor. Eggs were collected in sterilized colanders to drain ovarian fluid and then poured into a bucket. Single female spawns and incubation were maximized, but, because of limited incubation space, double female spawns and double incubations were necessary for portions of many takes. One male was used to fertilize one or more females. A one percent saline solution was used to maintain milt motility at fertilization. Green and surplus males and females were returned to holding ponds.

Eggs were rinsed and then placed into Heath incubator trays in a 75 mg/l iodophor solution. They were allowed to water harden for one-half hour. Upon eye-up (approximately 17 days after fertilization), the eggs were shocked, salted, passed through an electronic egg picker to remove dead eggs, and enumerated using an egg counter. Eggs were disinfected in a 100 mg/l iodophor solution for 10 minutes and placed into hatching jars (30,000 to 33,000 eggs per jar) or returned to the trays (10,000 to 12,000 per tray).

Spawning Summary

The 15 egg takes began January 26 and ended May 3 (Table 12). The 1,127 females spawned (excluding the 78 involved in the NBSC study) produced 7.2 million green eggs, enough to meet Dworshak's commitments to its own production program and to those of Clearwater and Magic Valley Fish Hatcheries.

Table 12. Spawning summary - steelhead Brood Year 1994.

	=NOspawnd= Mls	Fmls	Actual GRNeggs	Culled GRNeggs	Actual EYDeggs	EYup Enum egg%	EYup Total egg%	Eggs/ Female
Dworshak	403	1127	7193835	385797	6226800	91.5	89.9	6399
NBSC	84	78						

Source: EGUP94ST.wkl - 05/24/94

Egg Disposition

Almost 3.4 million eyed eggs were retained for Dworshak's production program this year (Table 13). Over 1.5 million eyed eggs were shipped to Magic Valley Fish Hatchery, and 925,000 were sent to Clearwater Fish Hatchery for rearing and later release in 1995 in the Clearwater River drainage.

Table 13. Eyed egg disposition - steelhead Brood Year 1994.

Actual EYDeggs	==========Disposition========== Dw	Clwtr.	MV	Culled
6,226,800	3,389,400	925,000	1,520,000	392,400

Source: EGUP94ST.wkl - 5/42/94

Over 392,000 eyed eggs were destroyed because of high-IHNV parental status, because they did not fit properly into the programs, or because of fungal contamination of IHN test plates. 107,000 eyed eggs from the NBSC study were also brought into Dworshak's production program.

Performance/stock productivity study

This is the third year in which Dworshak has cooperated with a team from the NBSC being led by Reg Reisenbichler. The cooperative part of the study involves the holding and spawning of wild and hatchery adult steelhead, the subsequent incubation of the resulting spawns, and the rearing of some of the fry and fingerlings in Dworshak's nursery and in Burrows ponds. The study seeks to "compare the growth, survival, and reproductive success, in natural streams and hatcheries, of steelhead from established hatchery stocks and form wild stocks", as stated in the NBSC team's quarterly progress reports. See the spawning report for details.

Adult Disposition

The following is a summary of the disposition of STT adults from BY 1994:

Landfill	-	487	(624)
WSU Bear Program	-	184	
Dept. of Education	-	2,686	(commodities program)
Boise River	-	400	

Total		3,757	

Nursery Rearing

Generally, Brood Year 1994 steelhead eyed eggs from successive egg takes were moved into Dworshak's nursery and placed into egg jars set up in nursery tanks. Takes 7 and 8, however, were allowed to hatch in incubator trays because rainbow trout still occupied the tanks designated for these tanks. Takes 9 and 10 also hatched in trays because C-bank water supply was considerably cooler than the heated 54°F water available to incubation units. Regarding these four takes, the hatched fry were brought to the swim-up fry stage in trays before being transferred to nursery rearing units. For the other 11 takes, the eggs hatched in egg jars, and when three fourths of the resulting fry had buttoned-up and swum out, the egg jars were dumped into the nursery tank. Initial loadings varied from 20,000 to 37,500 eggs per tank.

Dead eggs and fry were picked and enumerated from each tank. Mortalities up through two days after swim-up were subtracted from initial loadings, resulting in "adjusted initial loading" numbers. This year a total of 3,122,148 swim-up fry came on the books, a survival from the eyed egg stage of 89.5 percent, just slightly below the five year running average (Table 14).

Table 14. Survival summary of Brood Year 1994 steelhead vs. 5-year average.

	Percent Surviving from Previous Stage				Cumul.	Cumul.	Cumul.
BY	EYDegg*	TANKfry	PONDfing	RLSDsmlt	GRN>smlt Survival	EYD>smlt Survival	TANK>smlt Survival
1989	86.7	97.9	21.9	92.3	17.2	19.8	20.2
1990	84.1	97.0	71.1	89.1	51.7	61.4	63.4
1991	80.3	87.5	58.5	92.0	37.8	47.1	53.8
1992	81.0	90.9	82.2	81.2	49.1	60.7	66.7
1993	90.6	92.6	87.2	68.9	50.4	55.6	60.1
5YRavg	**84.5**	**93.2**	**64.2**	**84.7**	**41.2**	**48.9**	**52.8**
1994	91.5	89.5	87.4	0.0	0.0	na	na

Note: Data are only for STT reared entirely at Dworshak NFH.
* Data does not include eggs deliberately culled before eye-up..

Source: SRSM94ST.wk1 - RV 09/21/94

One incident that should be mentioned was the loss of approximately 250,000 swim-up fry from Takes 8 and 9. These fry were hatched in incubator trays because tank space was not available. They had been placed in the newest incubator stacks in B-bank, in trays that had only been used for eyeing up eggs until then. It was not realized that poor tray lid design permitted swim-up fry to slip through and out. Several mornings hundreds of fry were found on the incubation room floor. While the manufacturer eventually replaced all the lids, it was not soon enough to prevent this considerable loss. Although losses were estimated from these two takes to adjust initial numbers, the full extent of the loss was not apparent until these fish were moved from tanks to outside ponds.

First feeding dates for the various takes ranged from 3/9/94 through 6/17/94. Tankings were so arranged that when the fish reached 180 to 200 FPP, populations could be split as needed. Due to the considerations of a RBT program that

impacted STT tanking, and later and larger ponding of steelhead that demands closer tracking of tank densities, a tanking/ponding strategy was developed that optimized tank usage.

A computer spreadsheet was constructed to project growth, tank density, and splitting and ponding dates. This ensured that when, for example, Take 9 needed splitting on July 7, that Takes 1, 2, and 3 were already 70 to 90 FPP, that they had been ponded several days earlier, and that the tanks had been disinfected and flushed. One additional aid was the development of a monthly feed determination which helped to achieve specific growth increments by take, as opposed to the "feeding by eye" method used earlier. Altogether, the plans worked quite well, with tankings, splits, and pondings occurring as planned and with the various takes going to outside ponds at anticipated sizes and dates.

The performance of these steelhead in the nursery was quite satisfactory, with good survival and good growth generally. Table 15 below presents the nursery performance data for this lot of fish. Monthly growth increments actually ranged from 0.60 to 0.75 inches per month when examined by take. Data in the table are averages across all lots. New fish coming on feed during the month reduced end-of-month average lengths, as did the movement of larger fish to ponds, which began in June.

Table 15. Nursery production data - STT Brood Year 1994, Fiscal Year 1994.

	End of Month				Monthly		
	Numbers	Weight	FPP	L (in.)	Growth(in)	Mort. (%)	Temp °F
03/94	504,634	279	1809	1.16	0.11	1.39	52.7
04/94	1,103,525	1,705	647	1.64	0.48	1.26	54.6
05/94	2,501,864	6,221	402	1.92	0.28	0.56	51.9
06/94	2,662,413	9,915	269	2.20	0.28	0.57	54.9
07/94	1,786,070	10,733	166	2.58	0.38	0.71	55.9
08/94	82,079	846	97.0	3.09	0.51	1.03	52.4

Note: Growth was actually closer to 0.65 in/mo. Above data skewed by large fish moved out and to new fry coming on the books each mo.

The fingerling steelhead actually stayed quite healthy during the March through August nursery rearing season, as evidenced by the relatively low monthly mortalities. Only one tank broke with IHNV, shortly before it was split, and the resulting tanks lost 22 percent of the original tank's population. This tank happened to be one of the two tanks of NBSC experimental groups being raised at Dworshak this year. This is only the second tank to break with the virus since the hatchery began use of its new reservoir water supply.

A-bank and B-bank tanks received heated water through mid-summer, when reservoir temperatures had risen to equivalent levels. B-bank supply had been sent through the ozonation system in order to be heated. D-bank was supplied with heated water in late summer in an attempt to give the later takes as much growth as possible. Unfortunately, high fish densities and lower water flows than desired caused low oxygen levels and probably were responsible for a slight problem with Ichtyobodo (Costia) in several tanks. 21 tanks received 200 mg/l formalin bath

treatments with generally good success in getting rid of the parasites. The D-bank water supply temperature was dropped to 52°F shortly after the water quality problems arose, and direct reservoir water was used again. Initial plans were to use a mixture of warm primary line water and of cooler secondary water to supply D-bank tanks. However, due to the extended drawdown of Dworshak Reservoir that lasted until July 31, the primary intake had to be kept in a cooler water layer than desired to prevent high water temperatures from adversely affecting the Clearwater Fish Hatchery operations. In any case, the use of heated water for later takes may not be practical in the future because of the accompanying restriction in water flows.

Take 1 steelhead were the first to be taken to outside rearing, with the first ponding taking place 6/17/94. All fifteen takes were transferred to Burrows ponds over the next 12 weeks, so that by 9/1/94, all steelhead were in ponds on river water supplies with the exception of three groups of experimental fish. This earlier than historical ponding was planned in response to the results of a study conducted with Brood Year 1993 steelhead. In that study groups of fish were moved to ponds at approximately 300, 150, and 80 FPP. These fish had cumulative survivals through release of approximately 80, 60, and 30 percent, respectively. While not proven, it was suspected that the longer the fish were exposed to river water before the initiation of the reuse system, the better the fish's ability to deal with Ich. Analysis of the last program's data indicated 90 days of pond rearing before reuse was recommended. With December 1 the customary date of reuse initiation, September 1 became the recommended last date for ponding fish.

Fish from Take 13 were involved in a repeat of the ponding size and date study, and it was the 80 FPP group that remained in the nursery on 9/1/94. They were ponded on 9/13/94.

All fish were inventoried to outside ponds, with 910,468 going to System 1, 768,193 transferred to System 2, and 1,074, 562 to System 3, a total of 2,753,223 initially ponded. An analysis of the numbers of fish ponded from each take revealed that there were 318,150 fewer fish inventoried to ponds than were being carried on the books. This amounted to a 10.4 percent fish shortage. Historical shortages have ranged from 13 to 18 percent, but it is the goal of Production to improve egg enumeration, fish handling, and records adjustments to reduce this shortage further, from the current 10.4 percent down to five percent.

Pond Rearing

As just related, with the exception of a few test fish, all steelhead had been transferred to Burrows ponds in Systems 1, 2, and 3 between 6/17 and 9/1/94. While three ponds received 300 FPP fingerlings, the great majority of pondings were at 70 to 120 FPP. Pondings were planned to be as late in the summer as possible, to both avoid any possible higher level of IHNV in the water supply in early summer and to get the STT as large as possible before first exposure to the virus.

Judging by losses to the virus in this group of fish through 9/30/94, this strategy seems to be accomplishing its intended goals. Mortality attributable to the virus has been quite limited. Nine of System 1's ponds broke with the virus through the end of September, two breaking in July and seven in September.

BP 45 was the first to experience IHNV caused mortality, and this population of fish (over 40,000 fish) was deliberately destroyed in mid-July to prevent spread of the virus to other ponds. Its immediate neighbor, BP 47, subsequently broke as well, taking a cumulative loss of 38.8 percent. The other seven ponds affected lost from five to 20 percent of their populations, although 89.3 percent of this system's initially ponded numbers still survived through September's end.

Three of System 2's 16 ponds were also affected by the virus by fiscal year's end. One pond consisted of fish which had been confirmed with IHN in nursery rearing. The other two infected ponds lost from five to 20 percent of their populations. By September's end none of System 3's 17 ponds had exhibited signs of infection. So overall, the virus has had only minor influences on the performance of this year's steelhead program. Hopefully, this group of fish can avoid the IHNV/Ich problem experienced by BY 1993 steelhead during the remainder of the rearing cycle.

Another situation warranting comment is the fact that the fish in System 2 will be fed Bioproducts Inc. moist feed down to 35 FPP, rather than switching them to dry feed at 50 FPP as has been done in years past. The purpose of this is to try to minimize stresses that may precipitate an IHN epidemic in this system. IHNV can weaken the fish, leaving them prone to later health complications from Ich infestations. An evaluation of the effect of fish size and date of ponding on fish survival is being conducted in System 2 with three groups of Take 13 fingerlings. These fish were ponded at 300, 150, and 80 FPP in July, August, and September, respectively. A full report on this study will be issued when this rearing cycle has been completed.

At the end of the fiscal year 2.64 million BY 1994 steelhead were on station (Table 16). If losses through May 1995 tally less than 300,000 fish, a smolt release of over 2.35 million could be realized. Even with such a loss, a green egg to smolt survival of 60 percent for Dworshak reared steelhead would be realized for the first time in over a decade. With proper attention to fish culture and to fish health, Dworshak is getting closer and closer to a workable steelhead program that enables it to fully meet its mitigation goals.

Table 16. Inventory summary and program projection update - STT BY 1994 (09/30/94).

Location	Release Date	Balance Number	Balance Wt.	Balance FPP	Balance L(in/mm)	Projected Loss (%) Nur/Pond	Projected Number At Release
System 1	1 May 95	813,391	40,185	20.2	5.21/132	na/11	724,000
System 2	1 May 95	760,338	12,798	59.4	3.64/92	na/11	677,000
System 3	1 May 95	1,072,684	25,484	42.1	4.08/104	na/11	955,000
Totals/averages		2,646,413	78,467	33.7	4.39/112		2,356,000

Spring Chinook Salmon Production

- Brood Year 1992 -

For a complete review of this program, please refer to the program review of this brood year of fish. The review was written and distributed in September 1994.

The Brood Year 1992 spring chinook salmon program began Fiscal Year 1994 on October 1, 1993, with 1,319,872 fish on station averaging 49.3 FPP, and with a total weight of 26,773 pounds. This was slightly behind target size of 40.1 FPP. These fish had been put on a reduced feeding schedule of five days on/two day off feed because they had gotten ahead of target. This feeding rate addressed the two concerns of keeping released smolts within the 18 to 20 FPP target range and of giving the fish full rations in the three months immediately preceding release. Examination of chinook at this time revealed extremely low levels of pyloric cacae fat.

Numerous discussions took place involving the Fish Health Center, Idaho Fisheries Resource Office, and the hatchery regarding average growth rates for Dworshak's spring chinook program. Analysis of the program indicated the 0.26 inches per month growth averaged for the 17 month program was only 80 percent of manufacturers' recommended growth rate. The Dworshak Hatchery Evaluation Team will be attempting to determine what effect this has on fish quality, and what criteria need to be routinely monitored to ensure good smolt quality of the chinook when they are released. While clear answers to these questions require long-term analysis, an interim solution to the sub-optimal feeding was to feed this brood year of SCS at 90 percent of manufacturers' recommended rates. The increased feeding rates beginning in October 1993 increased smolt size at release to 17.3 FPP, and led to an increased fat index of 1.8, well above the previous brood year's 0.8.

Table 17 presents BY 1992 performance during this period, with monthly growth rates ranging from 0.16 inches per month up to 0.46 inches per month.

Table 17. Production Data - SCS Brood Year 1992, Fiscal Year 1994.

	==========End of Month==========				==========Monthly==========		
	Numbers	Weight	FPP	L (in.)	Growth(in)	Mort. (%)	Temp °F
09/93	1,319,872	26,773	49.3	4.07	-	-	-
10/93	1,313,098	36,872	35.6	4.53	0.46	0.51	53.1
11/93	1,309,803	44,625	29.4	4.84	0.31	0.25	48.2
12/93	1,308,226	49,439	26.5	5.00	0.16	0.12	43.3
01/94	1,307,318	55,101	23.7	5.19	0.19	0.07	41.3
02/94	1,306,568	62,406	20.9	5.41	0.22	0.06	40.5
03/94	1,278,553	73,062	17.5	5.74	0.33	0.05	41.1
04/94	74,758	4,681	16.0	5.92	0.18	0.02	42.2
Rlsd.	**1,302,687**	**75,386**	**17.3**	**5.77**			

* Transferred 304,861 fish to Kooskia
** Inventory gain

Performance of these fish continued to be quite satisfactory from October 1993 through release in April 1994, as indicated above in Table 17. Feeding continued at 90 percent of manufacturer's recommended feeding rates, producing an average smolt size of 17.3 FPP. Mortality rates remained subdued, well under 0.5 percent. Signs and clinical indications of EIBS were absent, and pre-release BKD symptoms also remained low.

PIT-tag marking of this brood year was conducted by Biomark (Scott McCutcheon) from February 22 through March 1, with 2,000 fish from each of the nine release study raceways (18,000 fish) and 150 from each of the sixteen erythromycin study raceways (2,400 fish) receiving tags.

In March personnel from the Columbia River Field Station of the NBSC took tissue samples and morphometric measurements of the chinook involved in the serial release study. The non-lethal sampling of gill tissues for ATPase measurements allowed these fish to be placed back into rearing units. Reflectance values were taken using digital imaging, a technique which is proving to offer consistent, objective measures of this smolting criterium.

The National Marine Fisheries Service (NMFS) received a total of 24,414 SCS from two rearing units during March. These fish were to be used to test the fish bypass facilities at McNary and Lower Monumental Dams.

Cumulative survival through release was 84.9 percent (Table 18), considerably above the 76.1 percent average of the preceding five brood years and almost three percent above BY 1991's 82.3 percent. Several factors may have played a role in Brood Year 1992's excellent quality smolts: 1) erythromycin injection of adults, 2) BKD egg segregation, 3) two prophylactic feedings of erythromycin, 4) medium densities of chinook during rearing, averaging just over 30,000 fish per raceway compared with historical densities of 45,000 fish per raceway, and 5) feeding rates closer to manufacturers' recommended feeding levels.

Table 18. Survival summary - SCS Brood Year 1992 vs. 5-year average.

	Percent Surviving from Previous Stage				Cumul.	Cumul.	Cumul.
BY	EYDegg	TANKfry	PONDfing	RLSDsmlt	GRN>smlt Survival	EYD>smlt Survival	TANK>smlt Survival
1987	92.5	86.2	97.4	93.8	72.8	78.8	91.4
1988	96.0	93.9	76.5	93.0	64.1	66.8	71.1
1989	92.8	94.2	89.2	96.5	75.2	81.1	86.1
1990	94.2	98.2	95.6	97.2	86.0	91.3	92.9
1991	89.0	96.1	99.3	96.9	82.3	92.5	96.2
AVG.	92.9	93.7	91.6	95.5	76.1	82.1	87.5
1992	96.4	96.3	93.4	97.9	84.9	88.1	91.4

Note: Data are only for SCS reared entirely at Dworshak NFH.

Source: SRSM92SC.wkl - RV 09/01/94

Distribution

Scheduled releases of these spring chinook smolts went without incident and took place from April 8 through May 6 on the five days listed in Table 19 below. The additional 24,414 smolts transferred to NMFS for smolt bypass facility testing might also be considered part of the station's smolt distribution, which would result in a total of 1.30 million BY 1992 SCS smolts being released. Water flow From Dworshak Reservoir increased from 1,300 cfs to 4,500 cfs during six hour

periods on April 14 and 15 at the time of the general chinook release. Reservoir flows increased from 1,300 cfs to 10,000 cfs on April 28 and to 20,000 cfs on April 29 to provide for "smolt flushing". These higher flows were maintained for the next several weeks to assure down-river water needs were met.

Table 19. Distribution summary - SCS Brood Year 1992 (April 8 - May 6, 1994).

Date	Water	Group	No.	Wt.	No/Lb	-Length- in	mm
Serial Release Study:							
04/08/94	N.F. CLEARWTR. R.	Rels. Grp.1	69,642	4,426	15.7	5.96	151
04/22/94	N.F. CLEARWTR. R.	Rels. Grp.2	84,654	5,182	16.3	5.89	150
05/06/94	N.F. CLEARWTR. R.	Rels. Grp.3	74,500	5,471	13.6	6.26	159
General Production:							
04/14-15/94	N.F. CLEARWTR. R.	Production	69,642	4,426	15.7	5.96	151
			=========	======			
Sub-Totals/averages			**1,278,273**	**73,955**	**17.3**	**5.78**	**147**
Bypass Test Fish:							
March 1994	NMFS (McNary, LGs)	Bypass Test	24,414	1,431	17.1	5.80	147
			=========	======			
Grand Total/Averages			**1,302,687**	**75,386**	**17.3**	**5.78**	**147**

Smolt Quality Assessment

According to Dworshak FHC BY 1992 the spring chinook released from Dworshak NFH in Spring 1994 rated excellent in terms of health, condition, and quality. Neither EIBS nor BKD were significant problems at the time. Scott McCutcheon of BioMark, Inc., who was involved in PIT tag marking several groups of these fish, stated that the chinook were "the best looking hatchery chinook I have ever had the pleasure to handle". Monthly mortality rates preceding release were well under one percent.

Supporting these comments are the more objective data provided by Dworshak FHC in its routine assessment of smolt quality (Table 20). The 60 fish selected randomly from production raceways indicated that overall, the chinook in this brook year were of very good quality. The average condition factor was just over 4.0E-10, demonstrating good fat levels (the standard book condition factor for SCS is 3.0E-10, which represents a considerably leaner body). An average mesenteric fat level of 1.8 confirmed this, as well. It should be noted this was a considerable improvement over BY 1991 when mesenteric fat averaged only 0.8. Gills were in good condition, and hematocrits averaged a satisfactory 47.5.

Table 20. Smolt assessment indices - spring chinook salmon Brood Year 1992.

System	No. Fish Sampled	Condition Factor	Hematocrit (35+=good)	Gill Condition (Normal/Swelled)	Mesenteric Fat (Scale 0 to 4)
B-bank	60	4.01E-10	47.5	93%nrml- 0%swell	1.8

Source: Summary of Fish Autopsy - DFHC 04/04/94

Chemical and drug treatments

This brood year on the whole was treated in a relatively drug-free manner with only one rearing unit receiving treatment for an actual health problem. The chinook reared in BP 49 were given one 30-minute treatment of formalin to address an occurrence of Ich in September 1993. Burrows ponds have shown themselves to be conducive to parasite problems at Dworshak in the rearing of chinook, for which reason they are avoided when at all possible.

Erythromycin treatments were provided all SCS in this brood year as a standard prophylactic measure. Spring and fall (1993) treatments were given at a nominal 100 mg/kg/day rate for 21 and for 28 days, depending on the test group a lot of fish was in. The INAD experiment conducted during this period also investigated two different erythromycin carriers, Gallimycin and Aquamycin.

No other drug or chemical treatments were given these spring chinook salmon during their approximate year and a half rearing program at Dworshak.

BKD-ELISA Evaluation

Monitoring of Renibacterium salmoninarum levels in the chinook by Dworshak FHC began in October 1993. 30 fish from each of six specific raceways were sampled each month through smolt release. Fluorescent Antibody Testing (FAT) was used as the test procedure until the fish were large enough to test individual fish kidney tissues, at which time ELISA testing was initiated. For a summary of these procedures, data, and results the reader is referred to the report on this subject prepared by the Dworshak Fish Health Center. It might be mentioned, however, that overall levels of the causative agent of BKD did remain fairly low through the time of smolt release.

Special Studies

Serial Release Study

An experiment was conducted in cooperation with the NBSC to examine "the effect of release timing on the health, smolt development, and migration of spring chinook salmon" reared at Dworshak. Only the offspring from adults ELISA-certified to be essentially negative-BKD were used in the study. Negative was defined as an ELISA reading of less than approximately 0.07 ODUs. After adult testing was completed, the study had enough negative spawns for 12 tanks, each containing the offspring from eight randomly combined females (approximately 28,000 eggs). Several spawns were not needed in the study and were merged into the other production groups.

When these fish were ponded, only nine of the 12 groups were used. Three replicates for each of three release groups resulted. The three groups were released two weeks apart from April 8 to May 6 (Table 19). Idaho FRO was also involved in this study, collecting out-migration data. The results of this study will be presented in a separate report.

Erythromycin Studies

Two INAD studies were conducted with BY 1992 chinook involving erythromycin medicated feed. Each test involved the comparison of two treatments, with each treatment group involving four raceways of chinook, or approximately 120,000 fish

in each of the four treatment groups. The first test compared the on-station performance of fish fed medicated feed for 21 days with the performance of fish fed medicated feed for 28 days. The second test involved 21 day feedings of medicated feed using two different erythromycin carriers, Gallimycin (the original carrier developed originally for the poultry industry), and Aquamycin (developed for aquaculture applications).

The preliminary analysis of data does not indicate any clear difference in on-station performance between groups in either test. Mortality, growth, and overall quality of fish appeared similar. Statistical testing remains to be conducted. In addition, the out-migration and adult return data for these groups will be gathered and analyzed in the future. The reader is referred to the reports and updates that will appear communicating findings and developments regarding these two experiments.

- SCS Brood Year 1993 -

Incubation

October 1, 1993, found eight of the 11 BY 1993 spring chinook takes eyed-up and enumerated. Takes 9, 10, and 11 eyed-up during the following month. A total of just under 3.5 million green eggs had been taken, producing 2.82 million eyed-eggs and an enumerated egg eye-up of 87.3 percent (Table 21).

Table 21. Spawning summary - BY 1993 Spring Chinook Salmon.

TK	TAKE DATE	NOspawned Mls.	NOspawned Fmls.	Green Eggs	Eyed Eggs	EYup Enum egg%	EYup Total egg%	Eggs/ Female	=====CULLED==== GRNeggs	EYDeggs
Kooskia Returns (Takes 1 - 11):										
subTL/avg		444	474	2007270	1583240	87.0	78.9	4231	187831	2340
Dworshak Returns (Takes 2 - 11):										
subTL/avg		318	343	1482121	1233960	87.5	83.3	4325	72025	3960
TOTAL/AVG		**762**	**817**	**3489391**	**2817200**	**87.2**	**80.1**	**4270**	**259856**	**6300**

Source: Spawning Activity Reports 8/23 - 9/13/93

Sufficient eggs were taken to guarantee full SCS production programs at both Dworshak and Kooskia. Of the 1.58 million eyed Kooskia eggs, 1.0 million were sent back to Kooskia while just over 580,000 were kept and reared at Dworshak. Dworshak retained just under 1.0 million of its eyed eggs, for a total initial program of 1.53 million eggs. This was the first time in three years the programs at both stations were both filled with eggs from adults that returned to the complex. Fry from the two stocks were maintained and tracked separately for the entire rearing program.

On October 26 114,900 sac fry and eyed eggs were transferred to the Nez Perce Sweetwater Incubation Station at their request. These were from eggs surplus to the complex' needs. Another 171,400 eyed eggs (2,340 from Kooskia stock and 169,060 from Dworshak stock) were discarded, most of these being surplus to program needs, but some due to BKD considerations.

The water temperature was dropped to 40°F during October to delay egg and fry development, which produced an average initial date of first feeding of December 8, two weeks later than normal. This delayed development enabled feeding these chinook at a slightly higher rate than would otherwise have been possible.

Nursery Rearing

Feeding of the fry in each tank usually began two days after tanking, when 75 percent of the fish had swum up. All 1,468,816 fish were tanked by late December, with initial tank loadings of 18 - 27,000 fish, averaging 24,0078 fry in the 61 tanks used. Survival through the swim-up fry stage for the combined stocks was 95.9 percent, just slightly above the five year average of 95.7 percent (Table 22). Kooskia and Dworshak stocks were maintained separate from one another physically, and were tracked in two individual production lots.

Table 22. Survival summary for various life stages of spring chinook salmon - Dworshak NFH.

	Percent Surviving from Previous Stage				Cumul.	Cumul.	Cumul.
BY	EYDegg	TANKfry	PONDfing	RLSDsmlt	GRN>smlt Survival	EYD>smlt Survival	TANK>smlt Survival
1987	92.5	86.2	97.4	93.8	72.8	78.8	91.4
1988	96.0	93.9	76.5	93.0	64.1	66.8	71.1
1989	92.8	94.2	89.2	96.5	75.2	81.1	86.1
1990	94.2	98.2	95.6	97.2	86.0	91.3	92.9
1991	89.0	96.1	99.3	96.9	82.3	92.5	96.2
1992	96.4	96.3	93.4	97.9	84.9	88.1	91.4
5YRavg	**93.7**	**95.7**	**90.8**	**96.3**	**78.5**	**83.9**	**87.6**
1993	87.2	95.9	96.7	0.0	na	na	na

Note 1: Data are only for SCS reared entirely at Dworshak NFH.
Note 2: Eye-up data is from enumerated eggs only (culled, unenumerated green eggs excluded from calculations).
Note 3: Data includes offspring from both KK and DW stock.

Source: SRSM93SC.wk1 - RV 10/28/94

By the end of December 1,455,302 SCS fry were feeding in the nursery (Table 23). Growth of these fish in nursery tanks through the following spring ranged from 0.18 inches in December (with less than a full month) to 0.34 inches in February. While the performance of these fish during nursery rearing was in general quite good, 11 tanks had elevated losses (over three percent monthly). One of these, Tank 73, lost 48.7 percent of its initial population of 10,000 fish. The FHC examined these fish several times, but were unable to establish any viral, bacterial, or parasitical cause for the losses. It was noted that several of the fish that died in Tank 73 fish had coagulated yolk, but a distinct reason for the unusual mortality was never established. While higher numbers of white pectoral fins were noted, no other problems occurred in the nursery and so no chemical or drug treatments were given these fish during this phase of the program. Monthly mortality in the nursery averaged under one percent.

Table 23. Production Data - SCS Brood Year 1992, Fiscal Year 1994.

	End of Month				Monthly		
	Numbers	Weight	FPP	L(in.)	Growth(in)	Mort. (%)	Temp°F
12/93	1,455,302	1,357	1072	1.46	0.18	1.07	40.5
01/94	1,434,551	2,051	699	1.68	0.22	1.58	41.0
02/94	1,428,345	3,536	404	2.02	0.34	0.44	41.0
03/94	1,424,344	4,697	303	2.22	0.20	0.60	50.0
04/94	1,419,913	5,955	236	2.42	0.20	0.31	48.6
05/94	1,403,053	8,517	165	2.72	0.30	1.19	45.4
06/94	1,422,380**	12,294	116	3.06	0.34	0.25	51.2
07/94	1,439,207**	20,266	71.0	3.60	0.54	0.18	47.5
08/94	1,438,476	29,162	19.3	4.07	0.47	0.05	50.0
09/94	1,437,803	40,870	35.2	4.55	0.48	0.05	51.7

** Inventory gains during marking

Raceway Rearing

In late April BY 1994 steelhead were in need of some C- and D-bank tanks being used by BY 1993, and so in the last three days of the month 189,696 Dworshak stock chinook were moved to A-bank raceways. The remaining 1,420,968 chinook transferred to A- and B-bank raceways by May 6. The chinook fingerlings were moved from nursery tanks to raceways without any sample counts being taken and without any fish being weighed. While this was easier on the fish, the principal reason for minimizing handling was due to the fact that half the fish involved in a study would be subsequently sample counted and weighed within a day of ponding as their populations were split and inventoried to other ponds.

One procedure conducted for the first time this year was the splitting of nursery tank populations to two raceways, A1 and A10. The experimental design of an erythromycin study being conducted on this brood year required representation of the population of each nursery tank in each of the five treatment groups. The most efficient and efficacious method to accomplish this was to move one half each tank's population to A1 and to then take the other half the population to A10. This "eyeball splitting" technique proved to be quite accurate, as revealed when these two raceways had their populations subsequently inventoried just after ponding. A1 received 336,640 fish (3.3 percent short of the ideal 347,970 fish) while A10 received 359,301 fish (3.3 percent long of the ideal). Putting this many fish into an 8 by 80 foot raceway for a day is generally not done, but it enabled the populations to thoroughly mix before further splitting. Experimental replicates thus contained genetically similar populations. These two raceways were split to three others within 24 hours. Monitoring of these fish while they were crowded initially ensured that they did not experience significant stress at this time.

A total of only nine raceways were used for ponding BY 1993 initially, with most receiving just over 100,000 fish per pond. Ponding locations, initial numbers, and chinook stocks were strategically chosen to take into consideration 1) the erythromycin study involving five study groups (four raceways each for a total of 20 raceways after splitting), 2) the arrival timing and placement of two

different marking trailers, each responsible for slightly different marking assignments, 3) the fact that ad-clips, coded wire tags (CWTs), and right ventral fin clips were given, and 4) Dworshak and Kooskia stock fish needed to be split into specific sections of raceways by the marking crews.

Erythromycin feeding trials began in May with the feeding of erythromycin medicated feed to selected groups of juvenile SCS. The first two study groups began erythromycin feeding on 5/17/94 for 28 days. One would receive spring/spring feedings and the other spring/fall feedings. The third and fourth groups began their feeding 21-day regimes on 5/24/94. Again, one will receive spring/spring feedings while the other will receive spring/fall feedings. The first spring medicated feedings all ended on 6/1/94. One group of control fish received non-medicated feed during this period. They will be fed non-medicated feed the entire rearing program. Normal production fish were fed erythromycin feed for 21 days.

On 6/23/94 marking crews supervised by Vancouver FRO personnel began adipose clipping and coded wire tag (CWT) marking all SCS on station. Only chinook involved in the INAD (erythromycin) experiments were CWT marked to help assess the released smolt to returning adult survival rates of the various test groups. All other chinook received adipose fin clips, with the exception of two raceways of Kooskia stock which were given a right vent fin clip. Marking operations were completed by 7/21/94.

Raceway populations were split to other rearing units during marking operations, with complete inventories of all spring chinook on station being accomplished. A gain of 36, 154 fish was realized, representing an inventory gain of 2.6 percent over then current book values, close to historical average inventory changes at marking. All 40 chinook raceways were filled with fish, averaging just under 36,000 fish per raceway.

These chinook continued to perform well through September 30, the fiscal year's end. Monthly growth during summer and fall ranged from 0.34 to 0.54 inches per month (Table 23 above). Monthly mortality rates were quite subdued, dropping from 0.25 percent in June to 0.05 percent in August and September. Few fish exhibited BKD during this period, while parasites were so limited that no treatments were warranted.

On 9/13/94 and 9/20/94 the 28-day and 21-day (spring/fall) feeding regime groups began receiving their second Aquamycin-medicated feedings. The 1.8 percent body weight feeding rate produced a 100 mg erythromycin per kilogram of fish daily dosage. All other raceways were also fed at the same percent body weight feeding rate to comply with the experimental design. At September's end, there was little difference in fish performance characteristics for the two treatments and control groups.

On September 30 BY 1993 chinook averaged 35.2 fish per pound, well ahead of schedule. Feeding rates of 95 to 100 percent of manufacturer's recommended rates have produced healthy fingerlings to this point in time. With fish size ahead of target, however, some adjustment in feeding rates during Fiscal Year 1995 will likely be necessary to ensure these fish are released no larger than 15 FPP smolts.

- SCS Brood Year 1994 -

For a complete report on Brood Year 1994 spring chinook spawning the reader is referred to the reports dealing with adult returns, adult holding, spawning, incubation, and disease sampling compiled by the Idaho Fishery Resource Office, the Dworshak Fish Health Center, and Dworshak NFH.

Ladder Operation

The fish ladder at Dworshak National Fish Hatchery was opened on May 25, 1994, and remained open through September 12. Kooskia's trap remained open after its steelhead season, with the trap being operational until July 27. A total of only 306 chinook salmon returned to the complex with 232 returning to Kooskia NFH and 74 to Dworshak NFH.

Pre-spawning Summary

All returning spring chinook salmon from Dworshak and Kooskia NFH were held in Holding Pond 1 to facilitate anti-fungal treatment of the 1994 brood stock. In order to distinguish stocks the 202 Kooskia SCS adults were tagged before being shipped to Dworshak. They received an opercle punch and a plastic cinch-up tie. An additional 25 SCS were passed above the weir at Clear Creek for possible natural recruitment. Including five trap mortalities resulted in a total Kooskia run of 232 BY 94 SCS. On the third of August 253 SCS being held at Dworshak were anesthetized with Tricaine Methane Sulfonate (MS-222) buffered with sodium bicarbonate, sexed, measured, and inoculated with Erythromycin Phosphate before being back put to Holding Pond 1.

Formalin Treatment for Adults

Adult spring chinook salmon returning to Dworshak and Kooskia NFHs were treated with a 167 mg/l formalin bath to control external fungus and reduce pre-spawning mortality. From 6/1 - 7/19/94, this was done three times per week, and from 7/20 - 8/23/94 this was increased to five times weekly.

Pre-spawning mortality of adult spring chinook was 7.8 percent (22 of the 281 fish held) for Dworshak and Kooskia stocks combined (Table 24). The Kooskia stock adults had a pre-spawning loss of 4.8 percent, while Dworshak adults experienced a 16.2 percent loss. The higher Dworshak loss was basically due to an incident in which adults were unknowingly trapped between the gates of the channel crowder. An overall loss for both stocks of 11.0 percent was realized for the entire spawning season.

Table 24. Mortality in adult spring chinook salmon held from June 1994 through spawning (September) - SCS BY 1994.

Type Mortality	Dworshak No.	Dworshak Percent	Kooskia No.	Kooskia Percent	Total No.	Total Percent
Pre-spawning*	12	16.2	10	4.8	22/281	7.8
During spawning	1	1.4	8	3.9	9/281	3.2
Total	13	17.6	18	8.7	31/281	11.0

* Morts picked from holding ponds from ladder opening on 5/25/94 through first spawn on 8/23/94. Dworshak - 74 adults, Kooskia - 207 adults (25 placed above KK weir not included).

Spawning Summary

Six egg takes were completed for this brood year, starting August 23 and ending September 14 (Table 25). 126 females were spawned, 31 from Dworshak returns and 95 from Kooskia returns. A total of 508,080 green eggs were produced, 388,000 from Kooskia stock and 120,080 from Dworshak stock. Eye-ups for enumerated eggs from Kooskia and Dworshak stock were 89.0 and 89.2 percent, respectively, resulting in 330,500 eyed eggs being available for Kooskia's program and 104,900 for Dworshak's.

Table 25. Spawning summary - spring chinook Brood Year 1994.

TK DATE	NOspawned Mls.	Fmls	Actual GRNegs	Culled GRNegs	Actual EYDegs	Enum egg%	Total egg%	Actual EGprFM	CULLDtray Dead	BKD
KOOSKIA:										
Sbtl/AVG	75	95	388000	16746	330500	89.0	85.2	4084	2	2
DWORSHAK:										
SBtl/AVG	22	31	120080	3347	104900	89.9	87.4	3874	0	1
TTL/AVG	97	126	508080	20093	435400	89.2	85.7	4032	2	3

Source: EGUP94SC.wkl - 10/18/94

Table 26. Comparison of BY 1994 spring chinook salmon spawning with 5-year average.

Brood Year	Adult Returns	Percent Females	Green Eggs	Eggs /Fml.	Eye-up Percent
1989	2,673	48.7	3,516,306	3,701	92.8
1990	3,183	54.9	4,833,104	3,623	94.2
1991	632	51.9	995,842	4,117	89.0
1992	681	53.2	881,980[1]	?	?
1993	1,579	51.7	3,489,391	4,270	87.2
5 Yr Avg	1,750	52.1	2,743,325	3,928	89.0
1994	306	54.7	508,080	4,032	89.2

1 Estimate.

Spawning Procedures

Adults were anesthetized with MS-222 and checked for ripeness. Spawned adults were identified with numbered pins, necessary for later identification and segregation/culling of eggs according to disease status. Sperm was collected in disposable styrofoam cups and kept on ice until needed. Females were cut and eggs collected in disinfected colanders to drain ovarian fluid. Gametes from both males and females were mixed with the addition of a small amount of 1.0% saline solution.

Fertilized eggs were rinsed thoroughly and placed into incubators where they were disinfected with 75 mg/L iodophor (buffered with sodium bicarbonate) for 30 minutes. One to one spawning was accomplished except when not enough males were available. This resulted in a male to female spawning ratio of 1.00 to 1.29.

Aseptic procedures were used throughout the entire spawning period. Females were swabbed with iodophor before spawning. Males, however, were not iodophored to avoid contaminating the milt.

Incubation

Dworshak and Kooskia eggs were single incubated in Heath trays. Incubation temperatures were kept at 52 °F or below. Water chillers provided 42 - 44°F water to chill Egg Takes 1 through 4, slowing their development so that Takes 1 through 5 all had accumulated approximately equal temperature units totals by eye-up, which occurred on October 8. Incubating eggs were given a 15-minute 1,667 mg/l formalin treatment three times each week.

Water temperatures of 48 - 52° F are planned for October and November of 1994, with 42°F temperatures planned for December. This should produce swim-up fry on January 1, 1995, when the fry should have about 1,650 temperature units accumulated. Kooskia eyed eggs are to be shipped to Kooskia the end of October.

Production Program Objectives

Approximately 100,000 chinook smolts should result from the eyed eggs incubated at Dworshak (Table 27). This assumes a survival from green eggs through released smolt of 85 percent.

Table 27. Program proposal - Spring Chinook Salmon Brood Year 1994.

Program (Egg Source)	Number at Release	Type of Release	FPP at Release	Date of Release	Release Site
(Dworshak) 105 K eyed	92,000	Smolt	15-20	Apr 96	Dworshak
(Kooskia) 330 K eyed	290,000	Smolt	18.0	Apr 96	Kooskia
	=======				
Total Smolts	382,000		Eyed egg to smolt survival of 85%		

-Rainbow Trout Production-

For the first time in many years, Dworshak NFH's rainbow trout (RBT) mitigation program was conducted at Dworshak. For the last decade, this program had been shifted off-site to Hagerman or to Kooskia NFHs to rear fish in IHN virus-free conditions and to allow releasing them into Dworshak Reservoir. With Dworshak Reservoir water becoming available for the nursery's water supply in 1992, the RBT program could once again be returned to Dworshak.

Examination of the then BY 94 steelhead program determined that there would only be minor overlap in the steelhead tank requirements with those of the rainbow trout program. It was decided to attempt to fulfill Dworshak's mitigation responsibilities by rearing the rainbow only on "clean" reservoir furnished nursery tanks.

Two groups of Arlee strain RBT were scheduled from Ennis NFH, with the first shipment of 100,000 eyed eggs arriving November 23, 1993 and the second lot of

100,000 eyed eggs arriving one month later on December 22. After appropriate water hardening and disinfection in iodophor, eggs were placed into 10 hatching jars in Dworshak's B-bank of nursery tanks on heated 54 to 58°F water. Hatching and swim-up occurred for each of the two groups in the next two weeks after arrival, and the new fry began feeding.

Growth was rapid, averaging 0.6 to 1.0 inches each month. Aside from one formalin treatment provided one tank to clear up elevated levels of Ictyobodo (Costia), no health problems occurred during the production program and no other treatments were given.

In March 1994, the State of Idaho raised objections to releasing rainbow trout from Dworshak into Dworshak Reservoir because of a perceived risk that the fish could be carriers of IHN and be a potential disease risk to Clearwater Hatchery receiving their water from the reservoir. Although there were no IHN incidents in the RBT in the nursery, the state request was respected and shipment of the fish to other locations was examined.

Approximately half the 162,000 rainbow ultimately produced were distributed in late March to local fishing lakes within the area (Table 28). These approximately 80,000 fish averaged 21.0 FPP or near the 20 FPP (5 inch) target. The second group of 80,000 RBT were loaded onto a IDFG distribution truck and hauled to Oxbow Lake in central Idaho on 4/27/94. In an arrangement worked out with the State of Idaho, the remaining 4,114 rainbow were stocked in Mud Spring Lake at the request of the Nez Perce Tribe in early May.

Table 28. Distribution summary - RBT BY 1993.

Stocking Site	Date	Number	Wt (lb)	FPP	L (in)
Winchester Lake	3/28/94	40,005	1,905	21.0	4.92
Mann Lake	3/30/94	37,691	1,792	21.0	4.92
Oxbow Lake	4/27/94	80,916	3,920	20.6	4.95
Mud Spring Lake	5/04/94	4,114	200	20.6	4.95
		---	---		
Totals		162,726	7,817	20.8	4.94

File: ANRP94FY - RV 11/30/94

HATCHERY PRODUCTION SUMMARY

Station:
DWORSHAK NFH
Period covered:
10/1/93 through 09/30/94

Density Index: 0.12 | Flow Index: 0.53 | Total Flow: 51004 gpm

Species and Lot	FISH ON HAND END OF MONTH			THIS F.Y.						TO DATE		LENGTH INCREASE 30 DAY MONTH
	Number	Weight	Length	FISH SHIPPED	WT GAIN	FISH FEED EXPENDED		Conver-sion	FEED COST	T.U. per Inch	T.U.	
				Number	Weight	Pounds	Cost		Per Lb.			Inches
1	2	3	4	5	6	7	8	9	10	12	13	14
STT-NFW-93-DWO-0	0	0		0	122	332	209.59	2.72	1.72	NA	NA	NA
STT-NFW-93-DWO-1	0	0		746,797	69,344	98,653	24,329.50	1.42	0.35	NA	NA	NA
STT-NFW-93-DWO-2	0	0		247,520	31,659	85,142	23,790.31	2.69	0.75	NA	NA	NA
STT-NFW-93-DWO-3	0	0		863,560	97,139	161,372	41,153.83	1.66	0.42	NA	NA	NA
STT-NFW-94-DWO-0	0	0		81,237	27,567	31,791	20,552.00	1.15	0.75	NA	151.7	NA
STT-NFW-94-DWO-1	813,391	40,185	5.21	0	29,302	48,542	14,485.49	1.66	0.49	31.9	62.9	0.75
STT-NFW-94-DWO-2	760,338	12,798	3.64	0	6,571	7,278	3,259.86	1.11	0.50	27.3	42.9	0.70
STT-NFW-94-DWO-3	1,072,684	25,484	4.08	0	16,519	20,444	6,229.73	1.24	0.38	33.3	30.3	0.66
RBT-ARD-93-ENN-0	0	0		162,726	7,745	9,231	3,699.38	1.19	0.48	NA	NA	NA
RBT-ERD-94-ENN-0	12,049	81	2.82	0	80	251	226.24	3.14	2.83	36	64.4	0.61
SCS-CRW-92-DWO-0	0	0		1,302,687	47,185	88,715	41,087.92	1.88	0.87	NA	NA	NA
SCS-CRW-93-DWO-0	866,984	23,760	4.50	0	23,760	33,116	18,103.18	1.39	0.76	42.4	138.4	0.48
SCS-CRW-93-KK-0	570,819	17,110	4.64	0	17,109	21,803	12,085.55	1.27	0.71	40.7	138.4	0.50
Subtotal RBT	12,049	81	2.82	162,726	7,825	9,482	3,925.62	1.21	0.50	NA	96.7	NA
Subtotal STT	2,646,413	78,467	4.30	1,939,114	278,223	453,554	134,010.31	1.63	0.48	30.8	95.9	0.70
Subtotal SCS	1,437,803	40,870	4.56	1,302,687	88,054	143,634	71,276.65	1.63	0.81	41.6	138.4	0.49
TOTALS	4,096,265	119,418		3,404,527	374,102	606,670	209,212.58					
AVERAGES			4.39					1.62	0.56			

Form 3-229

FISH AND FISH EGG FISCAL YEAR 1994 DISTRIBUTION SUMMARY

Fiscal Year: 1994

Delivering Hatchery: Dworshak NFH

Line 1	Program 2	Agency 3	State 4	WType 5	Management Area 6	Water Name 7	Acres/ Miles 8	Species 9	Strain 10	Fish & Fish Egg Numbers 11	Fish Length 12	Total Weight 13
1	RM	FWS	ID	SR	IDAHO	BOISE R.		STT	NFW	400	32.5	4800
2	RM	FWS	ID	SR	IDAHO	CLEAR CR.		STT	NFW	349633	7.66	55078
3	RM	FWS	ID	SR	IDAHO	MAIN S. CLEARWTR. R.		STT	NFW	1153417	7.63	179622
4	BS	STG	ID	HO	CLEARWATER AFH	CLEARWATER AFH		STT	NFW	905000	0	0
5	BS	STG	ID	HO	MAGIC VALLEY SFH	MAGIC VALLEY SFH		STT	NFW	1520000	0	0
6	BS	FWS	ID	HF	KOOSKIA NFH	KOOSKIA NFH		SCS	CRW	160000	0	0
7	RM	FWS	ID	SR	IDAHO	M.S.CLEARWTR.R.@KAMIAH		STT	NFW	136447	7.74	19008
8	RM	FWS	ID	SR	IDAHO	S.F.@COTTONWOOD CR.		STT	NFW	86951	7.39	12277
9	RM	FWS	ID	SR	IDAHO	S.F.@RIVER MILE 8.7		STT	NFW	97429	7.5	14390
10	RM	FWS	ID	LK	IDAHO	MANN LK.		RBT	ARD	37691	4.92	1792
11	RM	FWS	ID	LK	IDAHO	MUD SPRINGS LK.		RBT	ARD	4114	4.92	200
12	RE	NMF	WA	RE	WASHINGTON	NMFS		STT	NFW	34000	7.25	4541
13	RE	NMF	WA	RE	WASHINGTON	NMFS		SCS	CRW	24414	5.8	1431

Form 3-2026 (Rev. 12/91)

FISH AND FISH EGG FISCAL YEAR 1994 DISTRIBUTION SUMMARY

Fiscal Year: 1994

Delivering Hatchery: Dworshak NFH

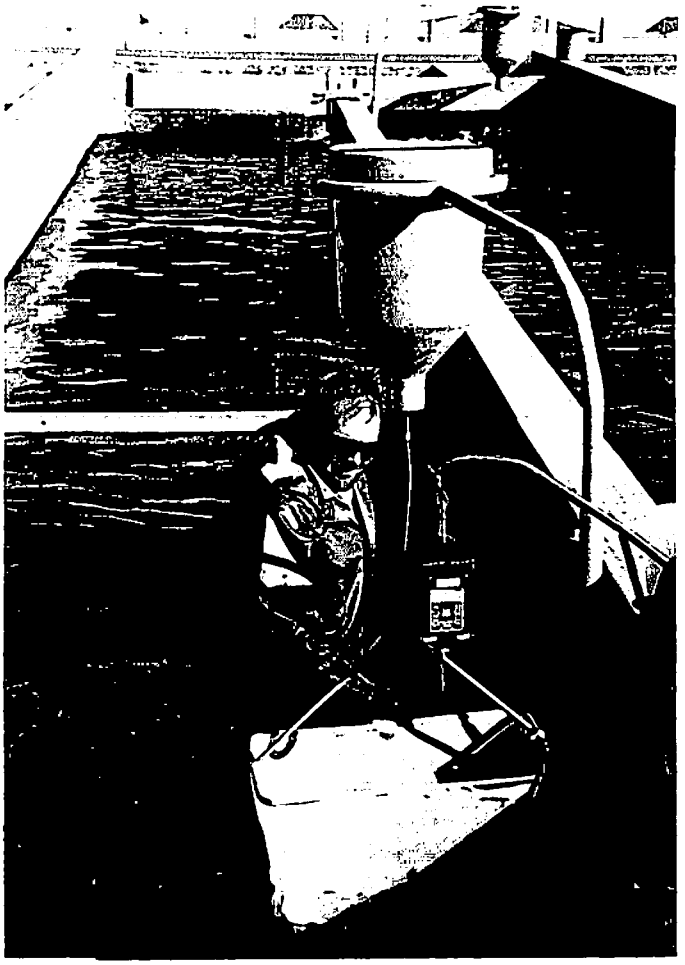
Line	Program	Agency	State	WType	Management Area	Water Name	Acres/ Miles	Species	Strain	Fish & Fish Egg Numbers	Fish Length	Total Weight
1	2	3	4	5	6	7	8	9	10	11	12	13
14	RM	FWS	ID	SR	IDAHO	N.F. CLEARWTR. R.		SCS	CRW	1278273	5.78	73955
15	BS	BIA	ID	HO	SWEETWATER INC. STA.	SWEETWATER INC. STA.		SCS	CRW	114900	0	0
16	RM	FWS	ID	LK	IDAHO	OXBOW LK.		RBT	ARD	80916	4.92	3920
17	RM	FWS	ID	LK	IDAHO	WINCHESTER LK.		RBT	ARD	40005	4.92	1905

FISH AND FISH EGG FISCAL YEAR 1994 DISTRIBUTION SUMMARY

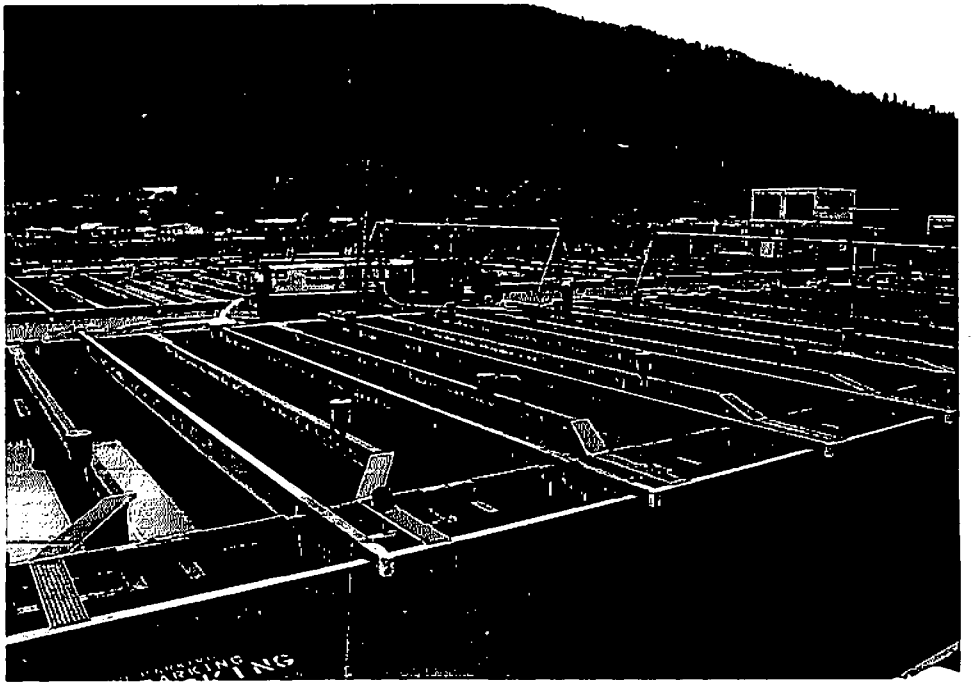
Fiscal Year: 1994

Delivering Hatchery: Dworshak NFH

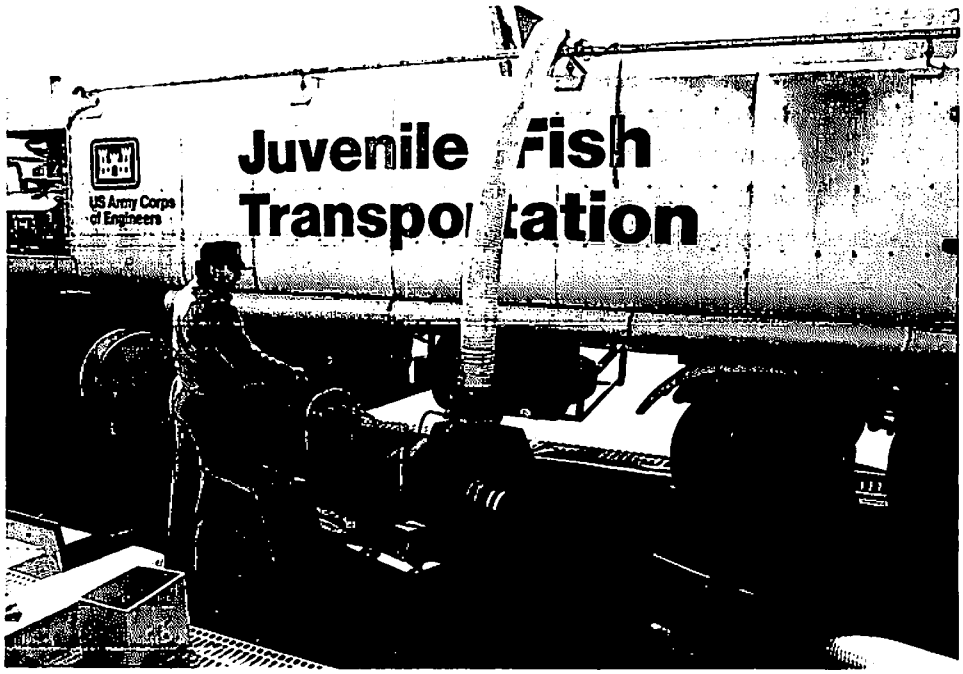
	SPECIES	STAGE	NUMBER	WEIGHT
SUMMARY:	STT	EGGS	2,425,000	0
		SMOLT	1,857,877	284,916
		ADULT	400	4,800
	SCS	EGGS	274,900	0
		SMOLT	1,302,687	75,386
	RBT	FINGERLINGS	162,726	7,817
	FY 1994 DISTRIBUTION TOTALS		6,023,590	372,919



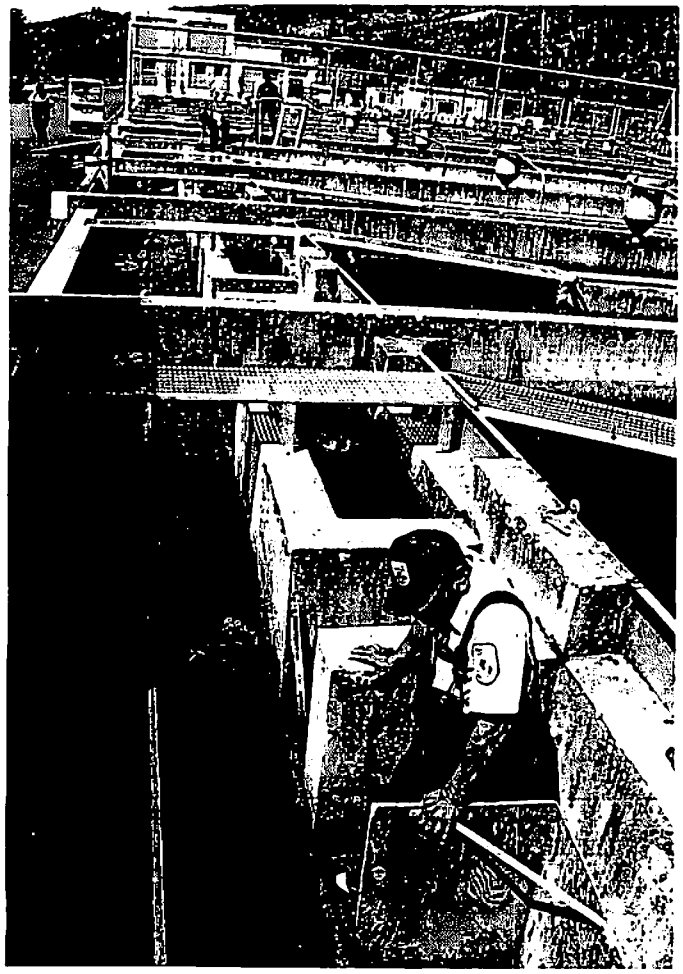
Weighing and sampling steelhead smolts for off-site release.



Corps fish distribution unit assisting with hauling steelhead smolts upriver for release.



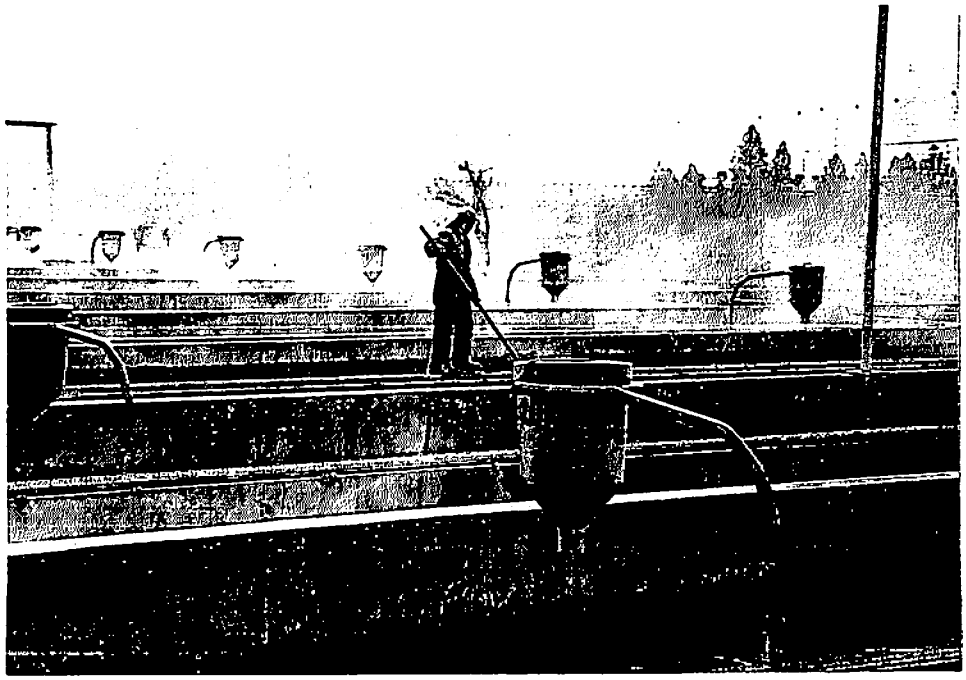
Ray Rosales, Maintenance Worker, operating a fish pump to load trucks with steelhead smolts for off-site planting.



Fish Culturist, Ron Oatman, releasing steelhead smolts directly from the ponds for on-site planting.

Spawned out steelhead carcasses in baskets to be picked up for processing and later distribution by Idaho Department of Education.

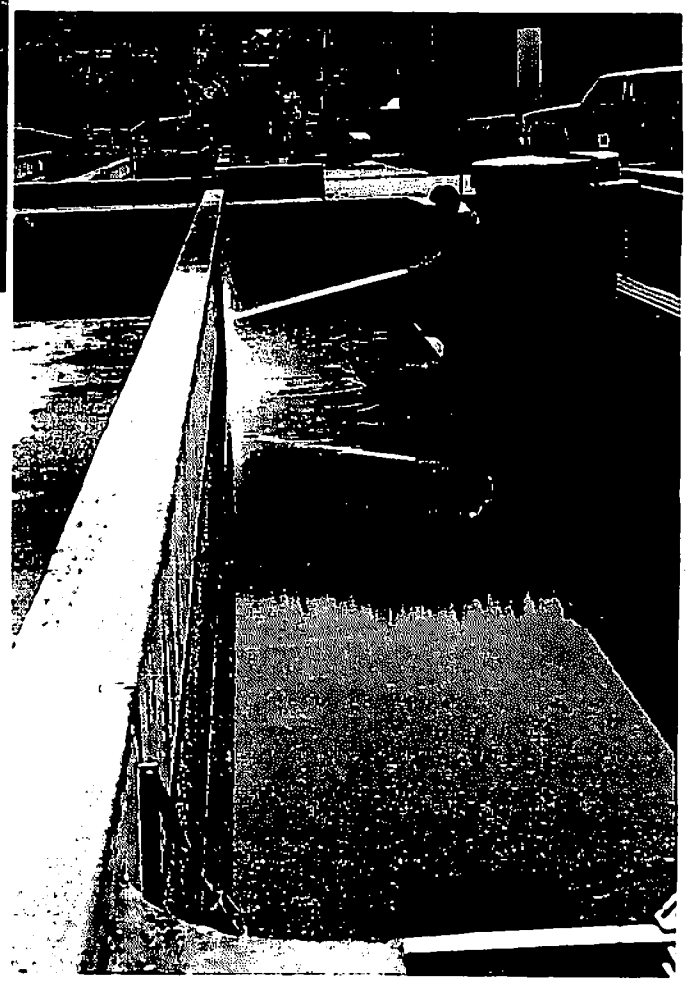
IDFG loading excess steelhead adults for transfer to Boise River.



Cleaning steelhead ponds - January 1994

Workers removing steelhead IHN losses from production ponds.

John Vargas, Fish Culturist, un-packing shipment of rainbow trout eggs.



Cleaning and hosing ponds for receiving new steelhead from inside nursery tanks.

Kip Bottomley, Kooskia NFH, netting spring chinook salmon adults to Hank Jenks, Maintenance Worker, for transfer to Dworshak's holding ponds.

Unloading spring chinook adults from Kooskia to ponds at Dworshak for holding and later spawning.

REPAIRS/IMPROVEMENTS/NEW EQUIPMENT

Work was nearing completion on enclosing the spring chinook raceways from bird predation. Approximate area of coverage was 25,000 sq. ft. at a cost of less than $20,000 to complete. In addition, labor costs for a temporary welder position to fabricate and install the heavy metal framing were $7,000. A wire mesh material was installed attached to the framing for a side enclosure and also for overhead cover.

A media transfer system, designed and completed by station employees, was tested and found to be successful in transferring media between filter beds of System II for cleaning and servicing. The proven success of this system replaces pumping and added staff hours previously involved in this operation. The project was completed by station personnel at a considerable cost savings to the government from original estimates and design provided by the Corps - $1,000.

The hatcheries distribution truck (FY1990 purchase @ $58,500) was delivered February 1994 with a new 2500 gallon tank (FY1991 - $66,300; FY1993 - $16,500) for hauling fish. Several modifications were required to assure the unit was road ready for operation by April. Total cost of unit from prior year funds - $141,300.

Annual overhead entance bridge inspection - $2,600.

Asphalt overlay of service road and entrance drives in housing area - $8,100.

Annual maintenance repairs of the bird netting cover over steelhead production ponds was performed. A more permanent enclosure similar to the chinook pond cover is a future project.

Servicing of the building overhead door was completed including an electrical operator for a large entrance door on Mechanical I building - $2,500.

New sludge pumps purchased in FY1993, were installed for waste removal from the chinook raceway cleaning.

Five (5) main entrance signs were cleaned and repainted after 25 years of outside exposure - $800.

Striping parking lot and service roads - $400.

Residence improvements included new bathroom wall tile and fixtures, completion of floor covering in Quarters No. 1 and No. 2 - $6,000.

A contract issued by the Corps for $4,800 was completed to test radon levels in four residences and make necessary corrections as needed. Earlier testing revealed higher than desired readings causing concern for immediate work to reduce levels. Latest testing indicated a reduction in radon using several fans installed in the basement areas.

Repair damaged piping supplying water to A-bank nursery tanks - $2,500.

Tree planting of buffer zone adjacent to hatchery residences - $1,100.

Installed two new pond aerators (purchased in FY1993) in sludge basin adjacent to filter beds replacing older Toronado units.

Completed installation of a fire/maintenance pump system purchased FY1993.

Replaced cable on overhead bridge crane in main pump building.

System III channel pump repaired - $2,200.

Materials purchased and work begun to construct and install storage cabinets and counters in office area - $1,500.

A debris barrier in front of Dworshak's river intake broke loose during high water flows in July. The hatchery crew with Corps assistance added new logs and reinstalled the barrier to the anchor points in place.

Work was completed on installing air bleeders and traps (FY1993 purchase) in the major feeder lines supplying water to the nursery tanks.

Cleaned and removed approximately 500 cubic yards of material from settling ponds with Corps equipment and operator providing assistance.

Youth Conservation Corps (YCC) contributed 2,200 hours towards a number of improvement accomplishments. A concrete handicap walk way for wheelchair access to the kid's fishing pond was constructed, painting of the aeration piping performed, weeding and landscaping completed.

Annual electrical breaker testing - $1,600.

A major project was begun and completed involving the lowering of six 30-inch pipelines at the main aeration chamber. A two-foot section from each of the upright supply lines was removed to reduce head pressure and increase water flow. Each column degasser was also reduced in height to accommodate the changes. A "special" two-month appointment of a welder with assistance from the maintenance crew completed the job. Modifications in the piping allows the hatchery to approach full pumping capability from six major pumps at the river intake structure. In addition, two 250 H.P. pumps are being purchased (FY1994, FY1995) to upgrade existing 200 H.P. units. Considerable cost savings resulted from the above design changes by eliminating extensive electrical upgrades of present services. Cost of the above project, excluding pumps, was $9,500.

The Corps of Engineers was notified that Dworshak's operating funds would cover a $13,200 cost to assist in improving electrical services at the hatchery. New overhead services will be provided

from the main Clearwater sub-station to the hatchery along with replacement and updating of major wiring on the hatchery grounds expected to be completed in fall 1994.

--Equipment--

Dworshak's new fish distribution unit was delivered on January 31, 1994. Nebraska Welding of Omaha constructed the 2,500 gallon "stainless" steel tank from prior year funding.

A cost bid of $44,300 was accepted for putchase of one 250 H.P. pump to be installed in Dworshak's main pumps tation. The bid price is also good for purchase of another unit in early FY1995. The two units are replacements for 200 H.P. pumps. This work is part of an upgrade of Dworshak's water system to increase pumping capability from the river.

Ozone generator tube replacement - $5,500.

Vehicle purchase replacing 1984 Dodge van - delivery FY1995 - $17,900.

Cost share of $4,400 for replacement of copy machine at $13,000.

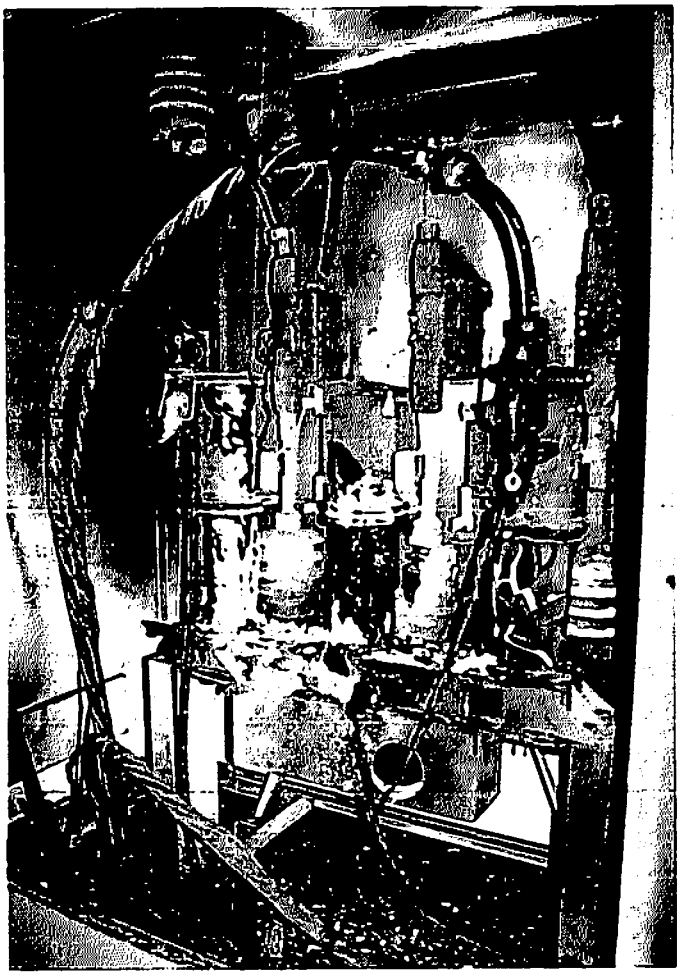
Refrigerator - Quarters No. 1 - $680.

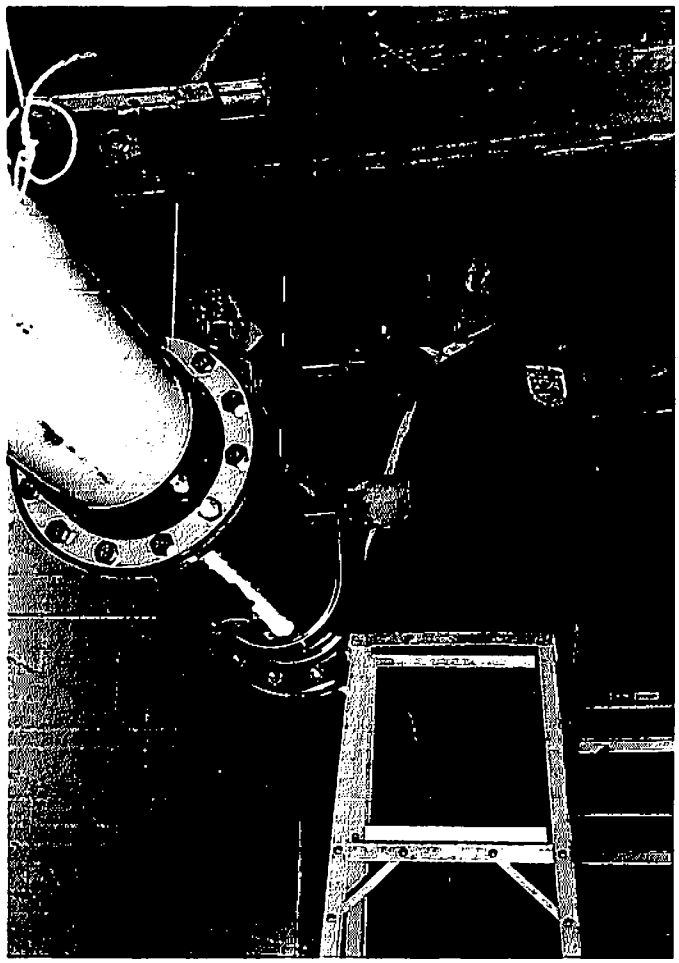
Welder - $2,100.

Battery replacement for pond crowder - $2,100.

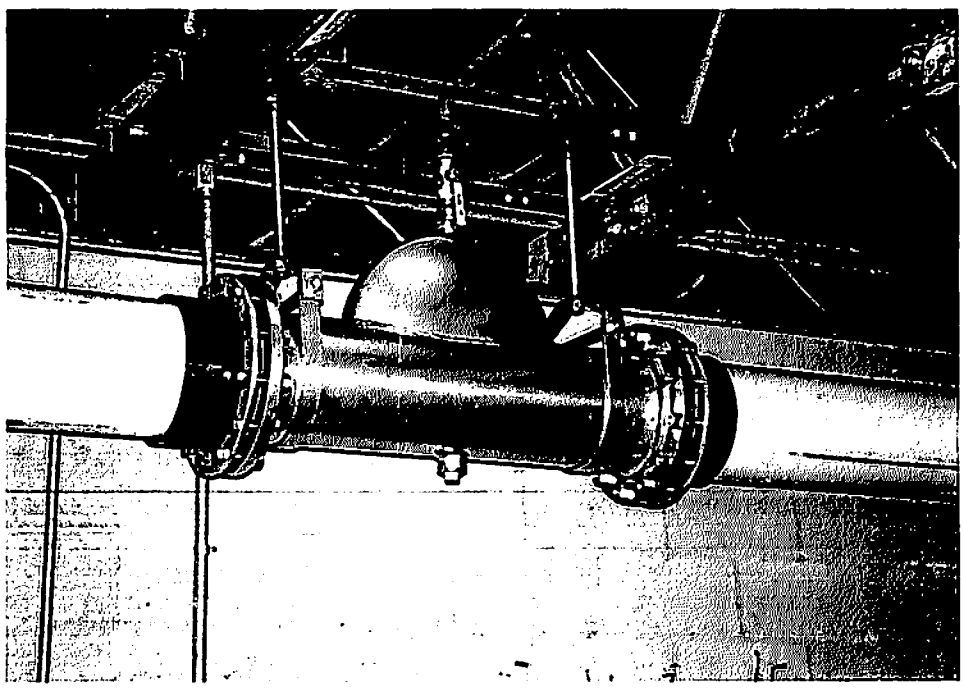
Battery replacement for fork lift - $1,200.

No. 2 boiler explosion resulting from a change over to commercial electrical power from standby generation - May 1994



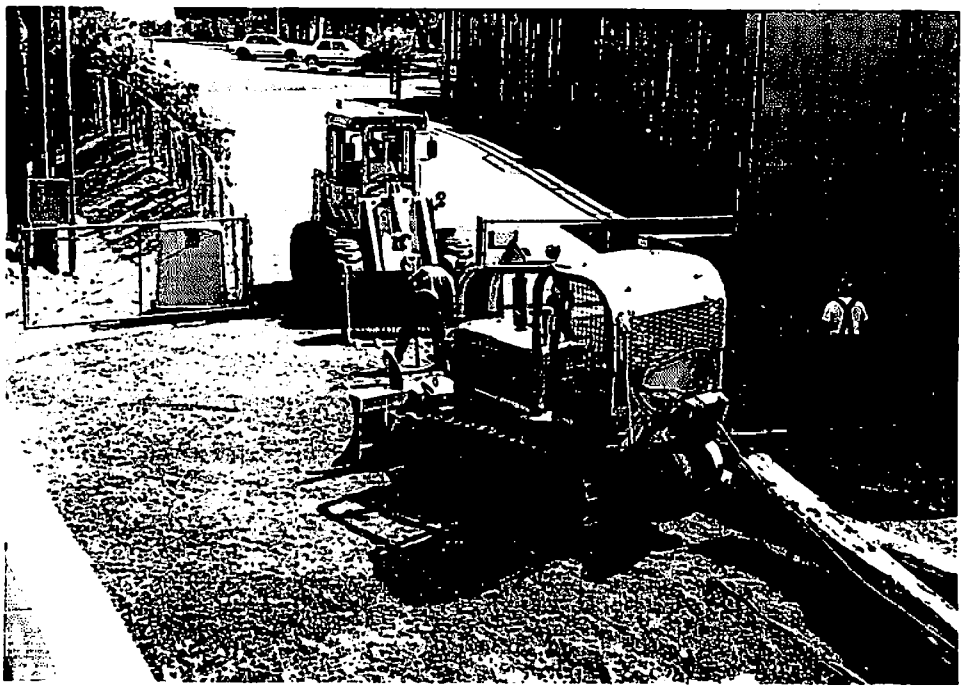


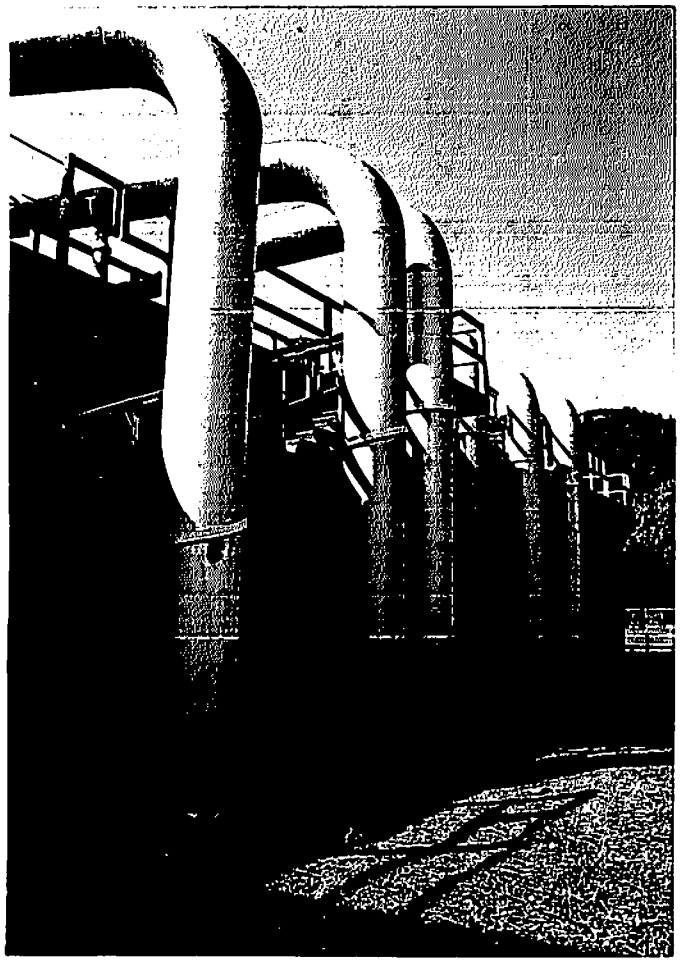
Maintenance Worker Terry Weeks installing new air bleeders(4) in nursery water supply lines.



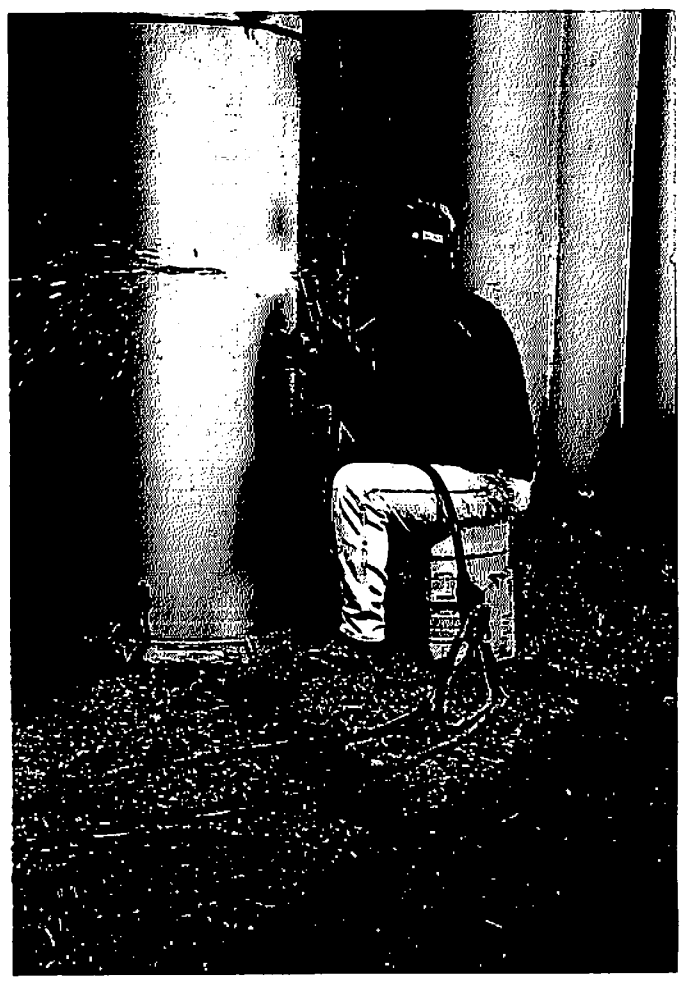
Planting trees in buffer area adjacent to hatchery housing.

Replacement of debris barrier near main river intake after high water flows from increased spilling caused logs to break loose.

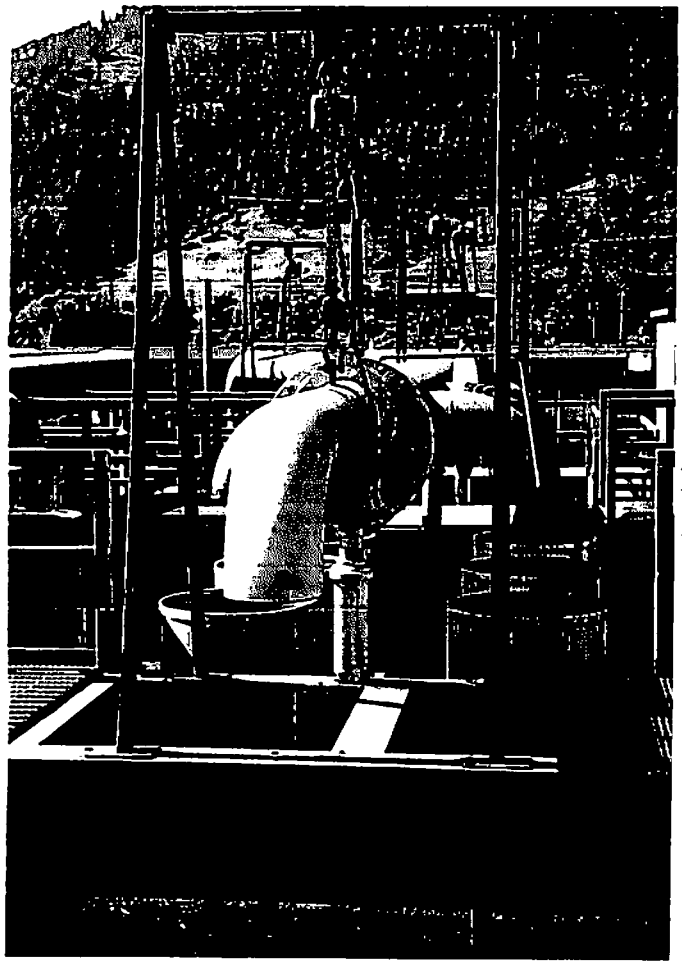




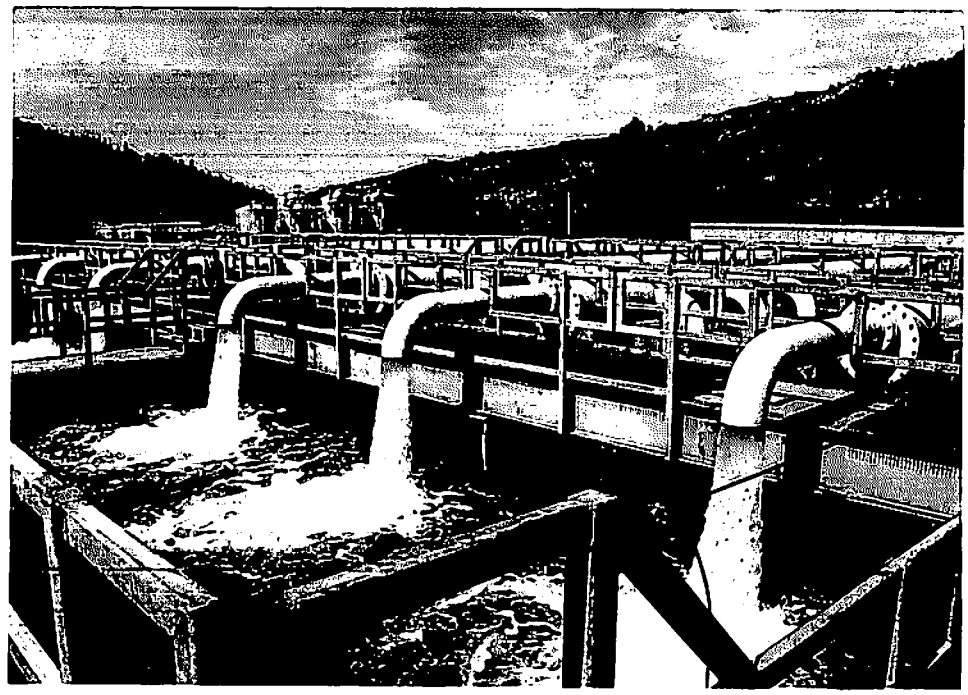
24-inch supply lines before removing 2-foot sections and lowering each pipe to reduce head pressure and increase water flow.



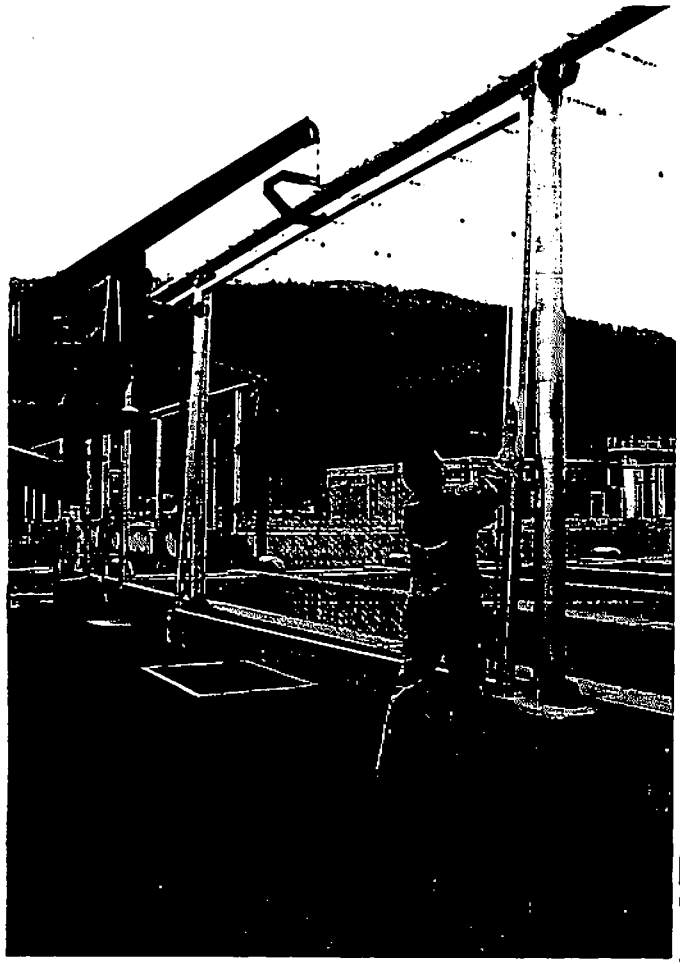
Welder, Joey Vaughn, applying cutting torch to water line for removing a 2-foot section of pipe.



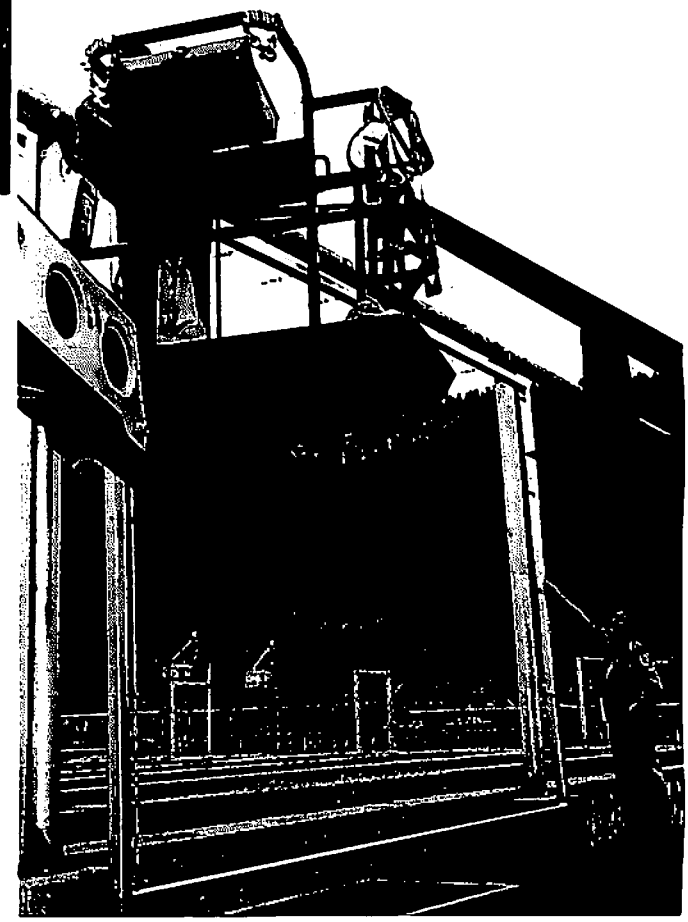
Fabricated hoists in operation to lower pipelines at main aeration chamber.



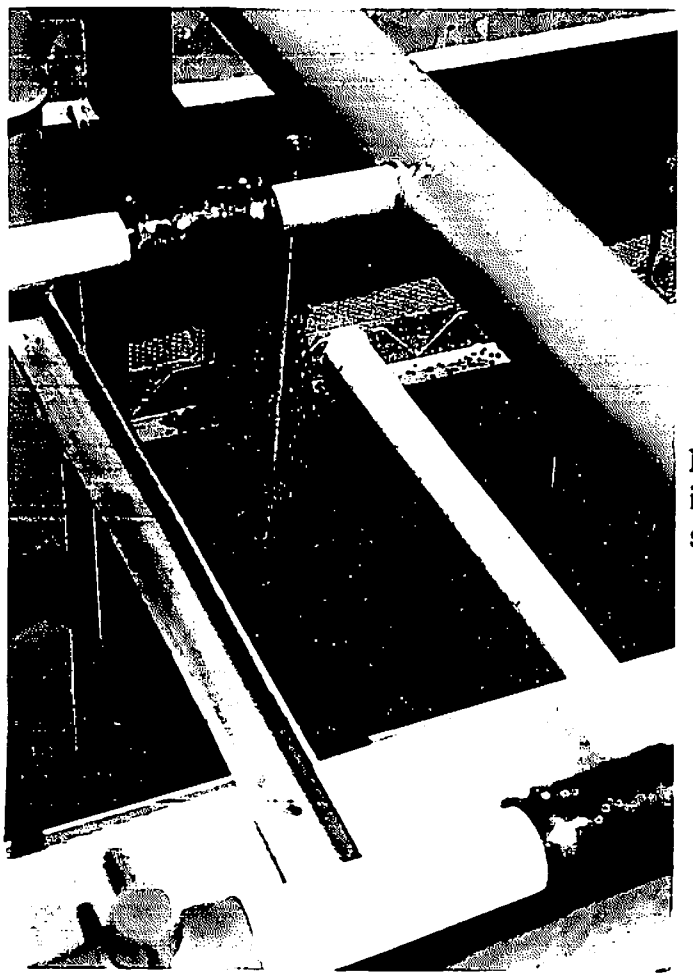
Project completed at main aeration chamber with lowering of six major supply lines to improve pumping capability and increase water flow to production units.



Maintenance Supervisor, Dave Clifford, assisted by the station manlift installs a section of enclosure along the spring chinook raceways to eliminate bird predation.

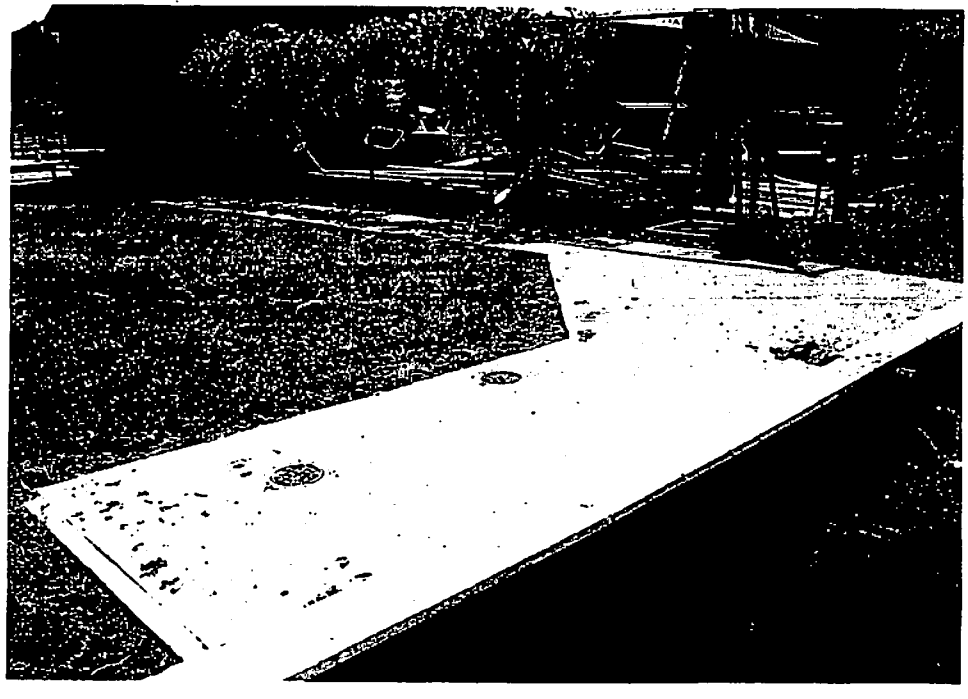


Cleaning and removal of materials from the sedimentation ponds.



Media transfer system fabricated and installed to assist in cleaning and servicing System II filter beds.

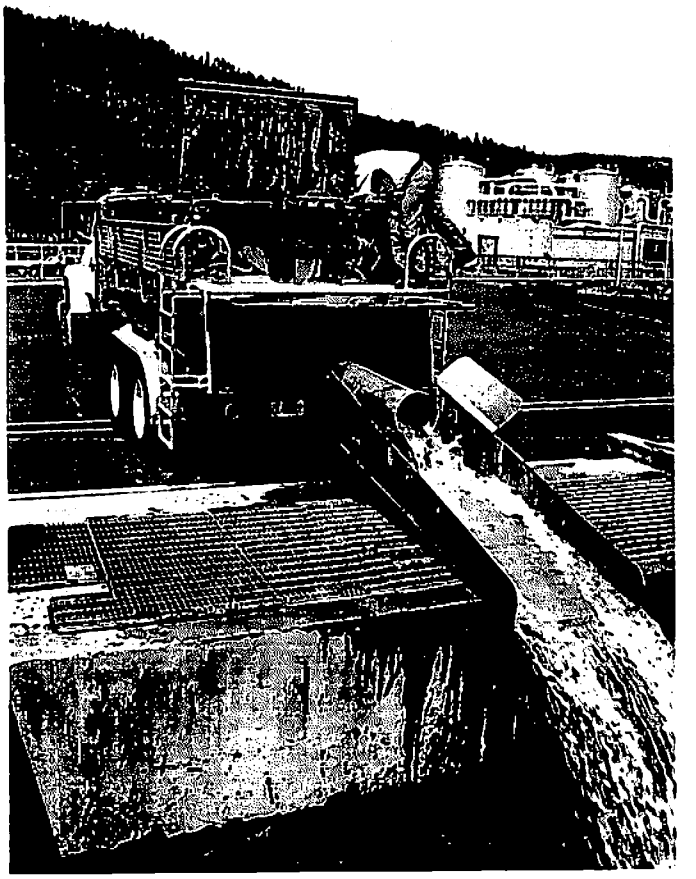
Asphalt overlay in area of hatchery housing - $8100



Handicap access walkway and concrete apron adjacent to the kids' fishing pond completed by the YCC program.

Receiving delivery of 2500 gallon fish distribution unit - February 1, 1994

1990 Ford diesel 9000 Series, with 2500 gallon stainless steel tank mounted for fish hauling.



New fish distribution unit in operation, unloading chinook adults to holding pond from Kooskia NFH.

MEETINGS/TRAVEL/TRAINING

Two coordination meetings were hosted by the hatchery. A fall meeting held on November 18, 1993 and the spring session on March 17, 1994 were attended by FWS staff, IDFG, Corps of Engineers and Nez Perce Fishery Project.

Dave Owsley attended the Annual Association of Conservation Engineers (ACE) meeting in Boise, October 4-7.

A meeting at the Dworshak Hatchery on November 22 reviewed the latest status of the station's major rehab program with the Corps of Engineers. In attendance from the Dworshak Dam Project were Wayne John, Acting Project Engineer, and assistants Dave Mitchell and Gary Delaney.

The 44th annual Northwest Fish Culture Conference was held in Spokane December 7-9. Attending from the Complex were Wayne Olson, Dave Owsley, Amy Kispaugh, Diane Praest, Ron Oatman, Rocky Greenland, Kip Bottomley and Ben Wright. Olson and Owsley co-chaired the program, Kishpaugh and Praest assisted at the registration desk.

Jon Streufert was selected for a Management Control Review Team organized by the Washington Office. The team's purpose was to review particular components of the Service to assure present controls were in place. Mr. Streufert attended a team meeting held in Arlington, Virginia on February 17-18.

Dave Owsley traveled to Springfield, Missouri in February to assist in instructing the Cold Water - Warm Water Fish Culture course conducted by the Leetown Academy.

Wayne Olson traveled to Portland on February 7 as part of a planning team for the 1994 Project Leader meeting.

Manager Olson attended the Outplanting Committee meeting held at Dworshak on February 11. Representatives included Idaho FRO, Nez Perce Tribe and Idaho Department of Fish and Game to review plans for the release of chinook and steelhead smolts.

Olson and Owsley traveled during the week of March 28 visiting IDFG facilities at Pahsimeroi and Sawtooth, private hatcheries at Mackay and Grace, Hagerman NFH and LSRCP office in Boise. Dave Owsley presented a paper on ozone at the Idaho Rural Association Conference in Pocatello on March 30. Of special interest was Kimball's Black Canyon Trout Farm near Grace, Idaho and the canning operation that utilizes Dworshak's steelhead for later distribution by the Department of Education.

Manager Olson attended the Native American Fish and Wildlife Conference held in Spokane, Washington April 5-7. Olson also met with a regional group in exploring the establishment of a Tribal liaison position in fisheries.

Manager Olson accompanied seven new employees on a tour of Lower Granite fish facilities on May 18.

Manager Olson visited Abernathy Tech Center on June 23, attended an Outreach Briefing session at Ridgefield NWR on June 24 followed by Regional Director Plenert's retirement party in the evening.

Wayne Olson attended an Eco-System workshop in Portland July 19-22 followed by a Columbia River Basin Eco-System management team meeting in Portland on August 30-31.

Manager Olson was a team leader on a peer review of the Warm Springs NFH and Mid-Columbia River FRO (MCRFRO) projects. A meeting with other team members and Warm Springs' staff was held at the hatchery during the week of August 1. Dave Owsley visited the Warm Springs hatchery during the week of August 29 at request of the peer review team. Dave reviewed the water system and reported his findings to the team. Travel to Leavenworth, Washington to complete the MCRFRO review took place on September 13-15. The five-team member group completed their assignment within a two month period and submitted a final report to the Regional Office on September 30.

Dave Owsley, Engineer, attended the 124th annual meeting of the American Fisheries Society (AFS) held in Halifax, Nova Scotia August 21-25. Mr. Owsley presented a paper, "The Use of Clinoptilolite in Fish Hatcheries", served as a session moderator and was represented at the Bio-Engineer Section meetings.

Station employees were involved in 768 hours of training:

Jay Ahn	Marrowstone Lab and Lower Columbia River hatchery visits, August 15-19
	New Employee FWS orientation, Portland, Oregon, August 22-26
	Fish health OJT
Kay Cole	New employee FWS orientation, Portland, Oregon, August 22-26
Mary Lou Galloway	ADP procurement training, Ashland, Oregon, May 12-13
Glenn Green	Marrowstone Lab and Lower Columbia River hatchery visits, August 15-19
Rocky Greenland	N.W. Fish Culture Conference, Spokane, Washington, December 8-9

	New Employee FWS orientation, Portland, Oregon, October 25-29
	Lower Columbia River hatchery visits, September 19-21
	Idaho AFS Chapter meeting, McCall, Idaho, February 24-26
	Fish health OJT
Ron Oatman	N.W. Fish Culture Conference, Spokane, Washington, December 8-9
Wayne Olson	FWS Mentor Training, Portland, Oregon, October 25-26
	Eco-System workshop, Portland, Oregon, July 19-22
	Pre-retirement Counseling session, Seattle, Washington, August 10-12
Ken Peters	New employee FWS orientation, Portland, Oregon, October 25-29
Kevin Sloan	Basic Supervision II, Orofino, Idaho, March 7-11
John Vargas	Lower Columbia River hatchery visits, September 19-21
David Weigand	CISPUS, Randle, Washington, February 28-March 4, 1994
	Outreach Phase I, Portland, Oregon, April 11-15
	Outreach Phase II, Nisqually NWR, July 25-28
Cyndie Wolfe	New employee FWS orientation, Portland, Oregon, October 25-29
Ben Wright	N.W. Fish Culture Conference, Spokane, Washington, December 8-9
Michelle Bouchard	Lower Columbia River hatchery visits, September 19-21
Adam Izbicki	Lower Columbia River hatchery visits, September 19-21

STAFFING

Several temporary appointments were made during the year to assist on special projects. Appointments included the extended hiring of David Trainor, WG-10, Welder, until November 11, 1994 to complete work on fabricating a raceway bird exclosure. Three GS-2 Bio-Aide hirees (Hinkle and McKinzie, six months and Seldon, two months) provided assistance on a Fisheries Stewardship study funded through the Idaho FRO project. A two-month appointment of Joey Vaughn, Welder, WG-10, was effective July-August 1994 to assist in a major piping modification at the hatchery's main aeration chamber.

The hatchery continued to participate in the Older Workers Program with hiring of Margaret Howard on February 4, 1994 to work weekends in production. Employment of Vernon Holloway, laborer, in a temporary part-time position, also provided assistance on weekends.

Unusual delays in hiring, as long as six months, were realized when filling a GS-5 fishery biologist (trainee) and GS-9/11 production assistant (Supervisor) position. These delays were an apparent result of an unusual heavy work load in the Region's personnel office to process and fill vacancies.

A group on-the-spot award of $500 was presented by Mary Lou Galloway to Idaho FRO employees, Amy Kishpaugh, Randy Bowen, and Diane Praest, for their extra office assistance during a period of employee transition from January-April 1994.

Senior volunteers Clay McGill, Jess Lyda, and Gordon Thiessen contributed 122 hours of service during the year. The program, initiated in 1987, has provided the station with 695 hours of volunteer time. Most of this work was involved with assisting the visiting public in viewing the hatchery's steelhead spawning activities.

The hatchery again participated in the Youth Conservation Corps (YCC) program. This activity has been ongoing since 1977--earlier as the Young Adult Conservation Corps, followed later by YCC. One crew leader and six enrollees were employed in an eight-week program beginning June 6 and ending July 29, 1994.

Personnel Actions:

Jay Ahn, Fishery Biologist, GS-482-5, E.O.D. October 17, 1993.

Glenn Green, Fishery Biologist, GS-482-7, transfer from Willow Beach NFH (Region 2), effective October 31, 1993.

Ken Peters, Fishery Biologist, promotion from GS-482-7 to GS-482-9, effective October 31, 1993.

Dawna Newman, Office Automation Clerk, GS-326-4, resignation effective January 8, 1994.

Cyndie Wolfe, Fishery Biologist, GS-482-7, transferred to Coastal California FRO, Arcata, effective February 6, 1994.

Glenn Green, Fishery Biologist, promotion from GS-482-7 to GS-482-9, effective February 6, 1994.

Kevin Sloan, Fishery Biologist (Supervisor), GS-482-11, transferred to Hotchkiss NFH (Region 6), effective April 3, 1994.

Ben Wright, Fish Culturist, promotion from WG-5048-4 to WG-5048-5, effective March 20, 1994.

Kay Cole, Office Automation Clerk, GS-326-3, E.O.D. April 11, 1994.

Glenn Green, Fishery Biologist, promotion from GS-9 to GS-9/11 Fishery Biologist (Supervisor), effective July 10, 1994.

Michelle Bouchard, Biological Technician, Marquette, Michigan (Region 3) to Dworshak, Fishery Biologist GS-482-7, E.O.D. August 8, 1994.

Adam Izbicki, Biological Technician, Ludington, Michigan (Region 3) to Dworshak, Fishery Biologist GS-482-5, E.O.D. August 21, 1994.

David Trainor, selected for WG-4749-8 Maintenance Worker, effective October 2, 1994.

All positions were in place ending the reporting year of September 30, 1994. Only one exception, a maintenance worker (electrician) WG-8 vacancy had been advertised, selected and approved effective October 2, 1994. This action placed the hatchery at full staffing in entering a new fiscal year.

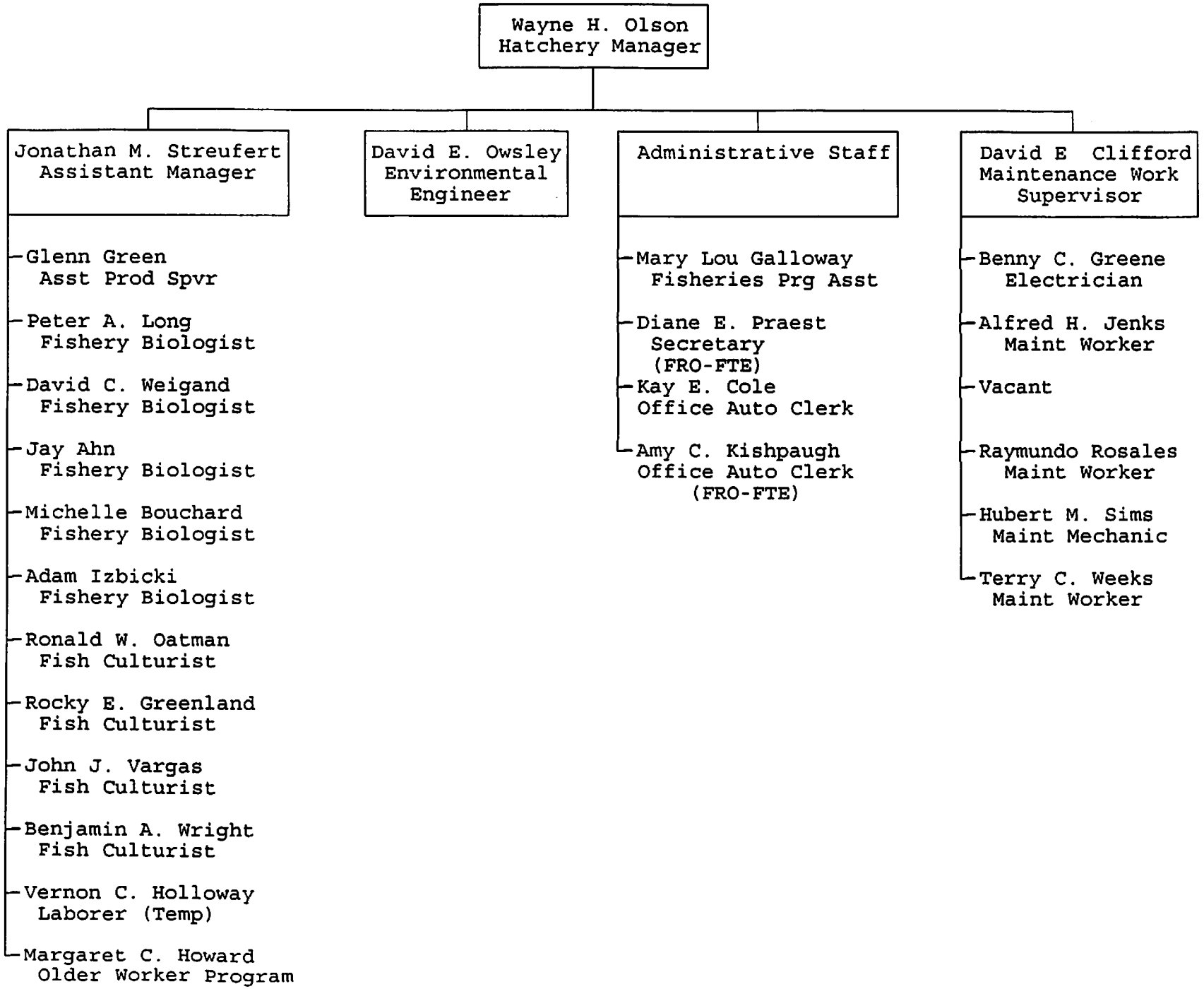
Dworshak Employees
- FY 94 -

Name	Position Title	Period of Employment		Status
Ahn, Jung J.	Fishery Biologist	10/17/93 9/30/94	-	Permanent
Allen, Beverly L.	Biological Aid	3/23/94 4/01/94	-	Temporary
Arnold, Robert G.	YCC Crew Leader	6/06/94 7/30/94	-	Temporary
Bouchard, Michelle A.	Fishery Biologist	8/07/94 9/30/94	-	Permanent
Clifford, David E.	Work Supvr. (Maint.)	10/01/93 9/30/94	-	Permanent
Cole, Kay E.	Office Auto. Clerk	4/11/94 9/30/94	-	Permanent
Cooper, Nicholas E.	YCC Enrollee	6/06/94 7/30/94	-	Temporary
Davis, Carol J.	Bio. Science Aid	12/12/93 8/20/94	-	Temporary
Galloway, Mary Lou	Program Assistant	10/01/93 9/30/94	-	Permanent
Green, Glenn S.	Fishery Biologist	10/31/93 9/30/94	-	Permanent
Greene, Benny C.	Electrician	10/01/93 9/30/94	-	Permanent
Greenland, Rocky E.	Fish Culturist	10/01/93 9/30/94	-	Permanent
Griffin, Leslie L.	YCC Enrollee	6/06/94 7/30/94	-	Temporary
Gunsolus, Lori L.	YCC Enrollee	6/06/94 7/30/94	-	Temporary
Hinkle, Clell E.	Biological Aid	3/21/94 9/30/94	-	Temporary
Holloway, Vernon C.	Laborer	10/01/93 9/30/94	-	Temporary
Howard, Margaret C.	Older Worker Program	2/06/94 9/30/94	-	Temporary
Izbicki, Adam H.	Fishery Biologist	8/21/94 9/30/94	-	Permanent
Jenks, Alfred H.	Maintenance Worker	10/01/93 9/30/94	-	Permanent

Long, Peter A.	Fishery Biologist	10/01/93 9/30/94	-	Permanent
McKinzie, Robert L.	Biological Aid	3/21/94 9/30/94	-	Temporary
Newman, Dawna M.	Office Auto. Clerk	10/01/93 1/08/94	-	Permanent
Oatman, Ronald W.	Fish Culturist	10/01/93 9/30/94	-	Permanent
Olson, Wayne H.	Hatchery Manager	10/01/93 9/30/94	-	Permanent
Owsley, David E.	Environment Engineer	10/01/93 9/30/94	-	Permanent
Peters, Kenneth K.	Fishery Biologist	10/01/93 11/14/93	-	Permanent
Rosales, Raymundo A.	Maintenance Worker	10/01/93 9/30/94	-	Permanent
Seldon, Kimberly K.	Biological Aid	4/22/94 6/20/94	-	Temporary
Shaw, Jerrod J.	YCC Enrollee	6/06/94 7/30/94	-	Temporary
Sims, Hubert M.	Maintenance Mechanic	10/01/93 9/30/94	-	Permanent
Sloan, Kevin N.	Fishery Biologist	10/04/93 4/03/94	-	Permanent
Streufert, Jonathan M.	Assistant Manager	10/01/93 9/30/94	-	Permanent
Trainor, David A.	Welder	10/01/93 11/10/93	-	Temporary
Vargas, John J.	Fish Culturist	10/01/93 9/30/94	-	Permanent
Vaughn, Joey A.	Welder	6/26/94 8/25/94	-	Temporary
Washburn, Richard D.	YCC Enrollee	6/06/94 7/30/94	-	Temporary
Weeks, Terry C.	Fish Culturist	10/01/93 9/30/94	-	Permanent
Weigand, David C.	Fishery Biologist	9/20/93 9/30/94	-	Permanent
Wessels, Kristie M.	YCC Enrollee	6/06/94 7/30/94	-	Temporary
Wolfe, Cynthia A.	Fishery Biologist	8/09/93 2/06/94	-	Permanent
Wright, Benjamin A.	Fish Culturist	10/01/93 9/30/94	-	Permanent

DWORSHAK NFH

September 30, 1994



PUBLIC OUTREACH/VISITORS

David Weigand, Fishery Biologist, was assigned one-third of his full time position to assist in outreach activities for the Complex. Training during the year included a one-week CISPUS workshop and two weeks participation at the Region's Phase I and Phase II outreach sessions. A station Outreach Team was formed with several staff members represented. Mr. Weigand's time was involved in conducting numerous tours of the facility, participating in a Career Day at the high school, preparing news releases, providing camp fire talks, updating information handouts and making distribution.

Dworshak's 4th Annual Open House was a continued success. The June 18th event attracted 503 kids to register and fish free for two rainbow trout. Another 605 adults attended to view the many activities that were ongoing during the day. The hatchery also hosted a special fishing day on June 16 for an extended education group of 42 handicaped children. Area news media reported on the Open House with excellent coverage.

The station provided 2700 steelhead carcasses for processing and distribution by Idaho Department of Education. The Department has been involved with this program since 1986. Prior to this date and beginning with 1983, fish were provided directly to an area food bank program.

A special volunteer recognition luncheon was hosted on April 18 in Orofino by the local senior citizen retired volunteer program. Manager Olson represented the hatchery and recognized three volunteer employees for their many hours of service at the hatchery.

Dworshak's 6th Annual kokanee fish-in and fish-fry were held May 20-21. Excellent success provided 394 fish for the following day's potluck featuring deep fried salmon and hushpuppies for all employees, their families and guests.

Among the many visitors to the hatchery included a lone moose sighted in June ambling through the housing area. Also, several geese took residency on the facility during mating season.

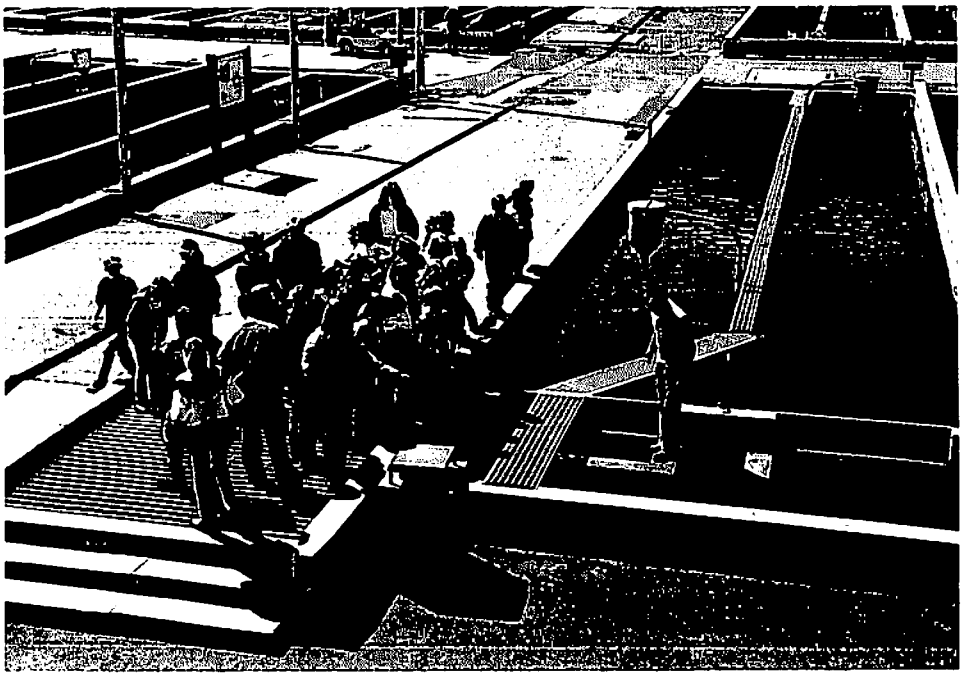
Several employees participated as judges at the Orofino Elementary School science fair.

Dave Owsley, for the 15th year, was organizer and instructor for two Idaho Hunter Education sessions held in the local community. Over 100 students participated in 20 hours of classroom instruction and four hours of range time.

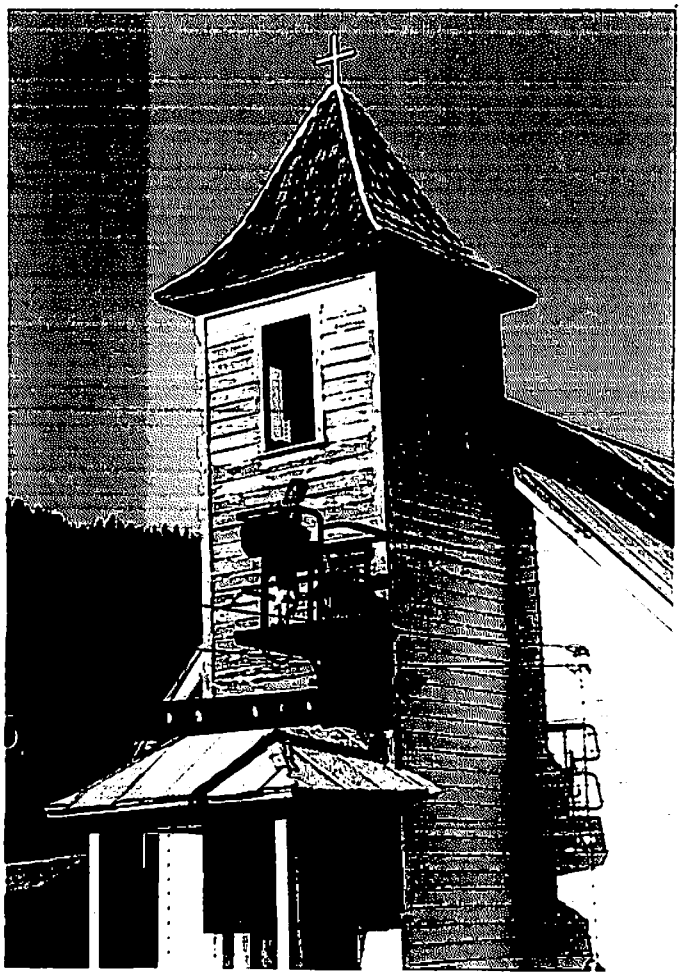
The hatchery continued to be well covered by the area news media in reporting of river flow effects, spawning activities, fish returns and production operations.

A number of formal tours were provided visitors by station employees. School groups from the surrounding area viewed steelhead spawning activities in March and April. Several university

groups were on hand for tours and formal discussions with staff. Groups from other agencies and programs were also represented. Visitors to the hatchery were estimated at 28,000.

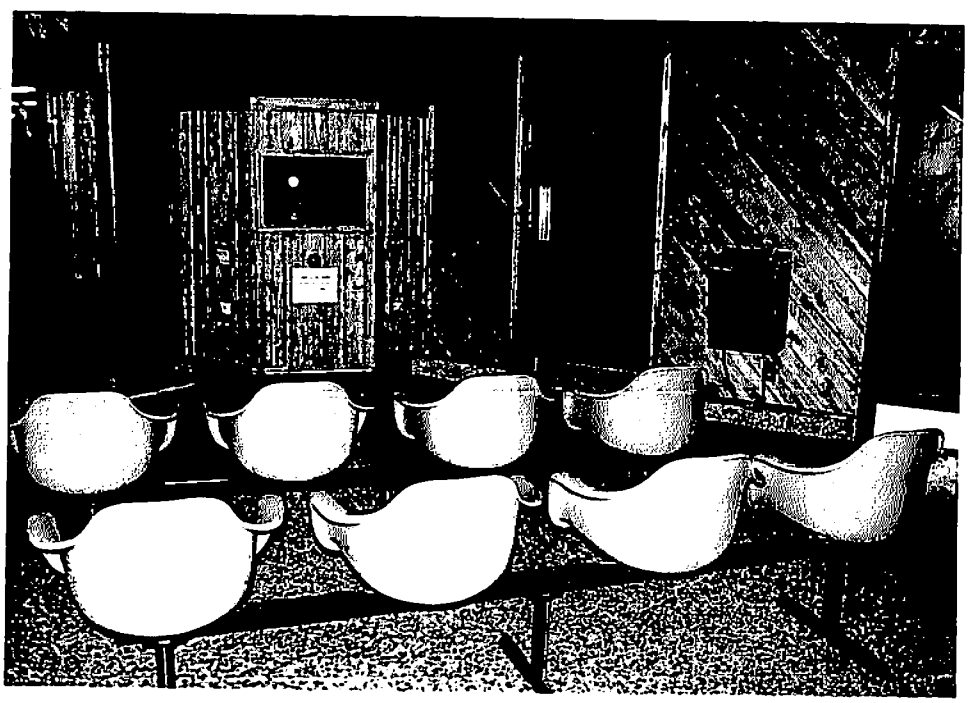


School group on tour of facilities.

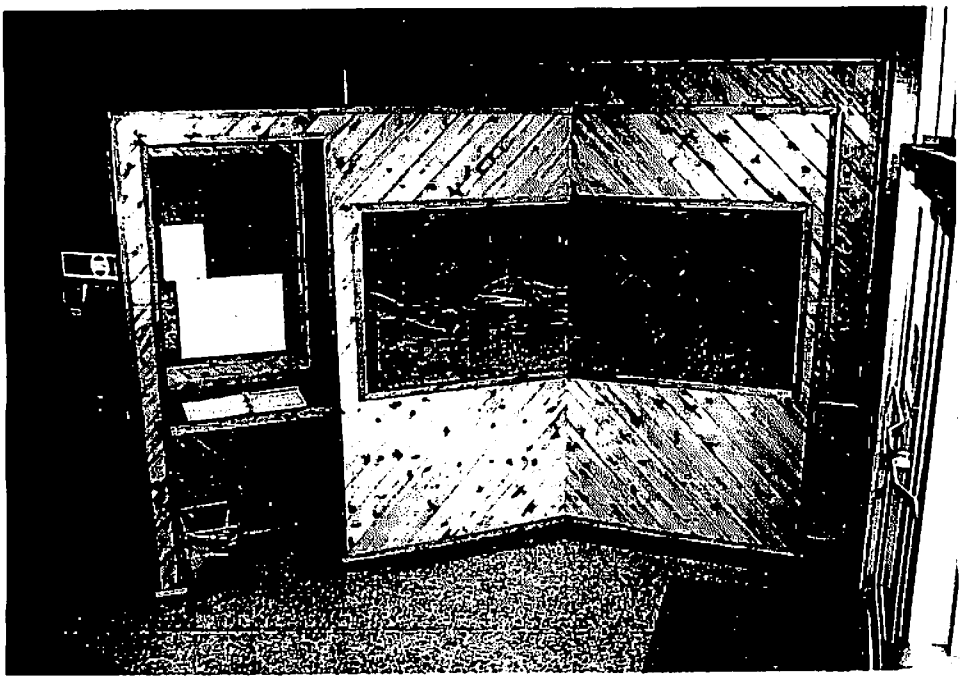


Providing equipment and assistance to scrape and paint exterior of Tribal church located adjacent to hatchery grounds.

Steelhead wall mounts in office area.

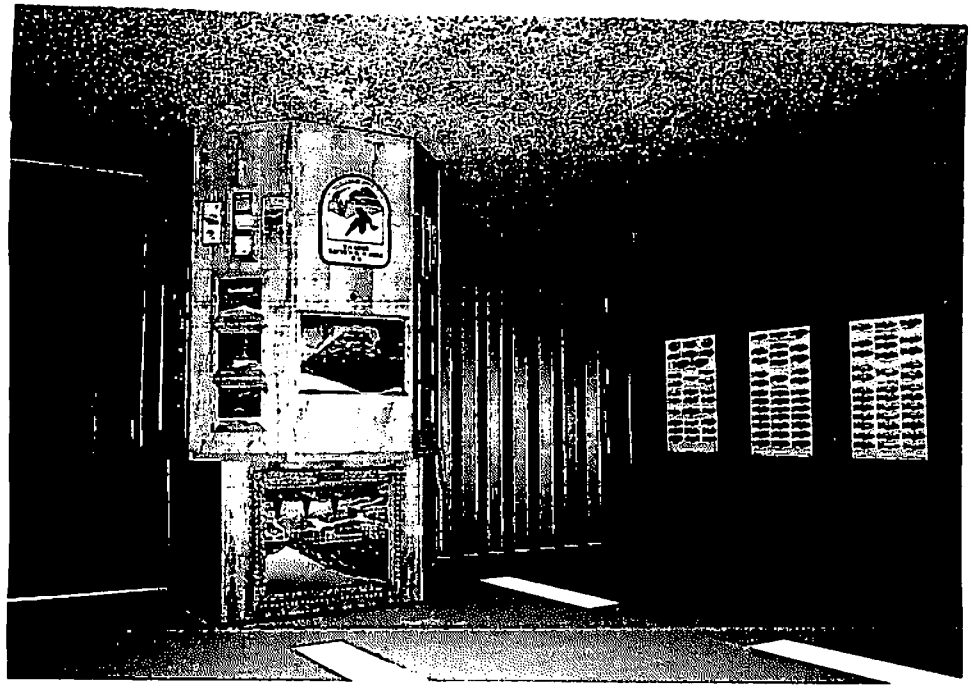


Visitor area in downstairs lobby area to view video, "This is your National Fish Hatchery."

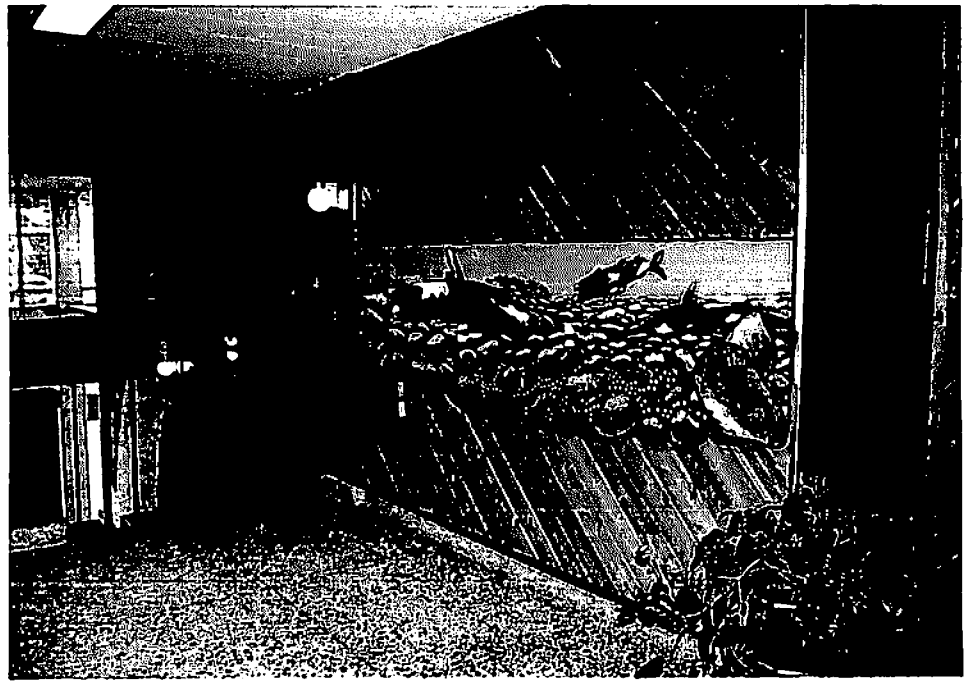


Diarama of fish display in downstairs lobby area.

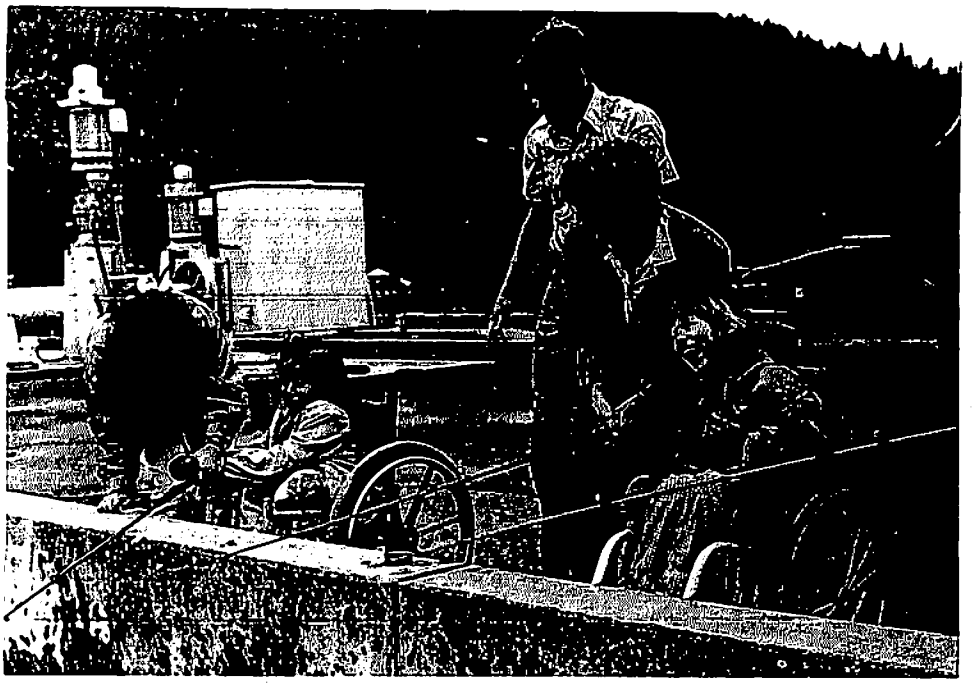
Panel depicting fish returning to spawning grounds located along stairway to upstairs lobby.



Upstairs viewing area of displays and informational exhibits.

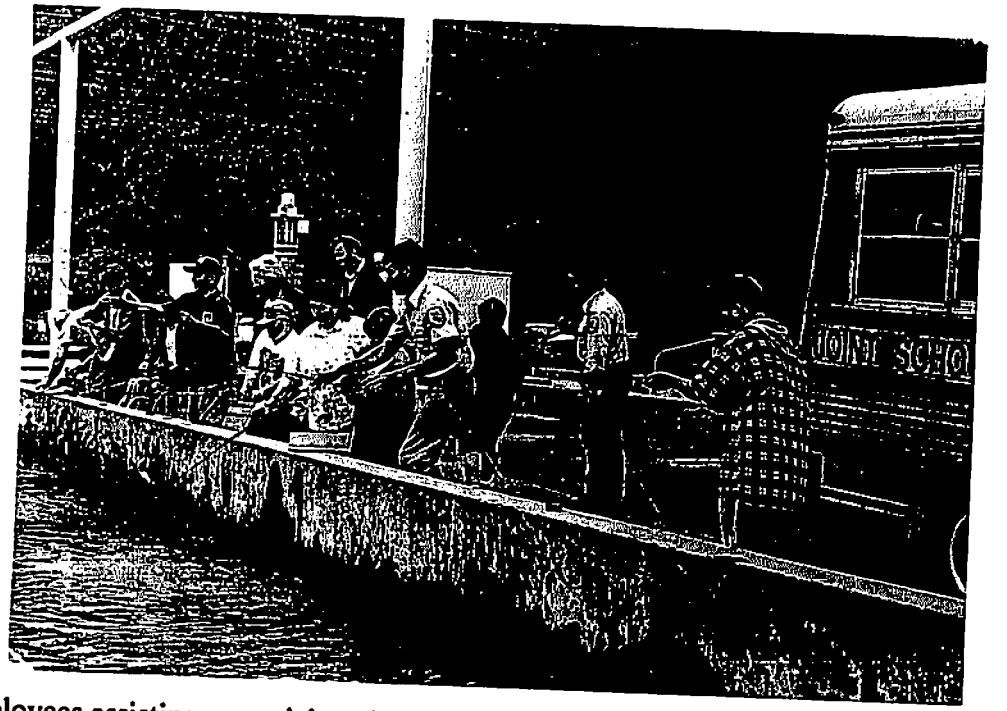


Lobby with display panels, exhibits, and observation viewing area of spawning activities.



Dworshak's "open house" extended to a special fishing day for handicapped children.

Hatchery Manager, Wayne Olson, assisting Madia Lopez in catching her first trout from Dworshak's fishing pond.

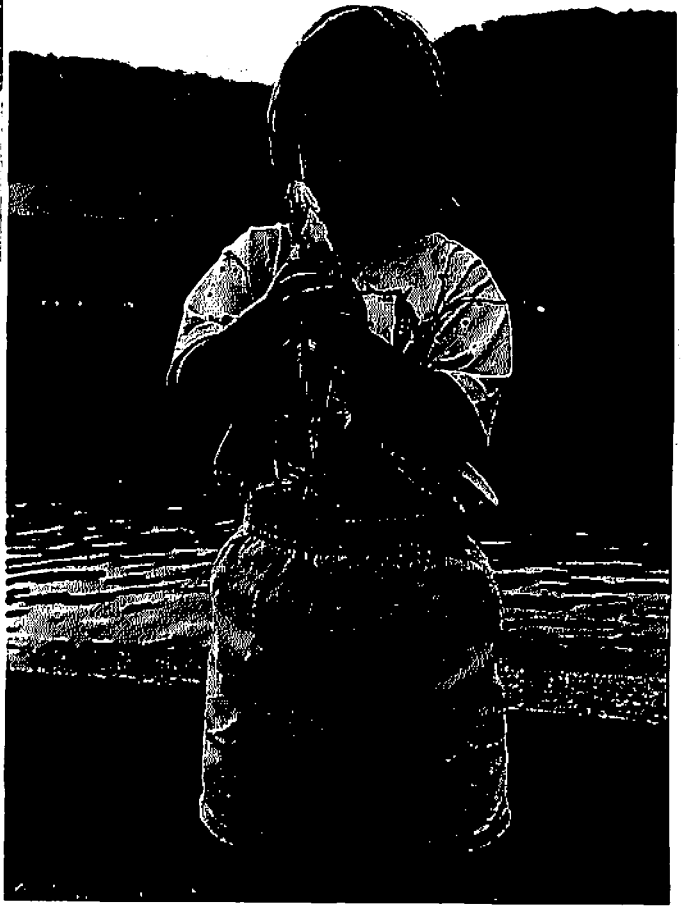


Employees assisting a special student group enjoying a fishing experience - June 1994

Free fishing day at Dworshak for children ages 12 and under - June 18, 1994

Record rainbow trout caught
at Dworshak's Open House -
June 18, 1994.

Dworshak's Open House and kid's free fishing pond -- a success for all participants.



COOPERATIVE PROGRAMS

The hatchery worked closely with the following agencies and groups to accomplish various activities.

- -Idaho Department of Fish and Game (IDFG)
  - Boise Office
  - Lewiston Office
- -National Biological Service Center - Seattle
- -Corps of Engineers (COE)
  - Walla Walla District
  - Dworshak Dam and Reservoir Project
- -Cooperative Fishery Research Unit (CFRU) - University of Idaho
- -Nez Perce Tribal Fisheries
- -National Marine Fisheries Service (NMFS)
- -University of Idaho
- -Washington State University
- -Clearwater National Forest
- -Clearwater County Sheriff Office
- -Clearwater Management Council
- -Older Worker Program
- -Senior Citizen Volunteer Program

Dworshak Fish Health Center and Idaho Fishery Resource Office are co-located on the hatchery. The three Service groups are cooperatively involved in Service activities on the Clearwater River.

Steelhead carcasses were, as in recent years, received by a local processor on spawning days to be processed, frozen, and made available to several commodity programs administered through the Idaho Department of Education. The hatchery provides cold storage space for the processed fish until transferred for distribution.

Eggs and small fish were furnished other agencies and university groups, as approved, for study purposes, i.e., environmental testing, genetic experiments, and ongoing bacterial kidney disease monitoring.

Two semi-annual coordination meetings were held at Dworshak with Idaho Department of Fish and Game, Nez Perce Tribe, Corps of Engineers and other Service groups to review hatchery production and to discuss Clearwater River fishery activities. A meeting in November 1993 was followed by another in March 1994.

Three senior volunteers contributed over 100 hours of service to assist visitors viewing Dworshak's steelhead spawning operations in the spring.

Environmental Engineer Owsley continued to assist both federal, state and private agencies on water treatment, holding design and other related facility operations. Numerous information mailings, telephone calls, personal contacts and site visits were made throughout the year. Mr. Owsley participated on several task forces and was involved in formal presentations and work groups as requested.

David Weigand represented the FWS at a "Nez Perce County Cooperation Strategy" session held in Clarkston, Washington on October 28. Government and local agencies met to "brainstorm" ways to better inform the public about the Nez Perce Indian country of the Clearwater.

A Stewardship Initiative Proposal was funded during the year to the Idaho FRO project. Funds were allotted from FRO to the hatchery as a cooperative participant for work involved in rearing and tagging steelhead for use in several groups.

The hatchery's fish distribution unit was on loan again for two months to the University of Idaho's fisheries program for transferring adult spring chinook to their research lab.

The hatchery participates in the Older Worker Program administered by Lewis-Clark State College. This program has been used actively by the Complex since initiated on March 23, 1989; Kooskia having one senior worker in the program until June 1991 and Dworshak assuming the position since 1991.

Distribution trucks and drivers from the COE assisted the hatchery in hauling steelhead smolts upriver from the hatchery. This assistance has been ongoing since 1982 when the hatchery first began releasing fish offsite.

The hatchery works closely with IDFG Clearwater Hatchery in the operation of the reservoir pipelines furnishing water to the two hatcheries. Temperature monitoring and valve operations were closely communicated to assure both parties were understanding of each other's needs.

Separate weekly spawning dates were set aside to collect eggs for Seattle's (Reisenbichler) research study. Temperature modifications and egg incubation space were made available at Dworshak to accommodate the study.

Several hatchery employees assisted Idaho FRO with fish monitoring and sampling activities.

Assistance was provided the Nez Perce Tribe with a truck and driver to distribute spring chinook fingerlings from Sweetwater Springs Hatchery to Talmac Lake on the reservation.

Dworshak's maintenance crew provided needed assistance with equipment and labor to the Nez Perce Tribe for painting their Tribal church located within the hatchery boundary.

Wayne Olson and Dave Owsley co-chaired the program for the 44th Annual Northwest Fish Culture Conference. Papers were collected, agenda prepared and presentations assembled for

printing in the conference proceedings. The conference, hosted by the Fish and Wildlife Service, was held in Spokane, Washington, December 7-9, 1993.

A cooperative arrangement was made with the Dworshak COE Project for their assistance in providing several months of work to construct and assemble cabinets and shelving in the office area.