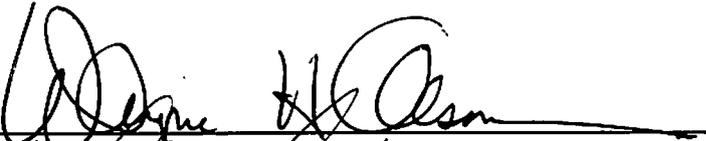
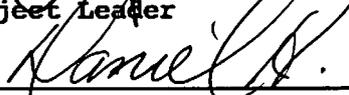


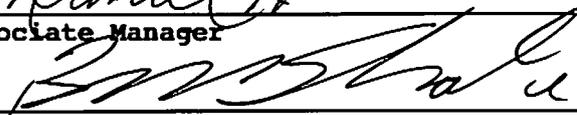
**ANNUAL REPORT**  
**FISCAL YEAR 1992**  
**DWORSHAK NATIONAL FISH HATCHERY**  
**AHSAHKA, IDAHO**

  
Project Leader

12/23/92  
Date

  
Associate Manager

\_\_\_\_\_  
Date

  
Assistant Regional Director

1/11/93  
Date

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## INTRODUCTION

Dworshak National Fish Hatchery is located at the confluence of the North Fork of the Clearwater River and the main stem Clearwater River near the unincorporated town of Ahsahka, in north central Idaho. The site is 3 miles west of Orofino (population 3,800) on the north bank of the Clearwater River, 1 mile downstream from Dworshak Dam. Land was purchased by the U.S. Army Corps of Engineers (COE) in 1967 from several owners with title remaining with the COE.

Construction of the Dworshak hatchery was included in the authorization for Dworshak Dam and Reservoir, Public Law 87-874, dated 23 October 1962. Design and construction was by the COE with administration and operation since 1968 by the U.S. Fish and Wildlife Service (FWS). The hatchery, the world's largest summer steelhead trout producer, was constructed to maintain and restore the unique run of "B" strain steelhead found in the North Fork of the Clearwater River when threatened by extinction with the construction of Dworshak Dam. Dworshak also serves as a donor egg station for steelhead in the Salmon River drainage and plays a key role in the fishery in Dworshak Reservoir having a responsibility to supply that body of water with rainbow trout each year.



Visitor entrance to hatchery facilities.



Front entrance area to main hatchery building.



Main access area to hatchery facilities.

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. In addition to spring chinook, the facility also serves as a temporary site for the rearing of rainbow trout for stocking Dworshak Reservoir while Dworshak's IHN virus problem continues to exist. 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.

Operations began in 1969 with completion of the first phase of construction. This provided a total reuse system for 25 ponds and a single-pass system for 59 ponds. A second phase in 1972 placed all ponds on recycled flow. The hatchery has option to operate the outside ponds on either single pass or recycled flow; the latter option used only for heating water during the winter months for added growth in steelhead production. Subsequent construction has modified many of the earlier features. New design concepts continue to be incorporated into the hatchery.

The hatchery was expanded in 1982 under the Lower Snake River Compensation Plan (LSRCP) program and given additional responsibility for restoring spring chinook salmon in the Clearwater River. First release of chinook yearling smolts occurred in spring 1983.

Initial construction of Dworshak consisted of 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 8 inches in only 1 year. In 1973, System II (25 ponds) and System III (34 ponds) were converted from single-pass 2-year raring to reuse 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. Further construction in the 1980s added 18,000 square feet of nursery building, doubling the number of inside rearing tanks to 128.

Water reuse is used extensively for rearing steelhead in the outside ponds. The 10 percent new water recycle system allows heating during the winter months. Chinook and rainbow production remain on single-pass without benefit of heated water. Selector gates at Dworshak Dam control water temperatures from May through October. A pump station on the North Fork, 1 mile downriver from the Dam, furnishes water to the hatchery. In addition, a pipeline from Dworshak Dam was completed in 1991 to supply reservoir water for egg incubation and early rearing. Benefit of this new water source was shown in 1992 when young steelhead were successfully reared through the nursery stage without incidence of IHN virus disease.

The uniqueness of Dworshak's water supply which includes unheated single-pass and heated reuse, utilizing different temperature profiles, separates into five distinct production programs. This is further expanded when seven temperature options are available for fish rearing. Three additional

temperature schematics are also used for regulating temperature units of egg development through the incubators.

The Dworshak hatchery has capacity for producing 2.3 million steelhead smolts; 1.4 million yearling chinook salmon smolts; and another 300,000 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, 1991 to September 30, 1992.

## STATION HIGHLIGHTS

Operating funds (1935 account) transferred from the Corps of Engineers (COE) were \$1,253,900. An amount of \$13,400 (8610 account) was used from quarters rental reimbursements for a total of \$1,267,300. Included was \$50,000 budgeted to the Dworshak Fish Health Center (FHC) for their assistance and \$41,000 to the Idaho Fishery Resource Office (FRO) for continuation of a broodstock and smolt monitoring evaluation.

Included in the hatchery's funding was a transfer of \$10,700 to Kooskia National Fish Hatchery for the production of rainbow trout for stocking Dworshak Reservoir; a mitigation responsibility of Dworshak hatchery. This cost represents Dworshak's share of expenses to rear rainbow trout at another hatchery in an effort to manage around IHN virus disease.

Fish marking costs included \$44,200 to ad-clip 2.4 million steelhead fingerlings and \$5,200 for coded-wire tagging of contribution groups released. Also major costs were shared with 13 cyclical projects (\$58,100) and purchase of replacement equipment (\$60,000).

The Lower Snake River Compensation Plan (LSRCP) funded \$285,200 (4710 account) for production of spring chinook salmon. The Youth Conservation Corps (YCC), an 8-week summer work program, was also funded by the LSRCP.

Total hatchery operation and maintenance funding, excluding \$91,000 for FHC and FRO assistance was \$1,461,300. Salaries and benefits accounted for 54 percent of the total.

Full-time staff years employed were 20.8. Permanent employees represented 20.5 and temporaries 0.3 years. Thirty-five (35) employees were represented in the staffing during the year. This number included YCC program enrollees and Older Worker Program employment.

Overall feed conversion was 1.37 (less than 2 pounds of food to produce 1 pound of fish gain); spring chinook (1.74) and steelhead (1.31). Total feed cost per pound of fish produced was \$0.39; chinook (0.60) and steelhead (0.35). Steelhead were similar to the previous year, whereas spring chinook costs were reduced by \$0.13 reflected by lower feed prices.

The hatchery's gain in steelhead production was 450,785 pounds for the year (10/01/91 - 9/30/92) compared to last year's production of 396,751 pounds. The weight gain was primarily from Brood Year 1991's program released as smolts in spring 1992. Dworshak released 2,309,052 steelhead smolts, weighing 429,623 pounds (206 mm), both off-site and directly from the hatchery.

Spring chinook production gain of 81,173 pounds was similar to the previous year of 92,093 pounds. Release totals included 1,564,199 yearling smolts weighing 93,752 pounds (149 mm) from Brood Year 1990; March-April 1992 planting.

Ending the reporting year of September 30, 1992, Dworshak had on station 820,000 spring chinook fingerlings Brood Year 1991 for a planned yearling

smolt release in spring 1993 of 450,000; 350,000 subyearlings to be transferred to Kooskia in October 1992. Steelhead fingerlings on station were 2.5 million to meet a scheduled smolt release of 2.6 million the following spring. Success of this program was attributed to the absence of IHN virus in Dworshak's nursery rearing due to water supply, however, a 26 percent mortality to the virus occurred after being ponded outside on the river supply.

A program document of goals and responsibilities for Fiscal Year 1992 was prepared for the hatchery complex. This document includes production planning, training, staffing information, budgets, or guideline prepared annually since 1988, and maintenance projects proposed for the year. The hatchery's vision action team met in October to review and add comment to the FY 1992 program document outlining work projects and goals for the coming year.

Dworshak's fish ladder began operating on October 21 to collect early returning steelhead. Over 700 steelhead were collected in October and November to be held for spawning beginning in late January. The fish ladder was closed on December 2 and reopened again in February 1992.

Adipose fin clipping of Dworshak's steelhead production was begun on October 7. Marking of 2.5 million fish was completed in late November. NMFS marking trailers were also at the hatchery in November to complete clipping of spring chinook fingerlings scheduled for a 1992 smolt release.

Dave Owsley, Engineer, was part of a Quarantine Task Group to finalize a report on "Development of Service Fish Quarantine Facilities." A meeting was attended in Atlanta, Georgia, during the week of November 4 to complete the document.

An "Outstanding Participant Award" was received in December from the Service and presented to the Dworshak Complex for their 1991 National Fishing Week activities.

Steelhead spawning at Dworshak began on January 28 with an estimated 270,000 eggs collected from 43 females spawned. Pre-spawning loss was only 4% in 729 fish held at Dworshak from adults returning during October and November.

Notice was received from Idaho Department of Education regarding this year's use of steelhead carcasses for commodity programs. Only 1700 fish are requested for distribution. In past years, a quota was not placed on numbers given out under contract. Unless this figure is increased to allow all carcasses to be used for distribution, the hatchery ends up utilizing the local landfill to bury fish above the 1700 requested number. As it presently stands, we do not foresee this number being increased.

Returning adult steelhead to Dworshak numbered 2974 as of March 31. A total of 5 million green eggs had been collected to date towards a goal of 7.1 million. Weekly fish returns averaged 350 during the month. A total of 240 unripe females and males were hauled upriver from the hatchery to the lower South Fork area.

Two nursery tanks, holding fingerling spring chinook, were fitted with a series of baffles to evaluate effectiveness of cleaning, and also effects on reducing stress in the fish.

Considerable time was spent on Reg Reisenbichler's (Seattle National Fisheries Research Center) study in planning the logistics of steelhead spawning and incubation to coincide with wild trout. This year's activities began on March 31 and will be followed through a complete production cycle to smolt release next April 1993.

Transportation arrangements were made with the Corps of Engineers to truck Dworshak's steelhead to off-site locations. Four trucks from the COE logged 36 trips and 1500 miles to plant the South Fork of the Clearwater River and Clear Creek. Dworshak's release of 1.1 million steelhead directly from the hatchery occurred on April 30 and May 1 for a final total of 400,000 pounds of steelhead smolts produced and distributed. Dworshak also direct released 1 million spring chinook to the North Fork of the Clearwater River on 4/15-16 and provided 65,000 fish to the State's satellite facility at Powell on 4/6.

An IHN virus confirmation was reported March 30 in a nursery tank of young steelhead. The irony of this finding is that the new reservoir is now supplying water to the tanks with expectation of seeing a reduced IHN problem. The good news was that only 20,000 fingerlings were affected out of nearly 4 million fish successfully reared in the absence of IHN during the period of tanking from March through September.

Steelhead spawning ended at Dworshak with the last egg take on April 28. Nearly 8 million eggs were collected from 3700 returning fish. The fish ladder closed on May 4.

Release of Dworshak's spring smolts from the hatchery was coordinated with Reservoir Control Center to provide increased flows from Dworshak Reservoir during time of release. This increase went from 1100 cfs to 5000 during a 2-day period (April 15, 16) during the time period of 1000 to 1600.

Final steelhead eyed egg shipments were made to Magic Valley and Clearwater state hatcheries in May. A total of 1.8 million eggs were transferred.

Despite the low predicted return of spring chinook, a limited salmon fishing season was opened on the Clearwater River, with adipose-clipped fish only being allowed to be kept. Fishing success was reported to be rather poor, with few numbers harvested in the sports and Tribal fisheries.

Fish tagging and clipping of spring chinook fingerlings were begun on May 27 by a crew contracted with and supervised by the Vancouver FRO. These activities, in which all 825,000 fish were CWT marked and ad-clipped, were completed on June 16.

An IHN virus outbreak occurred in an outside Burrows pond holding steelhead from early Egg Take No. 1. Losses approached 17 percent from an incidence that began on June 15. Mortality decreased near the end of June. This was

the first outbreak of IHN in steelhead on the river supply having been reared in nursery tanks on reservoir water.

Monthly hatchery evaluation meetings were initiated in June with Idaho FRO and Dworshak FHC participating with hatchery members.

Several engineers from COE met at Dworshak in July to review the major rehab work planned for the hatchery. Efforts are being made to obtain final approval for funding in FY 1995 with construction phase to begin in 1997.

The annual hatchery picnic for all employees, families, and friends was held at Kooskia on August 1.

Spring chinook spawning began on August 19 with completion on September 11. Adult returns to Dworshak were 363 fish and Kooskia 312. Green egg take was estimated at 800,000 for a yearling smolt release of 600,000; a shortage of 1.3 million smolts when considering capacities for 1.9 million. Total adult return was similar to 1991 when 632 fish were trapped; Dworshak returning 165 and Kooskia 467.

A cold water release and an increased flow from Dworshak Reservoir began on September 10 ending September 20. During this period, Dworshak's rearing temperature was held to 45°F from 55°F normally preferred. It is anticipated that future changes in temperature and flow by the Fish Passage Center will be better communicated to enable the hatchery to better plan a production program around colder water.

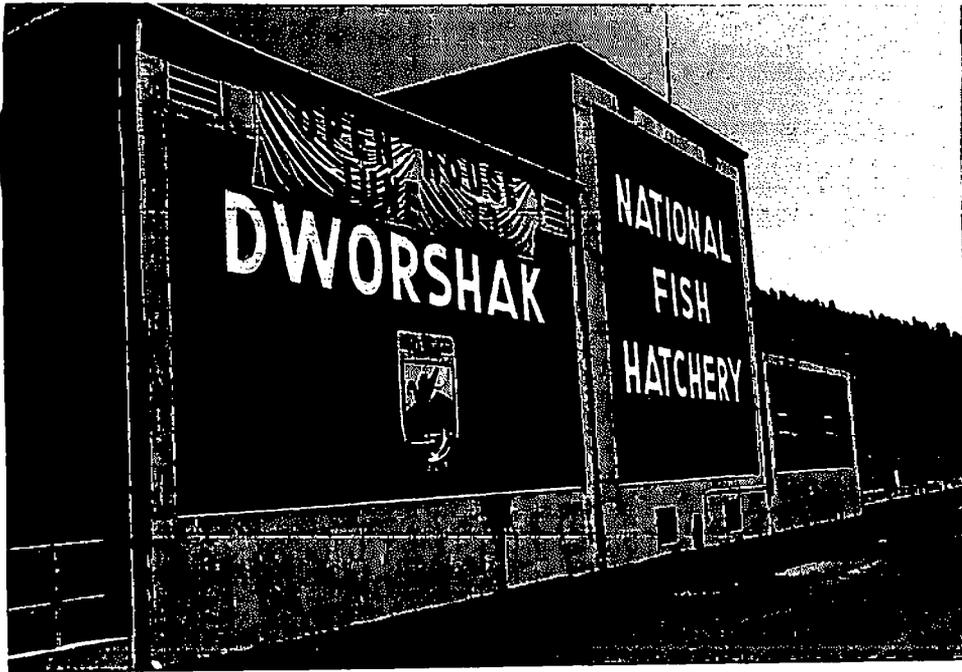
Annual COE property inventory was completed and submitted to the District Office. The new bar coding system, recently initiated by the COE, complicated accountability when identifying the many items that now appear on inventory.

IHN virus losses in steelhead production at Dworshak subsided in September. Prior losses during July and August in outside ponds on single-pass river water had reached 26 percent after fish were moved from a "pathogen free" reservoir supply furnishing the nursery. Indications of the virus causing further losses in outside pond rearing is evident in several new ponds breaking with IHN. These ponds were recently set up in August and September; a later time period and with a larger size fish.

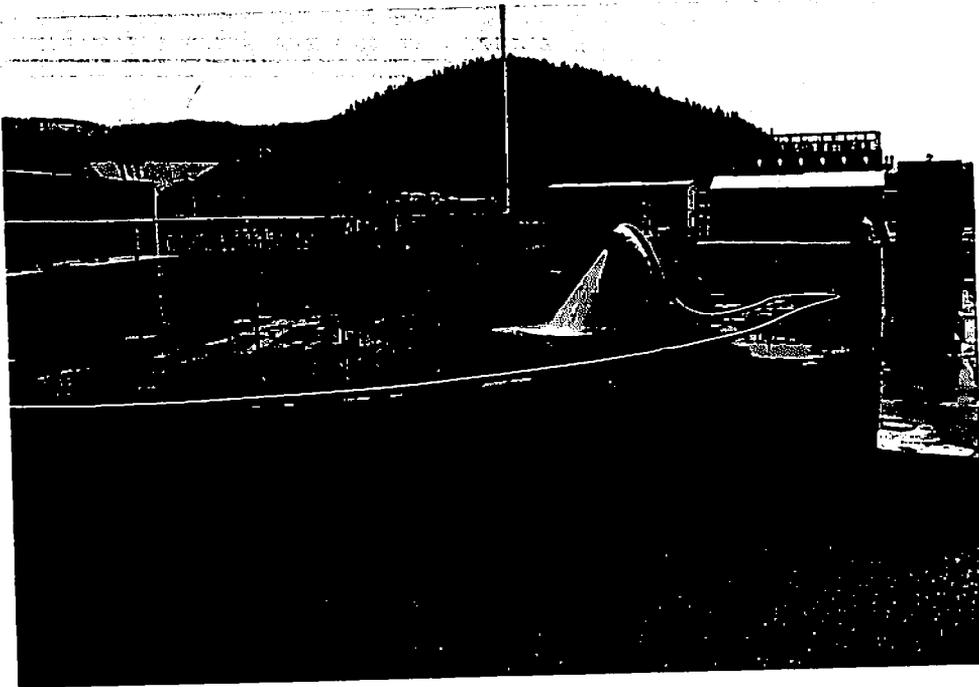
The station continues its approach towards a safe free work environment with only a few minor injuries reported for medical attention. Regular safety meetings continued to be held with a chairperson and committee actively participating.

To accomplish Region One's "Vision Action Planning" - "Fisheries: A Future Legacy," an action team is represented with several station members assigned. Accomplishments included (1) continuation of public outreach with a station "Open House" as a highlight, (2) expanding training activities for all employees, (3) routine meetings of maintenance and production sections, (4) employee representation on action planning teams, and (5) forming a hatchery evaluation team. Employees are also represented on the Region's market review team, budget action team, and water quality team.

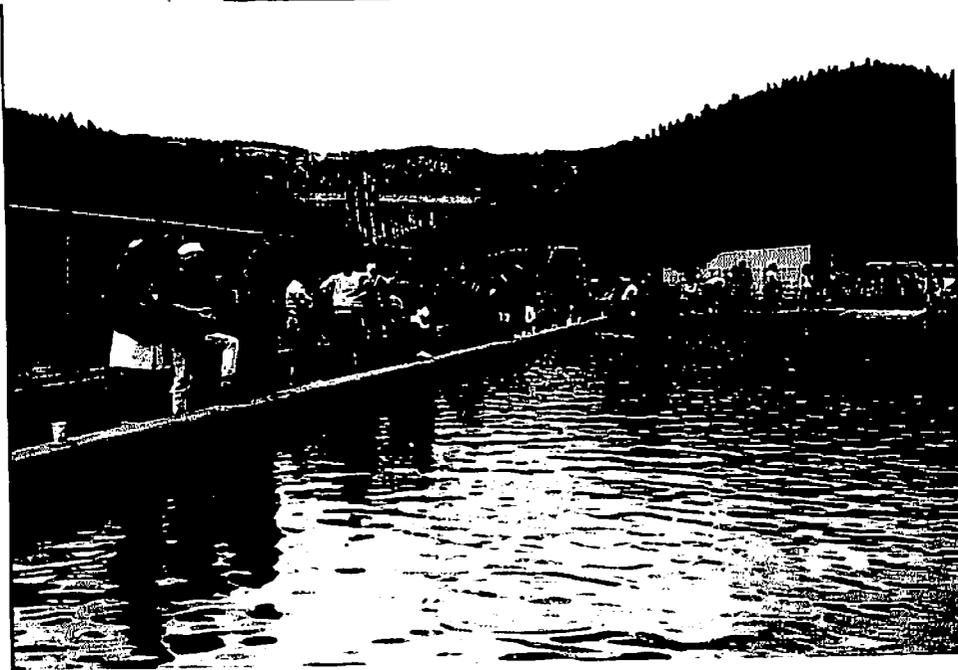
OPEN HOUSE PHOTOS



Open House banner displayed in view of Highway 12.



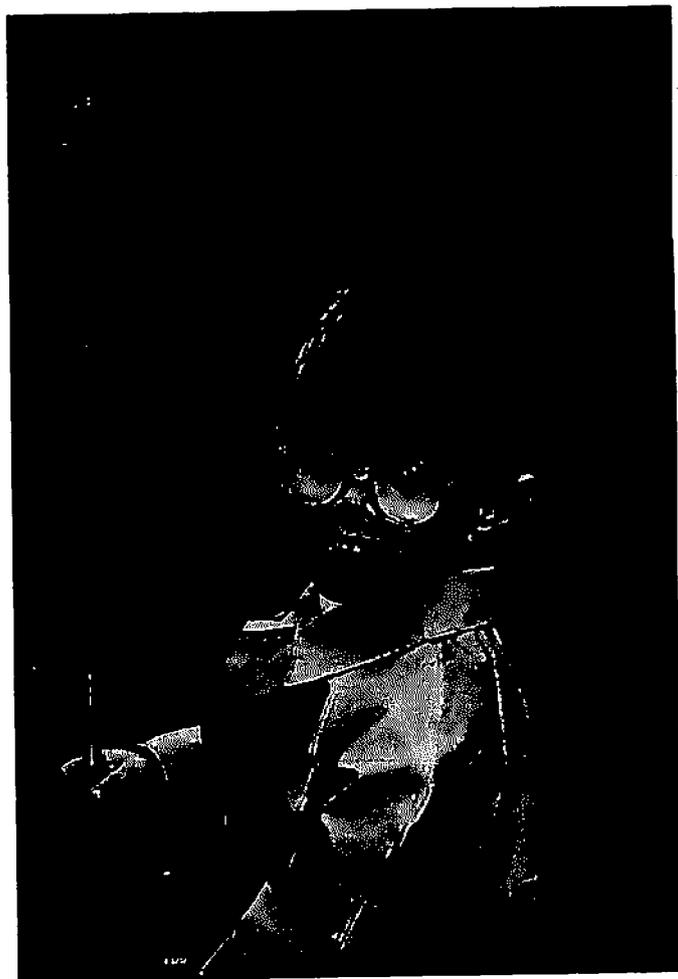
Hosing down area in preparation for the hatchery's "Open House" event.



- OPEN HOUSE - Kids' Free Fishing Pond.



- OPEN HOUSE - Kids' Free Fishing Pond.



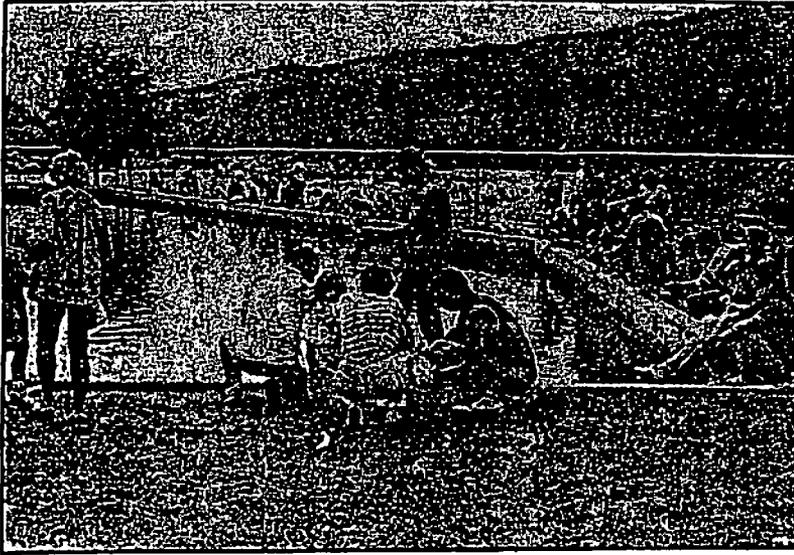
- OPEN HOUSE - Kids' Free Fishing Pond.



Presenting a young participant of Dworshak's free fishing pond drawing with a tackle box.



A "lucky" winner of a prize drawing from Dworshak's Open House event.



Dworshak Free Fishing Day, 1991

## Open House at Dworshak National Fish Hatchery Saturday

Dworshak National Fish Hatchery is hosting a 2nd Annual Open House on Saturday, June 13, from 9 a.m. to 4 p.m. the highlight of the day is the "Free Fishing Pond" for children 12 years and under. An 18-foot high rainbow colored balloon marks the pond. Temporary bleachers are set up for parents and spectators.

Fish and Wildlife Service employees will be welcoming visitors as well as helping with the fishing event, displays, and activities planned to make this an enjoyable experience. Area businesses have been very generous with donations for the children. A special drawing for fishing poles and tackle boxes will be held at the end of the day plus random drawings to award fishing tackle to those kids holding a lucky registration number at the sign-up table.

Last year's event attracted nearly 1500 people including 504 children each catching their two fish limit. Manager Wayne Olson extends an invitation to visit the hatchery and become a

part of the fun-filled activities planned for the day.

The Orofino Rotary Club will be providing local rides for families with special needs -- for information call 476-5527.

Thursday, June 4, 1992

LEWISTON MORNING TRIBUNE

ANGLING

# Catch a fish for free

The U.S. Fish and Wildlife Service plans a fishing clinic for children at Dworshak National Fish Hatchery to coincide with the Idaho events June 13.

The hatchery's first running of the event last year drew so many spectators that the agency will add a set of temporary bleachers this year, said Dworshak Manager Wayne Olson at Ahsahka.



# NORTHWEST

GONE FISHIN'

## The trout were flying, kids laughing

■ Rainy weather not enough to keep young anglers from annual day of free fishing

By Bill Loftus  
of the Tribune

**A** HSAHKA — Young anglers ringed a concrete pond at Dworshak National Fish Hatchery Saturday to take part in Idaho Outdoors Day.

The U.S. Fish and Wildlife Service, which operates Dworshak, had filled the pond with yearling steelhead to 12 inches long and offered the young anglers the best chance to catch a fish that they may ever enjoy.

The children, 483 in all, obviously enjoyed themselves.

"I caught one! Ha, ha, ho, ho, ha! Stay still fish," says an excited Brian Hanson, age four, of Orofino. He giggles excitedly as the silvery trout wriggles on the grassy slope by the pond.

While Brian's father, Keith Hanson of Orofino, unhooks the trout, the young angler is already searching the pond for another. "I saw one, Daddy!"

Like most things, the unseen ones surprise most of those lining the pond.

The young anglers at Dworshak, ages two to 12, know no finesse, or if they do choose not to practice it.

Parent and Dworshak employees and themselves ducking as a flying trout sailed over their heads or by their faces.

It was hard to tell at times whether Brian Hanson or hatchery manager Wayne Olson enjoyed themselves more. "This is really fun," Olson said as he surveyed the fishing frenzy.

"Some of the expressions on these kids' faces are just great," he added.

Saturday's event was the second annual at Dworshak. Last year's attracted 504 young anglers. This year's turnout was surprisingly good considering the cold rain that occupied much of the day.

Overall, the event drew more than 1,000 people to Dworshak, one of the world's largest steelhead hatcheries and the most popular fishing hole in Ahsahka Saturday.



Love of fishing drew the young and young-at-heart together at the Dworshak National Fish Hatchery's Open House and Free Fishing Day, held June 13 at the hatchery. The event sponsored a free fishing pond for children 12 and under. The pond was a popular place for the youngsters, with poles and tackle furnished and a guaranteed catch of two fish per child. Fish hatchery employees were on hand to give the kids help baiting their hooks and reeling in their catches.



Who cares if it's a little slimy, it's a great catch. This little guy was one of the many children who tried his luck at the free fishing pond at Dworshak National Fish Hatchery June 13.

## FISH CULTURE OPERATIONS

### Steelhead Trout Production

- Brood Year 1991 -

The hatchery's gain in steelhead production was 450,785 pounds for the year (10/01/91 - 9/30/92) compared to last year's production of 396,751 pounds. This increase reflected Brood Year 1991 fish achieving a larger size at time of smolt release (5.37 fish per pound) than did Brood Year 1990 STT (6.16 FPP). Dworshak released 2,309,052 steelhead smolts in Spring 1992, weighing 429,623 pounds, both off-site and directly from the hatchery. The mitigation goal for steelhead production was accomplished, with an average smolt length of 206 mm at time of release.

All steelhead fingerlings had relatively high survival rates in pond rearing this production program (Table 1). This held true both for STT early-reared at Kooskia and at Hagerman, as well as for fish reared entirely at Dworshak. Losses to Infectious Hematopoietic Necrosis Virus (IHNV) were subdued in outside ponds, with only a few ponds losing more than 10 percent of their populations to the disease. Fish health in general was quite good this production program, with only four ponds in System 1 needing treatment for Trichodina spp. Survival to smolts from ponded fingerlings averaged 92.7 percent overall for steelhead this year.

Table 1. Relative survival of STT fingerlings at Dworshak by early-rearing station - STT Brood Year 1991.

Early-rearing Station	Initial Dworshak No.	Appxmt. Date On Station	Release No.	Survival
Dworshak	1,555,846	6/1/91	1,432,586	92.1 %
Kooskia	408,962	6/4/91	336,699	82.3 %
Hagerman	527,074	8/26/91	539,767	102.4 %*
	-----		-----	
	2,491,882		2,309,052	92.7

\* Included inventory gain at ad-clipping.

#### System 1

This 25-pond system was made up of four ponds of steelhead returned from Kooskia in early June 1991 at 231 FPP, seven ponds of Dworshak-reared fish, and 9 ponds of fish brought back from Hagerman from August 19 through 29. Five ponds were used for rearing excess spring chinook salmon. The fish returned from Hagerman averaged 40.1 FPP and ranged from 32 to 55 FPP. The Dworshak fish were all from early-returning STT, Takes 1 through 5.

None of the ponds in this system were ever confirmed with IHNV. This in a period when approximately half of System 2's and a third of System 3's ponds

broke with the disease, albeit with fairly low losses. Fish in System 1 were generally in good health during the rearing cycle, although four ponds were treated with formalin baths in January and February of 1992 for heavy loads of Trichodina spp. This represents quite an improvement over the year previous when slightly more than half of ponds received such treatments. Moderate to heavy levels of other external parasites (Epistylis, Epitheliocystis, Ichthyophthirius, and Gyrodactylus) were also reported by Dworshak Fish Health Center (DFHC) during mid-winter.

Table 2. System 1 steelhead performance (1991-1992) - BY 1991.

Month	--1st of Month--		Growth (in.)	Mortality (%)	Temperature (°F)	
	Number	No/Lb				
October	91	666,536	22.8	0.94	0.14	53.3
November	91	660,386	13.6	0.39	0.17	49.1
December	91	659,295	11.2	0.55	0.21	43.8
January	92	563,203	8.75	0.30	0.23	41.7
February	92	561,916	7.70	0.26	0.16	41.0
March	92	561,034	6.91	0.30	0.10	41.0
April	92	560,489	6.14	0.26	0.10	41.1
Release		559,934	5.62	-	-	-

The fish in this system averaged 203 mm at time of release in Spring of 1992, a full 10 mm longer than Brood Year 1990 STT released from this system in 1991. This was accomplished despite water temperatures that averaged 46°F from 8/14/91 through 9/22/91 due to cold water releases from Dworshak Reservoir. Warmer than average water temperatures during the winter of 1991/1992 helped to maintain growth and achieve target length (Table 2). Normally, an average length of 190 to 195 mm is attained. A Length Deviation Index (LDI) of 4.05 for these ponds at release indicated fairly low variation in average pond lengths.

As already mentioned, fish health of this lot was quite good, with minimal therapeutic treatments being given. Conversion for the lot was also excellent, averaging 1.27 during pond rearing.

Most steelhead in this lot were adipose-clipped by an IDFG marking crew which started in System 1 on 10/8/91 and finished in the systems 11/18/91. An after marking inventory summary of over 2.4 million steelhead showed a gain of 2366 fish, producing a deviation from book value of 0.10 percent. Marking was completed with CWT marking and freeze branding of contribution fish was completed in February 1992. The IDFG, with the Nez Perce tribe and the state of Washington as observers and trainees, also conducted PIT tagging for the steelhead during February.

### System 2

As in the previous production program, this system was comprised entirely of steelhead reared exclusively at Dworshak. All fish were from takes 10 through

14, again the tail end of the run. These steelhead, however, maintained excellent growth through pond rearing (Table 3), and subsequently were able to reach an average length of 204 mm at release. It should be noted that in the previous production years, average release lengths in the system were only 181 mm and 193 mm. Like the STT in System 1, System 2 fish growth was also slowed by 38 days of 46°F water in Fall of 1991.

Table 3. System 2 steelhead performance (1991-1992) - BY 1992.

Month	--1st of Month--		Growth (in.)	Mortality (%)	Temperature (°F)	
	Number	No/Lb				
October	91	741,602	107	0.87	2.05	53.3
November	91	726,400	49.6	0.50	1.78	49.1
December	91	690,163	34.5	0.71	0.81	53.5
January	92	684,577	21.7	0.87	0.91	54.0
February	92	678,365	13.6	0.84	1.64	54.2
March	92	667,223	9.15	0.68	1.29	54.0
April	92	658,596	6.91	0.58	1.07	48.7
Release		651,518	5.50	-	-	-

Table 2 presents a summary of the System 2's performance this fiscal year. Mortalities exceeded one percent several months, much of which was due to early winter IHN and lingering problems associated with the virus. Early spring losses were largely attributable to pin-heads dropping out of the populations. Light to moderate external parasite infestations were noted by DFHC in mid-winter. In general, however, fish health was quite good for the system's steelhead, as evidenced by no treatments being needed during pond rearing. Feed conversion for the lot averaged 1.25.

Seventeen of the system's 25 ponds had broken with IHN by release, most during November and December 1991, although a few had already broken in the nursery before being ponded. IHN loss patterns resembled earlier years, with mortality stretching out over several months and with cumulative pond mortalities of 5 to 15 percent.

Most steelhead in System 2 were ad-clipped during October and November 1991, with contribution and outmigration marks (CWTs, freeze-branding, and PIT tags) being given in February 1992.

The system went on heated reuse 12/02/91 and remained on it until 4/17/92. The reuse system functioned with no major problems this year, pumps functioning properly and salt levels in the water maintained within normal operating ranges. According to DFHC, the general condition of the fish appeared to be very good, with remarkably good fin condition and reasonable blood electrolyte levels at time of release.

About one third of the system's fish were outplanted in the South Fork of the Clearwater River from 4/22 to 4/24, with the remainder being directly

released into the main stem of the Clearwater on 5/01. The LDI at release was 3.81, indicating minimal variation among average pond fish lengths.

System 3

Like last year, approximately half the fish in System 3 were early reared at Dworshak, while one fourth had come back from Kooskia and one fourth from Hagerman. Seven different takes were represented in the system's ponds, from Takes 5 through 11, with four ponds being largely or completely made up of offspring from early-returning adults. As indicated in Table 3, these fish achieved excellent growth during final rearing, with monthly length increments of 0.5 inches to 1.0 inches. This system also received 38 days of cold water in the Fall of 1991. Average length at time of release was a very satisfactory 208 mm, with only 5 of the 34 ponds having average lengths under 200 mm.

Table 3. System 3 steelhead performance (1991-1992) - BY 1991.

Month		--1st of Month-- Number	No/Lb	Growth (in.)	Mortality (%)	Temperature (°F)
October	91	1,025,090	44.3	0.95	0.98	53.3
November	91	1,031,247	23.4	0.68	0.53	49.1
December	91	1,037,733	16.0	0.70	1.05	44.8
January	92	1,121,493	11.3	0.62	0.60	54.4
February	92	1,114,723	8.51	0.48	0.60	50.2
March	92	1,108,029	6.97	0.57	0.62	52.0
April	92	1,101,143	5.59	0.11	-	41.1
Release		1,097,600	5.37	-	-	-

The table above also show the relatively low monthly mortalities ponds in this system experienced, with only one month above one percent. Part of this was due to System 3's fish having been ponded before System 2's steelhead, with IHN losses occurring in late summer of 1991 rather than in early winter. It might be noted that none of the six ponds of fish returned from Hagerman in August broke with IHN, and only one of the six ponds of Kooskia fish broke. Approximately one-third of the Dworshak-reared steelhead were affected by IHN, and even then, most cumulative pond losses were under 10 percent.

These fish performed quite well with few health problems, and no treatments were warranted or given this production cycle to fish in this system. In mid-winter 1991/1992 light loads of external parasites were mentioned by DFHC. Feed conversion for this lot of fish during pond rearing was a very respectable 1.32. Growth was maintained at a reasonable rate this production cycle, with few of the health and water quality problems that accompanied Brood Year 1990 in the spring of 1991.

These fish were ad-clipped in October and November 1991, with contribution marks being given in February. The system went on reuse 12/12/91, and kept on reuse until 4/06/92. These fish, being generally from earlier takes than

System 2 fish, are usually considerably larger and therefore are started later on reuse and taken off earlier.

General condition of the fish at release appeared to be very good, with good fin condition and reasonable blood electrolyte levels at time of release. Positive comments were heard from several people conducting smolt-assessments regarding the good quality of this year's smolts. The LDI for all releases from System 3 was 3.93, demonstrating fairly low variation between average pond lengths.

Distribution

Releases of steelhead smolts began 4/20 and continued through 4/24. During these four days 1.08 million smolts were successfully outplanted to the South Fork of the Clearwater River (Table 4). The direct release of 1.22 million additional smolts a week later from the hatchery into the Main Stem of the Clearwater River also went smoothly. A total of just over 2.3 million STT smolts averaging 207 mm in length were released from this production program.

Table 4. Distribution summary by type release - STT  
Brood Year 1991 (April 20- May 1, 1992).

	No.	Wt.	-Length-		
			No/Lb	in	mm
=====					
<u>OUTPLANTS</u> (4/20-24/92):					
System 1	276,730	48,589	5.70	7.94	202
System 2	221,051	40,550	5.45	8.06	205
System 3	587,170	107,856	5.44	8.07	205
	-----	-----			
Subtotal/average	1,084,951	196,995	5.51	8.03	204
<u>DIRECT</u> (4/30/92,5/1/92):					
System 1	283,204	51,042	5.55	8.01	203
System 2	430,467	77,869	5.53	8.02	204
System 3	510,430	103,717	4.92	8.34	212
	-----	-----			
Subtotal/average	1,224,101	232,628	5.26	8.16	207
	=====	=====			
GRAND TOTAL	2,309,052	429,623	5.37	8.10	206

Four Corps of Engineers units with drivers hauled the steelhead to three sites on the South Fork of the Clearwater River and in Clear Creek (Table 5).

Table 5. Release summary by water and site -  
STT BY 1991 (April 20 - 24, 1992).

WATER	AT (Site)	No.	Wt.	-Length-		
				No/Lb	in	mm
<u>OUTPLANTS: (4/20-24/92)</u>						
S.F. CLEARWTR.	R. MILL CR. BDG.	158,455	28,857	5.49	8.04	204
S.F. CLEARWTR.	R. COTTONWOOD CR.	312,283	58,308	5.36	8.11	206
S.F. CLEARWTR.	R. RIVER MILE 8.7	265,003	45,924	5.77	7.91	201
CLEAR CR.		349,210	63,906	5.46	8.06	205
Subtotal/average		1,084,951	196,995	5.51	8.03	204
<u>DIRECT: (4/30/92, 5/1/92)</u>						
M.S. CLEARWTR.	R.	1,224,101	232,628	5.26	8.16	207
GRAND TOTAL		2,309,052	429,623	5.37	8.10	206

As Table 6 below shows, an overall average smolt length of 206 mm was achieved this release year, with each of the three systems reaching at least 200 mm. General condition of the fish appeared to be very good, with remarkably good fin condition and reasonable blood electrolyte levels at time of release.

Table 6. Distribution summary by system - STT  
Brood Year 1991 (April 20 - May 1, 1992).

System	No.	Wt.	-Length-		
			No/Lb	in	mm
System 1	559,934	99,631	5.62	7.98	203
System 2	651,518	118,419	5.50	8.04	204
System 3	1,097,600	211,573	5.19	8.20	208
Grand Total	2,309,052	429,623	5.37	8.10	206

Marked groups were as follows: On-site Contribution (CWT, LV) - 82,098, (freeze-brands) - 30,832; South Fork Clearwater River Contribution (CWT, LV)- 40,408, (freeze-brands) - 10,303.

#### Special Studies

A comparison was made of the production performance of steelhead on two different diets, the control being Abernathy dry diet and the test feed being BioDry 500 from Bioproducts. BioDry 500 is an extruded feed that is low in phosphorus and has additives that is supposed to make it more palatable to fish. There were no significant differences in production performance for the two groups of fish, the production criteria examined being feed conversion,

growth, and cumulative mortality. While BioDry 500 was bulkier, and subsequently less convenient to put into demand feeders, it appears satisfactory for production use when phosphorus effluent levels are a major consideration.

- Brood Year 1992 -

A thorough summary of Brood Year 1992's spawning season is referred to in "Spawning Report - Steelhead Trout, Brood Year 1992", dated July 31, 1992.

Summary of Run

Collection of adult steelhead was conducted as in recent years, with early-returning STT being collected as well as the normal spectrum of the run. The ladder was initially opened October 21 to December 6, 1991, during which time 729 early-returning STT were collected. The ladder reopened February 18, 1992, remaining open until May 4, 1992.

During the collection period 3,700 adult STT returned to Dworshak, more than enough to allow sufficient eggs to be taken for the various programs involved (Table 7).

Table 7. Run summary - STT Brood Year 1992.

	Males	Females	Total
Totals	1,124	2,576	3,700

Source: IFRO Final 91/92 Dw Weekly STT Review

Of the adults, 30.4 percent were males and 69.6 percent were females, values approximating historical averages (Table 8). As in the past, the run was fairly well dominated by II-ocean fish, which constituted 84.7 percent of all returning adults.

Table 8. Age and sex structure summary - STT adults Brood Year 1992.

	---Males---		---Females---		----Totals----	
	No.	(%)	No.	(%)	No.	(%)
I-ocean	283	(7.6)	30	(0.8)	313	(8.5)
II-ocean	738	(19.9)	2,394	(64.7)	3,132	(84.7)
III-ocean	102	(2.8)	148	(4.0)	250	(6.8)
Unmeasured	1	(0.02)	4	(0.1)	5	(0.1)
	1,124	(30.4)	2,576	(69.7)	3,700	(100.0)

Source: IFRO 91/92 Final Weekly Dw STT Count

Early-returning adult STT were treated with a one-hour formalin treatment (167 mg/l) three times each week from 11/25/91 through 1/27/92. Pre-spawning mortality totaled 32 fish out of 729, or 4.4 percent of the fish on hand during the first day of spawning.

Spawning Summary

Over 8.7 million green eggs were taken in 15 egg takes from 1,263 females and 851 males (Table 9). This total was enough to cover mitigation needs and other program requirements.

Table 9. Spawning summary - BY 1992 Steelhead.

---

TAKE	NOspawned	Actual	Actual	EYup	EYup	Actual	=====CULLED=====			
TK	DATE	Mls.	Fmls	GRNeggs	EYDeggs	Enum	Total	Eggs/	GRNeggs	EYDeggs
=====										
Ttl/Avg	851	1263	8768053	5937000	81.0	67.7	6942	1436575	29386	

---

Source: EGUP92ST.wk1 - 920605

Fecundity for this brood year averaged 6,942 eggs per female and eye-up for eggs actually enumerated was 81.0 percent, which produced 5.93 million eyed eggs. The 81.0 percent eye-up is a slight decrease from previous years. Low eye-ups were experienced throughout this spawning season, as opposed to the historical pattern of poor eye-ups only in the early takes.

It should be noted that this year eye-up as a percent of the total eggs taken each take is also being reported. The reason being is that this eye-up (67.7 percent for this brood year) is often confused with eye-up for eggs actually counted (81.0 percent for this brood year). No standard for reporting this particular statistic exists, with some hatcheries using one and others using the other. For clarity, then, both are reported here. The 67.7 percent "total" eye-up reflects an unusually large number of egg trays that were found to be totally infertile (or nearly so). Explanations for both these infertile trays of eggs, as well as for the drop in "enumerated" eye-up this year, are being sought.

A total of 1.4 million green eggs were culled due to IHN status or to IHN concerns which prevented shipment outside the Clearwater drainage or to other hatcheries. The overall male to female spawning ratio was 1.0:1.5.

Spawning Procedures

Procedures were basically the same as in previous years. Adults were crowded from holding ponds into the channel, then further crowded into the channel basket and dumped into one of two anesthetic bins. The fish were anesthetized with a 200 to 300 mg/l carbon dioxide solution (buffered with sodium bicarbonate), then lifted to the sorting table.

Ripe adults were sent to the spawning table with the females killed by a pneumatic knife at the sorting table. Green and excess ripe adults were returned to holding ponds. Sperm from usable males was placed in a cooler until needed and the fish were sampled for disease. Eggs from one or two females were fertilized with sperm from one male and then placed in Heath incubator trays. Aseptic procedures were employed throughout spawning operations. Iodophor solutions of 500 mg/l and 250 mg/l were used to disinfect equipment and workers' hands, respectively.

Eggs were water hardened in a buffered 75 mg/l iodophor solution for one half hour. After eye-up, the eggs were shocked, passed through an egg picker, and then counted. They were then disinfected for 10 minutes in a buffered 100 ppm iodophor solution. Most eggs were then placed into hatching jars over nursery tanks for hatching, although some were hatched in incubator trays.

DFHC sampled selected spawned adults for IHNV (Table 10). As in previous brood years, IHN levels were fairly high early and late in the run.

Table 10. IHN Incidence in Sampled STT Adults - Brood Year 1992.

Take Date	No. Sampled		-----IHN Positive Fish-----					
	Females	Males	Females		Males		Totals	
	No.		No.	%	No.	%	No.	%
TOTALS	1250	296	330	26.4	33	11.1	363	23.4

Source: Viral Sampling Results-DFHC, IDFG Eagle Lab, NFRC-Seattle

In addition to testing spawned adults for IHNV, fish health samples were taken for several other diseases (Table 11).

Table 11. Disease sampling summary - STT Brood Year 1992.

Disease	--Adults Sampled--		Number Positive	Percent Positive
	Number	Percent		
1. BKD	217	17.2	90	41.5
2. <u>Ceratomyxa</u>	150	9.7	100	67.0
3. EIBS	150	9.7	4	2.7
4. ERM	135	8.7	15	11.1
5. Furunculosis	135	8.7	0	0.0
6. IPN	196	12.7	0	0.0
7. <u>Myxosoma</u>	85	5.5	0	0.0
8. PKD	135	8.7	0	0.0

Source: Dworshak FHC - 920707

Sperm and unfertilized eggs were provided to several research projects during the spawning season.

Special spawning procedures and special spawning days were conducted for a study being run in cooperation with Reg Reisenbichler et al. of the National Fisheries Research Center - Seattle (NFRCS). These took place on 4/07/92 and 4/14/92. The study is fairly complex, with a general objective of comparing on- and off-station performance of steelhead from natural and hatchery stocks.

Egg Disposition

This year 4.0 million eyed eggs were retained at Dworshak (Table 12), the first time in 10 years that the hatchery would attempt to keep its entire rearing program on station. Just under 400,000 eggs were sent to the newly operational Clearwater Anadromous Fish Hatchery (CAFH), with another 1.37 million eggs shipped to Magic Valley SFH. This was slightly short of the 1.5 million requested, which was partly due to egg request timing coinciding with the anticipated rise in IHN positive incidence in STT spawners. Only eggs from IHN negative parents were shipped out of the Clearwater drainage.

Table 12. Eyed egg disposition - STT Brood Year 1991.

Eyed Eggs	-----Eyed Egg Disposition-----				Green/Eyed EGGS
	Dw	CAFH	MV	NFpalouse	
Totals	5,937,000	4,012,449	397,000	1,375,000	121,165* 1,465,961

\* Unfed fry (Reg Reisenbichler study fish).

Of the eggs from the NFRCS study, most were outplanted as unfed fry in the North Fork of the Palouse River, while others were retained at Dworshak. Some of these were merged into the production program, while approximately 3,000 will be used for a performance comparison of natural and hatchery stocks.

A total of 1,436,575 green eggs were culled, due to IHN concerns, while only 29,386 eyed eggs were destroyed. Another 2000 eggs were taken by Idaho Department of Environmental Quality and split among Big Elk Creek, Little Elk Creek, American River.

Adult Disposition

The carcasses of most steelhead adults which had been spawned or used for disease sampling were processed by Latham Meats, with the processed meat going to the Idaho Department of Education for distribution. Early-returning adults were sent to the landfill or to the W. S. U. bear program. A total of 260 adults were outplanted, of which 250 were females (Table 13).

Table 13. Adult STT outplant summary - BY 1992.

Date	Water Body	Site	----No. Outplanted----		
			Males	Females	Total
03/11/92	S.F. CLEARWATER R.	RIVER MILE 8.7	0	120	120
03/12/92	S.F. CLEARWATER R.	RIVER MILE 8.7	0	120	120
04/08/92	CROOKED R.		10	10	20
			---	---	---
Totals			10	250	260

### Production Methods

Over 3.47 million feeding fry were initially tanked in Dworshak's nursery from 2/12/92 through 5/21. While most hatched from egg jars directly into tanks, many were also hatched and buttoned up in stacks because tanks were not available. Initial loadings ranged from 30,000 to 40,000, for the most part, depending on tank space available.

For the first time since IHN virus was a problem, all STT fry reared at Dworshak spent their nursery months in essentially virus-free water. A-, C-, and D-bank tanks received reservoir water, while B-bank was on ozonated water supply. A- and B-bank water supplies were both heated to 54°F, while C- and D-banks received water at ambient (reservoir) temperatures - from 42°F to 54°F. Out of 114 tanks, only one tank broke with IHN in the nursery this year, a marked improvement over previous production programs in which 30 to 90 percent of the tanks would break. The tank that broke this year happened to be from IHN high positive and early-return parentage. These high IHN positive offspring had been kept, along with two other tanks, to provide adequate representation of this part of the run. As soon as fish in the one tank began dying, however, these three tanks of fish were destroyed. No further outbreaks of the virus occurred during nursery rearing.

Offspring from early-returning adults reached ponding size (150 to 200 FPP) in May 1992. From mid-May through mid-June nineteen ponds were filled with fingerlings. Six weeks after initial ponding IHN began to occur in these ponds, eventually affecting all nineteen ponds. As IHN symptoms became more prevalent, it was decided to delay the ponding of any more steelhead fingerlings until August or September, or until the fish reached 100 FPP. No more STT were transferred to Burrows ponds until August 11, and STT still remained in the nursery on September 30.

Meanwhile, losses mounted in the early-ponded rearing units. An average of over 30 percent cumulative losses were experienced by these fish through October. Of the 25 rearing units ponded after 8/11/92, only two broke with the virus and these sustained losses of only one to six percent. Early-ponded fish averaged 178 FPP at ponding while late-ponded fish averaged 64 FPP. It has not been determined whether larger size fingerlings or whether later ponding had the greater influence on the drastic drop in IHN. In any case,

both will be maximized in devising ponding strategies for future steelhead production programs.

Considerable effort went into developing a tanking and ponding strategy as the developing IHN situation in outside ponds caused a continual reevaluation of what needed to be done with nursery tank rearing. Fish loadings were 40,000 split to 20,000 and then to 7-10,000. Keeping these latter takes inside as long as possible doubled and quadrupled the effort needed to inventory and move the increased weights and numbers of tanks. The increased effort did, however, give these fish a greater chance of surviving IHN.

In late August the reservoir water supply, for reasons yet undetermined, had high nitrogen levels (up to 121 percent), high total gas levels (up to 111 percent), and oxygen levels almost 20 percent below saturation. The resulting stress caused losses in C- and D-banks of nursery tanks, and these fish were ponded or moved to A- and B-bank tanks as quickly as possible.

Aside from the IHN problems suffered by the early-ponded fish, the outside rearing program progressed satisfactorily the remainder of the fiscal year. No major health problems warranting treatment, and growth was well on schedule. Despite cold water releases (46°F) from Dworshak Reservoir 7/5-11/92, 7/15-7/17/92, and 8/10-20/92. This was done a) to help determine what effect the cold water release would have on thermal stratification downstream and b) to possibly help fall chinook salmon adults in their upstream migration.

As of September 30, 1992, over 2.6 million steelhead remained in Dworshak rearing units (Table 14). With subdued IHN losses, a 1993 STT smolt release of 2.3 to 2.4 million steelhead is anticipated.

Table 14. Inventory summary - STT Brood Year 1992 (9/30/92).

Location	Number	Weight (Lb)	No/Lb	Length (in/mm)
Nursery	257,745	2,927	88.0	4.07/103
System 1	724,370	37,028	19.6	5.27/134
System 2	542,088	10,875	49.8	3.86/98
System 3	1,094,838	31,332	34.9	4.35/110
Totals/Avg	2,619,041	82,162	31.9	4.47/114

Source: Monthly Inventory Summaries - 921001

Special Studies

**Natural vs. Hatchery Stock Evaluation**

The natural versus hatchery stock comparison study being conducted by Reg Reisenbichler and associates had progressed, for the most part, fairly satisfactorily. The study involved genotyping adult STT prior to spawning in order to produce offspring homozygotic or heterozygotic for particular gene

pairs. Hatchery-stock females (53) were spawned in addition to several natural stock females. These produced over 200 thousand heterozygotic offspring, of which 117,114 were outplanted to the North Fork of the Palouse River as unfed fry, while another 90,000 plus were kept on station. These latter fish were to be integrated into Dworshak's rearing program, but kept separate from non-study fish. Unfortunately, in the haste of moving fish outside to escape the high nitrogen levels in August, a misunderstanding resulted in four of the eight tanks of heterozygote study fish being mixed with two tanks of non-study fish. These fish could no longer be used in the study. Approximately 45,000 fish in four tanks were kept separate, however, and were being reared in two Burrows ponds at fiscal year's end.

The hatchery and natural stock females spawned for the study also produced over 60,000 homozygotic fry, 59,317 of which were outplanted as unfed fry in Brushy Fork Creek. Another 2,900 were kept at Dworshak for rearing through smolting. These fish were right-vent clipped and are presently mixed with Take 15 steelhead in System 2. In April 1993 all the fish in this particular pond will be examined, and the study fish separated for analysis. These study fish will not be released for outmigration.

#### **Rainbow Trout Production**

Rainbow trout (RBT) for Dworshak Reservoir have been supplied from another hatchery since 1985 because of Dworshak's IHN disease status. This year Kooskia reared and released 101,186 at 35.5/lb into Dworshak Reservoir in April 1992 and another 145,026 at 23.2/lb into other nearby waters in May. Refer also to Kooskia NFH's Annual Report of FY 1992 for further details on rainbow trout rearing.

#### **Spring Chinook Salmon Production**

##### **- Brood Year 1990 -**

This brood year entered Fiscal Year 1992 with 1.67 million fish weighing 42,958 pounds. Averaging 38.9 FPP, these fish were slightly larger than targeted, and were released at an average size of 16.7 FPP. Table 15 below summarizes Fiscal Year 1992 performance of these fish. These chinook performed quite well through release, with a cumulative feed conversion of 1.72. Fish health remained generally quite good with no treatments required during pond rearing. While significant bacterial kidney disease (BKD) losses were not encountered during this rearing program, monthly mortality did rise to 0.7 percent the month before release. EIBS was also not a significant problem this rearing cycle. Eighteen of 40 raceways tested positive for the disease by release time, and only one of five Burrows ponds.

Table 15. 1991-92 Spring Chinook Salmon Performance -  
Brood Year 1990.

Month		--1st of Month-- Number	No/Lb	Growth (in.)	Mortality (%)	Temperature (°F)
October	91	1,673,008	38.9	0.41	0.28	53.2
November	91	1,568,258	29.7	0.30	0.17	49.1
December	91	1,594,661	24.9	0.18	0.34	43.8
January	92	1,589,198	22.4	0.16	0.32	41.7
February	92	1,584,086	20.4	0.19	0.37	41.0
March	92	1,577,208	18.5	0.24	0.73	41.0
Release		1,564,199	16.7	-	-	-

This lot received its second 21-day feeding of erythromycin beginning in late September and ending 10/11/91. Feeding was administered on a prophylactic basis for BKD.

Approximately 250,000 chinook were reared through release in five Burrows ponds this year. This was done because C-bank raceway loadings were dropped from 40,000 to 30,000, which required shifting the rearing of 120,000 fish as well as a surplus of another 120,000 fish. These fish were reared at loadings of 30-64,000 fish per pond.

#### Marking and Sampling

CWT marking of this lot of fish was conducted during November and December 1991. IDFG marking crews also freeze-branded approximately 66,000 SCS for fish passage study purposes. Vancouver FRO marked various SCS for different studies at this time. Inventory numbers were long 4.8 percent of book values for the 650,000 SCS marked with CWTs. National Marine Fisheries Service personnel began smolt quality assessments during November.

As in past years, many SCS received marks or were sampled for various studies. Table 16 presents a basic summary of marked groups from this brood year.

Table 16. Marked group release summary - SCS Brood Year 1990.

	CWT	PIT	Freeze-brand
Density/Low	141,437	600	0
Density/Medium	169,593	600	0
Density/High	121,664	600	0
Various Off-Site	235,230	0	0
Fish Passage	0	0	61,153

Source: IFRO - 921221

Distribution

In October 1991, 100,000 fish were shipped to Kooskia for further rearing as had been previously planned. These fish weighed a total of 2,310 pounds and, at 43.3 FPP, were 4.25 inches in length.

The release of BY 1990 spring chinook smolts took place from March 16 through April 16, 1992. As summarized in Table 17, just over 600,000 chinook smolts were outplanted this release year and 959,000 smolts were directly released at the hatchery into the North Fork and the Main Stem of the Clearwater River. This produced a total release of 1.56 million SCS smolts.

Table 17. Distribution summary by water and site - SCS BY 1990 (March 16-April 16, 1992).

WATER	AT (Site)	Number	Weight	No/Lb	-Length-	
					in	mm
<u>OUTPLANTS (3/16-4/6/92):</u>						
POWELL REARING FAC. (TRANSFER)		150,854	7,846	19.2	5.58	142
RED RIVER HATCHERY (TRANSFER)		207,519	11,273	18.4	5.66	144
ELDORADO CR.	DOLLAR CR.	183,000	9,178	19.9	5.51	140
WALTON CR.	POWELL RACK	63,457	3,386	18.7	5.62	143
	Subtotal	604,830	31,683	19.1	5.59	142
<u>DIRECT (4/15-16/92):</u>						
N.F. CLEARWTR. R.		896,202	58,024	15.5	6.00	152
MAIN S. CLEARWTR. R.		63,167	4,045	15.6	5.98	152
	Subtotal	959,369	62,069	15.5	6.00	152
	GRAND TOTAL	1,564,199	93,752	16.7	5.85	149

Source: FR92RY.wk1 - 920515

Chinook smolts (150,000) were transferred to the Powell rearing facility, and

over 200,000 were moved to the Red River facility for acclimation for two weeks before release in April. Another 63,000 smolts were released into Walton Creek at the Powell facility in early April along with the 150,000 acclimated smolts being held there.

Smolt releases went without incidence, and, according to fish health and assessment reports, this year's smolts were in fairly good condition at time of release. Good condition was confirmed by high hematocrit levels (30 to 40), by 100 percent survival in 24-hour saltwater challenges, and by generally subdued BKD levels. The fish also handled quite well during outplant hauling.

Special Studies

A number of experiments were conducted during this SCS production program. A summary of these investigations and results follows.

**Density Study**

The major study undertaken with 500,000 fish from this brood year was a repeat of the density study, with fish reared at three different rearing densities from first tanking through release. Nursery rearing performance was quite similar for the three groups overall, although cumulative mortality rose slightly for the medium- and high-density lots. Growth and health of these fish in raceways was also similar at first, but by the end of September two of the three high-density groups and one of the six medium-density groups had been confirmed with BKD. At time of release, all three high-density rearing units populations had BKD and were experiencing losses significantly above the average loss in the lot (see table below).

End-of-month and cumulative ponding data are presented below for these experimental fish through end of March 1992, just shortly before release in mid-April.

Performance summary (March 31, 1992) - Density Study SCS BY 1990.

Rearing Density (03/31/92)	Number	Lbs.	FPP	Length (in.)	Monthly Mortality (%)	Cumulative Mortality (%)*	Monthly Growth (in.)
Low	145,679	9,569	15.2	6.02	0.06	0.81	0.11
Medium	182,230	11,682	15.6	5.97	0.37	2.44	0.13
High	132,697	7,693	17.2	5.77	2.55	12.99	0.11

\* Since loadings of raceways in June 1991.

**High-BKD Male Offspring**

An evaluation was made of offspring of high-BKD males and moderate- and low-BKD females. The literature and first-hand observations indicated vertical transmission of the disease primarily through the female gamete. To evaluate

this probability 120,000 fish from the aforementioned matings were retained in the production program. Observations to date seem to confirm the fact that these fish perform as well as other production salmon, with cumulative raceway mortality in the high-BKD male offspring being only 0.26 percent versus 0.45 percent losses in production fish controls (no significant differences).

#### **Reduced C-bank Loading**

C-bank raceway loadings were reduced from the historical 40-42,000 fish to 30,000 fish. This was done to address the observation that fish health problems were more prevalent in this group of rearing units. The extra 120,000 chinook were placed in Burrows ponds in System 1, together with an additional 120,000 SCS being reared through smolting for this production program. The lower densities in C-bank raceways evidently helped reduce the incidence of BKD, and generally increased survival over previous years. Fish stamina also seemed to improve.

#### **Burrows Pond Rearing**

The 120,000 SCS taken from the normal C-bank loadings and the extra 120,000 smolts reared this year were all reared in five Burrows ponds in System 1. Because of previous problems in the early 80's with rearing chinook in Burrows ponds, special attention was given these fish. Two of the ponds experienced losses to BKD, but, in general, the test could be designated a success. Some observations were made that these fish handled the stress of marking less well than other SCS. While the BKD losses and the possibly less resilient smolts from Burrows ponds constitute a caveat in the future use of Burrows ponds for SCS rearing, these rearing units certainly offer a viable option when and if surplus chinook production become available in the future.

#### **ELISA BKD Monitoring (DFHC)**

From 12/4/91 through 4/1/92 DFHC sampled six raceways of spring chinook, taking (usually) 30-fish samples from each raceway each month and checking for BKD levels using the ELISA technique. Table 18 below summarizes the resulting BKD levels by raceway for each of the four BKD levels - negative (0.00-0.99 ODUs), low (0.10-0.19 ODUs), moderate (0.20-0.449 ODUs), and high (>0.45 ODUs).

Table 18. Comparison of BKD incidence as determined by ELISA in six raceways of BY 1990 SCS (12/4/91 to 4/1/92).

RW	--Parent---		Loading (1000s)	Rear. Unit	---BKD Level (percent)---				Total BKD (L/M/H)
	Female	Male			Neg.	Low	Mod.	High	
C 8	Lo/Mod	Lo/Mod	30	RW	60.3	35.3	4.3	0.0	39.6
B 28	Lo/Mod	High	41	RW	60.7	33.3	4.3	1.7	39.3
BP39	Lo/Mod	High	58	BP	53.5	41.4	5.1	0.0	46.4
A 3	Lo/Mod	Lo/Mod	16(lo)	RW	92.5	5.7	1.9	0.0	7.5
A 11	Lo/Mod	Lo/Mod	30(md)	RW	80.3	13.7	3.4	2.6	19.6
B 30	Lo/Mod	Lo/Mod	44(hi)	RW	41.4	36.0	8.1	14.4	58.5

Source: Dworshak FHC - (1991-92 SCS BKD ELISA Results)

Caution must be taken in interpreting the data presented in the table. The percent of samples for a particular BKD level represents all sampling dates. In addition, adequate replication of sampling the various test groups could not be done because of time, equipment, and fish sampling constraints. These fish were all from low and moderate-BKD level females.

Three of the six rearing units monitored were considered fairly high density rearing, and these all had about 40 percent plus total positive BKD samples. One of these, RW 30, a high-density study pond, had almost sixty percent positive samples and had the highest proportion of high-positive samples, over 14 percent. The three density study ponds (A3, A11, and B30) seem to exhibit two trends. Negative samples drop from 92.5 percent for the low-density pond to 41.4 percent for the high-density pond. And the high-BKD samples in this sub-group rise from 0 percent in low-density to 14.4 percent in the high-density pond. Again, without replication care must be taken in the interpretation and application of this data.

The original data, summarized here, does show definite trends in BKD incidence levels as time progresses in four of the six ponds examined. Five of the six had very low levels of BKD when testing was initiated in December of 1991. By the time the last samples were taken in early April 1992, however, increasing levels of moderate- and high-BKD incidence were indicated.

- SCS Brood Year 1991 -

### Production

As the reporting period began, on October 1, 1991, the six egg takes of Brood Year 1991 SCS were eyeing-up in incubators with approximately 860,000 eyed eggs on station. This included approximately 14,000 eggs taken at Red River and Powell. Fry (848,595) went on feed with a weighted first day of feeding of 11/22/91.

Good survival was seen again following initial tanking, as with Brood Year 1990 SCS. December and January mortality combined was only two percent (Table 19). This demonstrated a marked improvement over Brood Years 1988 and 1989 when four percent losses were recorded. This was most probably due to maintaining clean sand filters, which ensured that debris did not impede water flows through trays and through eggs incubated in colanders.

Table 19. SCS Performance - Brood Year 1991.

Month	---1st of Month---	No/Lb	Growth (in.)	Mortality (%)	Temperature (°F)	
November	91	Not on the books until month's end				44.0
December	91	845,825	1561	0.38	1.4	40.3
January	92	834,184	713	0.31	0.6	41.0
February	92	829,547	429	0.24	0.3	41.0
March	92	826,964	304	0.29	0.4	41.5
April	92	823,993	210	0.21	0.4	49.8
May	92	819,608	166	0.33	0.3	52.6
June	92	814,677	115	0.53	0.2	51.4
July	92	821,255	71.3	0.47	0.1	53.9
August	92	820,603	49.3	0.44	0.2	51.2
September	92	819,041	36.3	0.27	0.1	

Fish health during nursery rearing was generally quite good. This is the first lot of fish to be early-reared on reservoir water. Although an examination by DFHC in May 1992 revealed light amounts of ERM (Enteric redmouth) in some SCS fry held in the nursery, no treatments were warranted. Fish health remained satisfactory through the remainder of the fiscal year, again attested to by no disease treatment being recommended by DFHC.

Fish health was aided by the fact that, with only 850,000 fry in this Brood Year, tanks were loaded at an average 18,000 fish per tank. BKD parentage was again one of the attributes tracked, with moderate- and high-BKD parentage offspring being separated from low-BKD parentage fish. Out of 47 tanks used this year, there were only two of moderate parentage (26,000 fish) and three tanks of high parentage (42,000 fish).

Beginning 4/24/92, these fish began their first of two feedings of erythromycin medicated feed (4.5 percent Gallimycin per pound of feed). The last day of this feeding was 5/13/92, which gave the fish the recommended 10 plus days of a normal diet before CWT marking began 5/27/92. This was done to avoid any possible acute reactions to handling stress which had occurred on other stations. The effective dosage given these fish averaged 73 mg per kg of fish per day. Recommended dosage is 100 mg/kg/day for a minimum of 21 days. These fish received a second feeding of medicated feed for 24 days from 8/04/92 through 8/28/92. This was effectively a 43 mg/kg/day treatment. Future treatments with erythromycin will need to be made at the recommended

levels. It might be mentioned that both treatments given this brood year were prophylactic, with BKD symptoms fairly subdued during both periods.

Most of BY 1991 chinook were moved from nursery tanks to outside raceways during April with a few moved during May. Two small groups of fish totaling about 2,000 remained in the nursery to compare river water rearing with reservoir water rearing. No inventories were taken during fish moves in order to minimize stress. The fingerlings were combined to one of several raceways in A-bank. On May 27 crews supervised by the Vancouver FRO began CWT and ad-clip marking all fish in this lot, with fish being split to final rearing densities. Fish marking, which concluded June 16, provided a first inventory with an overall gain of 2.8 percent from book values. This generally good agreement with production records affirms not only record keeping accuracy, but also record keeping and enumeration methods.

An additional left-vent clip was made on SCS destined for rearing at satellite facilities, with 6,067 being shipped to Red River and 8,373 to Powell in June. Personnel and vehicles for these transfers were provided by the Clearwater hatchery.

A 97.6 percent survival from initially tanked fry numbers was determined, a significant rise from the 89.7 percent survival through the same stage for Brood Years 1987 to 1990. This may both help confirm the accuracy of the initial eyed-egg counting as well as reaffirm the chronic benefit to fish health resulting from the sand filter flushing which was practiced both this brood year and last.

These fish were on a feeding regime through September 1992 that would have produced a 16.5 FPP smolt in Spring 1993. In September 1992 the point was raised that historical releases were in the range of 18 to 20 FPP. The chinook were changed back to a feeding regime that would produce smolts in the 18 to 20 FPP range. They were placed on a 7-day on 5-day off feed schedule. Fish health will be closely monitored so that fish quality is not compromised.

There will continue to be a conflict in chinook rearing at Dworshak because of the twin demands of having the fish large enough to mark in June (150 to 180 FPP) and of not producing a smolt bigger than 18 FPP. To satisfy both demands chinook will continue to be put on diet restrictions. Growth-wise, it helped to have cold water releases (46°F) from Dworshak Reservoir 7/05-11/92, from 7/15-7/17/92, and from 8/10-20/92. However, this prevented the proper feeding rates already planned for erythromycin, which was instrumental in giving these fish an erythromycin dosage less than recommended.

As of September 30, 1992, there were 818,000 chinook on station at an average size of 30.3 FPP (Table 20). Kooskia's 346,000 were slated to be returned in October 1992.

Table 20. Inventory summary and program projection update -  
SCS BY 1991 (9/30/92).

Program	Rls/Tnsfr Date	-----9/30/92 Balance-----				-----Projected-----		
		Number	Wt.	FPP	L(in/mm)	-Loss (%) - Nurs. Pond	Number At Rls/Tnsfr	
Dworshak	Apr 93	471,745	15,466	30.5	4.78/121	0	4	452,875
Kooskia	Oct 92	346,499	11,507	30.1	4.80/122	0	1	343,034
Totals/Avg		818,244	26,973	30.3	4.78/121			

Special Studies

The study presently being conducted with this brood year's fish is a serial release experiment involving approximately 390,000 fish. One-third of these fish will be released in early April, in mid-April, and in early May of 1993. Feeding rates are being adjusted so that all fish are released at approximately equal sizes. The question being addressed by the study is which time period is more appropriate for chinook releases from Dworshak. Outmigration and adult returns will be monitored for guidance in release timing. There are two CWT groups for each of the three release times. The remaining 82,000 salmon not in the study will be released in mid-April.

- SCS Brood Year 1992 -

Summary of Run

Dworshak's ladder was open to collect returning adult spring chinook salmon from May 22 until September 11, 1992, while Kooskia kept its trap functional from May 9 through August 28. A total of 681 adult SCS returned to the complex this year, with 312 back to Kooskia and 369 back to Dworshak (Table 21). On 8/06/92 tribal, state, and federal personnel angled for SCS adults at the mouth of Dworshak's ladder. Fifteen adults were caught and put into Holding Pond 9. As in years past, II-salt adults predominated, making up 77 percent of all returns.

Table 21. Age Structure Summary - SCS Adults Brood Year 1992.

	Kooskia NFH	Dworshak NFH	Totals
I-ocean	14	22	36 ( 5.3 %)
II-ocean	239	286	525 (77.1 %)
III-ocean	38	40	78 (11.4 %)
Unmeasured	21	21	42 ( 6.2 %)
Totals	312 (45.8 %)	369 (54.2 %)	681

Source: IFRO - 921007

Pre-spawning Summary

Returning brood stock were anesthetized with Tricaine Methanesulfonate (MS-222) buffered with sodium bicarbonate, sexed, measured, and inoculated with Erythromycin Phosphate (20 mg/kg body weight) before being sent to a holding pond. The adults were treated three times weekly with a one-hour, 150 mg/l flow-through formalin treatment from 6/2/92 through 8/17/92. Adult mortality was removed daily, recording sex, size, jaw tag numbers, and fin clips. Most adults received a second injection of erythromycin phosphate. Adults which returned within a week of the first spawning day did not receive an injection. Adults returned from Kooskia were put into Holding Pond 1 and kept separate from Dworshak returns.

Pre-spawning losses totaled 124 fish (19.4 percent) of the 640 fish (Dworshak, 328; Kooskia, 312) on station by 8/26/92 (Table 22).

Table 22. Pre-spawn mortalities - SCS Brood Year 1992.

	Dworshak	Kooskia	Total
Males	24	27	51
Females	5	43	48
Sex Unknown	2	23	25
	--	--	---
Total Mortality	31	93	124
Percent Mortality	9.5	29.8	

Kooskia's higher percentage losses appear to be problems with injecting adult SCS with erythromycin under warm water conditions (up to 75°F). Total mortality was 159 fish, or 23.3 percent. Fungus was a problem in both groups of fish, with formalin treatment not being an effective fungicide as malachite green.

Ten males and 10 females from Kooskia stock were released into Clear Creek above Kooskia's intake on August 25.

Spawning Summary

Seven egg takes were accomplished for this brood year, starting August 19 and ending September 11 (Table 23). Females (231) were spawned, 138 from Dworshak returns and 93 from Kooskia returns. A total of 900,000 green eggs were taken and, judging by the general look of the eggs at month's end, eye-up should approach historical averages of 90 percent plus. Another 900,000 eyed eggs were expected from Rapid River SFH in early October. Kooskia eggs were incubated with one spawn per individual Heath tray. Only Kooskia eggs were enumerated for eye-up this year. Dworshak eggs were incubated individually in colanders for a NFRCS study on low-BKD offspring. Dworshak's egg counting equipment is geared for large takes of 50-800,000 eggs, not for counting individual takes of 3-4000 eggs each. As the table below indicates, Dworshak stock fecundity will be presumed to be 3,750 eggs per female.

Table 23. Spawning summary - BY 1992 Spring Chinook Salmon.

TK	TAKE DATE	NOspawned Mls.	Fmls.	Green Eggs	Eyed Eggs	EYup Enum egg%	EYup Total egg%	Eggs/Female
1	8/19	9	9	33750	na	na	na	3750
2	8/25	53	72	270000	na	na	na	3750
3	8/28	43	43	161250	na	na	na	3750
4	9/01	53	53	198750	na	na	na	3750
5	9/04	20	20	75000	na	na	na	3750
6	9/08	27	30	112500	na	na	na	3750
7	9/11	4	4	15000	na	na	na	3750
		209	231	866250	805612	93.0	na	3750

Note: Only KK eggs were enumerated so all data are estimates (except for numbers spawned).

After Take 5, adults were combined into one holding pond. Eggs from the two hatcheries were incubated and tracked separately to ensure that fish to be returned to Kooskia in April 1993 are from Kooskia returning adults. It should be noted that it is almost impossible to ensure complete separation of stock. Adults being returned to holding ponds occasionally jump from Holding Pond 2's return chute to Holding Pond 1's. This mixed several Dworshak returnees with Kooskia adults. Fish also occasionally are inadvertently left in the small crowding channel and subsequently mix with adults from the next pond brought into this channel. These occasional intermixtures of stocks need to be recognized in dealing with the questions of total returns to each hatchery, sex ratios, genetic separation, and in accounting procedures.

Table 24 summarizes a few detail of Brood Year 1992 and compares it with a 5-year average.

Table 24. Comparison of BY 1992 spawning with 5-year average. Spring Chinook Salmon.

Brood Year	Adult Returns*	Fmls. (%)	Green Eggs	Eggs /Fml.	Eye-up (%)	II-salt (%)
1987	2,704	59.3	4,075,666	3,526	92.5	82.1
1988	2,567	52.6	4,890,970	4,615	96.0	36.3
1989	2,673	48.7	3,516,306	3,701	92.8	76.3
1990	3,183	54.9	4,833,104	3,623	94.2	88.4
1991	632	51.9	995,842	4,117	89.0	27.7
5yr Average	2,781	53.5	3,662,378	3,916	92.9	62.2
1992	681	53.2	866,250	?	?	82.2

\* Includes trap mortalities and strays from other hatcheries.

Numerous groups were on station to take tissue, sperm, or egg samples. University of Idaho personnel took liver and heart samples for DNA extractions. NFRCS sampled kidney and other tissue to examine possible genetic links between genotype and BKD level. IFRO preserved some SCS sperm using cryopreservation.

### Spawning Procedures

Spawning procedures were basically taken from 1991, and were accompanied by additional extensive health lab sampling for IHNV and BKD.

On a given spawning day all adults were anesthetized with MS-222 (buffered with sodium bicarbonate with oxygen addition) and checked for ripeness. Males were sent directly to the spawning table while females were killed using a pneumatic knife and bled for 5-10 minutes in a spawning rack. Green females were sent back to the holding ponds along with unnecessary males. To facilitate record-keeping, spawned adults were identified with numbered, stainless steel pins for later culling and segregation due to disease status. Sperm was collected in styrofoam cups and kept on ice in a cooler until used. Females were cut and eggs collected in pre-iodinated colanders to drain ovarian fluid. Gametes from both males and females were then combined and mixed by hand.

Fertilized eggs were thoroughly rinsed before the eggs were put into incubator stacks. Crosses were made between one male and one female, with occasional exception when males were running low or when exceptional amounts of milt were obtained from a male. This resulted in a male to female spawning ratio of 1.0 to 1.1.

Aseptic procedures were used throughout the entire spawning period to prevent possible cross-contamination of IHNV positive parents or high-BKD parentage, or contamination of health lab sampling equipment. Males, however, were not iodophored because of concerns over extra iodophor dripping into the sperm. Iodophor solutions of 500 mg/l and 250 mg/l were used to disinfect equipment and workers' hands. Fertilized eggs were placed in individual Heath trays or individual colanders, and allowed to water harden for 30 minutes in iodophor (75 mg/l) buffered with sodium bicarbonate.

### Adult Disease Sampling

Table 25 outlines the disease sampling regimen generally followed this year.

Table 25. Fish health sampling - SCS Brood Year 1992.

Disease	=====FISH=====			
	Dworshak		Kooskia	
	Males	Females	Males	Females
BKD	100%	100%	100%	100%
IHN	Sub.	50-100%	Sub.	100%
Other	20-25/spawn		20-25/spawn	

Sub. = subsample

BKD segregation was based on ranges given in Table 26, using ELISA values only from female parents. This assumes, as the literature and on-station observations indicate, that the BKD status of the female should carry more weight in the designation of the offspring than that of the male.

Table 26. Optical density units associated with BKD-levels in Dworshak/Kooskia SCS.

BKD Level	Optical Density Units Range
Negative	0.000 - 0.099
Low	0.100 - 0.249
Medium	0.250 - 0.449
High	0.45 and above

High-BKD parentage eggs were not culled this year as was generally done in the past because of the shortage of eggs. High-BKD offspring will be reared as isolated as possible from other fish lots, using separate cultural utensils, low densities, feeding erythromycin feed twice, as well as any other cultural device or method to minimize stress in this group as well as minimizing risks to other fish lots.

Subsampling for IPN, VEN, ERM, furunculosis, Myxobolus spp., and Ceratamyxa ghasta was also carried out by the Dworshak FHC.

Incubation

All spawns from Kooskia stock were individually incubated in Heath tray, while Dworshak spawns were incubated in colanders. Large Dworshak spawns were split to two colanders. Incubation temperatures were kept at 52°F or below. After eye-up Kooskia eggs were shocked, picked, counted, and put back in trays at 5,000 per tray. Dworshak eggs were shocked, hand picked, then transferred to individual Heath trays so that tracking of individual females was accomplished. Strategy for this year was to tank the fry when 50 to 75 percent reached swim-up in the trays.

Special Studies

The disease samples for all 138 Dworshak spawns were run by the Seattle lab, with selection of spawns only from negative males and females. Negative was defined as an ELISA reading of less than approximately 0.07 ODUs. After testing was completed, the study had enough negative spawns for 12 tanks, each containing the offspring from eight females, with several female negative spawns left over.

Program Objectives

Distribution of fingerling and smolts from the present brood year should proceed according to the following proposed schedule:

Table 27. Program proposal - Spring Chinook Salmon Brood Year 1992.

Program	Number at Rls/Tnfr	Type of Release/Transfer	FPP at Rsl/Tnfr	Date of Rls/Tnfr
Dworshak (1.397M eyed)	1,200,000	Smolt	18.0	Apr 94
Kooskia (0.347M eyed)	(325,000) 298,000	Fingerlings from DW Smolt	160 18.0	Apr 93 Apr 94
<u>Objectives based on appx. mortality of:</u>				
			Eyed to ponding	= 14%
			Ponding to release	= 6%
Total Smolts	1,498,000			

**- SPRING CHINOOK SALMON -**  
**Problems and Concerns**

1. The issue of segregating adults returning to Kooskia and those returning to Dworshak is being addressed by holding these adults separately, beginning with BY 1992 adults, and by the planned return of BY 1992 Kooskia fish offspring to Kooskia.
2. Increases in pre-spawning mortality and in total mortality for BY 1992's broodstock necessitates examination of the possible causes, and remedies. This is the first year that formalin was used as a fungicide in adult SCS holding ponds. Fungus on these fish became quite a problem and was the likely cause of much of the mortality. We need to reexamine the use of malachite green on chinook adults to help reduce this holding mortality.
3. The proper dosage, injection site, drug carrier, and numbers of injection of returning adults with erythromycin continue to be examined. Based on fair success with previous applications (one to two injections at 20 mg/kg in the dorsal sinus) and a lack of clear superiority of proposed changes (40 mg/kg into the peritoneum(?)) - previous techniques will be repeated.
4. Incubating eggs are maintained in a temperature range of 52°F to 54°F. Previous experience with higher incubation temperatures indicated greater numbers of deformed fry and higher initial losses.
5. The incubator water supply has been converted to reservoir water. A sand filter previously employed to reduce silt is no longer necessary. The cleaner water is a likely contributor to reduce losses of eyed eggs and of initially tanked fry.
6. Trays of eggs are regularly cleaned at hatching to remove egg shell debris, and dead eggs are periodically picked out thereafter. Eggs which eye-up in colanders are transferred as quickly as possible to incubator trays to give them the better water flow that trays provide. The causes of the chronic nursery mortality experienced by past brood years of chinook have still not been determined. Hopefully, the increased attention being paid to temperatures, flows, and cleanliness will eliminate these early losses.
7. The concern that regular segregation and culling of high-BKD female offspring may adversely affect the genetic pool of this population still needs to be addressed. Because other eggs may be transferred in to supplement Dworshak's egg need, however, genetic concerns regarding the culling of high-BKD eggs from chinook in this basin may remain minor for a while yet.
8. The question regarding what weight to give high-BKD males in assigning a BKD level to resulting offspring was examined using 80,000 BY 1990 chinook. As indicated by the literature, results from this study showed the male seems to play little, if any, role in passing the disease to

the eggs. Until further evidence to the contrary is shown, offspring from high-BKD males and from medium and low females will be classified as medium-BKD parentally.

9. The efficacy of feeding erythromycin to every lot of spring chinook is still open to question, and should be examined by conducting a properly designed experiment. The current problem remains, there are simply not enough fish to conduct a study with.
10. A limited examination should still be made regarding accelerated growth, i.e., rearing some SCS to 12 FPP while controls are reared to the traditional 18 FPP. While earlier experience with larger smolts pointed to greater problems with BKD, we need to reexamine the facts in light of other projects rearing larger chinook with no apparent problems.
11. The overall improvement in fish health accompanying the reduced densities in C-bank should provide sufficient logic against ever loading these rearing units so heavily, when and if they are ever used for SCS again.
12. The general success with rearing BY 1990 SCS in Burrows ponds affirms the possible use of this alternative in the future. Questions, however, remain concerning the health of fish so reared, given some BKD-associated mortality as well as some observations that these fish may have not taken the stress of marking as well as RW-reared chinook.
13. Regular examinations of SCS populations using ELISA will be conducted to perhaps a) develop strategies to avoid the disease, b) develop indices to track the incidence and communicate this information to whoever needs it, and to c) develop a better feel for what conditions are associated with BKD.
14. It is again recommended that a summary be made of the information regarding 0-age rearing that the Dworshak-Kooskia NFH Complex has generated so far, including the preliminary results of outmigration data. This is necessary to help determine whether further studies in this area are justified.
15. The tracking of low/medium/or high-BKD levels in the various SCS groups will continue to evolve, hand in hand with the tracking of other parental disease attributes as well as offspring disease attributes.
17. The effects of EIBS will continue to be monitored, examined, and reported.
18. Problems associated with the dual species programs at Dworshak continue to be examined and communicated so that proper prioritization can be accomplished when conflicts arise.
19. Coded-wire tagging along with an adipose fin clip of all SCS released from the hatchery was initiated in June 1992 on Brood Year 1991 fish to be released in spring 1993; purpose of mark to identify hatchery fish

from wild. Concern is over continuing to nose tag all hatchery production.

20. Feeding to a target size of 18 fpp at time of smolt release, when considering a sequential release over a 30 day period, requires adjusting a feed schedule. This adds a variable to the study. QUESTION? Is it better to continue all groups on the same feed schedule and consider size at time of release as a lesser variable.
21. Low adult chinook returns to the Clearwater River in 1991 (632) and 1992 (675) after four successive years beginning with 1987 when total numbers ranged from 2500 to 3200.
22. Absence of malachite green for fungus control when holding chinook broodstock causes increased holding mortality in 1992 program.

## Fish Cultural Improvements

The following presents a list of practices that have been implemented or are proposed for our production programs, along with a brief summary of some procedural specifics and what impact these practices have had or may have in the future. Because some pertain to steelhead and to spring chinook or to both programs, they have been grouped accordingly.

### Efforts Involving both Steelhead and Spring Chinook

Baffle use in nursery tanks--presently initiating use; should (1) reduce cleaning time in nursery and, therefore, the stress to the fish, (2) result in cleaner environment for the fish, and (3) provide reduced current areas which may help the fish condition.

Cover adults held in holding ponds with tarp--present practice to reduce stress; more permanent structure proposed.

Formalin injection system adapted from other stations and literature--ensures regular treatment of eggs, reduces formalin in air, and reduces risk of workers' accidental exposure to chemical.

Formalin treatment (167 ppm/1 hour) of adults held in holding ponds--replaces malachite green use as fungus control procedure.

Individually incubating spawns whenever possible--maintains proper disease or other attribute groups for tracking/isolation purposes.

New reservoir water supply in incubation room and nursery--initial indication that it has much less suspended solids which should help eye-up; also eliminates risk of water loss by pump failure.

Iodophor disinfecting (75 ppm/10 min) of eggs at eyed stage--this is in addition to 75 ppm/half hour iodophor at fertilization; literature and Dworshak testing indicate effectiveness of procedure in reducing/eliminating IHNV outbreaks.

Degassers reinstalled on 128 nursery tanks to reduce high nitrogen gas problems seen from using the new reservoir water supply.

Install air bleed system on all main overhead water lines to nursery tanks to correct uneven flow patterns.

Replumb reservoir water supply from Mechanical I over to ozone supply.

Converting C1 and C2 raceways back to adult holding pond No. 3 for greater flexibility in holding and separating brood fish.

Fish counter modification including a false weir and gravity slide with counter to No. 9 holding pond.

Replumbed spawning room with new reservoir water supply to eliminate any contamination previously caused by the direct river supply.

### Steelhead Improvements

New reservoir water supply eliminates IHN virus in early rearing.

Egg jars used for hatching and button-up - reduces handling and may also reduce IHN incidence.

Maximize use of "IHN-free" reservoir water supply by holding fingerlings to 100 fpp in nursery tanks prior to moving to outside ponds on river water; normal practice to move at 200-250 fpp.

Ozone use maximized - proven to essentially eliminate IHN.

Tanking database being designed to, hopefully, identify various combinations of cultural procedures or fish attributes that may have influenced IHN incidence.

### Spring Chinook Improvements

BKD-confirmed fish groups clearly identified and separate cultural tools and disinfection used to practically isolate these fish from their neighbors - shown to be effective in limiting the spread of the disease.

BKD incidence in ponds being monitored (Dworshak Fish Health Center effort) - ELISA measurements being made of BKD level in six specific raceways from early winter through release; should provide insights into progression of the disease and into its general severity.

Culling high-BKD female offspring generally; when not culling (too few fish, genetic considerations) - give special attention (low densities, medicated feed, segregation of cultural tools, isolation).

CWT marking fingerlings in late spring rather than fall may reduce risk of spreading BKD; may also increase adult returns when compared to fish that are CWT marked in fall.

Density effect on performance and adult returns being evaluated - 2nd study group released spring 92; initial results indicate low density fish perform better on-station, no data yet on adult return effect.

Densities reduced in C-bank raceways - these rearing units historically had more health problems; drop from 45K to 30K fish per unit for present production program seems to have reduced BKD incidence - will probably delete future rearing of SCS in C-bank due to unavailability of eggs beyond A and B bank raceway requirements.

Enclose all of SCS ponds in bird-proof wire netting to reduce stress of fish and eliminate losses.

Erythromycin medicated feed (4.5 percent) given twice during rearing program some indication of effectiveness in reducing on-station BKD; needs properly designed study to adequately evaluate effects.

Erythromycin injecting (once or twice) adults prior to spawning (usually 20 mg/kg body weight, dorsal sinus) - literature and U of I studies point to effectiveness in reducing incidence of high-BKD levels in adults and to egg and fry retention of drug.

High-BKD male offspring performance being evaluated - to date, no difference from other production fish; may alter disease policy so that such offspring are not regularly culled (may have genetic implications).

Reducing general fish stress wherever possible (no weighing at ponding, minimize sample counting, etc.) - may improve on-station performance and increase adult returns.

Segregating all fish groups by parental BKD status (negative/low, medium, high) - previous segregation studies (Pascho/Elliott) demonstrated higher BKD incidence in high-BKD offspring; will, hopefully, minimize disease incidence both on-station and in outmigrating smolts.

Later release of SCS smolts made possible beginning Brood Year 1990 and release in 1992--allows for a wider range of release times that coincide more closely with management's needs.

Division of Fish Hatcheries

HATCHERY PRODUCTION SUMMARY

Station:  
 DWORSHAK NFH  
 Period covered:  
 10/1/91 through 09/30/92

HPDW9209.WK1  
 19-Oct-92  
 10:40 AM

Density Index: 0.12				Flow Index: 0.54				Total Flow 45100 gpm				
Species and Lot	FISH ON HAND END OF MONTH			FISH SHIPPED THIS F.Y.	GAIN THIS F.Y.	FISH FEED EXPENDED THIS F.Y.		Conversion	UNIT FEED COST Per Lb.	T.U. per Inch	T.U. to Date	LENGTH INCREASE 30 DAY MONTH
	Number	Weight	Length			Pounds	Cost					Inches
	1	2	3	4	5	6	7	8	9	10	12	13
	0	0	0.00	559,934	81,481	100,857	25,246.42	1.24	0.31	0.0	0.0	0.00
STT-NFW-91-DWO-1	0	0	0.00	651,518	111,488	139,298	35,040.76	1.25	0.31	0.0	0.0	0.00
STT-NFW-91-DWO-2	0	0	0.00	1,097,600	177,482	230,921	56,486.68	1.30	0.32	0.0	0.0	0.00
STT-NFW-91-DWO-3	0	0	0.00	0	31,123	38,314	17,848.28	1.23	0.57	76.9	164.6	0.41
STT-NFW-92-DWO-0	257,745	2,927	3.19	0	29,423	47,126	14,041.93	1.60	0.48	32.7	100.0	0.67
STT-NFW-92-DWO-1	724,370	37,028	5.27	0	2,769	3,905	1,230.84	1.41	0.44	6.8	19.2	0.54
STT-NFW-92-DWO-2	542,088	10,875	3.86	0	17,019	28,052	8,761.88	1.65	0.51	45.8	81.1	0.54
STT-NFW-92-DWO-3	1,094,838	31,332	4.34									
SCS-CRW-90-DWO-0	0	0	0.00	1,664,199	53,131	104,689	32,915.85	1.97	0.62	0.0	0.0	0.00
SCS-CRW-91-DWO-0	818,244	26,973	4.79	14,440	28,042	36,895	16,136.83	1.32	0.58	42.8	151.8	0.27
Subtotal SCS	818,244	26,973	4.79	1,678,639	81,173	141,684	49,052.68	1.74	0.60	42.8	151.8	0.27
Subtotal STT	2,619,041	82,162	4.38	2,309,052	450,785	588,473	158,656.79	1.31	0.35	54.1	121.6	0.72
TOTALS	3,437,285	109,135		3,987,691	531,958	730,057	207,709.47	1.37	0.39	51.3	129.2	0.61
AVERAGES			4.48									

Division of Fish Hatcheries

HATCHERY PRODUCTION SUMMARY

Station:  
 DWORSHAK NFH  
 Period covered:  
 10/1/92 through 11/30/92

HPDW9211.WK1  
 16-Dec-92  
 11:30 AM

Density Index: 0.14				Flow Index: 0.72				Total Flow: 62618. gpm				
Species and Lot	FISH ON HAND END OF MONTH			FISH SHIPPED THIS F.Y.	GAIN THIS F.Y.	FISH FEED EXPENDED THIS F.Y.		Conversion	UNIT FEED COST Per Lb.	T.U. per Inch	T.U. to Date	LENGTH INCREASE 30 DAY MONTH Inches
	Number	Weight	Length			Number	Weight					
1	2	3	4	5	6	7	8	9	10	12	13	14
STT-NFW-92-DWO-0	0	0		0	1,277	1,352	462.44	1.06	0.36	NA	183.5	NA
STT-NFW-92-DWO-1	690,996	62,777	6.38	0	25,749	43,634	11,541.10	1.69	0.45	36.3	139.2	0.58
STT-NFW-92-DWO-2	789,164	32,076	4.88	0	16,997	23,867	6,832.08	1.40	0.40	22.5	58.4	0.57
STT-NFW-92-DWO-3	1,121,498	65,637	5.51	0	34,305	52,047	13,720.84	1.52	0.40	40.9	120.3	0.53
SCS-CRW-91-DWO-0	470,456	20,972	5.30	346,354	6,601	10,950	3,744.90	1.66	0.57	47.0	191.0	0.25
SCS-CRW-92-DWO-0	797,422	529	1.30	0	81	110	108.09	1.36	1.33	270.0	18.9	0.07
SCS-RRW-92-ID	875,649	585	1.31	0	95	110	108.09	1.16	1.14	236.0	18.9	0.08
Subtotal SCS	2,143,527	22,086	2.18	346,354	6,777	11,170	3,961.08	1.65	0.58	184.3	76.3	0.13
Subtotal STT	2,601,658	160,490	5.55	0	78,328	120,900	32,556.46	1.54	0.42	33.2	167.1	0.56
<b>TOTALS</b>	<b>4,745,185</b>	<b>182,576</b>		<b>346,354</b>	<b>85,105</b>	<b>132,070</b>	<b>36,517.54</b>					
<b>AVERAGES</b>			<b>4.03</b>					<b>1.55</b>	<b>0.43</b>	<b>108.8</b>	<b>121.7</b>	<b>0.35</b>

FISH AND FISH EGG FISCAL YEAR 1992 DISTRIBUTION SUMMARY

Fiscal Year: 1992

Check One:  Initial Report  
 Nothing to Report  
 Amended Report

Delivering Hatchery: Dworshak NFH

Page 1 of 3

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
01	RM	FWS	ID	SR	IDAHO	CLEAR CR.		SCS	CRW	20	36.2	303
02	RM	FWS	ID	HF	IDAHO	KOOSKIA NFH		SCS	CRW	100000	4.25	2310
03	RM	STG	ID	HO	POWELL REARING FAC.	POWELL REARING FAC.		SCS	CRW	8373	3.47	105
04	RM	STG	ID	HO	RED RIVER HATCHERY	RED RIVER HATCHERY		SCS	CRW	6067	3.47	76
05	RM	INT	ID	SR	IDAHO	ELDORADO CR.	575	SCS	CRW	183000	5.51	9178
06	RM	INT	ID	SR	IDAHO	MAIN S. CLEARWTR. R.	500	SCS	CRW	63167	5.97	4045
07	RM	INT	ID	SR	IDAHO	N.F. CLEARWTR. R.	500	SCS	CRW	896202	6	58024
08	RM	INT	ID	HO	POWELL REARING FAC.	POWELL REARING FAC.		SCS	CRW	150854	5.59	7846
09	RM	INT	ID	HO	RED RIVER HATCHERY	RED RIVER HATCHERY	635	SCS	CRW	207519	5.65	11273
10	RM	INT	ID	SR	IDAHO	WALTON CR.	600	SCS	CRW	63457	5.63	3386
11	RM	STG	ID	SR	IDAHO	AMERICAN R.		STT	NFW	666	0	0
12	RM	STG	ID	SR	IDAHO	BIG ELK CR.		STT	NFW	667	0	0
13	RM	STG	ID	HO	CLEARWATER AFH	CLEARWATER AFH		STT	NFW	397000	0	0

<u>Trips</u>	<u>Mi's</u>
1	80
3	240

FISH AND FISH EGG FISCAL YEAR 1992 DISTRIBUTION SUMMARY

Fiscal Year: 1992

Delivering Hatchery: Dworshak NFH

Page 2 of 3

L i n e	P r o g r a m	A g e n c y	S t a t e	W T y p e	Management Area	Water Name	Acres/ Miles	S p e c i e s	S t r a i n	Fish & Fish Egg Numbers	Fish  L e n g t h	Total Weight
1	2	3	4	5	6	7	8	9	10	11	12	13
14	RE	STG	ID	SR	IDAHO	LITTLE ELK CR.		STT	NFW	667	0	0
15	BS	STG	ID	HO	MAGIC VALLEY SFH	MAGIC VALLEY SFH		STT	NFW	1375000	0	0
16	RE	INT	ID	SR	IDAHO	N.F. PALOUSE R.		STT	NFW	117114	1.05	47
17	RE	INT	ID	SR	IDAHO	BRUSHY FORK CR.		STT	NFW	59317	1.05	23
18	RM	INT	ID	SR	IDAHO	CLEAR CR.	540	STT	NFW	349210	8.06	63906
19	RM	INT	ID	SR	IDAHO	MAIN S. CLEARWTR. R.	500	STT	NFW	1224101	8.16	232628
20	RM	INT	ID	SR	IDAHO	S.F. CLEARWTR. R.	570	STT	NFW	735741	8.02	133089
21	RM	INT	ID	SR	IDAHO	S.F. CLEARWTR. R.	570	STT	NFW	240	32.5	2880
22	RM	INT	ID	SR	IDAHO	CROOKED R.	635	STT	NFW	20	32.5	240

Trips MI:  
2 600  
4 38'  
1 270

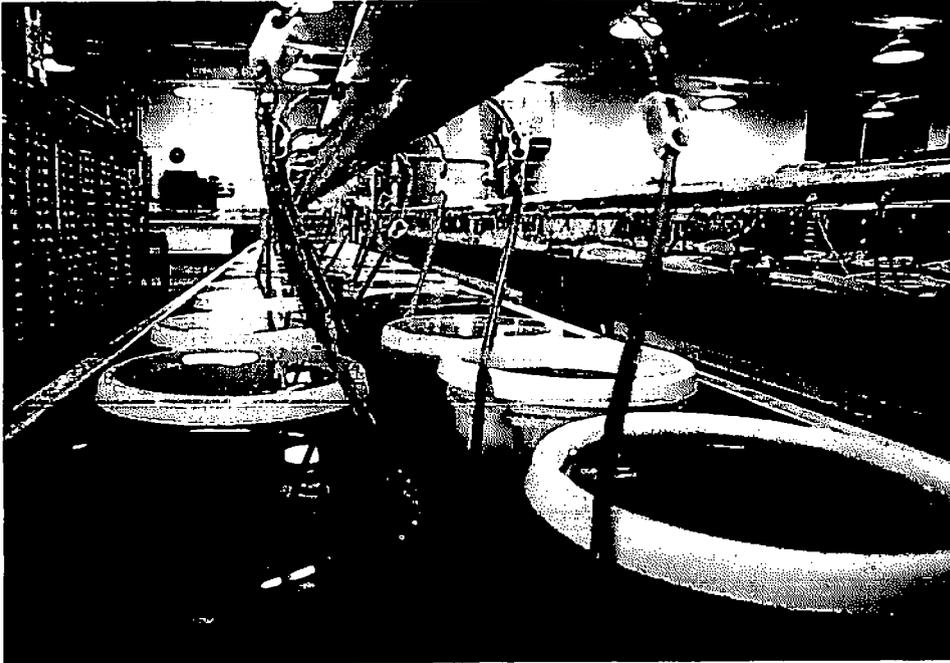
FISH AND FISH EGG FISCAL YEAR 1992 DISTRIBUTION SUMMARY

Fiscal Year: 1992

Delivering Hatchery: Dworshak NFH

S P E C I E S	S T A G E	N U M B E R	W E I G H T
SUMMARY:	STT	1774000	0
	EGGS	176431	70
	FRY	2309052	429623
	SMOLT	260	3120
	ADULT	114440	2491
	FINGERLING	1564199	93752
SCS	ADULT	20	303
TRIPS/MILES		11	1574
FY 1992 DISTRIBUTION TOTALS		5938402	529359

FISH CULTURE PHOTOS



Spring chinook egg incubation for SNFRC bacterial kidney disease study.



Julie Bliss, Personnel Specialist, Regional Office on station visit.



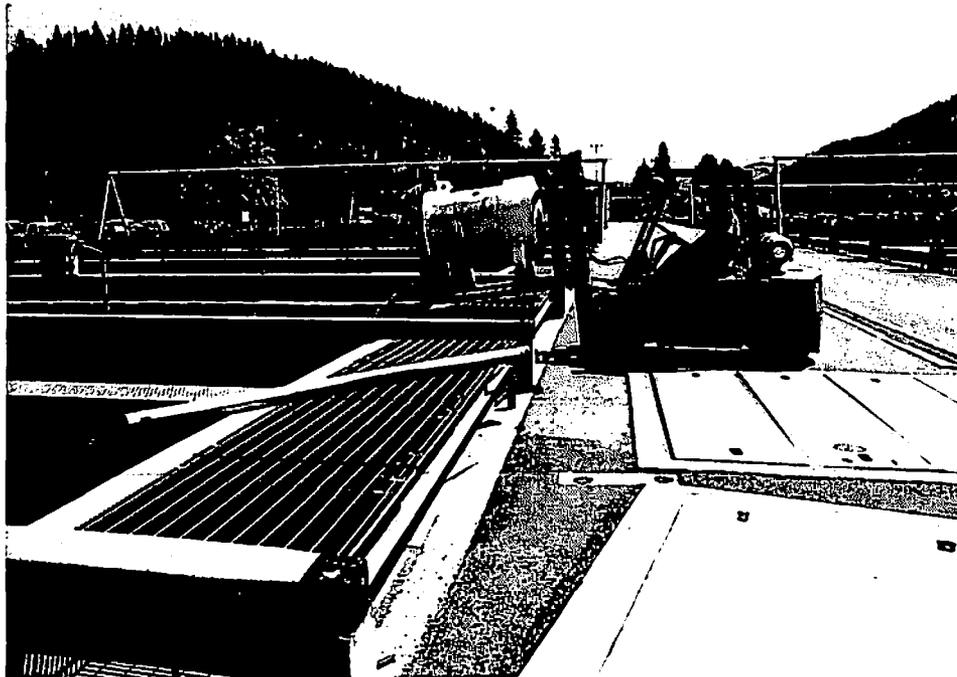
Joe Lientz, Lab Director, and Julie Bliss, Regional Office Personnel Specialist, sampling spring chinook for fish health monitoring.



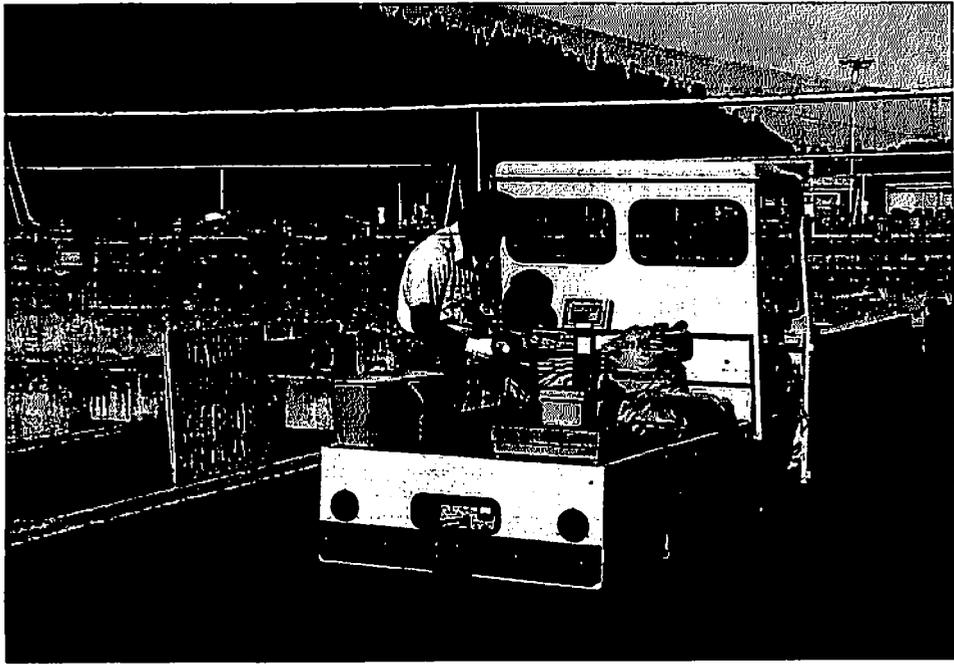
Julie Bliss assisting Rocky Greenland in the sorting of spring chinook brood fish.



Perry Moffett with net weighing and transferring steelhead from nursery tanks to outside ponds.



Transferring steelhead from the nursery tanks to outside ponds.

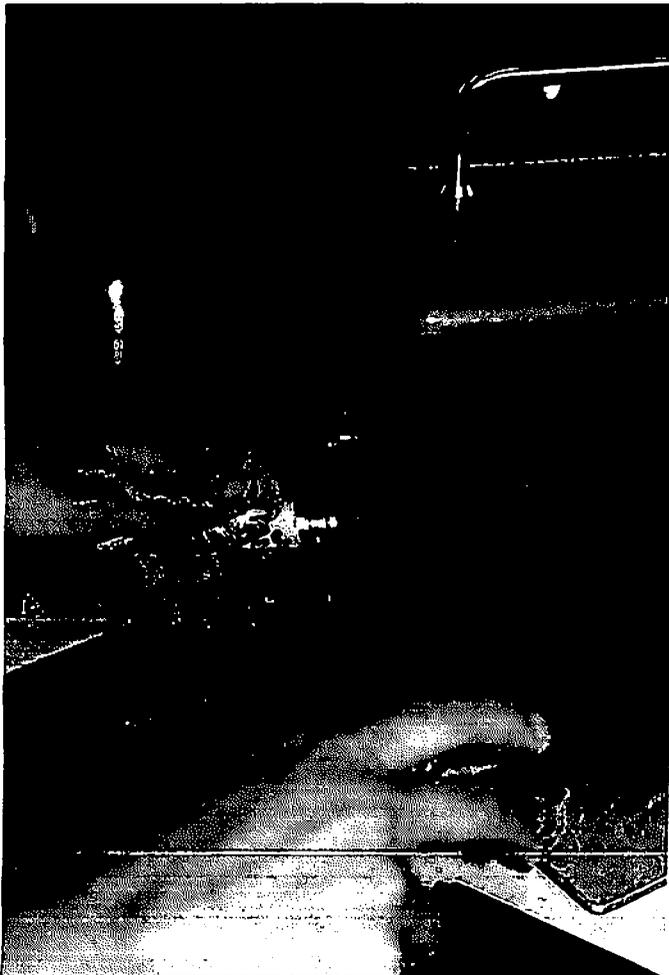


Fish Culturist, Ben Wright, weighing feed for outside steelhead production.



Columbia River trailers on site to mark all Brood Year 1991 SCS production.

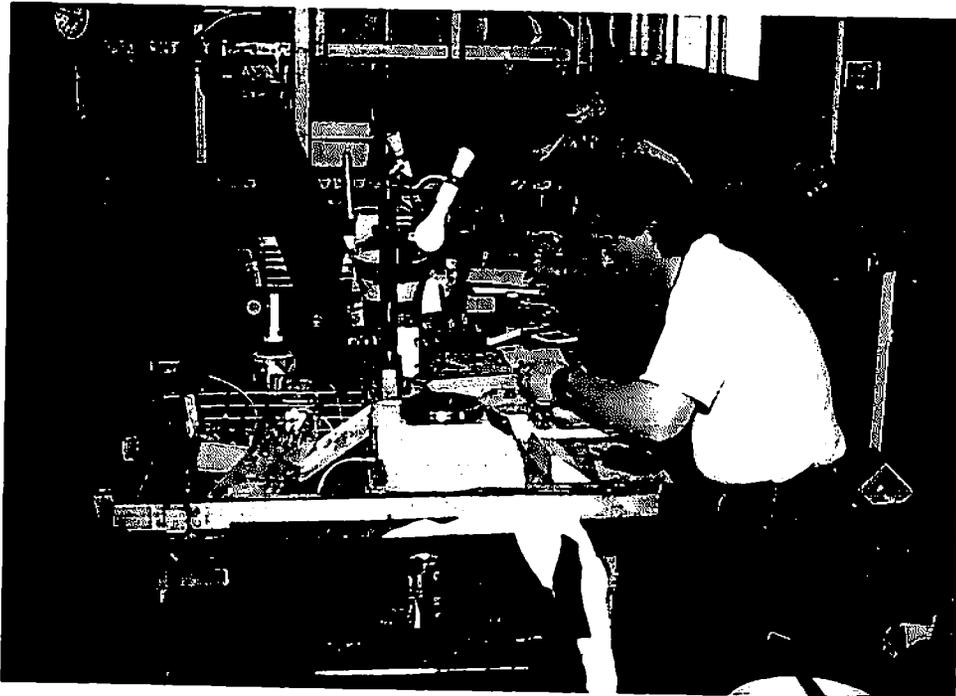
Coded-wire tagging of SCS.



Inserting coded-wire tag in SCS.



Station employees assisting SNFRC personnel on sorting and sampling STT for research purposes.



NMFS personnel "PIT" tagging young SCS smolts prior to release.

## REPAIRS/IMPROVEMENTS/NEW EQUIPMENT

A major improvement to Dworshak's water supply was completed in November 1991 with the addition of a 6400 gpm water source piped directly from Dworshak Reservoir. The pipeline furnishes all the water needs for the newly constructed Clearwater Anadromous Fish Hatchery, across the river from Dworshak, with a lesser amount for egg incubation and early nursery rearing at the federal site. Cost to the Corps of Engineers for Dworshak's supply line was \$450,000. Two pipelines, one a secondary stationary cold supply and another a primary warmer source with selector adjustment, mixes for the desirable temperatures required. The total source if not used inside is over flowed into Dworshak's main water distribution chamber and can be used for outside production. Advantages of using the reservoir source are: (1) gravity flow - no pumping, (2) warmer temperatures over a longer period of time, (3) a reduction in IHN virus losses through nursery tank rearing, and (4) additional water quantity to offset reduced pumping capacity from the river source.

A formalin injection treatment system was installed and tested for treating the egg incubators. The system was completed and in operation to all the incubators in time for steelhead egg collection. The enclosed pumping of formalin replaces the open gravity fed treatment system previously used. Approximate cost of this changeover was \$1300.

A purchase was issued for \$22,000 by the Corps of Engineers to complete temporary repairs of the hatchery's main water aeration system. These repairs include replacing a section of the system resulting from structural collapse occurring in July 1991. Work is anticipated to be completed in late spring 1993. Major rehab is identified in the Reconnaissance Report issued by the COE in August 1991.

Work was begun on the design of a permanent bird enclosure for the 30 spring chinook raceways. A visit by maintenance supervisor Dave Clifford to Coleman NFH in June 1992 provided an on-site view of Coleman's pond enclosures. A similar design is planned for Dworshak with completion expected in summer 1993. The enclosure consists of metal framing with a wire mesh attached and includes access gates to all the raceways. This new design replaces the plastic netting suspended along the sides from overhead supports.

The hatchery's new diesel truck cab and chassis was picked up on June 3 for delivery to Inter-pipe, Phoenix, Arizona, for installation of a new 1500 gallon distribution tank. The unit is expected to be completed in early fall 1992 for use in spring 1993.

Additional funds (\$8000) were requested of the COE for materials and labor costs to furnish reservoir water to the ozone treatment system. Present operation uses the river source. Work is expected to be completed in early FY 1993.

Cleanup work in the parking area of the hatchery's public entrance location resulting from the reservoir pipeline construction, was finished. New sidewalks were poured, shrubbery replanted and general landscaping completed.

A floating log boom near the main river intake broke loose during high water in July and was located 25 miles downriver from the hatchery. The COE was alerted, boom recovered, and installation scheduled for early fall 1992.

Overhauling the feed cold storage rooms was begun in FY 1991 at a cost of \$29,000. An additional \$6500 in FY 1992's program included lowering a ceiling, installing refrigeration equipment and all necessary electrical hookup and wiring. Total cost of complete rehab - \$35,500.

Equipment purchased/received:

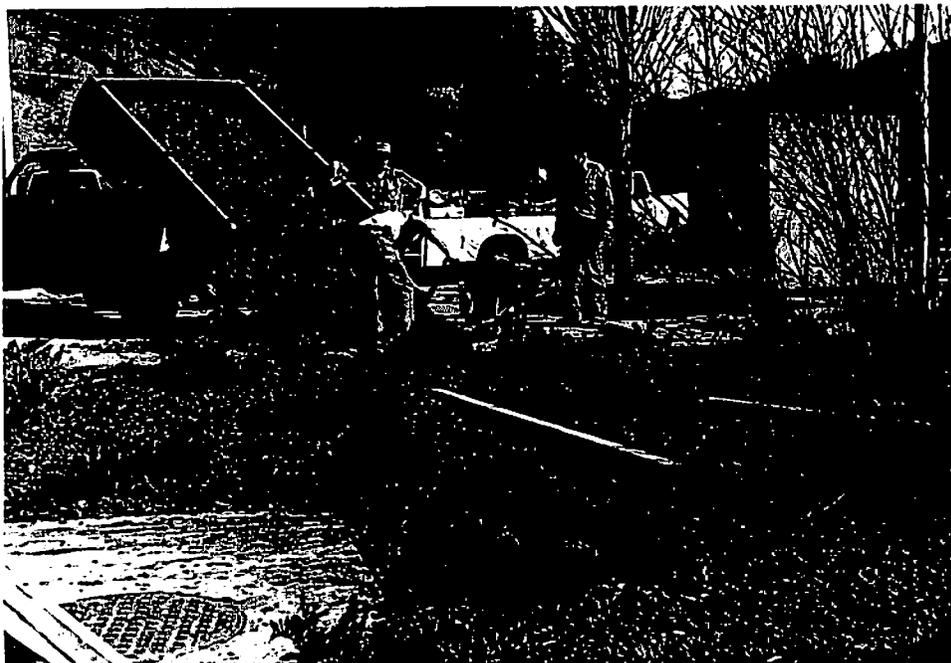
John Deere utility tractor (FY 1991 funds) -----	(\$ 19,450)
Fish distribution tank -----	66,300
1000 gpm pump - weir counter -----	4,000
Video cassette player -----	200
35 mm Minolta camera -----	400
Egg incubator jars (17) -----	3,500
Fish loading dewater -----	4,500
Fire and maintenance pump replacement -----	12,700
Fire extinguisher/replacements -----	2,600
Oxygen meter with temp. probe -----	900
Hanging weigh scale -----	1,000
Telephone system replacement -----	*22,000
*shared with FRO and FHC	
Magic Valley hydraulic fish pump (FY 1991 funds) -----	*10,725
Office computer (FY 1991 funds) -----	(2,300)
Oxygen meter -----	875
16 - 8-tray egg incubator stacks - SNFRC funding -----	

Other maintenance projects include:

Installation of carpet in quarters No. 3 and 4 -----	\$ 1,200
(carpet purchased FY 1991)	

Modification of fish counter weir to allow gravity entrance and to improve counting of returning adult fish via the fish ladder into Holding Pond 9 - includes weir pump, design and fabrication changes of existing system -----	4,500
Purchase safety barrier material for installation along head channel of broodstock holding ponds (project to be completed in FY 1993) -----	3,100
Replace 9 windows in office area, conference room, crew's room and production office -----	4,800
Recarpet office area -----	2,200
Repair damage to main pump No. 6 -----	15,700
Repair pump No. 5 -----	9,800
Reconverting raceways C1 and C2 to adult holding pond No. 3 -	8,500
Material purchase for permanent enclosure of chinook raceways	5,000
Replace rain gutters on hatchery residences -----	2,000
Electrical breaker maintenance -----	2,900
Install fire and maintenance controllers - FY 1991 funding --	(12,000)
Sprinkler system repairs -----	2,500
Additional packed columns degassers for nursery tanks - material purchase ----- work to be completed in fall 1992	1,800
Striping of streets and parking area -----	750
Pond screen replacement (3/32) -----	4,500

MAINTENANCE PHOTOS



Relandscaping area in vicinity of reservoir water pipeline construction.



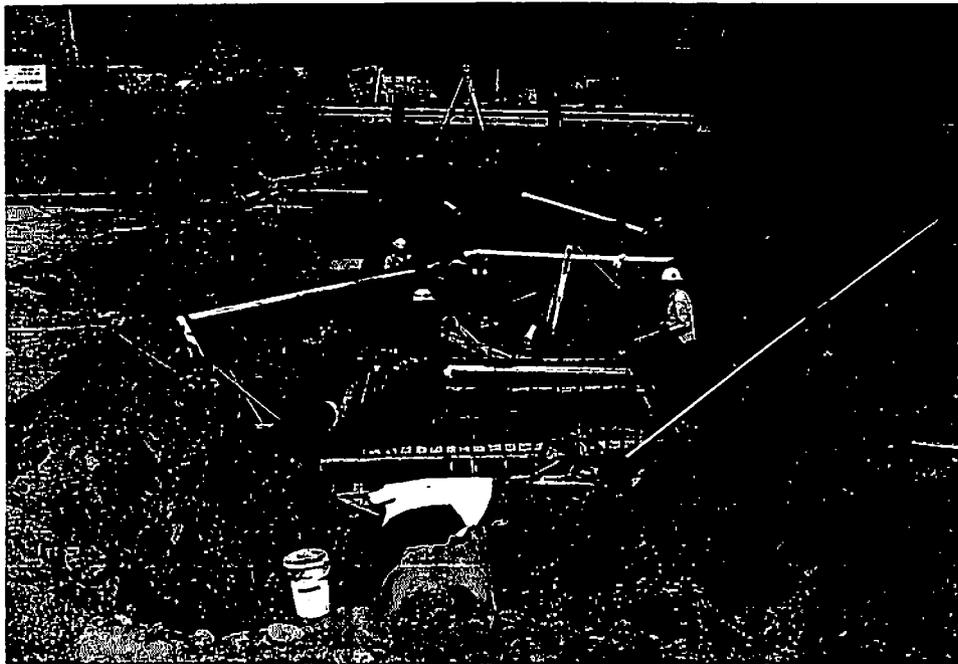
Replacing pond screens in System II with larger hole size.



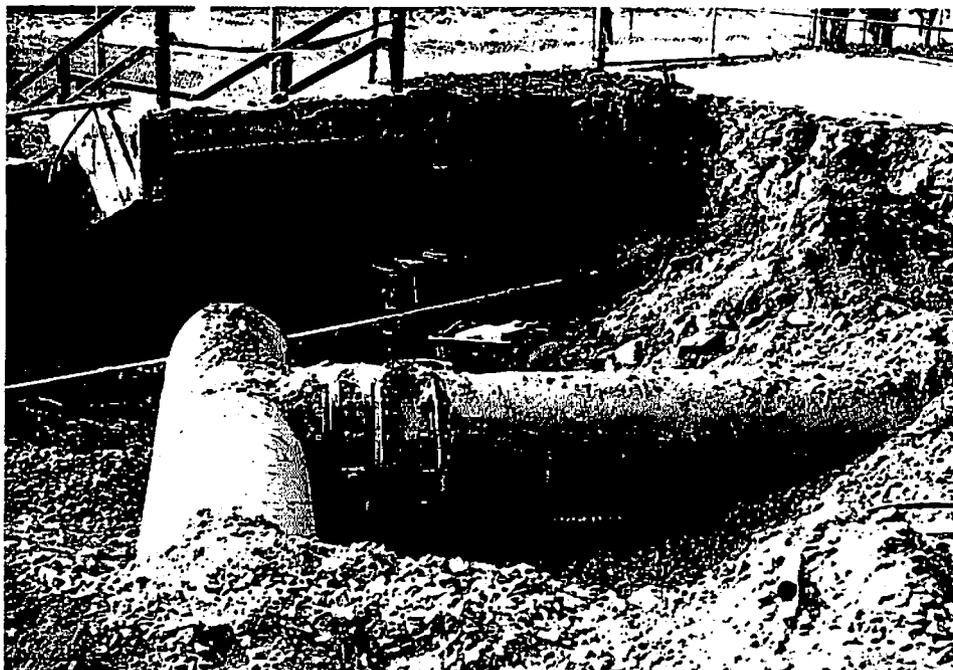
Window replacement in main hatchery building.



Installing safety manguards in water channel of System I ponds.



Construction of valve distribution box for new reservoir water supply.



New reservoir water pipeline construction prior to final connection to nursery building--line on right furnishes overflow to main water chamber.



Rehab of Holding Pond No. 3--removing raceway center wall.

## MEETINGS/TRAVEL/TRAINING

A Columbia River fisheries meeting was held in Kennewick, Washington, October 1-3, 1991 and included Service representatives from the upper and lower river fishery projects attended by Olson, Maskill, and Streufert.

Dworshak's fall coordination meeting was held on November 14. A prepared agenda was followed and the various fishery operations and activities on the Clearwater River were reviewed. Attendees represented FWS, LSRCP, IDFG, COE, NMFS, and Nez Perce Fisheries.

Dave Owsley, Engineer, was part of a Quarantine Task Group to finalize a report on "Development of Service Fish Quarantine Facilities". A meeting was attended in Atlanta, Georgia, during the week of November 4 to complete the document.

Olson and Owsley traveled to Walla Walla, Washington to meet with Manager Bodle of Little White NFH on designing a fish distribution tank. Work is proceeding on specifications for two tanks to be built in FY 1992 for Dworshak and the lower river complex of Little White.

The 42nd Annual Northwest Fish Culture Conference, held in Redding, California during the week of December 2, was attended by Olson, Lawson, and Owsley. Olson gave a presentation on "Public Relations at Dworshak NFH".

Manager Olson traveled to Portland on December 17 and met with a tank manufacturer to review construction and design of several new fish transportation units.

Manager Olson attended an outplanting committee meeting held in McCall on January 7-8, 1992. Salmon and steelhead smolt distribution for the upcoming season's releases were reviewed and locations decided upon. Representation included the Service, Idaho Fish and Game and Nez Perce Tribe.

The visioning action team "Water Quality and Effluent Treatment", of which Dave Owsley is a member, met at Dworshak on January 22-23.

Olson and Maskill attended a 40-hour training course, February 3-7, in Norman, Oklahoma on "Fish Genetics and Broodstock Management".

Manager Olson was detailed to the Regional Office, February 10 to February 28, as Acting Deputy Assistant Regional Director - Fisheries. Opportunity was given to review the Regional employee development training program and to provide comments where appropriate.

Employees Streufert, Maskill, and Lawson attended a Chinook Smolt Workshop held on the University of Idaho campus February 26-27.

A fisheries' coordination meeting was held at Dworshak on March 19, with attendees from the Service, IDFG, and Nez Perce Tribe.

Dave Owsley participated in a Vision Action team meeting, "Water Quality and Effluent Treatment", held at Dworshak on March 4-5.

The Idaho AFS Chapter Meeting in McCall, Idaho, March 12-14, was attended by Biologists' Lawson, Berg, and Bigelow.

Dave Owsley traveled to Mackay, Idaho March 30-31 to assist with a water quality problem at a private trout farm.

Attending the Regional Conference in Portland, Oregon April 13-17, were Olson, Streufert, Bigelow, Berg, and Owsley.

Employees Greene, Weeks, and Clifford toured Lower Granite Dam and the fish passage facilities on May 6.

Mary Lou Galloway attended a budget vision meeting in Portland, Oregon June 29-30.

Manager Olson traveled to McCall, Idaho on July 28 and met with Dave Bruhn of Hagerman NFH. Site visits were made to McCall State Hatchery and to Rapid River.

Olson and Owsley attended the centennial celebration of the Bozeman Technology Center, Bozeman, Montana on August 15.

Owsley presented a paper at the American Fisheries Society meeting held in Rapid City, South Dakota, September 14-17.

An Idaho Department of Environmental Quality workshop was conducted in Dworshak's conference room on September 30. Thirty (30) attendees representing local, county, and federal government reviewed future drinking water standards and testing procedures. Dave Owsley represented the hatchery.

Formal training was provided the following station employees:

Jerry Berg - Organizational Development through Effective Supervision, USFS, Orofino, Idaho (40 hours) - October 21-26, 1991.

Jay Bigelow -Organizational Development through Effective Supervision, USFS, Orofino, Idaho (40 hours) - October 21-26, 1991.

Dave Clifford - Coaching and Team Building Skills - Managers and Supervisors, Spokane, Washington (8 hours) - March 13, 1992.

Lower River fishery project visits, April 1-3.

Mary Lou Galloway - Team Training, Clarkston, Washington (8 hours) - May 7.

Ben Greene - Idaho Electrical Code, Lewiston, Idaho (8 hours) - July 18

Lower River fishery project visits, April 1-3.

Rocky Greenland - Team Training, Clarkston, Washington (8 hours) - May 7.

Hank Jenks - Lower River fishery project visits, April 1-3.

Mark Maskill - Fish Genetics and Broodstock Management, Norman, Oklahoma (40 hours) - February 3-7.

Coaching and Team Building Skills for Managers and Supervisors, Spokane, Washington (8 hours) - March 13.

Team Training, Clarkston, Washington (8 hours) - May 7.

Perry Moffett - Lower River fishery project visits, April 1-3.

Dawna Newman - Professional Secretary Workshop, Lewiston, Idaho (8 hours) - April 22.

Getting Started with DOS, Correspondence (16 hours).

Wayne Olson - Fish Genetics and Broodstock Management, Norman, Oklahoma (40 hours) - February 3-7.

Marketing Skills, Portland, Oregon (8 hours) - December 18.

Team Training, Clarkston, Washington (8 hours) - May 7.

Dave Owsley - Coaching and Team Building Skills for Managers and Supervisors, Spokane, Washington (8 hours) - March 13.

Assertive Supervision, Correspondence (24 hours)

Expert Witness Workshop, Boise, Idaho (16 hours) - August 20-21.

Ray Rosales - Team Training, Clarkston, Washington (8 hours) - May 7.

Jon Streufert - Advocacy Role of Managers, Minneapolis, Minnesota (24 hours) - March 17-20.

Team Training, Clarkston, Washington (8 hours) - May 7.

Ben Wright - Team Training, Clarkston, Washington (8 hours) - May 7.

## STAFFING

A major change in the production staff began in April 1992 with the retirement of Tom Taggart, Fish Culturist (Work Leader) on a medical after 27 years of government service of which 23 years were at Dworshak; followed by Mark Maskill (Assistant Production Supervisor) on a transfer to Leadville NFH in July; Doug Lawson (Fishery Biologist) on transfer with promotion to Pittsford, Vermont in August; and two fishery biologists in the Region's Development Training program, Jerry Berg and Jay Bigelow were reassigned to Idaho FRO (Berg 6/92) and North Central Valley FRO (NCV FRO), California (Bigelow 9/92). Vacancies as the result of these moves were filled by fishery biologists Cyndie Wolfe on a reinstatement from the U.S. Forest Service, Baton Rouge, Louisiana (August 1992); Peter Long, from National Marine Fisheries Service, Narragansett Laboratory, Rhode Island; David Weigand (trainee) from NCV FRO, California; Kevin Sloan, Williams Creek NFH, Arizona (expected October 1992 transfer); and Ken Peters, Veterans Readjustment Appointment, currently completing an M.S. degree at the University of Idaho (expected appointment November 1992). Above actions were completed as follows:

### Losses:

Tom Taggart, Fish Culturist (Work Leader), WL-5, medical retirement, 4/17/92.

Mark Maskill, Fishery Biologist (Assistant Production Supervisor) GS-11, lateral transfer to Leadville NFH, Colorado, as Assistant Manager, 7/26/92.

Doug Lawson, Fishery Biologist, GS-7, promotion to GS-9 with transfer to Pittsford, Vermont, 8/23/92.

Jerry Berg, Fishery Biologist, GS-7, lateral transfer to Dworshak Fishery Resource Office, 6/01/92.

Jay Bigelow, Fishery Biologist, GS-9, lateral transfer to Northern Central Valley FRO (Red Bluff) California, effective 9/20/92.

### Accessions:

Cyndie Wolfe, Fishery Biologist, GS-7, effective 8/09/92.

Peter Long, Fishery Biologist, GS-7, effective 8/09/92.

David Weigand, Fishery Biologist, GS-9, effective 9/20/92.

Kevin Sloan, Fishery Biologist, GS-11, expected 10/04/92.

Ken Peters, Fishery Biologist, GS-7, expected 11/01/92.

Other staffing highlights included the addition of another senior volunteer, Gordon Thiessen, to assist volunteers, Clay McGill and Jesse Lyda, with the increased visitor load on steelhead spawning days; an 8-week summer YCC program employing six enrollees and one crew leader; continuation of the Older Worker Program with the one year 20 hours/week employment of Richard Rountree effective 9/18/92; and the promotion of Wayne Olson, Hatchery Manager, from GM-13 to GM-14, effective 2/09/92. Also, Length of Service certificates were presented to John Vargas (10 years), Dave Owsley (20 years); and a Service award to the station crew for outstanding participation in 1991's National Fishing Week activities.

The hatchery complex of Dworshak-Kooskia employs a large diverse group of 27 permanent and several temporary employees. These include professional fishery biologists (supervisory and staff), fish technicians, clerical and budget assistants, maintenance workers and mechanics, a maintenance supervisor, electricians and an environmental engineer. Youth programs have played a major role in employment since 1977; Young Adult Conservation Corps (YACC) in the early years and, later, the Youth Conservation Corps (YCC). Over 175 teenagers have participated in the two programs. Use of student aids, initiated in 1976, have provided another 60 local high school students part-time employment. In the late 1970s, recruitment and hiring of professional fishery biologists for placement in the Service's employee career development program was begun. Dworshak continues to be the leading field training facility in the Service with 30 fishery biologists having begun their career at the hatchery. Most of these young trainees have since transferred with promotion to other field projects.

**Dworshak Employees**  
- FY 92 -

<u>Name</u>	<u>Position Title</u>	<u>Period of Employment</u>	<u>Status</u>
Berg, Jerry D.	Fishery Biologist	10/01/91 - 5/30/92	Permanent
Bigelow, John P.	Fishery Biologist	10/01/91 - 9/19/92	Permanent
Blendon, Michael J.	YCC Enrollee	6/08/92 - 7/31/92	YCC Program
Buck, Eric C.	YCC Enrollee	6/08/92 - 7/31/92	YCC Program
Clifford, David E.	Work Supervisor (Maint.)	10/01/91 - 9/30/92	Permanent
Collins, Sheila K.	Clerk-Typist	10/01/91 - 11/02/91	Temporary
Davis, Pamela J.	Summer Aide	10/01/91 - 6/28/92	Temporary
Galloway, Mary Lou	Program Assistant	10/01/91 - 9/30/92	Permanent
Greene, Benny C.	Electrician	10/01/91 - 9/30/92	Permanent
Greenland, Rocky E.	Fish Culturist	10/01/91 - 9/30/92	Permanent
Holloway, Vernon C.	Older Worker Program	10/01/91 - 6/30/92	Temporary
	Laborer	7/01/92 - 9/30/92	Temporary
Hovey, Pamela G.	YCC Enrollee	6/08/92 - 7/31/92	YCC Program
Jenks, Alfred H.	Maintenance Worker	10/01/91 - 9/30/92	Permanent
Kahole, Lawrence	Older Worker Program	8/14/92 - 8/29/92	Temporary
Konrad, Jennifer, C.	YCC Enrollee	6/08/92 - 7/31/92	YCC Program
Lawson, Douglas L.	Fishery Biologist	10/01/91 - 8/22/92	Permanent
Long, Peter A.	Fishery Biologist	8/09/92 - 9/30/92	Permanent
Maskill, Mark G.	Fishery Biologist	10/01/91 - 7/25/92	Permanent
Miller, Briana E.	YCC Enrollee	6/08/92 - 7/31/92	YCC Program
Moffett, Clarence P.	Maintenance Worker	10/01/91 - 9/30/92	Permanent
Newman, Dawna M.	Clerk-Typist	10/01/91 - 9/30/92	Permanent
Oatman, Ronald W.	Fish Culturist	10/01/91 - 9/30/92	Permanent
Olson, Wayne H.	Hatchery Manager	10/01/91 - 9/30/92	Permanent

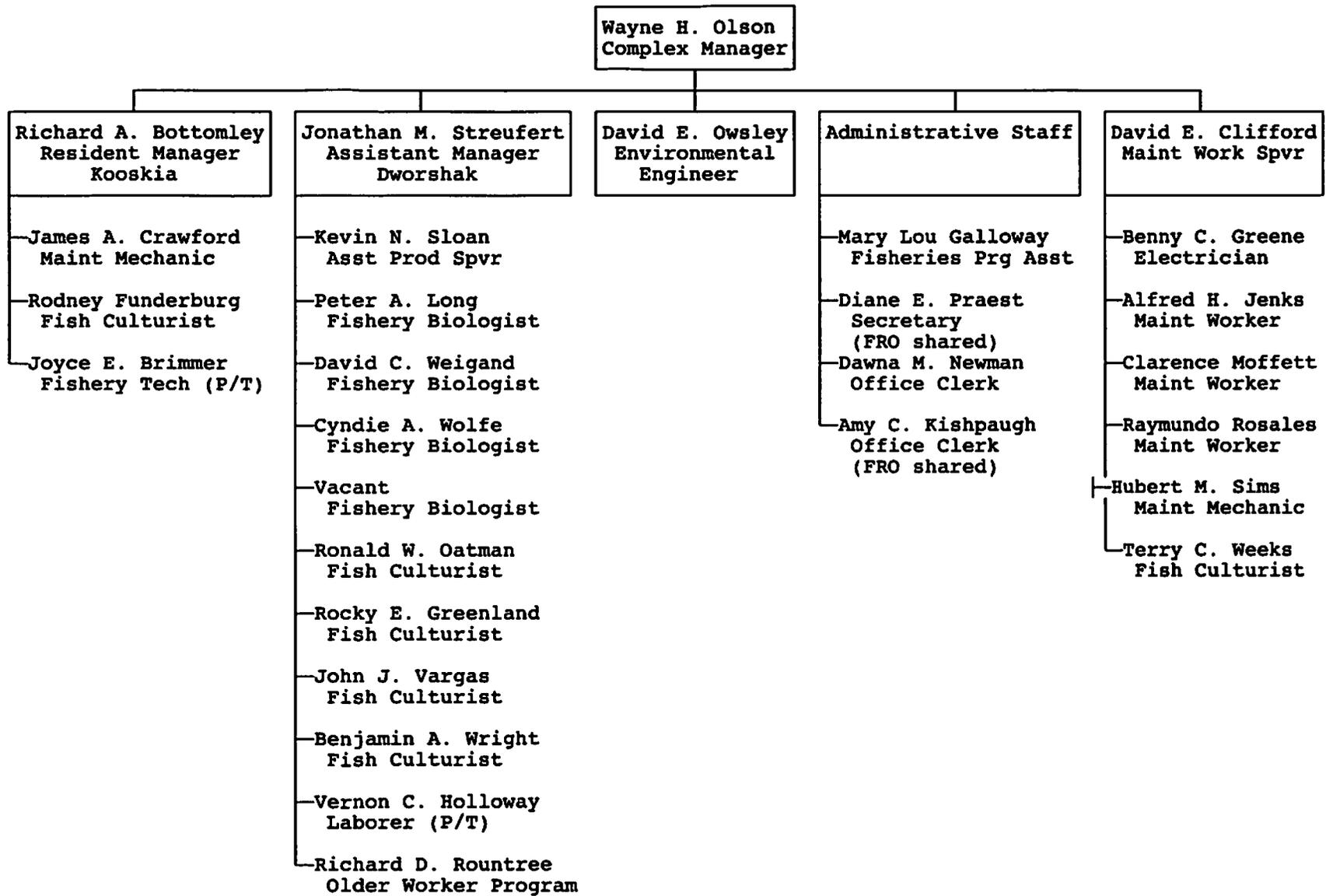
<u>Name</u>	<u>Position Title</u>	<u>Period of Employment</u>	<u>Status</u>
Owsley, David E.	Environmental Engineer	10/01/91 - 9/30/92	Permanent
Powell, Michael S.	YCC Crew Leader	6/08/92 - 7/31/92	YCC Program
Rosales, Raymundo A.	Maintenance Worker	10/01/91 - 9/30/92	Permanent
Sims, Hubert M.	Maintenance Mechanic	10/01/91 - 9/30/92	Permanent
Streufert, Jonathan M.	Assistant Manager	10/01/91 - 9/30/92	Permanent
Taggart, Thomas M.	Fish Culturist	10/01/91 - 4/18/92	Permanent
Vargas, John J.	Fish Culturist	10/01/91 - 9/30/92	Permanent
Weeks, Terry C.	Fish Culturist	10/01/91 - 9/30/92	Permanent
Weigand, David C.	Fishery Biologist	9/20/92 - 9/30/92	Permanent
Wells, William F.	YCC Enrollee	6/08/92 - 7/31/92	YCC Program
Wolfe, Cynthia A.	Fishery Biologist	8/09/92 - 9/30/92	Permanent
Wright, Benjamin A.	Fish Culturist	10/01/91 - 9/30/92	Permanent

Kooskia NFH

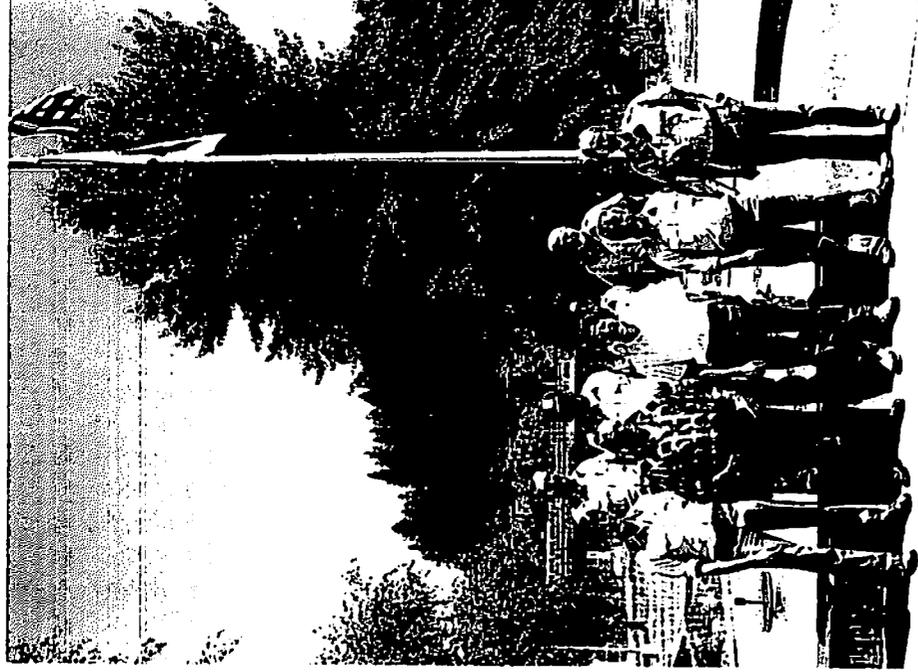
<u>Name</u>	<u>Position Title</u>	<u>Period of Employment</u>	<u>Status</u>
Bottomley, Richard J.	Assistant Manager	10/01/91 - 9/30/92	Permanent
Brimmer, Joyce E.	Biological Aid	10/01/91 - 9/30/92	Temporary
Crawford, James A.	Maintenance Mechanic	10/01/91 - 9/30/92	Permanent
Funderburg, Rodney A.	Fish Culturist	10/01/91 - 9/30/92	Permanent
Hendren, Sarah L.	YCC Enrollee	6/08/92 - 7/31/92	YCC Program
Johnson, Barry W.	YCC Enrollee	6/08/92 - 7/31/92	YCC Program
Norton, Phillip	YCC Enrollee	6/08/92 - 7/31/92	YCC Program
Shepherd, David R.	YCC Enrollee	6/08/92 - 7/14/92	YCC Program
Sherman, Jessica A.	YCC Enrollee	6/08/92 - 6/19/92	YCC Program
Wilsey, Lisa R.	YCC Enrollee	6/25/92 - 7/31/92	YCC Program
Withey, Kim C.	YCC Enrollee	6/08/92 - 7/31/92	YCC Program
Weeks, Steven W.	YCC Crew Leader	6/08/92 - 7/31/92	YCC Program

# DWORSHAK-KOOSKIA NFH COMPLEX

October 1, 1992



STAFFING PHOTOS



Production crew, foreground, left to right, Doug Lawson, Vern Holloway, Mark Maskill, Rocky Greenland, and Jay Bigelow; back row, left to right, Jon Streufert, Ron Oatman, John Vargas, and Wayne Olson.



Hatchery volunteers, left to right, Gordon Thiessen, Clay McGill, and Jesse Lyda.



Cake and social for Mark Maskill's departure to Leadville NFH and completion of 1992's YCC program.



ffing, left to right, Michael Blenden, Mike Powell (Crew Leader), Eric  
riana Miller, Jennifer Konrad, Pamela Hovey and William Wells.



YCC work project - pouring a concrete sidewalk at Residence No. 3.

## PUBLIC OUTREACH/VISITORS

Public outreach is a major responsibility with over 30,000 visitors annually on-site to view the hatchery. Recent update of information signs, and displays, installation of large wall murals, new photo and video exhibits, handicap access availability, and both formal and self-guided tours add to the visitors' education experience. Senior citizen volunteers provide assistance to the hatchery on fish spawning days by visiting with the public, answering questions and providing guided tours. Active participation with the news media, sportsmen groups and surrounding communities, enhances the hatchery's excellent exposure to its facility size and program. As an active participant in National Fishing Week, the station hosts an annual "Open House" and kids' free fishing pond. Another similar event is planned for June 19, 1993.

Visitors to Dworshak on October 30-31 included Deputy Director Richard Smith, Washington D.C.; Marv Plenert, Regional Director, and Bill Shake, Assistant Regional Director (Fisheries) from Portland. A meeting with 34 employees representing Dworshak/Kooskia Complex, Idaho FRO and Fish Health Center was held in Dworshak's conference room. This was an excellent opportunity for the crew to meet and ask questions of the directorate.

Hatchery Manager Olson presented a program at a noon luncheon of local Orofino members of NARFE (National Association of Retired Federal Employees) on November 7. Station activities were highlighted along with 1991's successful Open House and kids' free fishing pond.

Representatives Susan Fagan and Sam Routeson from Senator Symms' Lewiston and Boise offices were at Dworshak in November regarding the proposed salmon endangered species listings.

A tour was presented to several Clearwater National Forest Service employees in December to acquaint them with Dworshak's activities. The Forest Supervisor's office, in Orofino, provides personal services on maps, brochures, etc. on where to visit in the area. The hatchery maintains contact with the office.

Jerry Berg, Fishery Biologist, presented an evening program to the Palouse Chapter of AFS held in Moscow, Idaho on December 11. Mr. Berg was a former Peace Corps employee in Thailand working in aquaculture.

Employees Berg, Bigelow and Greenland assisted as judges at the Orofino Elementary School science fair on February 27.

Several "Special Education" students from the local school visited the hatchery on February 21 and were provided a formal tour. Also, a noticeable increase in visitors were viewed the steelhead spawning operations. Senior volunteers Jesse Lyda, Clay McGill and Gordon Thiessen assisted on tours and in providing information.

The Orofino Rotary Club was contacted for assistance in transporting kids from the local community to the hatchery on June 13 for a free fishing event. A commitment was made from the club to provide this service.

Tour groups during March included 180 students from Orofino Junior High School, St. Maries High School, and Harrison High School. Also, a group of wildlife students from University of Idaho and veterinary students from Washington State University visited Dworshak. Three senior volunteers provided 47 hours of service in March assisting the many public visitors in viewing the steelhead spawning activities.

Dave Owsley was recognized for 13 years of continuous service in Idaho as a Hunter Safety Education instructor. Dave conducted two sessions each year with over 800 youngsters in the local community benefiting from his teaching. The most recent session, in March, had 56 enrollees.

The hatchery was represented at the Portland Regional Conference in April with an exhibit of 1991's National Fishing Week activities. Display panels were purchased for \$1400. Attached to the panels were enlarged photos of kids participating in the free fishing event.

Idaho Department of Fish and Game from Lewiston and KXLY-TV of Spokane were at Dworshak on April 21 to film the steelhead spawning activities and to interview Manager Olson on various aspects of hatchery operation. Segments of the filming were later shown on KLEW-TV Lewiston, and also on the Spokane station.

Some 570 students representing 14 schools visited the Dworshak hatchery to observe steelhead spawning in April. Three senior volunteers donated 50 hours of time during this month to assist the public visitors.

Planning of Dworshak's "Open House" on June 13 involved several committee meetings, contacts with numerous business sponsors in the area for donated fishing tackle, interviews with the news media and posters distributed.

Chris Moffitt, University of Idaho, was at Dworshak on May 18 to update the staff on their erythromycin research. A review was also made of the hatchery's protocol plan for using erythromycin drug in spring chinook production.

In May, the hatchery provided tours to five school groups. Also, off-site informative presentations were given to several high school classes. A group of 30 Rotary Club exchange students, representing many world countries, toured the hatchery and were given a slide and video presentation. Several other groups representing water resource agencies were on site for a tour of the facilities and review of operations.

Mike Taylor, COE, Walla Walla, visited Dworshak on May 6 for a review of current and future budget requirements.

A noon luncheon hosted by the Retired Senior Volunteer Program (RSVP) on May 11 was attended by Manager Olson in honor of local senior volunteers in Orofino. Service awards were presented to hatchery volunteers McGill, Thiessen and Lyda.

Orofino Elementary classes were visited on June 1 by hatchery employees to invite student participation in the June 13 free fishing event. Time was also spent with area news media for coverage of the "Open House" and visits made to many area business sponsors for donations.

Dan Diggs, Fishery Associate Manager, Portland Regional Office, was at the Complex during the week of June 9. Programs were reviewed and operational concerns noted.

Dworshak's "Open House" activities took place on June 13. Highlight of the day was the kids' fishing pond which registered 483 children catching their limit of 2 fish each. Over 1000 visitors viewed special displays and participated in a most successful event.

Biologist Bigelow participated in an outreach program at the local public library on July 22. Twenty kids learned about the salmon's downriver and upriver migration through the dams.

Biologist Bigelow presented an hour program in Orofino on August 4 to 25 kids participating in "Fun in the Sun" activities sponsored by Lewis-Clark State College.

News reporter Gary Darigol of KHQ-TV Spokane was at Dworshak on August 3 to interview Manager Olson regarding spring chinook returns and other related production activities. The report was carried on Channel 6 news the following day.

Dworshak participated in the annual "Clearwater County Art Exhibit", held at the Dworshak Dam Visitor Center on August 9. Over 600 visitors viewed the hatchery's National Fishing Week display.

Julie Bliss, Personnel Specialist, from the Regional Office, was at the hatchery on August 24-25. Her visit was most appreciated by all employees.

Tom Warren and John Hilton, tracing the western route of Lewis and Clark from St. Louis, Missouri to the mouth of Columbia, visited Dworshak in August and took time to "regroup" for their final leg downriver to the Pacific Ocean. A fair amount of news coverage took place along their 2-month journey including filming and interviewing at Dworshak.

Eric Stabble of Washington State University accompanied visitors from Japan on a tour of Dworshak. Public visitors at Dworshak during August appeared to have increased over previous years.

The generic 8-minute video, "This is Your National Fish Hatchery", was viewed by numerous visitors to Dworshak. The video has been a special highlight in providing the viewer an insight to fish culture activities. Ben Greene, electrician, was recognized with a monetary award of \$500 for his work in designing and installing the video display. This same design has broad application for other video units region wide.

Number of visitors to the hatchery during the period covered by this report approximated 30,000. Open House activities and viewing of the steelhead spawning operation were two major events that appealed to the public visitor.

VISITORS PHOTOS



A visit to Idaho's finest steelhead fishing waters provided successful catches to guide Billy Connor, Idaho FRO; Dick Smith, FWS Deputy Director; and Bill Shake, ARD (Fisheries), Region 1.

## COOPERATIVE PROGRAMS

The hatchery continued to work closely with the following agencies and groups in the accomplishment of various activities.

- Idaho Department of Fish and Game:
  - Boise Office
  - Lewiston Office
- Seattle National Fishery Research Center (SNFRC)
- Corps of Engineers
  - 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
- Older Worker Program

Dworshak Fish Health Center and Idaho Fishery Resource Office shared facilities on the hatchery. The three Service groups are cooperatively involved in FWS 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 provided cold storage space for the processed fish until 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 and COE to review hatchery production programs and to discuss Clearwater River fishery activities. A meeting in November 1991 was followed by another in March 1992.

Three senior volunteers contributed 125 hours of service to assist visitors viewing Dworshak's steelhead spawning operations in the spring.

Environmental Engineer Owsley continued to assist other agencies both federal and private on water treatment, holding design and other related facility operations. Numerous information mailings, telephone calls and personal contacts were made throughout the year. Mr. Owsley participated on several task forces and was involved in formal presentations and work groups as requested. Dave also instructed at the Leetown Academy course "Water Treatment Processes" held in Bozeman, Montana, 6/92 and "Cold Water Fish Culture", Sacramento, California, 12/91.

The hatchery shares equipment with the Dworshak Dam project. The wood shop is also used by the COE for various projects during the year.

Several partnership meetings with the COE, IDFG and private contractor regarding the new water supply lines from Dworshak Reservoir were attended by Dworshak personnel. The two pipelines furnishing water to the new Clearwater State Hatchery are available for 6400 gpm to Dworshak. Communication with the State hatchery on usage (temperature and flows) is ongoing to assure water requirements of the hatchery are addressed.

Arrangements were made to have two IDFG employees from the Clearwater Hatchery assist in Dworshak's weekly steelhead spawning.

The hatchery's GMC fish distribution unit was on loan 2 weeks to the University of Idaho's fisheries program for transferring adult chinook from Cowlitz (Washington) hatchery.

Assistance was given by station staffing to help Idaho FRO on securing a temporary modular office building for location at Dworshak and to assure all services are available. It is anticipated that a permanent building can be constructed in FY 94 and be located on the hatchery grounds.

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.