

ANNUAL REPORT
FISCAL YEAR 1984
DWORSHAK NATIONAL FISH HATCHERY
AHTSAKA, IDAHO

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Date Received Regional Office: _____ Reviewed By: _____ Date: _____

Date original forwarded to Washington Office: _____

Date Received Washington Office: _____ Reviewed By: _____ Date: _____

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INTRODUCTION

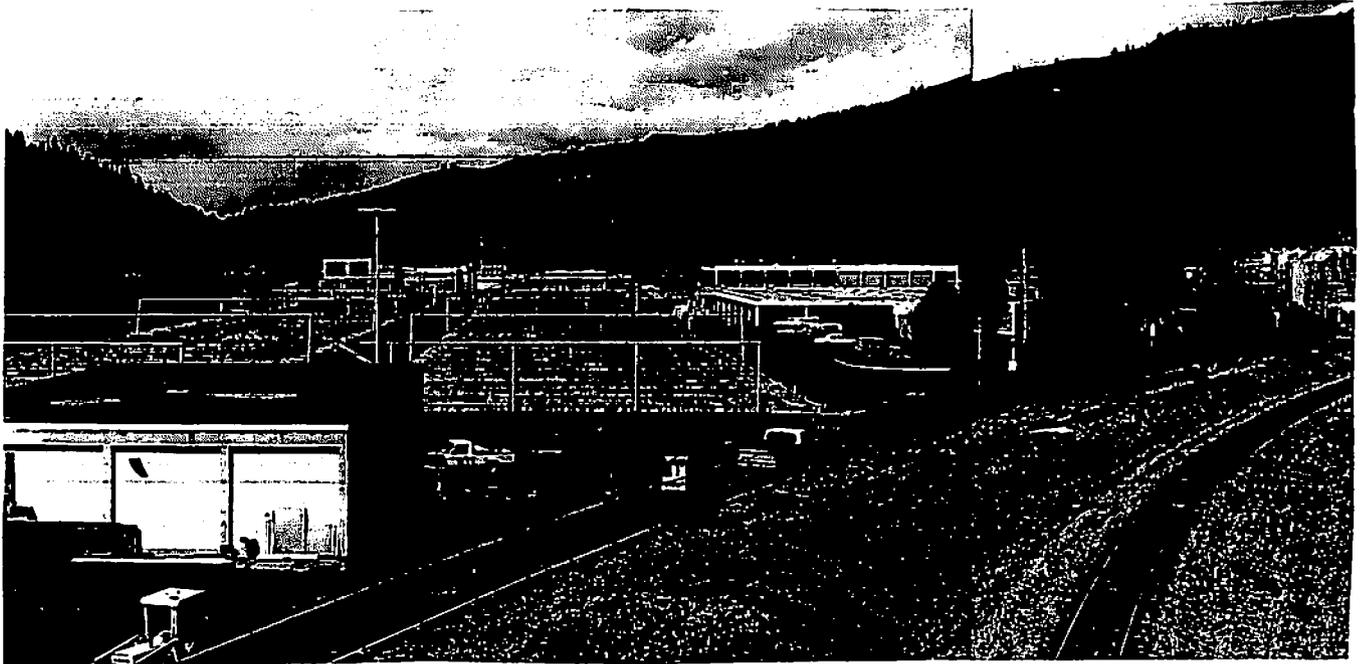
Dworshak National Fish Hatchery is located at the confluence of the North Fork of the Clearwater River and the main stem Clearwater River near the unincorporated town of Ahsahka, in north central Idaho. The site is 3 miles west of Orofino (population 3,800) on the north bank of the Clearwater River, 1 mile downstream from Dworshak Dam.

The site was purchased by the U.S. Army Corps of Engineers in 1967 from several landowners. Title remains with the Corps.

Funds for developing the hatchery were allocated through construction of Dworshak Dam under Public Law 10 U.S.C. 2304 (a), Appropriation 96 x 3122, Construction, General, Corps of Engineers, Civil, Dworshak Dam and Reservoir.



Aerial view of hatchery at confluence of Clearwater River and North Fork looking downriver.



View of facility showing steelhead ponds in foreground and hatchery building and nursery area to the right.

The hatchery was designed and constructed by the U.S. Army Corps of Engineers. It is administered and operated by the U.S. Fish and Wildlife Service. Rearing facilities consist of 84 recirculating-type ponds (17 feet by 75 feet) for steelhead production, 128 inside nursery tanks (3 feet by 16 feet), and 128 vertical stack egg incubators. In addition, there are nine adult holding ponds (17 feet by 75 feet) of which six are modified into twelve 8-foot by 75-foot raceways to hold rainbow production and thirty 8-foot by 80-foot concrete raceways for production of spring chinook salmon.

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. Subsequent construction over the years modified some of the existing features, and new design concepts continue to be incorporated into the hatchery.

Steelhead and rainbow trout are mitigation production assigned to the hatchery with construction of Dworshak Dam. Steelhead are released into the Clearwater River drainage; rainbow into Dworshak Reservoir.

Further construction was completed in June 1982 to expand facilities for spring chinook salmon. Authorized and funded under the U.S. Fish and Wildlife's Lower Snake River

Compensation Plan, site selection was approved in 1981 and construction began in September.

Kooskia National Fish Hatchery, located 35 miles upriver, operates as a complex with Dworshak to produce spring chinook smolts and steelhead fingerling.

This report covers the period of hatchery activities from October 1, 1983 to September 30, 1984.

STATION OPERATIONS

O&M funding from the Corps of Engineers (COE) included \$895,000 (subactivity 1935) and \$11,700 (subactivity 1994) quarters reimbursement. In addition, \$30,000 was annual work planned to the Dworshak Fish Health Center (FHC). Bureau of Indian Affairs (BIA) reimbursed the hatchery \$2,125 for rainbow trout production costs. Funds totaling \$142,200 were provided by the Lower Snake River Compensation Plan (LSRCP) for production of spring chinook salmon. The Youth Conservation Corps (YCC) contributed \$8,750 towards labor costs for an 8-week summer program. Funding from all sources totalled \$1,059,775, exclusive of FHC.

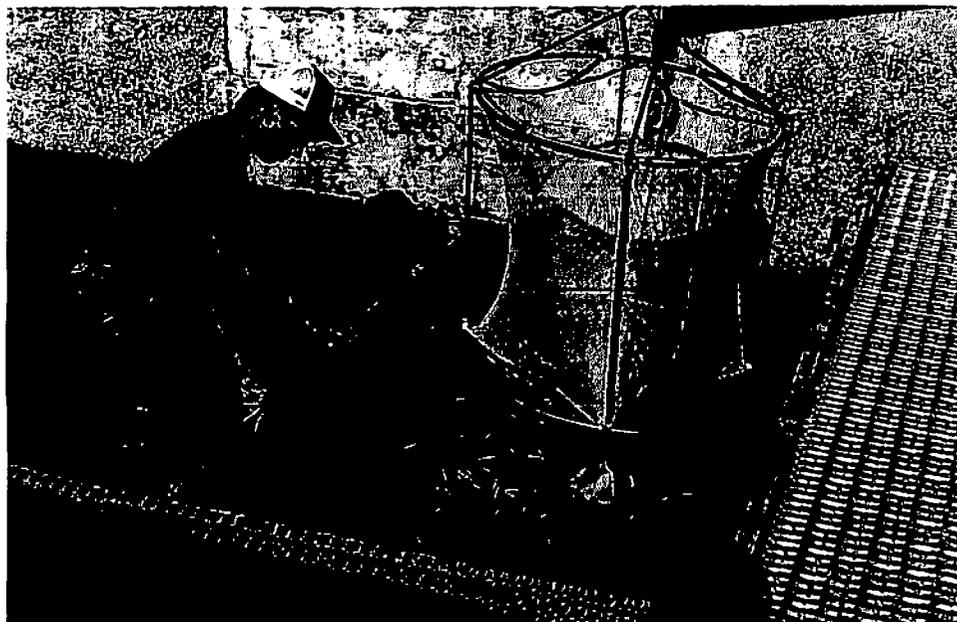
Cost per pound of all fish produced was \$2.90, based upon a production gain of 364,591 pounds. This cost reflects equipment repair and maintenance, facility care, rehabilitation, travel and training, and direct production expenses. Production costs alone (labor, fish food, mineral addition, drugs and chemicals) were \$580,000 or \$1.59 per pound.

A total of 23.0 staff-years was used during the year for a 15,851 pound production gain per staff-year employed. Production each staff-year increased to 24,385 pounds when based upon direct production responsibilities.

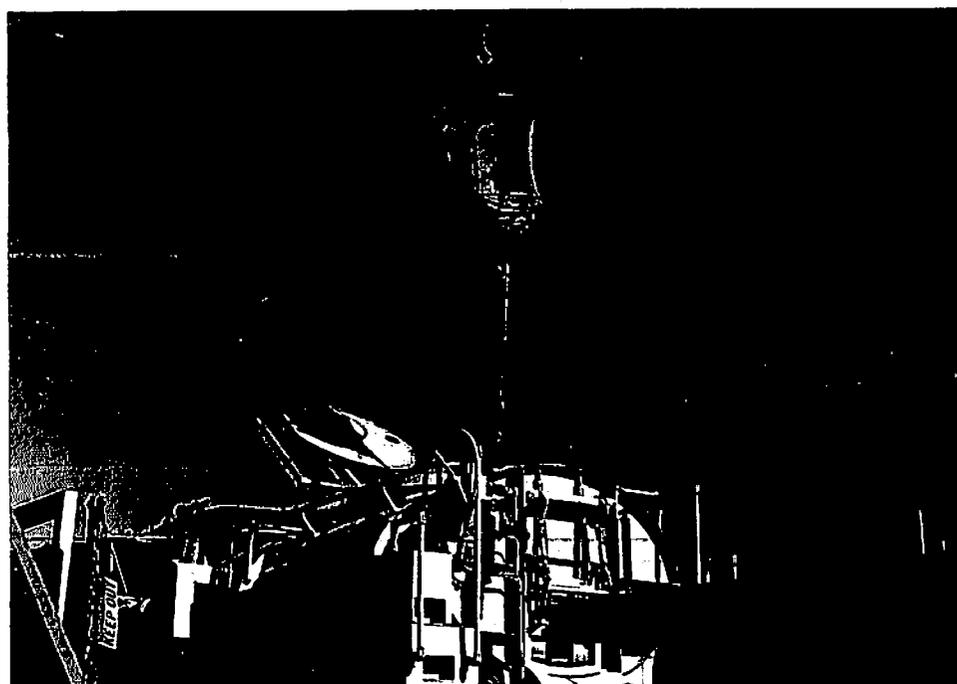
Food conversion (pounds of food to produce 1 pound of fish) was 1.55. This figure is calculated from 565,000 pounds of fish food used to produce a gain of 365,000 pounds.

IHN virus was again found in Brood Year (BY) 1984 steelhead production despite broodstock culling and initiation of a full scale single-parent incubation program. Although all "positive" eggs were destroyed (3.5 million) and only negative eggs (7 million) were held, results of the culling program did not appear to reduce the virus problem. A 70 percent loss in fingerling was recorded in early rearing and residual losses to IHN continued when moved to the outside ponds. Kooskia NFH, for the third successive year, assisted Dworshak in early rearing production with 2.5 million eyed eggs (negative) received and 2.2 million fingerling (250/lb.) returned to Dworshak's ponds. This off-site program, again, proved highly successful towards meeting Dworshak's steelhead commitment despite some later losses to IHN after 6-7 weeks at Dworshak. The Kooskia hatchery, free of the virus, assures its continued use in next year's expanded program.

For the first time in the hatchery's history, rainbow trout production was deleted from the program as the result of a severe IHN outbreak in June. Future rainbow needs for Dworshak Reservoir will be met elsewhere until conditions at Dworshak improve.



Removing IHN virus losses in rainbow trout production



Disposing of 130,000 fingerling rainbow production from an IHN epizootic.

Production was down from recent years for several reasons:

1. Rainbow production was destroyed.
2. Fewer numbers of steelhead smolts were available for release as a result of earlier mortality to IHN.
3. A spring chinook program, highly-infected with bacterial kidney disease (BKD), caused heavy losses and poor quality smolt production in the spring.

Changes in the rearing regime of BY 1983 spring chinook, using colder water in incubation and early rearing, provided excellent fish health conditions at start. It is anticipated that these same conditions will continue; and size, at time of release in spring 1985, will meet management's request.

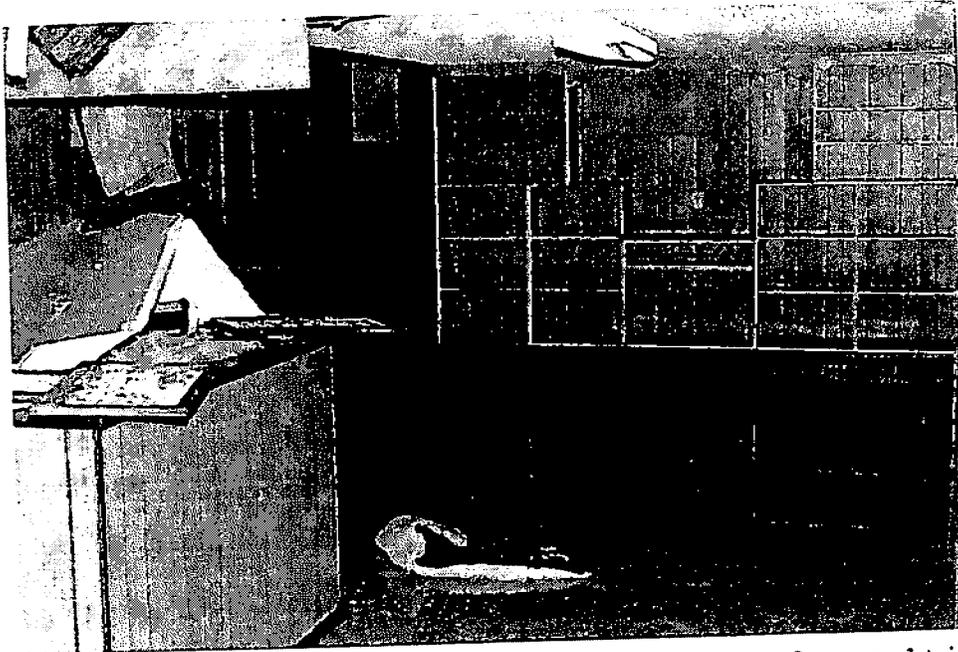
Some 3 million steelhead were on-hand to begin the new fiscal year. Losses, however, may carry over from IHN; seen high in late summer in advance fingerling size. The additional number of steelhead on-hand will hopefully offset any further losses in production, resulting in increased numbers at release time over spring 1984's program.

The YCC program at Dworshak NFH was an 8-week, non-residential program. Five enrollees were funded through Dworshak NFH and one enrollee through Dworshak FHC. The enrollees worked hard and accomplished a number of worthwhile projects at a cost savings. The YCC program returned approximately \$1.47 worth of work for each dollar spent. Hours spent on maintenance of the grounds and buildings and on fish facility cleaning were very important. Most of the projects were located on the hatchery grounds. The projects completed by the enrollees were supervised by one of several hatchery personnel. The enrollees had the opportunity to work on a variety of projects and with a diversity of hatchery personnel. These experiences will be valuable to them in future jobs and occupations.

Standby/scheduled overtime was terminated effective June 1. A telephone dialing system, interfacing with the hatchery alarm, is used to alert designated employees. Application for an assigned radio frequency was approved. This will allow the station to proceed with off-site communication by radio, if later desired.

Unusual below-freezing weather in December 1983 and January 1984 caused numerous water problems; broken pipes, inoperative pumps, and some damage to residences. Considerable damage was done in Quarters No. 2 when water flooded the upstairs living area. Work was also needed in the nursery building which required some pipe replacement. Total cost for repairs was \$2,100. The subzero temperatures also caused some heating problems in the

production systems as desired water temperatures were often difficult to attain.



Water damage in basement of Quarters No. 2 resulting from frozen and broken water pipe.



Workers stripping ceiling of Quarters No. 2 damaged by water.



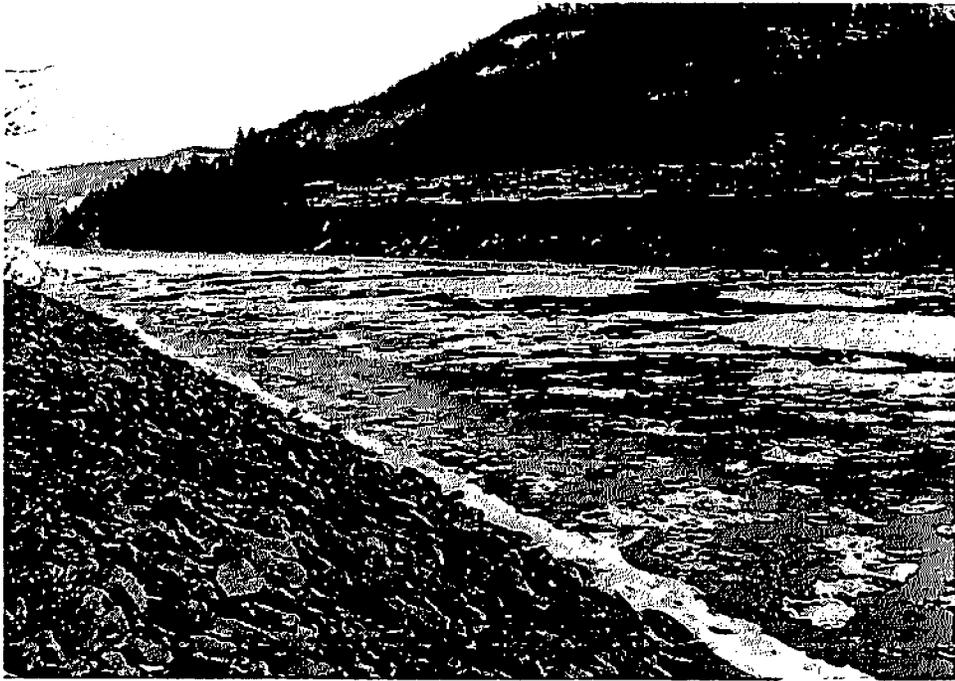
Feeding fish in subzero temperatures.



Rising early morning fog over heated steelhead ponds when temperatures fell to -15°F .

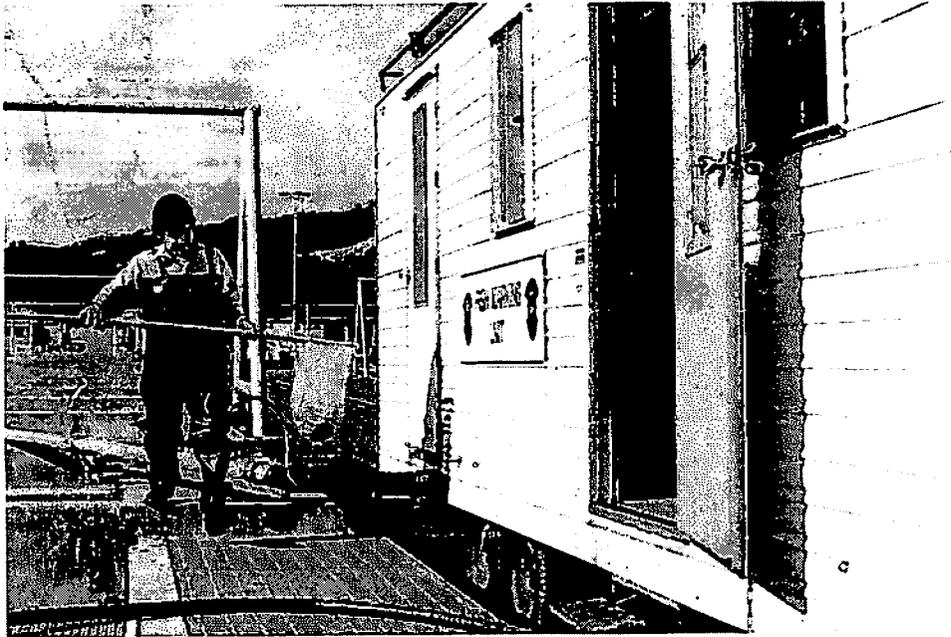


Unusual ice condition seen on the Clearwater River near hatchery, in December-January.

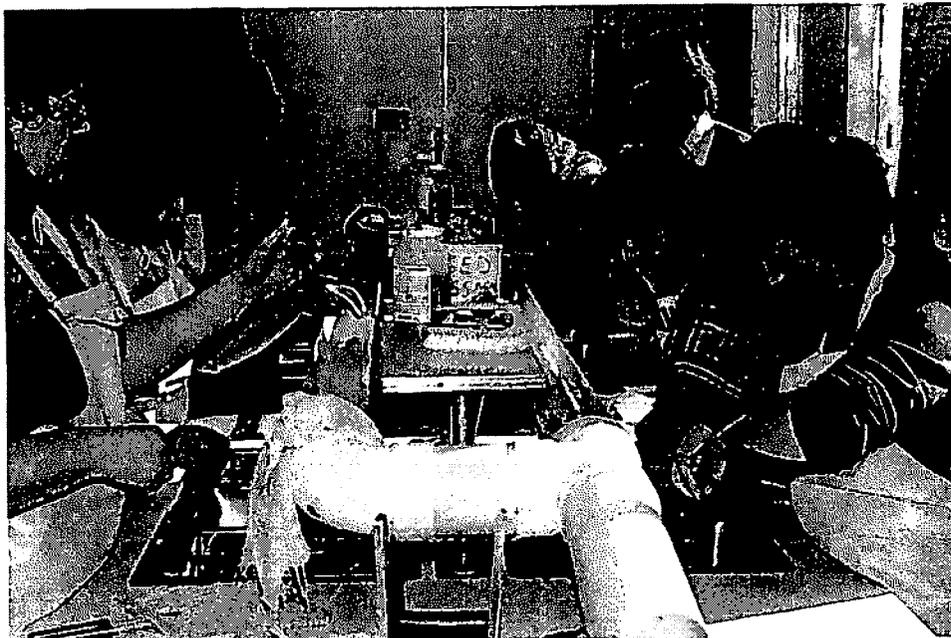


Ice flows on the Clearwater River in late-January.

All BY 1983 steelhead were adipose clipped by the State of Idaho prior to release as smolts in spring 1984. Some 1.8 million young fingerling were marked during a 2-week period in November. Purpose of this on-going program is to identify hatchery fish from wild upon return as adults. Sixty markers, laborers, and coordinators were involved in the project.



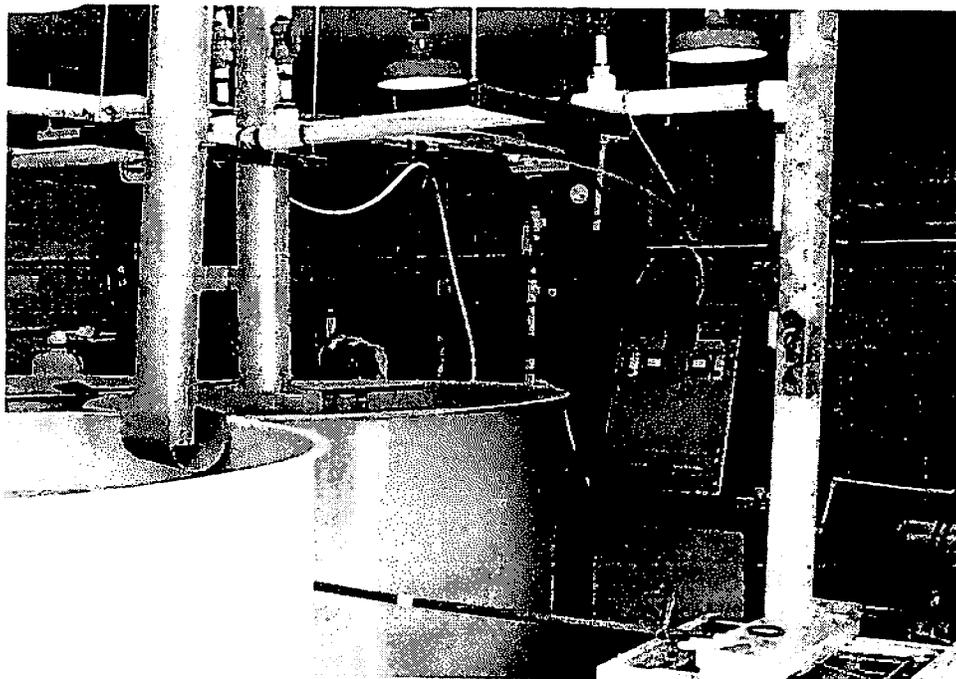
Netting young steelhead for adipose clipping.



Workers removing adipose fins from 1.8 million young steelhead.

Off-hour security coverage was initiated with the Clearwater County Sheriff at a cost of \$1,500. Period of coverage was from March 1 to April 30 during steelhead collection and again from June 15 to August 15 when spring chinook broodstock were on station. Renewal of this service is planned for future years, considering the excellent cooperation and coverage provided. The hatchery, however, did experience some poaching of fish from the broodstock ponds. Incidents, though few, did require response from local enforcement.

A study was initiated using ozone to sterilize a small flow of water on several test groups of steelhead fingerling. Purpose of the study was to determine the effectiveness of ozone in removing IHN. Mechanical problems, apparent from the beginning, terminated the study at an early date without meaningful results. Equipment purchased by the COE will be replaced with a larger system, having backup, for use in a cooperative study with the State, COE, and FWS in spring 1985. Results from this are expected to provide some indication on the potential of ozone at Dworshak and also in Idaho's design of the new Clearwater hatchery.

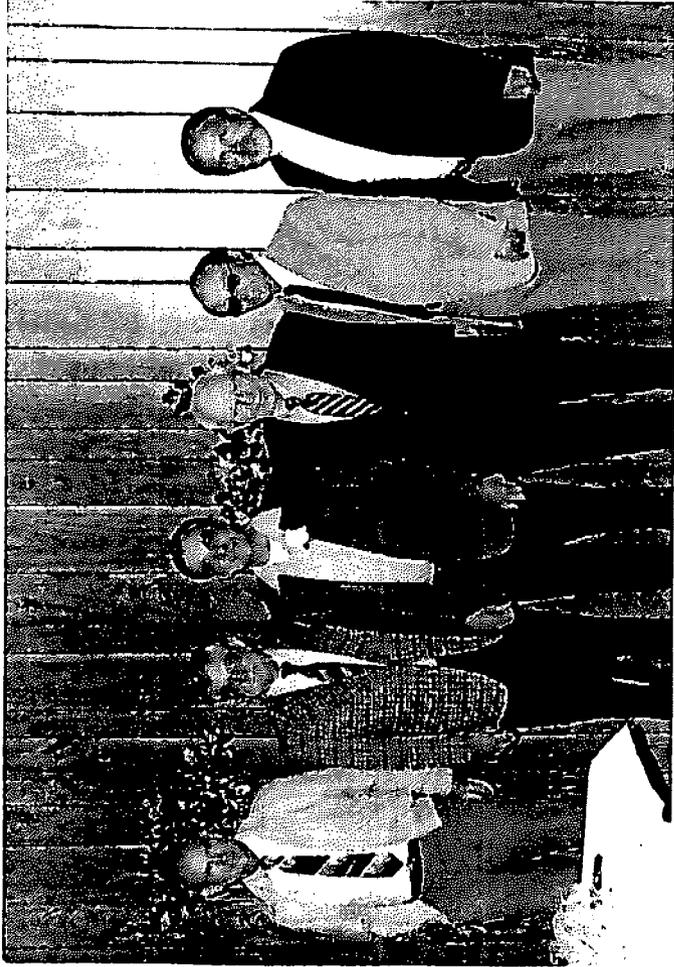


Small scale ozone study in operation.



Ozone generator for treating 100 gm water flow.

A retirement party for long-time service employee George Williams, Assistant Manager since 1968, brought together a reunion of the "old guard" in May. John Parvin, Hatchery Manager at Dworshak from 1968-1975, since retired; COE employees Morris Croker and John Hess, both formerly of the Dworshak Hatchery Study Team and design engineers from the early hatchery beginning until 1980, and now retired; along with Joe Lientz, Hatchery Biologist since 1974; Hatchery Manager Wayne Olson, since 1975; and Engineer Dave Owsley, at Dworshak since early 1976, enjoyed the renewal of old acquaintances.



Left to right: John Hess, John Parvin, George Williams,
Morris Croker, Dave Owsley, and Wayne Olson.

FISH CULTURE OPERATIONS

CHINOOK SALMON PRODUCTION

Fall Chinook Spawning
Spring Chinook - Brood Year 1982
Spring Chinook - Brood Year 1983
Spring Chinook - Brood Year 1984

STEELHEAD PRODUCTION

Brood Year 1983

System I
System II
System III

Brood Year 1984

Spawning Summary - Related Production

RAINBOW TROUT PRODUCTION

RI-117 - HATCHERY PRODUCTION SUMMARY

CHINOOK SALMON PRODUCTION

FALL CHINOOK SPAWNING

Fall chinook salmon (FCS) were transported during September 1983 from Ice Harbor Dam to Dworshak NFH for spawning and early incubation. A total of 202 adults and 55 jacks was received. The holding pond was covered and treated weekdays with malachite green. Prespawning mortality was 4.3 percent.

Spawning began on October 25 and concluded on November 23. A total of 492,130 green eggs were taken from 119 females. The green-to-eyed egg survival was 88.1 percent. A total of 433,680 eyed eggs were shipped to Hagerman NFH from December 20 to January 16.

SPRING CHINOOK - BROOD YEAR 1982

Fiscal Year 1984 began with five lots of spring chinook salmon (SCS) being reared in the Lower Snake River Compensation Plan (LSRCP) raceways. The lots included two (2-Le-1a and 2-Le-1b) from Leavenworth NFH, two (2-RR-2a and 2-RR-2b) from Rapid River SFH, and one (2-KK-1) from Kooskia NFH. The lot from Kooskia NFH was made up of a mixed BKD-positive and BKD-negative group. The populations and weights of the SCS on October 1, 1983 were:

<u>Lot No.</u>	<u>Number</u>	<u>Size</u> <u>(No./lb.)</u>	<u>Weight</u>
2-Le-1a	95,645	@ 8.17/lb.	= 11,707 lbs.
2-Le-1b	153,933	@ 10.54/lb.	= 14,605 lbs.
2-RR-2a	89,702	@ 11.83/lb.	= 7,583 lbs.
2-RR-2b	219,748	@ 12.08/lb.	= 18,196 lbs.
2-KK-1	185,311	@ 25.29/lb.	= 7,358 lbs.
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TOTAL SCS	744,339		59,449 lbs.

Most of the LSRCP raceways were included in several ongoing studies. Hand-fed SCS were compared to demand-fed SCS. Some raceways were fed dry food (Abernathy) and others were fed moist food (OMP). Several raceways were fed an iodine/fluorine supplement. Performance of BKD-positive and BKD-negative SCS was compared.

The incidence of BKD-related mortality was very high in the large Leavenworth SCS (2-Le-1a). This led to the release of these fish in the North Fork Clearwater River on November 2 and 3. The Rapid River SCS (2-RR-2a) were shipped to Kooskia NFH November 8 and 9. Dworshak received 205,760 SCS (2-Le-1b) from Kooskia NFH November 7-9. This left Dworshak with three lots of SCS in the LSRCP raceways.

Overall, BKD incidence and related mortality gradually increased from October to March. The quality of these SCS deteriorated. The BKD-positive group from Kooskia was an exception; it showed gradual improvement.

Release of the SCS began in March. A decision was made to release the healthiest fish. Half of 2-RR-2b was "culled" due to their high BKD infection. Final SCS release information for Brood Year 1982 is summarized below:

<u>Date</u>	<u>Lot No.</u>	<u>Number</u>	<u>Size (No./lb.)</u>	<u>Weight</u>	<u>Release Site</u>	<u>Remarks</u>
<u>1983</u>						
10/3-11/3/83	2-Le-1a	75,179	6.4	11,696	North Fork Clearwater R.	Poor Health
11/8-11/9/83	2-RR-2a	87,251	8.9	9,816	Kooskia NFH	Final Rearing
11/9-11/10/83	2-RR-2b	65,204	7.6	8,524	Kooskia NFH	Final rearing
<u>1984</u>						
3/29-4/4/84	2-RR-2b	51,714	8.1	6,389	Clear Ck.	Poor Health
3/19-4/4/84	2-Le-1b	260,519	6.9	37,595*	North Fork Clearwater R.	
3/26/84	2-KK-1	169,787	18.1	9,580	Clear Ck.	BKD Pos.-Neg.
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TOTAL BROOD YEAR 1982						
LSRCP PRODUCTION		709,654		83,600*		

*Included in this weight is 10,000 lbs. gained in Lot 2-Le-1b while at Kooskia NFH.

SPRING CHINOOK - BROOD YEAR 1983

The third year of the LSRCP at Dworshak began with 145,122 eyed eggs (3-KK-2) from Clear Creek stock on hand. On October 12, a total of 429,300 eyed eggs (3-Le-2) were received from Leavenworth NFH. On October 31, 1,787,900 eyed eggs (3-LW-2b) were received from Little White Salmon NFH. In November, about 340,000 of these eggs were transferred to Kooskia NFH. Approximately 300,000 swim-up fry (3-LW-2a) were received from Kooskia NFH on October 24. These fry were originally shipped to Kooskia NFH from Little White Salmon NFH on September 8.

The Little White Salmon SCS (3-LW-2a) swim-up fry were placed in single-pass, raw water in nine nursery tanks and fed BioDiet No. 2. These fish comprised three test groups, varying in treatment of adults and eggs with Erythromycin. The Leavenworth SCS (3-Le-2) were started on feed December 29. Three diets were fed: OMP, OMP with 20 percent desiccated liver, and BioDiet. Two water regimes were utilized: nine tanks were started on 48°F reuse water and six tanks were started on 40°F single-pass, raw water. The Little White Salmon SCS (3-LW-2b) were started on feed January 18-20. Twenty-four tanks were included in a starter diet trial (12 in raw water and 12 in reuse). The three diets compared were OMP, OMP with 20 percent desiccated liver, and BioDiet. In all, 1,438,400 swimup fry were placed in 48 nursery tanks. Twelve tanks were supplied with raw water; the remainder heated reuse water. An initial mortality of 183,720 left 1,254,680 fry in 38 tanks as of February 1, 1984.

The Clear Creek SCS were started on feed January 17-23. The fish were split according to their BKD status; 72,621 BKD-negative fry went into three tanks and 72,501 BKD-positive fry went into three tanks. All six tanks were on single-pass, heated make-up water, and the fish were fed BioDiet No. 2. The total number of SCS (all lots) that began feeding as swim-up fry was 2,312,822 weighing 1,928 pounds.

Problems developed by mid-January in the nursery building. Infectious hematopoietic necrosis (IHN) was confirmed in Lot 3-Le-2 and suspected in lot 3-LW-2b. Other factors, such as bacteria and Epitheliocystis, apparently contributed to the mortality in the SCS. From February 3-7, approximately 900,000 SCS (3-LW-2b) were moved to heated (48°F), single-pass water due to continued environmental problems and increasing mortality of fish in the nursery reuse system. Lots 3-LW-2a and 3-KK-2 were performing well.

In April, 1,231,073 SCS were moved from the nursery tanks to the LSRCF raceways; 429,775 SCS remained in the nursery, and 329,324 excess fingerlings were released in the North Fork Clearwater River. The number of SCS (3-KK-2) transferred to Kooskia NFH on May 2 was 153,163. On May 21, an estimated 234,475 excess fingerlings were released in the North Fork Clearwater River. The release information for Brood Year 1983 is summarized below:

<u>Date</u>	<u>Lot No.</u>	<u>Number</u>	<u>Size (No./lb.)</u>	<u>Weight</u>	<u>Release Site</u>	<u>Remarks</u>
4/25/84	3-LW-2a	178,219	125.0	1,426	North Fork Clearwater R.	Excess Fingerlings
4/24-5/21/84	3-LW-2b	342,670	294.1	1,165	North Fork Clearwater R.	Excess Fingerlings
4/24/84	3-Le-2	43,000	250.0	172	North Fork Clearwater R.	Excess Fingerlings
5/2/84	3-KK-2	153,163	242.7	631	Kooskia NFH	Final rearing
TOTAL		717,052		3,394		



Transferring spring chinook salmon (Lot 3-KK-2) to Kooskia NFH for final rearing and release in spring 1985.

The three lots (3-LW-2a, 3-LW-2b, and 3-Le-2) of SCS remaining in the LSRCF raceways performed well from May through the end of the fiscal year. Routine fish health sampling indicated a low incidence of BKD in a few raceways. The water temperature was held to approximately 49°F, and the fish were fed by hand to restrict their growth and to minimize the impact of BKD. A medicated diet (BioDiet containing 5 percent Erythromycin) was fed to 11 of the raceways to test its effect on BKD. The above measures resulted in the average size of the SCS being in full accordance with projected size, suffering minimum mortalities, and having a low incidence of BKD.

Spring chinook salmon on station September 30, 1984:

<u>Lot No.</u>	<u>Number</u>	<u>Size</u> <u>(No./lb.)</u>	<u>Weight</u>
3-LW-2a	58,119	@ 25.28/lb.	= 2,299 lbs.
3-LW-2b	752,432	@ 45.51/lb.	= 16,533 lbs.
3-Le-2	375,982	@ 42.89/lb.	= 8,766 lbs.
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TOTAL SPRING CHINOOK SALMON	1,186,533		27,598 lbs.

SPRING CHINOOK SPAWNING - BROOD YEAR 1984

A total of 284 adults and 51 jacks were collected at Kooskia NFH in June and July 1984 and transferred to Dworshak for holding and spawning. Thirty-seven of the jacks were given to the Nez Perce Tribe in July. Dworshak captured 63 adults and 19 jacks via the hatchery's fish ladder. Half of the adult holding pond was covered, and the pond was treated with malachite on weekdays. The adults were inoculated with Erythromycin. Prespawning mortality was 12.5 percent (46 fish). A high percentage (34%) had broken backs. Spawning began on August 13 and was completed on September 4. Dworshak and Kooskia SCS were spawned separately whenever possible.

An estimated 600,600 green eggs were taken from 143 females. Eggs were water-hardened in Argentyne and then moved to Kooskia NFH for incubation in chilled water

(42°F). Again this year, eggs from BKD-positive and BKD-negative adults were kept separate. Cooperation among Dworshak FAO, Dworshak FHC, and Dworshak production crew has been important in carrying out this complex operation.

STEELHEAD PRODUCTION

BROOD YEAR 1983

Fiscal Year 1984 began with 2.1 million steelhead (73,688 lbs.) on station. Reuse Systems I, II, and III held 508,944, 797,020, and 843,634 fish respectively. Except for three ponds suffering low IHN-related mortality, all fish were in good health.

SYSTEM I

Steelhead in System I exhibited excellent health and performance up through release despite a multitude of reuse system problems. Switch from raw water to reuse with mineral addition (20 mg/l Na⁺ and 8mg/l K⁺) occurred November 7-8. Poor system design caused suspended solids to increase dramatically. Parasite load remained light although pond flows were inadequate.

In an attempt to improve environmental conditions in the reuse system, tube settlers were installed in one of the clarifiers. Monitoring of suspended solids and turbidity demonstrated little improvement following installation of the media. Water temperature was reduced to 48°F on February 23; changeover to single-pass raw water occurred March 6.

Adipose clipping of all systems began November 7 and was completed November 23. Adipose clipping of five ponds in System I, which had been exempted from the earlier operation, occurred in March. Little mortality resulted from both marking operations conducted by Idaho Department of Fish and Game personnel.

SYSTEM II

Performance remained quite good in System II fish with the exception of a few ponds where IHN was suspected in contributing towards higher mortality in October. Myxobacteria was found both internally and externally. Treatment with medicated feed (TM-50) was carried out beginning November 23 and ending December 6. Treatment was effective as little bacteria was observed in kidney smears.

Stresses of the marking operation in November resulted in an elevated mortality for a 10-day period. Mortality moderated in December after Terramycin treatment. Performance and health also increased significantly and continued through release.

System II was switched to reuse November 22. A mineral package of 20 mg/l Na⁺ and 8 mg/l K⁺ was initiated concurrently. In preparation for release, switch to raw water occurred on April 2. Due to physiological changes (as determined by blood analysis and general fish health observations) occurring at that time, some gill swelling and increased mortality was noted. The switch to raw water helped to alleviate these problems.

SYSTEM III

System III was switched to reuse on November 22, with mineral addition initiated concurrently. Physiological changes were taking place in these fish when the switch was made. Coupled with high metabolic load resulting from this switch and marking stress, an increase in mortality was observed. Improvement was observed in December although a moderate parasitic load of Gyrodactylus was present.

Physiological changes continued in January and February. Gill swelling as well as lingering signs of IHN virus was observed. However, overall fish quality remained excellent through release.

Switch to raw water occurred on March 5. Gill swelling had diminished and examination of blood parameters indicated that these fish were physiologically ready for release. System III fish were the largest size fish at release (202 mm).

STEELHEAD RELEASES

Smolt releases occurred in April and May. Quality was excellent in all groups, and smolt size was larger than past years. Observations of fish at downstream collection/transportation points indicated that quality and outmigration were excellent.

A Summary of this year's smolt releases:

<u>Lot No.</u>	<u>Number</u>	<u>Size</u> <u>(No./lb.)</u>	<u>Weight</u>
SYSTEM I (3-DS-I-14) xT.L. 197 mm	527,467	@ 5.95/LB.	= 88,650 LBS.
SYSTEM II (3-DS-II-16) xT.L. 193 mm	654,596	@ 6.15/LB.	= 106,409 LBS.
SYSTEM III (3-DS-III-15) xT.L. 202 mm	779,309	@ 5.42/LB.	= 143,788 LBS.
TOTAL RELEASE	1,961,372	@ 5.79/LB.	= 338,847 LBS.

Distribution of the smolt releases:

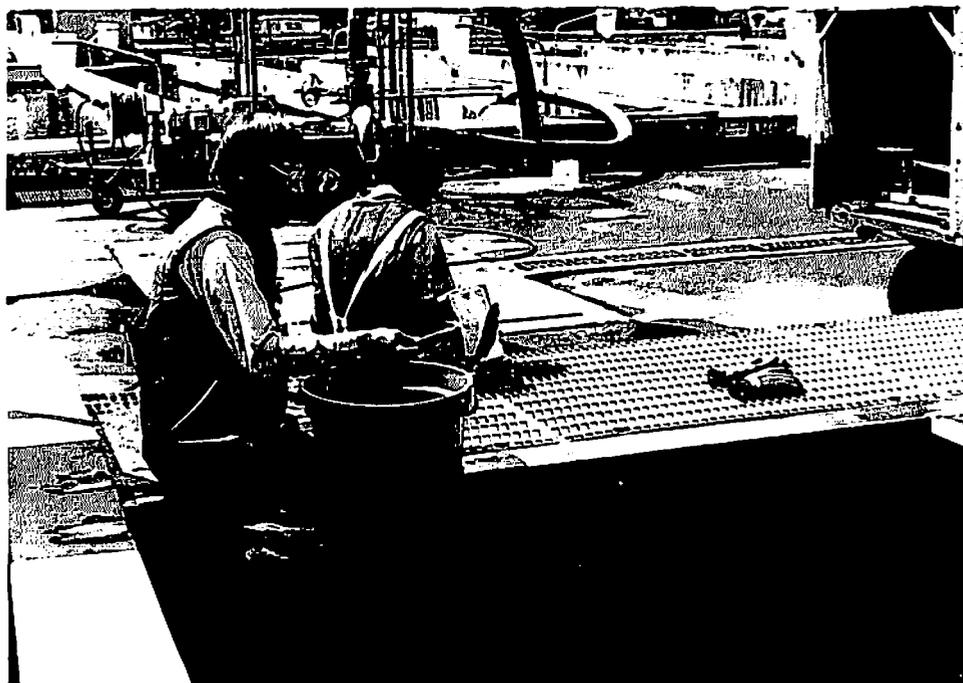
<u>Lot</u>	<u>Number</u>	<u>Size</u> <u>(No./lb.)</u>	<u>Weight</u>
Main stem Clearwater River	1,208,319	@ 6.08/LB.	= 198,676 LBS.
South Fork Clearwater River	506,930	@ 5.43/LB.	= 93,283 LBS.
Clear Creek	246,123	@ 5.25/LB.	= 46,888 LBS.
Total	1,961,372	@ 5.79/LB.	= 338,847 LBS.

South Fork Clearwater River releases were made at six different locations within the watershed:

<u>Location</u>	<u>No. of Smolts</u>
Mount Idaho Bridge	161,854
Red River	82,929
Rainy Day Bridge	66,988
Crooked River	15,850
American River	117,177
Newsome Creek	62,132
TOTAL	506,930

Four groups of smolts were specially tagged prior to release into the main stem Clearwater River on May 3-4. Release information and study purposes are summarized below:

Lot	Number	Size (No./lb.)	Pound	Coded Wire Tag	Freeze Brand	Purpose
3-DS-II-16	40,092	6.25	6,415	5/13/35	---	Run Timing - Tail End
3-DS-I-14	40,436	6.84	5,912	10/25/16	---	Run Timing - Fall Return
3-DS-I-14	39,001	5.76	6,771	10/25/17	---	Run Timing - Early Spring
3-DS-I-14	19,969	5.16	3,870	---	RAJ-1	Water Budget



Sample counting steelhead smolts prior to release from ponds.

BROOD YEAR 1984

STEELHEAD SPAWNING SUMMARY

Ladder Opened	November 7, 1983
Ladder Closed	May 15, 1984
Spawning Began	February 2, 1984
Spawning Ended	May 15, 1984
TOTAL FISH IN RUN	3,284
Females Spawned	1,537
Total Green Eggs	10,746,552
Total Green IHN-Negative Eggs	6,821,762
Total Eyed IHN-Negative Eggs	6,199,800 (91.5%)

DISPOSITION OF EGGS

Kooskia	2,442,800
Dworshak NFH	3,584,250
University of Rhode Island	20,000
University of Idaho	46,906
Wet Lab	72,500
Destroyed (IHN positive)*	3,663,714

* Eggs culled upon confirmation of IHN status 8 days subsequent to spawning.

Only 93 adult steelhead were collected at Dworshak by February 28. Seventeen females provided a total of 102,000 eggs. The number of returning adult steelhead to Dworshak was quite low compared to last year's when nearly 150 fish were collected before the ladder was closed early in December. Normally, in past years, the hatchery did not collect large numbers early in the season.

Fish were anesthetized with MS-222 since spawned fish were not intended for human consumption. Eggs from one female were fertilized with sperm from two males. All spawned fish were sampled to determine IHN status of progeny. Fertilized eggs were water-hardened in an iodophore solution (75 mg/l) for 1 hour and incubated individually in numbered colanders supplied with single-pass heated water (56°F). Once IHN status was known, all positive eggs were destroyed with the exception of a few test groups intended for the laboratory scale ozone study and IHN study at the University of Idaho. Eyed eggs were picked and transferred to Heath trays either at Kooskia or Dworshak.

Approximately 37 percent of eyed eggs (3.7 million) were mechanically culled as IHN positive, leaving over 6.1 million eyed eggs as a starting point for both Kooskia (2.4 million) and Dworshak (3.6 million) production regimes.



Transferring steelhead broodstock to sorting table for determining sex, age class, and spawning ripeness; and recovery of tagging information.



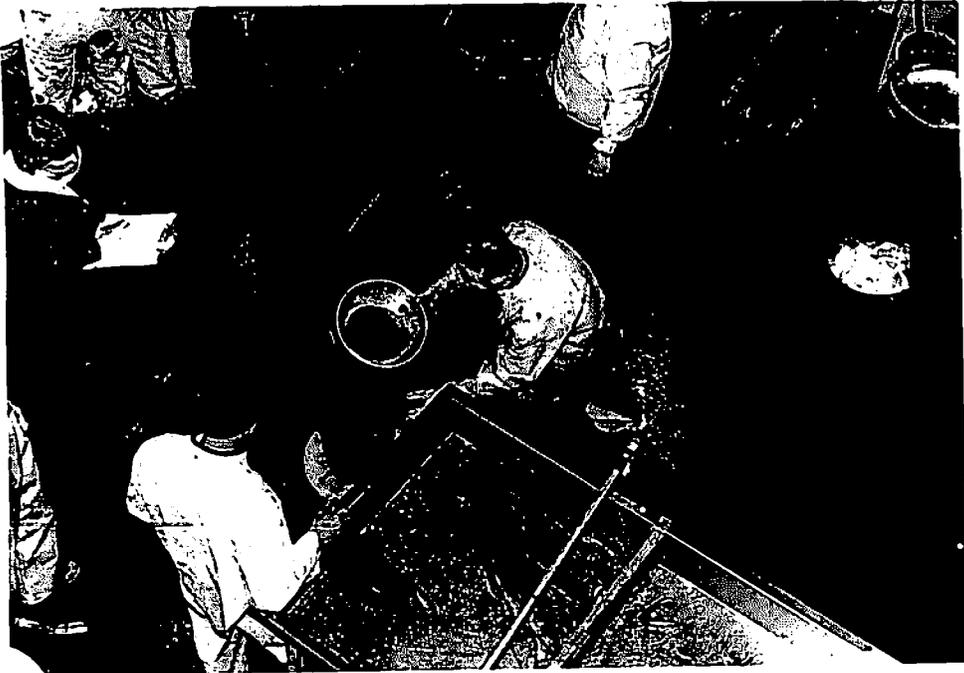
Following established sanitation procedures, a female adult is wiped clean prior to spawning.



Preparing to collect eggs from one of 1,537 females used in spawning.



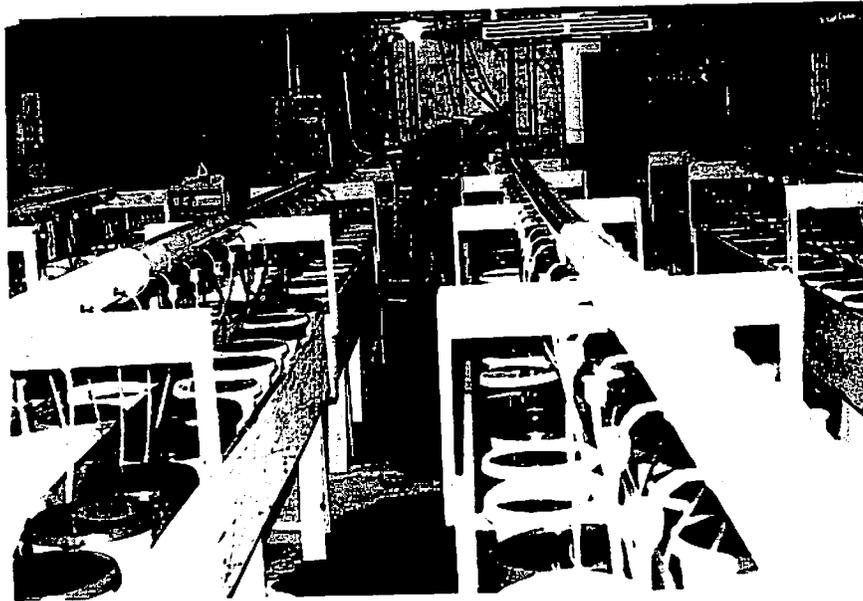
Collecting a small ovarian sample for IHN virus determination.



Eggs, collected from one female, held separate and recorded for later single incubation.



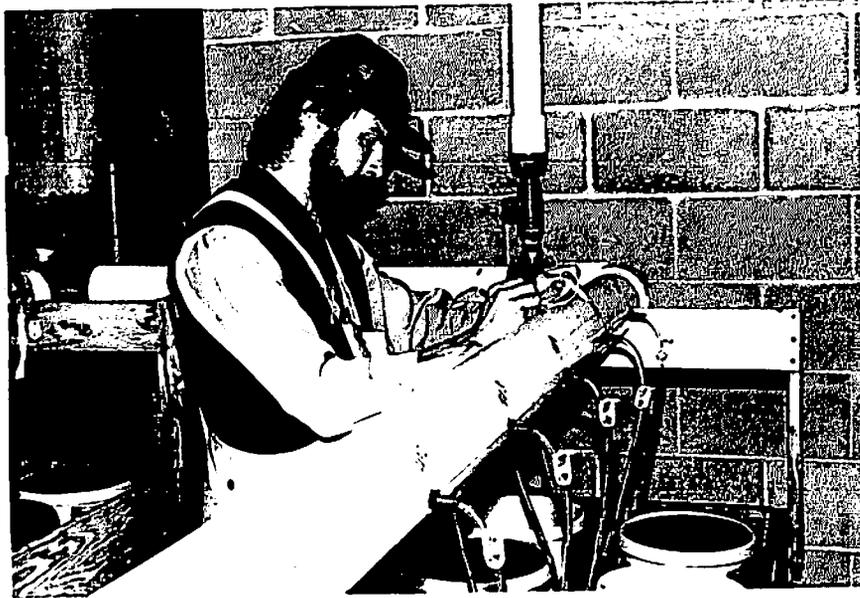
600 bucket/colander units for separate incubation of eggs from a single parent.



Transferring eggs to individual incubator units.



Eggs water-hardened in an iodophore solution and incubated in numbered units.



Each incubator is tagged to correspond with numbered female for tracking and for separating when IHN status becomes known 8 days later.

Steelhead fry reared at Kooskia experienced excellent performance, health, and survival (90%) from swimup to transfer as fingerlings to Dworshak's outside ponds. As in past years, IHN was not detected in fish reared at Kooskia.

Nursery rearing of 2,545,200 fry, representing egg Takes 1-5 and 7-10, began at Dworshak in May. IHN and related losses began appearing in tanks containing egg Takes 3-5 on May 12. A decision was made to destroy tanks of fish experiencing high mortality in hopes of reducing the possibility of contamination in remaining tanks. By the end of May, 365,000 fish had been lost.

An additional 723,450 fry, representing egg Takes 11-14, were moved to tanks in June. Losses to IHN continued for all groups except for egg Takes 12 and 14. In order to study mortality patterns, additional tanks of fish showing IHN breaks were not destroyed. Some tanks showed typical mortality patterns of a sudden increase in mortality followed by chronic low mortality. Other tanks, particularly the later egg Takes (9-14), experienced low, chronic mortality without an initial high peak.

Several test groups were initiated to help clarify the IHN problem. Two tanks each of Take 14 fry were set up in the nursery, pumphouse, and at Dworshak Dam to study the possible role of water supply in the onset of the virus. After 84 days, the study was terminated without IHN-related mortality found in any group. Two groups of egg Take 13 fry incubated at Kooskia were transferred to Dworshak; one at swimup and the other at 700 per pound. While in Dworshak's nursery, IHN was not detected in either group.

Several tanks from egg Takes 12 and 13 were initialized on heated single-pass water (60°F) to test the temperature sensitivity of the virus. After 2 months of rearing, mortality was somewhat lower in heated tanks compared to those reared in raw water; although little difference in growth was observed between both groups.

An ozone pilot study set up in the Dworshak Fish Health Center wet lab yielded inconclusive results due to a myriad of mechanical breakdowns. A more elaborate ozone experiment is planned for FY 1985.

By September 27, all steelhead fingerling in the nursery were either transferred to System III ponds or released into the main stem Clearwater River. Survival to ponding or releasing is summarized below:

Egg Take	Number Eyed Eggs Started	Number of Fingerling Surviving to Ponds	Number of Fingerling Surviving to Release	Percent Mortality
1	8,000	6,400	---	11.1
2	44,250	26,811	---	39.4
3	16,000	---	---	100.0
4	30,000	---	---	100.0
5	58,000	---	---	100.0
7	137,000	58,952	---	57.0
8	1,298,750	28,512	---	97.8
9	885,000	239,108	---	73.0
10	326,500	202,120	12,363	34.3
11	95,000	17,653	30,263	49.6
12	485,000	322,051	67,921	19.6
13	150,000	78,111	34,301	25.1
14	58,750	---	46,364	21.1
	3,592,250	973,318	191,212	67.5

System III fingerling continued to show low, chronic IHN-related mortality through September.

System I pond loading was completed June 28. A total of 965,880 steelhead from egg Takes 6 and 7 was transferred from Kooskia NFH. Fish performed well after transfer.

Approximately 1,242,588 steelhead were transferred from Kooskia to Systems II and III by August 8. Several ponds experienced low, chronic mortality due to IHN during August and September. By October, mortality had subsided to acceptable levels, although performance of System II and III fish was not optimum.

Total steelhead on station September 1984:

SYSTEM I (4-DS-I-18)	918,826	@ 39.83/lb.	= 23,069 lbs.
SYSTEM II (4-DS-II-19)	932,082	@ 48.63/lb.	= 19,168 lbs.
SYSTEM III (4-DS-III-17)	1,180,319	@ 84.09/lb.	= 14,037 lbs.
<hr/>			
TOTAL STEELHEAD	3,031,227		56,274 lbs.

All systems were switched to reuse in late November when raw water temperatures became too low for optimum growth. Mineral addition (20 mg/l Na⁺ and 8 mg/l K⁺) was initiated concurrently.

RAINBOW TROUT PRODUCTION

Lot 2-WS-12 performance was excellent during Fiscal Year 1984. However, distribution to Dworshak Reservoir was necessary to reduce pond densities. Also, along with reducing pond weights, formalin (167 ppm) was used to control the level of ectoparasites. Lot 2-WS-12 was transferred from holding pond raceways to ponds in System I and in LSRCP raceways because holding pond raceways water supply system needed renovation. Overall, the lot performance was good. A total of 99,777 catchables (34,620 pounds at 2.88/pound) was planted in Dworshak Reservoir, and on the Nez Perce and Coeur d'Alene Indian Reservations. There were 396,326 subcatchables (3,343 pounds at 118.5/pound) planted in Dworshak Reservoir. The total number planted from Lot No. 2-WS-12 was 496,103 weighing 37,963 pounds. Mortality from initial feeding to final planting was 53.06 percent. Total weight gained was 37,729 pounds.

Initially, Lot 3-WS-13 performed poorly. Groups 1 and 2, were placed in heated water in nursery tanks to promote growth. Lab samples from both groups indicated no IHN virus. The lot was transferred from nursery tanks to ponds in Systems II and III to allow room for hatchery steelhead fry. Group 1 had 74,993 fish transferred to

System II - Pond No. 50; Group 2 had 73,825 fish transferred to System III - Pond No. 65. After one month, Lot 3-WS-13 was transferred to holding pond raceways. Mortality rose to 6.81 percent for that month. Health exams reported high levels of ectoparasites and virus samples which confirmed the presence of IHN. It was recommended, and effected, that the entire lot be destroyed and not planted in Dworshak Reservoir.

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

HATCHERY PRODUCTION SUMMARY

Station

DWORSHAK

Period Covered

October 1, 19 83

through September 30, 1984

OLSON _____
PRATSCHNER _____
OWSLEY _____
McCALL _____
RUSSELL _____ Page 1 of 3
GALLOWAY _____
NEH _____
KOSIUA _____
GREGS _____
FILE _____

Density Index 0.107				Flow Index 0.499				Total Flow 45,698					
Species and Lot	Fish on hand End of Month			Fish shipped this F.Y.	Gain this F.Y.	Fish Feed Expended		Conversion	Unit Feed Cost		T.U. Per Inch	T.U. to Date	Length increase 30 day month Inches
	Number	Weight	Length			Pounds	Cost		Per lb.	Per 1000			
1	2	3	4	5	6	7	8	9	10	11	12	13	14
SCS													
2-LE-1A	0	0	8.122	75.2	-11	2,168	498.64	0.00	0.00	0.00	18.31	80.50	0.000
SCS													
2-LE-1B	0	0	7.372	261.3	2,552	21,896	7,300.84	8.58	2.86	141.41	23.41	141.97	0.000
SCS													
2-RR-2A	0	0	6.801	87.3	2,233	2,777	1,097.83	1.24	0.49	13.75	23.41	128.60	0.000
SCS													
2-RR-2B	0	0	7.497	116.9	-3,283	16,751	4,080.53	0.00	0.00	0.00	21.13	130.77	0.000
SCS													
2-KK-1	0	0	5.450	169.8	2,222	5,612	1,400.09	2.53	0.63	10.53	31.22	129.75	0.000
RBT													
2-WS-12	0	0	10.816	99.8	19,099	28,226	7,178.46	1.48	0.38	134.93	16.62	165.54	0.000
TOTALS													
AVERAGES													

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

HATCHERY PRODUCTION SUMMARY

Station

Page 2 of 3

DWORSKAK NFH

Period Covered

October 1, 19 83 through

Density Index				Flow Index				Total Flow					
Species and Lot	Fish on hand End of Month			Fish shipped this F.Y.	Gain this F.Y.	Fish Feed Expended		Conversion	Unit Feed Cost		T.U Per Inch	T.U. to Date	Length increase 30 day month Inches
	Number	Weight	Length			Number	Weight		Pounds	Cost			
1	2	3	4	5	6	7	8	9	10	11	12	13	14
STT													
3-DSII-16	0	0	7.612	716.8	96,168	146,090	37,150.58	1.52	0.39	57.15	18.97	124.40	0.000
STT													
3-DS-I-14	0	0	7.774	527.5	67,671	88,994	22,704.68	1.32	0.34	43.02	19.87	107.93	0.000
STT													
3-DS-III-15	0	0	8.046	779.3	102,020	149,674	37,748.27	1.47	0.37	50.85	17.17	95.81	0.000
SCS													
3-LW-2A	58.1	2,299	4.828	178.2	3,475	4,238	1,738.96	1.22	0.50	19.38	22.77	77.76	0.342
RBT													
3-WS-13	0	0	3.444	0	-48	2,961	1,164.51	0.00	0.00	0.00	0.00	55.51	0.000
SCS													
3-KK-2	0	0	2.500	153.2	510	556	279.88	1.09	0.55	1.80	15.07	16.39	0.000
TOTALS													
AVERAGES													

(36)

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

HATCHERY PRODUCTION SUMMARY

Station

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DWORSHAK NFH

Period Covered

October 1, 19 83 through September 30, 1984

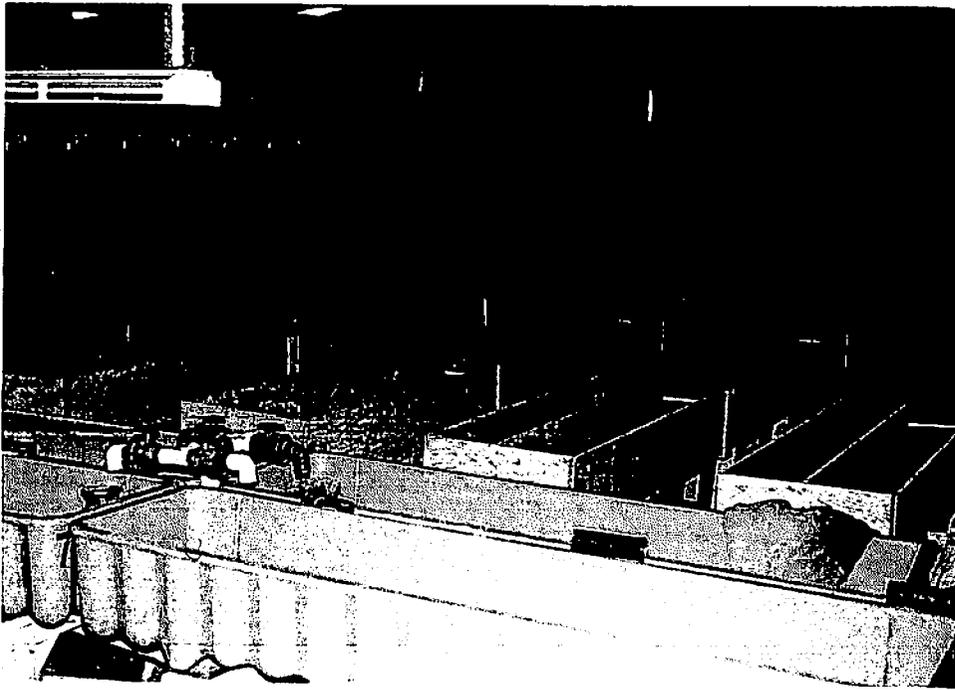
Density Index				Flow Index				Total Flow					
Species and Lot	Fish on hand End of Month			Fish shipped this F.Y.	Gain this F.Y.	Fish Feed Expended		Conversion	Unit Feed Cost		T.U. Per Inch	T.U. to Date	Length increase 30 day month Inches
	Number	Weight	Length			Number	Weight		Pounds	Cost			
1	2	3	4	5	6	7	8	9	10	11	12	13	14
SCS													
3-LE-2	376.0	8,766	3.785	43.0	8,580	10,561	4,228.15	1.23	0.49	11.08	28.23	66.97	0.333
SCS													
3-LW-2B	752.4	16,533	3.680	342.7	16,517	21,841	9,333.95	1.32	0.57	11.95	29.79	67.56	0.418
STT 4-DS- III-17	1,180.3	14,037	3.269	191.2	12,301	20,998	9,066.58	1.71	0.74	8.47	20.93	46.33	0.619
STT 4-DS-I-18	918.8	23,069	3.947	36.3	20,043	24,373	7,868.04	1.22	0.39	8.21	18.26	29.95	0.173
STT 4-DS-II-19	932.1	19,168	3.803	0	14,542	15,462	5,943.12	1.06	0.41	6.77	14.39	22.03	0.412
TOTALS	4,217.8	83,872		3,778.3	364,591	563,168	158,783.11						
AVERAGES			3.676					1.55	0.44	19.86	19.97	87.52	0.383

REPAIRS AND IMPROVEMENTS

As noted earlier, damage was quite extensive to Quarters No. 2 when a frozen pipe broke causing water to flood the upstairs area. Station labor accounted for a number of hours in cleaning and repairing damages. Hardwood floors were sanded and revarnished, but consideration of carpeting the residence remains for FY 1985.

Station personnel constructed troughs for holding 600 units and installed plumbing to furnish water to each incubator \$2,200.

A small, scaled-down design of the "Dworshak" incubation jar was built and tested for use in single incubation of eggs. Further testing and design is planned in FY 1985.

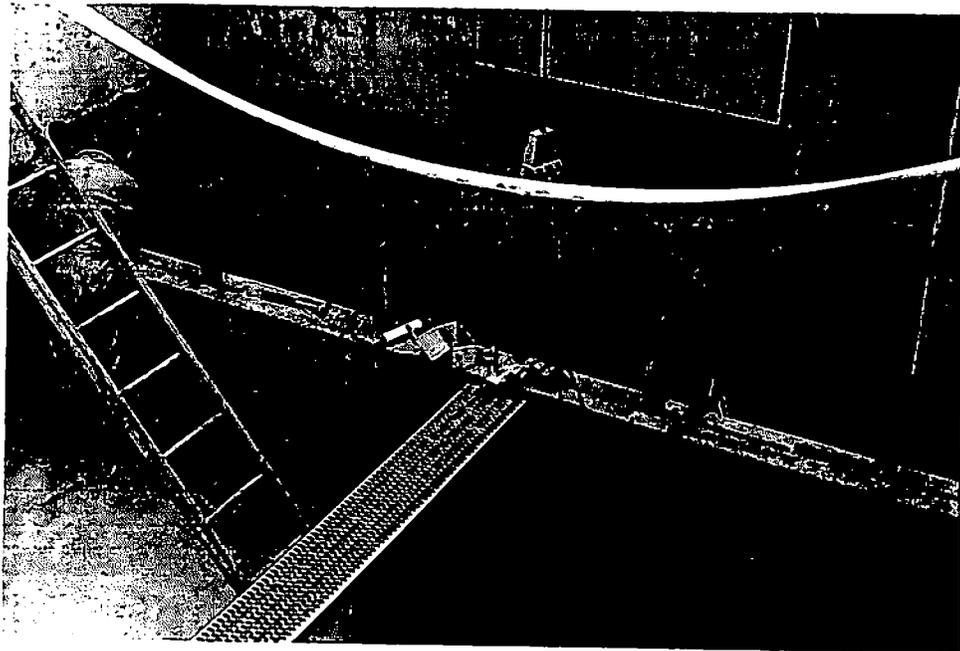


Construction and placement of wooden troughs for holding 600 single incubation units.

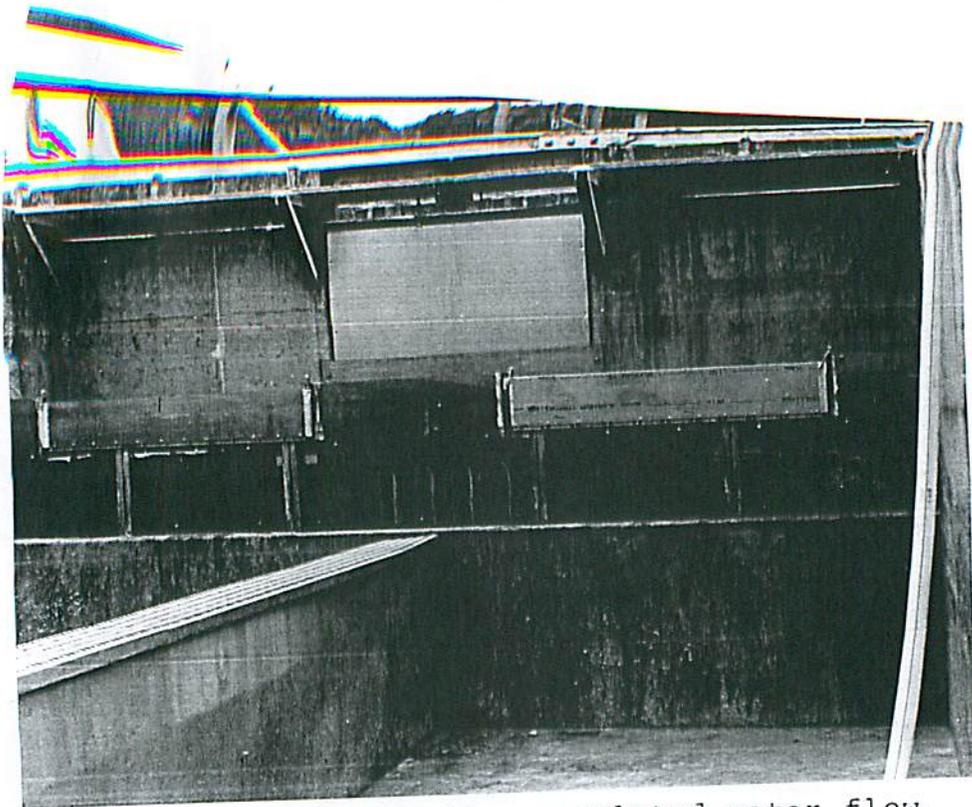


Troughs with single parent incubators (bucket/colander) in operation with capacity to hold 3.6 million eggs.

Work was completed by force account to fabricate and install aluminum weirs at each of the newly-modified holding pond raceways (12) including placement of valves. Material cost was \$3,100 to complete.



Installing weirs on holding pond raceways.



Weirs in place to allow regulated water flow.

An 8-inch pipeline was installed separately from the existing water system to allow use of heated single-pass water (1200 gpm) to the nursery building. This addition enables the station to bypass System I biofilters on reuse flow and to operate 25 percent of the nursery tanks on single-pass. Cost for piping and installation was \$2,400.

Other improvements included:

New entrance and parking lot gates	\$ 1,100
Telephone system purchase	8,800
Office computers (2) w/printers and accessories	9,400
Vehicle - 4x4 pickup truck	12,000
Packed column modification for water degassing	2,500
Mower and sweeper for grounds care	2,000
Electronic weighing scale for fish sampling	1,600
Misc. shop equipment and tools	7,400
Dodge Van (1984 eight passenger) - purchased w/ FY 1983 money, delivered in May 1984	1,800
Interior painting of Quarters No. 1 & 4	

In addition to above improvements, some repairs and rehab costs included:

Boiler No. 2 (heat shield & misc.)	\$ 2,800
Various pumps/motors overhaul and replacement	10,300
System II sandfilters (pipe replacement)	5,100
Installation of sludge recirculating line in Systems II & III, includes 85 feet of 6" iron pipe (on hand)	700

MEETINGS/TRAVEL/TRAINING

Official attendees to the 34th Annual Northwest Fish Culture Workshop, in Moscow, Idaho, December 6-8, were Wayne Olson, Bob Austin, Jerry McClain, Dave Owsley, and Bruce McLeod (Kooskia). Participants on the program included Olson, Chairman of the fish culture technology section; Austin, a paper on "Effects of Raceway Cover on the Incidence of Bacterial Kidney Disease"; and McClain, a paper on "History of Infectious Hematopoietic Necrosis (IHN) at Dworshak NFH".

Several meetings were held during the year with various groups representing State, Corps, and FWS regarding IHN virus.

Dave Owsley, Environmental Engineer, assisted Regional Office engineers by reviewing station development plans and making several on-site visits to some Region 1 hatcheries.

Dave Owsley was actively involved with site reviews of ozone water treatment equipment. His review will assist the State and COE on selection of equipment for Dworshak's FY 1985 ozone study.

A Region 1 Fisheries Programmatic meeting was held in Sparks, Nevada, during the week of May 21. Wayne Olson and Jerry McClain attended the sessions.

Correspondence courses were offered to Cindy McMurray, "Proofreading"; Sharon Russell, "Applied Supervision"; and Doug Lawson, "Programmed English Usage".

Bob Austin completed a 5-day "Basic Supervision I" course, in Portland, during the week of June 4.

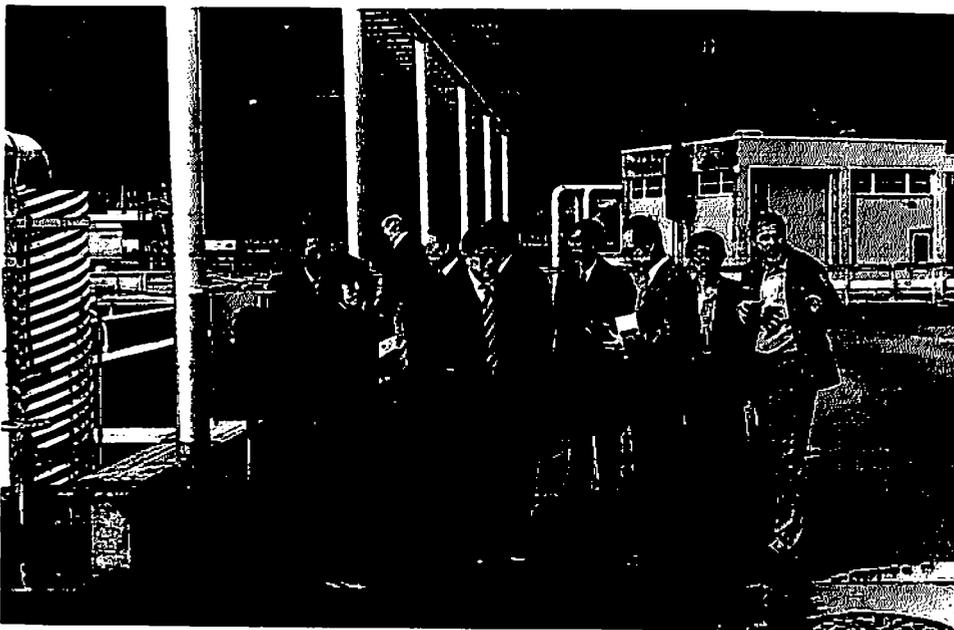
Cindy McMurray and Mary Lou Galloway attended a 2-day session in Portland Regional Office on PAY/PERS (payroll preparation) in May.

In May, Sharon Russell and Cindy McMurray were provided "hands on" microcomputer experience in the Portland Regional Office on two KAYPRO 10 computers that were purchased for the station's office.

PROGRAM INFORMATION

A number of visitors were at Dworshak to view the facility and activities. Notably these were:

- 10 engineers from mainland China for a 2-hour tour on October 31 together with several COE officials.



Manager Wayne Olson explaining hatchery operations to a group of engineers from China.

- International group, representing 14 different countries, on November 11, as part of a "Fish Feed Technology Course" from the University of Washington, Seattle, Washington, with John Halver and Richard Noble accompanying.
- Researchers Bob Smith and Don Johnson of Hagerman's Tunison Laboratory, on January 17, to review nutritional problems of spring chinook production and set up studies to determine causes.
- Joe Kutkuhn and John Brown, of the Washington Central Office, accompanied by Wally Steucke of Portland Regional Office and Ken Higgs, of Boise, on April 4.
- 16 students and two advisors from Aloha High School, Beaverton, Oregon, were provided overnight accommodations on hatchery and then given a tour and lecture on hatchery operations, April 25.

- Josephine Motter and Kathy Tynan, Washington D.C.; Larry Debates, Portland Regional Office; Ken Higgs and Dan Herrig, Boise, on June 6.
- Don Weathers, Portland Regional Office engineer; George Devine and Ty Arkan of Region 2, Albuquerque, on July 24.
- John Nickum, CFRU Unit Leader, Iowa State University, and Mary Lewis, Editor, Progressive Fish Culturist, Bethesda, Maryland, July 20.
- An estimated 1200 students, teachers, advisors, and other visitors were at the station to view steelhead spawning operations during the period of March-April.



School group visiting hatchery for a view of spawning operations.

Numerous news stories appeared in the local newspapers, were broadcast over radio, and viewed on TV. Sources of media used for reporting were: KLER radio, Orofino; KOZE radio, Lewiston; KORT, Grangeville; KLEW-TV, Lewiston; Lewiston Tribune; and Clearwater Tribune. Returning steelhead run, spawning activities, and continuing reports on IHN virus and its effects on hatchery production made up the news stories.

Manager Olson provided programs for the Orofino Chamber of Commerce, Orofino Rotary, and Kiwanis Clubs. Presentations were also given to the local high school biology class.

A 32 informational sign plan was developed and submitted to the Walla Walla COE District for review and purchase. The signs, describing the various activities of fish culture, will facilitate self-guided tours.

Estimated number of public and official visitors was 31,000.

CONSTRUCTION

The \$140,000 contract by the COE with Contractors Northwest of Coeur d'Alene, Idaho, to complete the mineral addition system for System I and to construct a shelter for storage of the station electric carts, was finished in January after 6 months of on-site work.

Adskon Inc. of Renton, Washington, was awarded a \$989,000 contract with the COE for the "Energy Recovery Program". It included modifications of heat recovery systems, packed columns for the main aeration chamber replacing the surface agitators, and other related energy reducing modifications.

STAFFING

Several major changes in staffing occurred during the year resulting from retirements and transfers.

Retirement farewells were given for George Williams, Assistant Manager, on May 31 and Warren Thornton, Electronics Mechanic, July 12, at the Ponderosa Restaurant in Orofino. Mr. Williams, with 34 years of federal service, was employed at Dworshak since the start of operation in 1968; Mr. Thornton, 28 years of service, was also one of the first at start-up. Warren was presented with a \$500 Special Achievement Award for outstanding performance during a period when cold weather resulted in several major mechanical problems. Both Williams and Thornton were presented Certificate of Service Awards from the Portland Regional Office.

Another major change included the transfer of Production Supervisor, Jerry McClain, to Iron River NFH, Wisconsin, in July. Mr. McClain's replacement, Gregory Pratschner, from Bears Bluff NFH, South Carolina, assumed the position in September.

A change was made which abolished the Assistant Manager's position and established a Maintenance Supervisor at the same organizational level as the Production Supervisor. Jim McCall was recruited from a similar position held with the National Park Service, Yosemite. Mr. McCall assumed the Maintenance position in July.

Leon Hand arrived at Dworshak, in May, as Electrical Equipment Repairer, replacing Mr. Thornton. Mr. Hand's former position was with a private company in Bellingham, Washington.

Other permanent changes included:

- Richard Zollman - Animal Caretaker, new appointment.
- Gary Bertellotti - Animal Caretaker, new appointment.
- Susan Espinosa - reassignment to Dworshak FAO.
- Roger Guinea - Fishery Biologist from Coleman NFH.
- Richard Zollman - reassignment to Eagle Creek NFH.
- Hubert Sims - Maintenance Worker, new appointment (hired through a Veteran's Readjustment Appointment (VRA)).

A total of 50 personnel action changes were filed involving permanent recruitment, YCC student hiring, student aides, temporary laborers, and other seasonal hires.

As in previous years, the Dworshak hatchery took advantage of high school hiring. These students, at minimum wage, proved invaluable. They worked 15-20 hours per week on various assignments including routine custodial maintenance, office practices, and feeding and care of fish. Weekend production activities were covered by student employees supervised by a Production employee providing some relief for the permanent crew.



Manager Olson presenting George Williams a Certificate of Service Award upon completion of 34 years of federal service.

COOPERATIVE PROGRAMS

Among the cooperating agencies and groups that the hatchery continues to work closely with are:

- Idaho Department of Fish and Game:
 - Boise Office
 - Nampa Office
 - Lewiston Office
- Seattle National Fishery Research Center (NFERC)
- Corps of Engineers:
 - Walla Walla District
 - Dworshak Dam and Reservoir Project
- Cooperative Fishery Research Unit (CFRU) - University of Idaho
- Nez Perce Tribal Executive Committee:
 - Fish and Wildlife Enforcement
- National Marine Fisheries Service (NMFS)
- University of Idaho
- Washington State University
- Clearwater National Forest
- Clearwater County Sheriff

Dworshak Fish Health Center and Dworshak Fisheries Assistance Office share facilities with the hatchery. Training assignments for personnel include various work with the two offices. The three service groups are highly involved, together, in FWS activities on the Clearwater River.

Manager Olson remains an active participant on the Steelhead Impact Committee involved with a 5-county area of the Clearwater.

The hatchery distribution truck was again made available to the Cooperative Fisheries Research Unit, in Moscow, for hauling fall chinook broodstock to Dworshak's holding ponds. Facilities were used for spawning and incubation with eyed eggs shipped to Hagerman NFH.

Two coordination meetings were held with Idaho Department of Fish and Game, at Dworshak, on October 27 and March 1. Hatchery activities of Kooskia and Dworshak were reviewed, and fishery concerns in the Clearwater River area were noted. Other representatives at the meetings included Dworshak FAO, Dworshak FHC, Portland Regional Office, COE, Nez Perce Tribe, Seattle National Fishery Research Center, University of Idaho CFRU, and Boise LSRCP.

The HATCH database program was initiated by Dworshak FAO for record storage of hatchery production data and fish tagging information at a cost of \$4,700.

Seattle National Fishery Research Center was reimbursed \$7,300 for their services on IHN diagnosis.

University of Idaho CFRU coded-wire tagged spring chinook at a cost to the hatchery of \$2,000 for wire tags.