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DWORSHAK NATIONAL FISH HATCHERY

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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 by the U.S. Fish and Wildlife Service (FWS). Purpose of the hatchery is to mitigate for steelhead losses caused by Dworshak Dam and Reservoir.

North Fork Clearwater River looking upstream towards Dworshak Dam.

Rearing facilities consist of 84 recirculating-type ponds (17′ x 75′) for steelhead production, 128 inside nursery tanks (3′ x 16′) and 45 vertical stack egg incubators. In addition, there are nine adult holding ponds (17′ x 75′) of which six are modified into twelve 8′ x 75′ raceways to hold rainbow production. Thirty 8′ x 80′ concrete raceways rear 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. 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.

Additional construction, completed in 1982 under the Lower Snake River Compensation Plan (LSRCP) expanded facilities to rear spring chinook salmon. First release of chinook smolts occurred in spring 1983.

Steelhead and rainbow trout are mitigation production assigned to the hatchery with construction of Dworshak Dam. Steelhead and spring chinook are released into the Clearwater River drainage and rainbow into Dworshak Reservoir. As the result of Dworshak's Infectious Hematopoietic Necrosis Virus (IHNV) disease status, rainbow trout production has been assigned elsewhere since 1983 for stocking Dworshak Reservoir. Costs for this program remains with the Dworshak hatchery. Spring chinook are presently being reared in 12 raceways previously identified for rainbow production. This additional rearing space allows for an increased chinook production capacity of 400,000 smolts weighing 20,000 pounds.

Total production capacity is as follows:

Steelhead	2.3 million	450,000 pounds
Spring Chinook	1.7 million	90,000 pounds

Kooskia National Fish Hatchery (KNFH), located 35 miles upriver, has operated as a complex with Dworshak since 1978 to produce spring chinook smolts. Steelhead fingerlings have, since 1982, been added to their program in an effort to manage around Dworshak's IHNV disease problem. Fish are returned to Dworshak at 250 per pound.

This report covers the period of hatchery activities from October 1, 1988 to September 30, 1989.

STATION HIGHLITES

Operating funds (1935 account) transferred from the Corps of Engineers (COE) were $1,105,600. An amount of $12,000 (8610 account) was received from quarters rental reimbursements for a total of $1,117,600. In addition, $47,000 was budgeted to the Dworshak Fish Health Center (FHC) for their assistance and $37,000 to the Dworshak Fisheries Assistance Office (FAO) for continuation of a broodstock evaluation study. Included in the hatchery's funding was a transfer of $19,500 to Hagerman National Fish Hatchery (HNFH) for the production and distribution of rainbow trout for stocking Dworshak Reservoir; a mitigation responsibility of Dworshak hatchery. Also, $5000 was transferred to Kooskia National Fish Hatchery (KNFH) for pumping costs to rear Dworshak steelhead fingerlings, another $16,000 to HNFH for transportation costs to return and release steelhead smolts (Brood Year 1988) in spring 1989 and $35,000 for rearing and transporting steelhead fingerlings (Brood Year 1989) to Dworshak in late summer 1989. The total cost, $75,500 for the above programs, represents Dworshak's share of expenses to rear rainbow and steelhead trout at other hatchery locations in an effort to manage around IHN virus disease.

The Lower Snake River Compensation Plan (LSRCP) funded $207,500 (4710 account) for production of spring chinook salmon; $6500 included for additional fish production to provide LSRCP satellites with fingerlings in spring 1989 for release the following fall. The Youth Conservation Corps (YCC), an 8-week summer work program, was also funded by the LSRCP.

Total hatchery operation and maintenance funding, exclusive of FHC, FAO and YCC, was $1,325,100. Salaries accounted for 51 percent of this total or $675,500.

A total of 22.2 staff years were employed during the year compared to 21.7 staff years in 1988; an increase of 0.5 reflecting several months overlap in training positions. Permanent employees represented 18.3 and temporaries 3.9 years.

Feed conversion was 1.82 (less than 2 pounds of feed fed to produce 1 pound of fish gain) for spring chinook and 1.33 for steelhead. Feed cost per pound of fish produced was $0.86 for chinook and $0.44 for steelhead; an increase of $0.15 for chinook from the previous year as a result of increased feed costs and a higher conversion.

Steelhead production was considerably reduced this year in an effort to manage around a serious IHN virus disease problem that has plagued Dworshak since 1982. The hatchery's gain in steelhead production was 265,942 pounds for the year (10/01/88 - 9/30/89) compared to last year's production of 434,521 pounds gained primarily from Brood Year 1987's program released as smolts in spring 1988. This year's lower production was reflective of Brood Year 1988's program being reduced in numbers at release time (spring 1989) by nearly 50 percent from IHN virus losses occurring the previous summer.

Hagerman NFH assisted in producing and distributing 450,000 steelhead smolts to the Clearwater River Basin (South Fork) in a highly controversial issue between State, Tribe, and FWS over numbers of "B" fish to be returned. Total steelhead smolts released (Dworshak and Hagerman) in the Clearwater River in spring 1989 was 1,850,000 or 450,000 short of planned production.

Spring chinook production of 95,930 pounds compared favorably with the previous year of 100,342 pounds. Sufficient returns of spring chinook adults to Dworshak and Kooskia hatcheries assured meeting yearling smolt egg requirements for the third successive year.

Ending the reporting year of September 30, 1989, Dworshak carried 1.8 million spring chinook fingerlings Brood Year 1988, for a planned yearling smolt release in spring 1990 of 1.7 million. Another 3.1 million eggs from Brood Year 1989 adult returns were in incubators. Steelhead fingerlings on station were 2.65 million to meet a smolt release requirement of 2.3 million the following spring.

The fish ladder was placed in operation on October 11, 1988 for the collection of steelhead adults. This date was the earliest since 1972 with exception of a short period the ladder operated in November-December 1982. Normally, Dworshak opens the ladder in January. This year's early opening was necessary for a Dworshak FAO broodstock evaluation study. During a 10-day period (October 11-21), the hatchery collected 405 adult steelhead. Also, a total of 95 fish were received from Lower Granite Dam to add to Dworshak's early return.

Ladder operations resumed again on February 15, 1989 and continued to operate until shut down on May 2. A total of 6,041 fish were collected via the ladder in addition to the Lower Granite group. Steelhead spawning began on February 14 and ended in early May with 12 million eggs taken during the period.

Disposition of 4.3 million eyed eggs to Hagerman and Kooskia NFH's were made in an effort to reduce IHN virus losses at Dworshak. Kooskia experienced an 85 percent loss to the virus; a first discovery of IHN in 8 years of receiving eggs from Dworshak. Hagerman's successful rearing, in absence of the virus, returned 1.6 million fingerlings to Dworshak in late summer 1989.

Loading coolers of steelhead eggs for shipment to Hagerman NFH.

Hagerman steelhead transfer - returning 1.6 million fingerlings from eyed eggs received earlier from Dworshak.

A total of 41,000 pounds of steelhead carcasses were made available to the Idaho Department of Education (IDE). Final numbers were received by the local processor upon closure of ladder operations in May. Disposition of the frozen fish was made to several commodity programs in the state with reimbursement of processing costs to IDE from the recipients.

Selector gates at Dworshak Dam were removed on December 13, 1988, causing water temperatures to drop from 48°F to 41°F. Dworshak's heated reuse systems were maintained at 54°F until mid-April when steelhead smolt releases were begun. Selector gates were reinstalled in May 1989 when warmer temperatures became available.

Weather conditions were less than ideal in February. A good accumulation of snow occurred during the month. Snow depths in the Clearwater drainage in some areas were reported at 135 percent of normal. An unusual amount of rainfall occurred in August. Over 2 inches above normal was recorded.

A study was initiated to compare early steelhead production on an iodine treatment, ozone treatment and control until terminated on August 14. Losses to IHN virus were monitored daily from initial start-up on June 22. Nearly all fish were lost in tanks treated with iodine. The ozone group had a mortality of only 5 percent. The control group of fish experienced a 15 percent loss.

Two senior volunteers provided 68 hours of service to Dworshak during the steelhead spawning season. Volunteers assisted the public by providing information regarding spawning operations.

Senior volunteers assisted in providing group tours and answering many questions regarding steelhead spawning activities.

Information was prepared for the Corps of Engineers regarding an additional water requirement from Dworshak Reservoir for extended rearing of steelhead fingerlings at Dworshak. The FWS later requested a 20,000 gpm river intake supply be treated with ozone for use in egg incubation, nursery rearing, and also for 25 outside ponds of System I to control IHN virus disease. This latter request was in lieu of increased reservoir water.

A YCC 8-week program, employing 6 enrollees and one crew leader, assisted in a variety of work projects during the summer. This program has been available to the hatchery since 1983. Prior to YCC, the station had been actively involved in the Young Adult Conservation Corps program since late 1977. YCC enrollees, alone, have contributed nearly 23,000 hours of work to the project since the program was initiated.

YCC enrollees preparing concrete base for installation of new fencing in hatchery housing area.

Ladder operation for collection of spring chinook adults was begun on May 26. Chinook spawning ended on September 14 with nearly 4 million eggs collected from a return of over 2600 fish to Dworshak and Kooskia. The success of this program assures the two federal hatcheries of meeting their 2.5 million yearling smolt requirement for the third successive year.

Cooler temperatures and good water flows in the rivers appeared to have created ideal conditions for an excellent early return of adult steelhead to the Snake and Clearwater Rivers in September. Forecasts were optimistic for a record number of fish returning from Brood Year 1986's smolt release in spring 1987. These fish will be providing eggs for Dworshak's 1990-91 steelhead program.

Several major projects were completed during the year by the station maintenance crew to enhance hatchery operations and to improve facilities. A rehab of the egg incubation area was accomplished with painting, extensive clean up, new piping, lighting and additional incubator units and study tanks. Replacement of chain-link fencing with a cedar fence around the station residences added to security and privacy. Other work accomplishments are highlighted with photos in the section under improvements.

The station continued its approach towards a safe free work with only a few minor injuries being reported for medical attention. Regular safety meetings were held with a chairperson and committee actively participating during the year.

FISH CULTURE OPERATIONS

Steelhead Trout Production
- Brood Year 1988 -

Steelhead production for Brood Year 1988 fell short of target, with only 1.39 million smolts being released in spring 1989. The fish weighed 275,000 pounds and averaged 210 mm in length at time of release. This particular brood year was plagued with health problems, particularly IHN virus. Of the 3.6 million fry hatched in Dworshak's nursery in 1988, only 842,000 (23 percent) were released as smolts the following spring. Seventy-seven percent of these fish were lost to IHN. Approximately 550,000 of the smolts released were fish that had been returned from off-station rearing sites. These particular fish experienced losses to both Ich and to IHN. At time of release, however, all health problems were under control.

System 2

The steelhead in this system were, for the most part, fish that had been returned from Kooskia in July 1988. These fish started the fiscal year with minimal health problems, having already weathered "Ich" and IHN. Another 80,000 STT from Hagerman were added in November. These fish experienced a slight IHN outbreak two and a half months later, losing eight percent of their population to the virus.

System 2 was on reuse from November 22, 1988, until April 12, 1989. Fingerling performance was excellent during this time, as can be seen in Table 1 below. Feed conversion remained well below 1.30, and monthly growth increments of one inch were obtained twice, well above the 0.6 inch increment normally associated with the low-50s temperature maintained in the system.

Crews of markers hired and supervised by State of Idaho personnel ad-clipped fish in November and coded-wire tagged and ad-clipped the remaining fish in December. State inventory numbers averaged 3.7 percent below the hatchery book values.

Fish health at time of release was generally excellent, although one pond tested newly positive for IHN in March, and daily mortalities had risen in a few ponds due to elevated ammonia levels. The monthly mortality for April, the last full month before release, was below 0.2 percent, indicating no major physiological problem.

Table 1. System 2 Steelhead Performance -- 1988-89.

Month	1st of Month Number	1st of Month No/Lb	Growth (in.)	Mortality (%)	Temperature (°F)
October 88	524,358	35.1	0.60	2.5	53.7
November 88	433,628	18.3	1.19	0.8	51.0
December 88	512,140	12.8	0.68	0.4	53.9
January 89	507,770	8.34	0.94	0.7	49.0
February 89	504,067	7.12	0.38	1.0	48.0
March 89	498,945	6.03	0.42	0.5	46.0
April 89	488,940	5.27	0.35	0.2	42.0
Release	488,874	4.98	0.16	-	-

System 3

This system consisted primarily of fish reared completely at Dworshak, with the exception of approximately 90,000 fish (three ponds) that were returned late July from Kooskia. The fish in this system started the reporting year with moderately low monthly mortality rates, running from two to five percent per pond initially. Mortalities had dropped to less than 0.1 percent monthly by release time.

The system switched to reuse and mineral supplementation on November 22, 1988, and continued until April 25, 1989. Reuse operation and fish performance was quite satisfactory, with overall feed conversion under 1.40. Monthly growth increments were well over the 0.6 inches expected for the temperature maintained in the system, with growth increments of one inch being attained twice.

The fingerlings, along with those in System 2, were ad-clipped in November 1988, with additional clipping and coded-wire tagging taking place in December.

At time of release, fish health and quality were excellent. Monthly system parameters are provided in Table 2.

Table 2. System 3 Steelhead Performance -- 1988-89.

Month	1st of Month Number	1st of Month No/Lb	Growth (in.)	Mortality (%)	Temperature (°F)
October 88	1,056,584	55.8	1.04	1.1	53.7
November 88	962,324	26.6	0.62	0.6	50.8
December 88	937,396	18.4	0.78	0.5	53.8
January 89	929,451	12.3	0.95	0.6	52.6
February 89	924,350	7.97	0.48	0.5	50.2
March 89	916,502	6.56	0.46	0.7	53.9
April 89	909,972	5.50	0.18	0.7	46.4
Release	903,125	5.14	-	-	-

Table 3 summarizes overall performance of the two pond systems rearing steelhead trout.

Table 3. Performance Summary - Steelhead Brood Year 1988.

System	Number Shipped	Weight Gained (Lb.)	Feed Fed (Lb.)	Feed Conversion
2	488,874	81,671	95,003	1.16
3	903,125	160,056	218,055	1.36
Totals	1,391,999	241,727	313,058	1.30

Distribution

Releases of steelhead smolts began on April 24, 1989, with upriver outplants and continued through May 4, when direct releases into the main stem of the Clearwater River were completed. As mentioned earlier, only 1.39 million STT smolts were released this year, due to the devastating losses from IHNV.

Distribution units from the Corps of Engineers provided assistance in transferring the fish to off-site locations. Two trucks hauled 12 loads of fish over a 4-day period. Direct releases from hatchery ponds were equally distributed over 3 days. Table 4 below provides a summary of the distribution.

Table 4. Steelhead Smolt Distribution - Brood Year 1988 (April 24 - May 4, 1989).

	Site	Number	Weight	No./Lb.	Length (in/mm)
Outplants:					
System 2	Clear Creek	208,201	41,092	5.07	8.26/210
System 3	Crooked Rv.	109,898	21,383	5.14	8.19/208
Subtotal/Avg		318,099	62,475	5.09	8.24/209
Direct:					
System 2	Main Clwtr.	280,673	57,164	4.91	8.39/213
System 3	Main Clwtr.	793,227	155,545	5.10	8.24/209
Subtotal/Avg		1,073,900	212,709	5.05	8.28/210
Totals/Averages		1,391,999	275,184	5.06	8.27/210

- Brood Year 1989 -

Adult Collection

Adult steelhead (STT) collection operations at Dworshak proved to be intermittent this brood year because of the need to collect the early part of the run. Initial opening of the ladder was from October 11 to October 21, 1988. It was opened again for 24 hours on October 25, and again from November 7 through December 2. Of the 697 adults collected early, 284 were outplanted downriver at Peck, leaving 413 to be held for spring spawning. Another 94 adults were brought back from Lower Granite Dam in early October by Dworshak Fisheries Assistance Office. These STT, as well as those which returned to Dworshak directly in October, were intended to be part of a study evaluating the time effect of parental return on offspring return. Unfortunately, only offspring from early returning adults could later be clearly distinguished from their siblings because of a severe IHN outbreak at Kooskia NFH.

The ladder reopened on February 2, 1989, and remained operating until May 2, the last spawning date. (See the Steelhead Spawning Report - Brood Year 1989, Dworshak NFH, for further details on this run).

A total of 12.3 million green eggs were taken in 12 egg takes, from 1,821 females and 963 males (Table 5 below). There were 6,772 eggs per female and eye-up averaged 86.7 percent, producing 9.7 million eyed eggs. Only 1.2 million eggs were culled as not needed in the shipment programs or due to IHN positive identification which negated outside the Clearwater drainage. Male to female spawning ratio was 1:1.9.

Table 5. Steelhead Spawning Summary - Brood Year 1989.

Take	Date	No. Spwnd. Fml.	No. Spwnd. Ml.	Eggs/ Female	Green Eggs	Eyed Eggs	Eye-Up(%)	Green Eggs Culled
1	2/14	103	65	6,031	621,150	498,750	80.3	0
2	2/21	110	42	5,346	588,099	388,750	66.1	0
3	2/28	77	46	4,984	465,561	299,380	78.0	81,780
4	3/07	50	38	6,190	343,871	261,750	84.6	34,385
5	3/14	88	61	6,513	646,624	474,000	82.7	73,480
6	3/21	118	89	6,142	724,797	625,000	86.2	0
7	3/28	197	92	6,769	1,333,401	1,030,000	81.9	75,890
8	4/04	188	112	7,406	1,392,328	657,470	83.0	599,886
9	4/11	204	127	7,477	1,525,454	1,346,750	88.3	0
10	4/18	236	147	7,142	1,685,546	1,520,000	90.2	0
11	4/25	200	60	7,104	1,350,118	1,051,750	93.7	298,368
12	5/02	250	84	6,616	1,654,132	1,525,000	92.2	0
Totals		1,821	963	6,772	12,331,081	9,678,600	86.7	1,163,789

Note that percent eye-up values are based on green egg numbers adjusted for unenumerated, culled eggs.

Age Composition

A summary of the age and sex ratio for Brood Year 1989 is given in Table 6.

Table 6. Adult Steelhead Sex And Age Structure Summary - Brood Year 1989 (data provided by Dworshak (FAO).

	Males		Females		Totals	
	No.	(%)	No.	(%)	No.	(%)
I-ocean	337	(78.7)	91	(21.3)	428	(7.1)
II-ocean	1,247	(23.5)	4,049	(76.5)	5,296	(87.7)
III-ocean	193	(60.9)	124	(39.1)	317	(5.2)
	1,777	(29.4)	4,264	(70.6)	6,041	(100.0)

Spawning Procedures

Spawning protocol was similar to that of past years. Single incubation was practiced when possible, with egg lots being placed into individual colanders until eye-up. Eggs from two females were incubated together at times because of limited colander space and also for fish health sampling considerations. All eggs were water hardened in iodophore at 100 mg/l for one hour.

Fish health samples were taken throughout the entire run with IHNV sampling from all spawned fish. Of the 2,190 fish spawned and individually sampled for IHN virus from the first ten takes, 242 (11.1 percent) tested positive (Table 7). Two-female pooled ovarian fluid samples were used the last two takes. A positive sample could not be clearly differentiated from other groups, hence the "not applicable" codes in the table. An average 43.5 percent of the female samples taken the last two takes were positive. This high percentage, together with an increasing proportion of positive males in the last two egg takes (33.3 and 63.1 percent, respectively), corroborate earlier observations that IHN incidence in adults normally rises substantially in later takes.

Table 7. IHN Incidence In Spawned Steelhead Adults - Brood Year 1989 (data furnished by Dworshak FHC).

		No. Spawned		IHNV Positive Fish					
				Females		Males		Totals	
Take	Date	Females	Males	No.	%	No.	%	No.	%
1	2/14	103	65	47	45.6	6	9.2	53	31.5
2	2/21	110	42	21	19.1	1	2.4	22	14.5
3	2/28	77	46	15	19.5	3	6.5	18	14.6
4	3/07	50	38	4	8.0	1	2.6	5	5.7
5	3/14	88	61	9	10.2	1	1.6	10	6.7
6	3/21	118	89	3	2.5	4	4.5	7	3.4
7	3/28	197	92	20	10.2	17	18.5	37	12.8
8	4/04	188	112	29	15.4	13	11.6	42	14.0
9	4/11	204	127	16	7.8	5	3.9	21	6.3
10	4/18	236	147	15	6.4	12	8.2	27	7.0
11	4/25	200	60	na*	na*	20	33.3	na*	na*
12	5/02	250	84	na*	na*	53	63.1	na*	na*
Totals		1,821	963	na*	na*	136	14.1	na*	na*

*Two-fish pooled samples cloud results.

One curious fact emerged from a comparison of IHNV incidence in adults returning early and adults brought back from Lower Granite Dam. Although both groups of adults were held on station four months before spawning in February, 7.9 percent of the males and 38.0 percent of the females which came up the ladder tested positive for IHN, while none of the 56 STT hauled from Lower Granite Dam were positive.

Egg and Adult Disposition

A fair amount of flexibility was exercised this year in determining which eggs were to be shipped elsewhere. Eyed eggs from Take 1 (February 14) through Take 10 (April 11) were assigned to Hagerman (Hg), Kooskia (Kk) and Magic Valley (MV) for later return as fingerlings to Dworshak or retained for use in their own production programs. Dworshak held 3,166,750 from the later egg takes of April 18 through May 2 (Table 8).

Table 8. Eyed Steelhead Egg Disposition - Brood Year 1989.

Egg Take	Date	Eyed Eggs*	Dw	Kk	Hg	MV	Destroyed
1	2/14	498,750	0	498,750	0	0	0
2	2/21	388,750	0	388,750	0	0	0
3	2/28	299,380	0	74,630	224,750	0	0
4	3/07	261,750	0	0	261,750	0	0
5	3/14	474,000	0	0	474,000	0	0
6	3/21	625,000	0	625,000	0	0	0
7	3/28	1,030,000	0	763,000	267,000	0	0
8	4/04	657,470	0	100,000	206,000	350,000	1,470
9	4/11	1,346,750	0	0	725,875	485,875	135,000
10	4/18	1,520,000	590,000	0	550,000	380,000	0
11	4/25	1,051,750	1,051,750	0	0	0	0
12	5/02	1,525,000	1,525,000	0	0	0	0
Totals		9,678,600	3,166,750	2,450,130	2,709,375	1,215,875	136,470

*After culling unenumerated eggs for IHN, etc. Eggs destroyed were counted eyed eggs.

Early production planning had precluded having feeding steelhead until June. This was a move to lessen the effects of IHN virus on fingerlings returned from other hatcheries. Late egg groups had been destined for the State as a swim-up fry release in June, if available. This program had to be cancelled when IHN virus was found in steelhead at Kooskia, necessitating retaining the "extra" numbers at Dworshak. Only eggs from negative IHN parentage were shipped outside the Clearwater River drainage. Kooskia, for the first time, received eggs from positive broodstock as well as negative.

Carcasses of adults from spawning and health sampling were donated to Idaho Department of Education for processing and distribution to food banks and public institutions.

Landfill	517	(mortality, experimental groups)
Dept. of Education	3,453	(food bank - 41,436 lb.)
Nez Perce Tribe	20	(food fish - 240 lb.)
Outplants	1,773	(enhancement - releases of excess fish at Peck)

It was determined in April that there would be excess adults for outplanting. A total of 1,489 adult fish were hauled to Eldorado Creek and to American River in 12 trips (Table 9). In addition, all 72 steelhead trapped at Kooskia were outplanted to Eldorado Creek. The trap at Kooskia was closed once it was determined that sufficient numbers were returning to Dworshak.

Table 9. Excess Adult Steelhead Outplant Summary - Brood Year 1989.

Date	Release Site	Number	Weight (Lb.)
10/27 - 12/06/88	Clrwtr. R. - Peck	284*	3,408
04/12 - 04/21/89	Eldorado Creek	501	6,012
04/13 - 04/20/89	American River	988	11,856
Totals		1,773	21,276

*Fish not included in run statistics for this brood year because they were released below the hatchery and some of these fish later reentered the hatchery.

Production Methods

Infectious Hematopoietic Necrosis drastically affected production of steelhead trout. Of the 3.1 million STT fry initially put into nursery tanks in early July, only 678,520 fingerlings remained on station as of September 30, 1989 (see Table 10 below). This represents a 78.1 percent loss to the virus from the last three egg groups of Take 10, 11, and 12.

The late groups broke with the virus less than two weeks after being placed into tanks, an unusually brief period of time compared with earlier epidemics. The disease proceeded to infect almost every tank on raw water as well as several receiving ozonated water. A large number of tanks were subsequently combined due to massive losses. By September 30, losses due to IHN had fallen off considerably, with only a few ponds from these late takes continuing to suffer chronic losses to the disease.

Table 10. IHN Loss Summary - Steelhead Brood Year 1989.

Fingerling Group	Initial Loads		Losses (to 9/30)		No. on Hand 9/30/89
	Number	Date	Number	Percent	
Takes 10,11,12	3,100,655	7/3/89	2,422,135	78.1	678,520
Kk Returns	417,789	6/1/89	59,169	14.2	358,620
Hg Returns	1,626,432	9/1/89	12,028	0.7	1,614,404
Totals	5,144,876		2,493,332	48.5	2,651,544

Eggs from the early portion of the steelhead run had been shipped to Kooskia and Hagerman for early-rearing. Hagerman returned 1.63 million fish to Dworshak in August and September in overall good health, having grown to an average size of 33 fish per pound. One month later, September 30, 1989, these fish had only experienced losses of 0.7 percent, with no IHN confirmation in the entire group and no symptoms evident.

Kooskia also received eggs from the early part of the run, but was hit hard by its first IHN outbreak, ultimately losing 83 percent of the 2.45 million fry hatched. Eggs from IHN-positive parentage were shipped to Kk for the first time this year, in addition to negative parentage eggs. It has not been determined if the IHN epidemic was caused by the positive parentage eggs, by the abnormally high incubator loadings that were necessary this year, by inadequate initial disinfection, or by cross contamination during incubation. In any case, only 417,789 STT fingerlings were returned to Dworshak in early June. Fingerlings which had broken at Kk were put directly into Dworshak's System 1 ponds on raw water, while a group of IHN-positive parentage fingerlings which had not experienced the disease were placed into nursery tanks on ozonated water. These fish were later transferred to outside ponds on raw water. By the end of the reporting year cumulative losses to IHN in these Kk returnees totaled 14.3 percent, and daily losses to the virus were minimal.

Table 11 presents a summary of STT inventories in the various systems. Even assuming a 15 percent loss to IHN through release, 2.28 million steelhead smolts would be available for release in spring 1990.

Table 11. Inventory Summary - Steelhead Brood Year 1989 - 9/30/89.

Location	Number	Weight(lb)	No/Lb	Length (in/mm)
System 1	850,241	61,311	13.9	5.91/150
System 2	661,700	7,629	86.7	3.21/81
System 3	1,169,333	53,930	21.7	5.09/129
Total	2,681,274	122,870	21.8	5.08/129

Special Studies

A study examining the effect of different treatments on control of fungus was conducted on green eggs. Eggs from 42 females in Take 11 were pooled, subdivided into seven treatments, and observed through eye-up. Treatment types were no treatment (control), saline (3% solution for 15 minutes three times weekly), Melluca (treatment from Fish Health Center), formalin (1:600 for 15 minutes three times a week), malachite green (1 mg/l for 3 to 5 minutes three times a week), ozonated water, and iodine. While a thorough analysis and report have not as yet been accomplished, only the formalin and malachite green treatments provided any meaningful protection from fungus.

A study comparing the protection afforded STT fingerlings hatched and reared in raw water (control), ozonated water, and iodonated water was also conducted this year. Eyed eggs (319,000) from 42 IHN-negative females, from Take 10, were pooled. These eggs were then sub-sampled into 12 groups of 26,500 eggs, providing four replicates for each treatment type. Eggs were placed into Dworshak hatching jars where they were initially disinfected for 10 minutes in 100 mg/l iodine solution. Fry from these eggs began feeding on June 23. The experiment ended on August 14. As mentioned above, a severe IHNV epidemic occurred in the non-experimental steelhead in the nursery on raw water. The IHN losses recorded in the experiment were as follows:

Table 12. IHNV Mortality - Steelhead Brood Year 1989
Raw/Ozone/Iodine Study.

Treatment	Mortality Loss (%)
Raw (Control)	15.1
Ozone	6.9
Iodine	80.0

Despite losses averaging 76 percent in all non-experimental fingerlings on raw water, only one of four control tanks broke with IHN, losing 40 percent of its population. While the raw tanks lost 15.1 percent, on the average, this was not significantly different at the a = 0.05 level from the 6.9 percent average losses experienced by the fish reared on ozone. The 80 percent losses sustained among the iodine-reared fish was, however, significantly different. All four of these tanks broke with IHNV and suffered severe losses. Evidently the iodine level of 0.26 mg/l was not high enough to impair the virus, but was enough to affect the ability of these fish to resist IHN. The fact that protection was given the fish on raw water by disinfecting and hatching the eggs in jars has prompted the design of a similar experiment for Brood Year 1990 using raw and ozonated water. It has also induced a change in the standard operating procedure for hatching STT eggs. All non-experimental eggs held at Dworshak will henceforth be disinfected after eye-up and hatched in hatching jars.

There are other comparisons between subgroups of fish which need to be performed. One group of 160,000 fingerlings were brought back from Kk and placed into ozonated water in the nursery. Kooskia fish from other takes were also brought back and placed directly into raw water in outside ponds. As yet no analysis has been made of subsequent losses in these two groups. Also, 40,000 fingerlings from the smallest fish returning from Hagerman were put into ozonated water in the nursery for one month. Siblings from this group were put into outside ponds on raw water. No noticeable difference in mortality was noticeable at the end of this reporting period.

Rainbow Trout Production

Rainbow trout (RBT) for Dworshak Reservoir have been supplied from another hatchery since 1985 because of Dworshak's IHNV disease status. For the fourth successive year, Hagerman NFH produced the necessary trout to meet mitigation requirements. The $19,500 cost for rearing and distribution was reimbursed by Dworshak. Hagerman stocked 245,380 RBT weighing 23,200 pounds from June 1 through June 8. The fish were of the Arlee and Shasta strains.

Spring Chinook Salmon Production
- Brood Year 1987 -

Beginning on October 1, 1988, a total of 1,904,718 SCS, weighing 56,799 pounds, from Brood Year 1987 were on station. Of these, 360,000 were being held in System 1 on raw water, having been returned to Dworshak from Kooskia because of Icthyophthirius and bacterial gill problems. Appropriate treatments cleared these situations after several weeks. SCS fingerlings, 198,924, were transferred to Kooskia in late October for grow-out as part of the complex' normal fish transfer program.

Monthly production parameters for this brood year are shown in Table 13.

Table 13. Spring Chinook Performance -- 1988-89.

Month	1st of Month Number	1st of Month No/Lb	Growth (in.)	Mortality (%)	Temperature (°F)
October 88	1,904,718	33.5	0.36	0.4	53.7
November 88	1,696,978	26.8	0.23	0.2	49.1
December 88	1,693,481	23.5	0.18	0.2	43.3
January 89	1,678,036	21.2	0.17	0.2	40.5
February 89	1,674,029	19.3	0.00	0.4	37.8
March 89	1,662,404	19.3	0.06	0.6	46.0
Release	1,653,252	18.7	-	-	-

Marking

Personnel from the National Marine Fisheries Service pit-tagged 10,000 SCS during November for a study examining accelerated photoperiod effects on smolt out-migration. This study took place in the holding pond raceways, with pit-tagged fish being placed in raceways 6, 8, 10, and 12. An advanced photoperiod regime was provided raceways 5 and 6, 7 and 8, and 11 and 12. Raceways 9 and 10 were the controls. The IDFG marking crew CWT-tagged, freeze branded, and fin-clipped chinook fingerlings in December. Smoltification evaluations were made on several raceways of SCS.

Distribution

Fish health was generally quite good at time of release, although those in System 1 had some gill and fungus problems from BKD and were experiencing elevated mortality at time of release. Several raceways exhibited popeye - a symptom of BKD - with one showing a 35 percent incidence. In the total number of fish released, possibly 3.5 percent showed signs of the disease. Table 14 summarizes 1989's SCS smolt release.

Table 14. Smolt Release Summary - Brood Year 1987 Spring Chinook (March 27-29,1989).

Site	Number	Weight	No/Lb	Length (in/mm)
Direct:				
N.F. Clearwtr. R.	1,110,364	59,589	18.6	5.41/137
Main Clearwtr. R.	142,559	8,776	16.0	5.70/145
Subtotal/Avg	1,252,923	68,365	18.3	5.43/138
Outplant:				
White Sands Creek	200,639	10,125	19.8	5.28/134
Crooked River	199,690	10,008	20.0	5.24/133
Subtotal/Avg	400,329	20,133	19.9	5.26/134
Totals/Average	1,653,252	88,498	18.7	5.43/138

Special Studies

The only major study involving this particular brood year of chinook was a 21-day prophylactic feeding of OMP feed containing 4.5 percent erythromycin phosphate in late September and early October 1988. The purpose was to evaluate possible effects of the drug on fingerling susceptibility to BKD. Initial observations indicated insignificant mortality differences between the six control raceways fed non-medicated feed and the remaining A- and B-bank raceways fed the medication. However, at time of release the cumulative mortality from medicated raceways was 2.2 percent compared with 5.0 percent from those rearing units fed normal feed. A complete analysis of the experiment is in progress.

The NMFS photoperiod study was discussed above in the Marking section.

Spring Chinook Salmon
- Brood Year 1988 -

Production

As the reporting period began, Brood Year 1988 SCS was eyeing-up in incubators with approximately 3.7 million eggs on station. Most of these fry went on feed in November 1988. Aside from low chronic unexplained losses in November (2.0 percent) and December (2.9 percent), this lot of fish experienced low mortalities and no serious physiological problems during the year. Total daily mortalities from the 42 raceways of chinook fell below 100 at times, compared with 250 to 400 per day mortality experienced by the previous brood year. Growth was adequate with beginning of month sample counts approximating target values quite consistently (Table 15).

Table 15. SCS Performance - Brood Year 1988.

Month		1st of Month Number	1st of Month No/Lb	Growth (in.)	Mortality (%)	Temperature (°F)
November	88	Not on the books until month's end				
December	88	3,085,272	902	0.25	3.0	43.4
January	89	2,980,484	573	0.34	0.5	40.5
February	89	2,967,454	341	0.17	0.3	40.5
March	89	2,958,218	270	0.13	0.4	38.7
April	89	2,765,880	230	0.19	0.6	39.7
May	89	2,491,593	184	0.27	1.7	51.0
June	89	2,250,659	137	0.35	1.1	52.0
July	89	2,012,471	97.0	0.32	0.4	51.5
August	89	1,995,836	73.0	0.44	0.4	53.6
September	89	1,987,505	52.3	0.39	0.3	53.4

Approximately 200,000 of these SCS were placed on a heated water, accelerated growth program, to get them to sufficient size for a 0-age release in Spring 1989. Fish reached 77 per pound by the end of March 1989 and released in conjunction with the Brood Year 1987 smolts.

Distribution

A very successful spawning program allowed the station to raise, in addition to the 200,000 0-age fish discussed above, another 350,000 fingerlings which were outplanted in May and June 1989 to the main stem of the Clearwater River, Lolo Creek, Big Flat Creek, White Sand Creek, Hopeful Creek, and Crooked Fork Creek (Table 16). Over 300,000 fingerlings were also transferred to IDFG's Red River facility of which 200,000 were fingerlings from eggs taken at the satellite site. Another 200,000 SCS were moved to Kooskia in September 1989 from this brood year; a part of the early SCS rearing program in recent years.

Table 16. Transfer/Release Summary - SCS Brood Year 1988.

Destination	Date	Number	Weight	No/Lb	Length (in/mm)
0-age Releases:					
M.S. Clrwtr.	Mar 89	206,459	2,683	76.9	3.50/89
Fingerling Outplants/Transfers:					
Outplants	May,Jun 89	356,244	2,695	132	2.93/74
Red River Fac.	Jun 89	309,393	2,308	134	2.92/74
Kooskia	Sep 89	199,883	5,416	36.9	4.48/114
Totals/Averages		1,071,979	13,102	na	na

Special Studies

As of September 30, 1989, there were 230,000 fish in the Pascho/Elliott experiment. Three raceways of SCS from low-BKD parentage are being raised separately from three raceways of SCS from high-BKD parentage. The purpose of the study is to compare the performance of these fish during out-migration with and without barge transportation, as well as to examine long-term effects on adult returns. All three raceways of high-BKD parentage fish show BKD symptoms higher than normal production groups and much higher than fish from low-BKD parentage. During September, for example, they lost 2.0 percent of their population, normal production loss was 0.15 percent, while the "Pascho-lows", as they are referred to, experienced only 0.10 percent losses.

The only other major study conducted with this brood year of chinook was the one-time feeding of medicated feed containing 4.5 percent erythromycin phosphate for a 21-day period. This prophylactic feeding was given to approximately half the production SCS being held in the upper raceways. As of September 30, 1989, no apparent difference in mortality between the two groups was noted. Mortality through release will be monitored and a report examining the results will be issued.

- Brood Year 1989 -

Summary of Spring Chinook Returns

This year's return of spring chinook salmon adults to the Dworshak/Kooskia complex was excellent, totaling 2673 fish or 106 more than Brood Year 1988. The breakdown of this brood year by age class is shown in Table 17. Dworshak's ladder operated from May 26 to September 14. Peak of the run at Dworshak occurred the second week of August. Over 1000 fish entered the ladder in August and September compared to 500 in 1988 during the same time period.

Adults were transported from Kooskia several times during June and July, as has been standard practice since 1978. The warmer water temperatures at Kooskia prevent holding the adults there until spawning.

Table 17. Brood Year 1989 SCS Adult Returns By Age Structure (data provided by Dworshak FAO).

	Kooskia NFH	Dworshak NFH	Total
I-ocean	107	156	263 (9.8 %)
II-ocean	717	1322	2039 (76.3 %)
III-ocean	142	221	363 (13.6 %)
Unmeasured	7	1	8 (0.3 %)
	---	----	----
	973	1700	2673

II-ocean fish predominated (76.3 percent) in this year's returns to cause a reduction in average number of eggs per female to 3701. This year's egg number was down from 4615 in Brood Year 1988 when 55.8 percent of the returning adults were III-ocean fish. Also, figuring into this lower number was the observation of late numbers of ripe females. There never was a single peak in female ripeness as several spawning days of 100-200 ripe females (takes 3-7) occurred. Also, many of the females spawned were partially spent or had absorbed many of their eggs.

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). Open wounds were swabbed with malachite green and fish placed into one of two holding ponds, where they were treated three times weekly with a flow-through malachite green treatment up to the first day of spawning. These procedures kept fungal infections to a minimum. Pre-spawning mortality was 10.3 percent comparable to 9 percent in 1988 and lower than the 16.6 percent experienced in 1987.

Spawning Procedures

Spawning operations began August 21 and concluded September 14. Procedures, for the most part, followed the protocol of past years. Brood fish were anesthetized with MS 222, checked for ripeness, and green adults returned to the two holding ponds. Sperm was collected from males, held in an ice chest, and combined with eggs from killed and bled females. Normally, crosses were made between two males and two females. The major exception was in crossing one male with one female for the Pascho/Elliott study (SNFRC) for high- and low-BKD lots. Fertilized eggs from two females were placed in individual Heath trays or individual colanders (Pascho/Elliott), allowed to water harden for 30 minutes in iodophore (75 mg/l) and buffered with sodium bicarbonate.

Sampling for overall health included all fish being sampled for BKD and IHNV. This was accomplished by sampling kidneys, spleens, and ovarian fluid from each fish. The ELISA technique for determining BKD was used exclusively this year by the Fish Health Center and the Seattle NFRC. Ovarian fluids from females and spleens from males were checked to determine IHNV positive or negative status. Sub-sampling for IPN, VEN, ERM, furunculosis, *Myxobolus spp.*, and *Ceratomyxa shasta* was also carried out by the Fish Health Lab. IHN Results showed 67 out of 1750 sampled fish (3.8%) to be IHNV positive, a decrease from Brood Year 1988's 4.4%.

Spawning Summary

Nine total egg takes were completed totaling 3.5 million green eggs collected from 950 females and fertilized from 800 males, giving a male to female ratio of 1:1.2 (Table 18). Total adult pre-spawning mortality was 10.3 percent (236), with females comprising 56 percent (131) and males comprising 44 percent (105) of those mortalities. Total post-spawn mortalities were 375 with females comprising 37 percent (140) and males comprising 63 percent (235) of the last mortalities. Total mortalities of 611 reflect a 22.9 percent loss out of the run of 2673 SCS. This compares with a 12.5 percent loss in 1988 and a 19.5 percent loss in 1987. Higher mortality this year was in part due to increased handling of adults for a University of Idaho erythromycin study.

Table 18. Dworshak Spawning Summary - SCS Brood Year 1989.

Take	Date	No. Spwnd. Fmls.	No. Spwnd. Mls.	Eggs/ Female	Green Eggs	Eyed Eggs	Eye-Up(%)
1	8/21	59	49	4,234	249,793	214,284	85.8
2	8/22	22	19	4,234	93,143	79,902	85.8
3	8/28	127	110	4,226	536,737	504,247	93.9
4	8/29	152	143	3,747	569,543	509,951	89.5
5	9/01	173	91	3,478	601,670	560,000	93.1
6	9/05	145	122	3,559	516,040	487,420	94.5
7	9/08	198	198	3,466	686,280	655,500	95.5
8	9/11	49	45	3,498	171,410	162,500	94.8
9	9/14	25	23	3,668	91,690	89,750	97.9
Totals		950	800	3,701	3,516,306	3,263,554	92.8

The 3.3 million eyed-eggs reflects a 92.8 percent eye-up, comparable to eye-up in 1987 but lower than that in 1988 of 96 percent. Kooskia NFH received 883,750 eyed eggs in September for their yearling smolt production.

Dworshak also received over 131,000 eyed eggs taken during the Red River satellite facility's spawning season, summarized below in Table 19. Eye-up for the group was 85.9 percent with an average fecundity of 4949 eggs per female. Green eggs had initially been taken initially to Kooskia for eye-up.

Table 19. Red River Spawning Summary - SCS Brood Year 1989.

Take	Date	No. Spwnd. Fmls.	No. Spwnd. Mls.	Eggs/ Female	Green Eggs	Eyed Eggs	Eye-Up(%)
1	8/08	2	?	4,742	9,483	4,413	46.5
2	8/09	2	?	4,742	9,483	4,413	46.5
3	8/15	4	?	5,889	23,556	20,592	87.4
4	8/18	2	?	4,858	9,716	9,500	97.8
5	8/22	10	?	4,779	47,790	43,500	91.0
6	8/24	1	?	4,355	4,355	4,020	92.3
7	8/29	6	?	4,864	29,186	28,250	96.8
8	9/01	2	?	5,216	10,432	9,268	88.8
9	9/05	2	?	4,705	9,410	7,880	83.7
Totals		31	?	4,949	153,411	131,836	85.9

It is anticipated that approximately 115,000 fingerlings at 130 fish per pound will be available for return to the Red River facility in June 1990.

Special Studies

The Pascho/Elliott study (Seattle NFRC) is a continuing effort from 1988 to examine the effects of BKD on the transport or non-transport of smolting SCS around the dams. The original 84 egg lots were combined into 12 groups (6 of high-titre and 6 of low-titre). Fry resulting from the study will be included in normal production but held in totally isolated rearing units from tanking through release.

This was the first year the ELISA test was used exclusively for BKD screening and separating between high and low titre BKD groups. Any egg lots higher than 0.3 plaque forming units were defined as high-titre for production purposes only and were segregated in the incubation stacks from the low-titre groups.

The University of Idaho pre-spawning injection study involved injection with erythromycin phosphate of some pre-spawning adults and jaw-tagging them for later identification. This was accomplished at the same time Dworshak brood adults were sorted and injected (refer to pre-spawning summary). The University of Idaho sampled tissues and blood from their jaw-tagged fish each spawning day. They will screen the erythromycin residues in the tissues and blood will be screened to determine what effect time has on residual erythromycin.

Bureau of Sport Fisheries and Wildlife
Division of Fish Hatcheries

HATCHERY PRODUCTION SUMMARY

Station: Dworshak NFH

Period covered: 10/01/88 through 9/30/89

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
	Number	Weight	Length	Number	Weight	Pounds	Cost		Per Lb.	Per 1000			Inches
1	2	3	4	5	6	7	8	9	10	11	12	13	14
STT Dw(H)-8802	0	0	0	488,874	81,671	95,003	30,667.73	1.16	0.38	66.58			
STT Dw(H)-8803	0	0	0	903,125	160,056	218,055	70,956.70	1.36	0.44	77.73			
STT Dw(H)-8901	793.2	43,484	5.39	0	11,852	18,504	6,111.99	1.56	0.52	21.7	21.1	43.0	0.69
STT Dw(H)-8903	1,102.7	27,870	4.17	0	6,661	11,463	3,328.17	1.72	0.50	3.50	49.8	21.4	0.43
STT Dw(H)89-0	215.3	2,690	2.00	0	5,702	9,086	4,641.66	1.59	0.81	7.24		82.6	0.05
STT Dw(H)8902	540.2	2,470	2.36	0	0	546	267.32						
STT SUBTOTAL					265,942	352,657	115,974	1.33	0.44				
SCS Dw(H)-89S	0	0	0	1,510,693	34,837	78,498	34,964.99	2.25	1.00	23.24			
TOTALS													
AVERAGES													

Form 3-229
(Sept. 1971)

Bureau of Sport Fisheries and Wildlife
Division of Fish Hatcheries

HATCHERY PRODUCTION SUMMARY

Station: Dworshak NFH

Period covered: 10/01/88 through 9/30/89

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
	Number	Weight	Length	Number	Weight	Pounds	Cost		Per Lb.	Per 1000			Inches
1	2	3	4	5	6	7	8	9	10	11	12	13	14
SCS 87-Kk-45	0	0	0	341,483	6,266	10,410	4,240.95	1.66	0.68	20.79			
SCS Dw(H)-88-90S	1,777.5	44,805	4.37	643,005	50,894	78,978	39,125.90	1.55	0.77	18.77	51.7	150.3	0.39
SCS Dw(H)88-89Z	0	0	0	206,459	2,446	4,534	2,582.58	1.85	1.06	12.90			
SCS Dw(Rd)88-89S	0	0	0	224,547	1,487	1,863	1,160.36	1.25	0.78	5.24			
SCS SUBTOTAL					95,930	174,283	82,074	1.82	0.86				
TOTALS	4,428.9	121,319		4,318,186	361,872	526,940	198,048.35						
AVERAGES			4.14					1.46	0.55	22.60	40.9	74.3	0.39

Form 3-229
(Sept. 1971)

FISH CULTURE PHOTOS

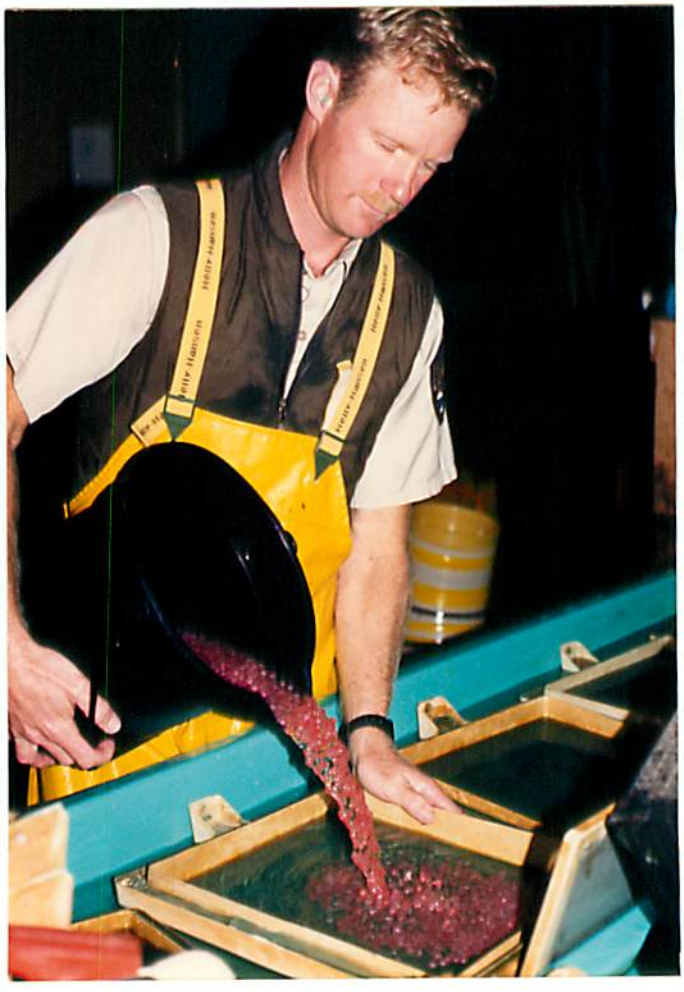
Checking and sorting adult steelhead for spawning.

Removing eggs from steelhead spawners.

One of several adult steelhead found carrying a foreign object -- a plastic ring protruding from the ventral area.

A large male chinook ready for spawning.

Picking and counting SCS eggs.



Transferring SCS eggs to incubator trays.

Placing steelhead eggs in new Heath stack units.

New incubation units in operation for STT production.

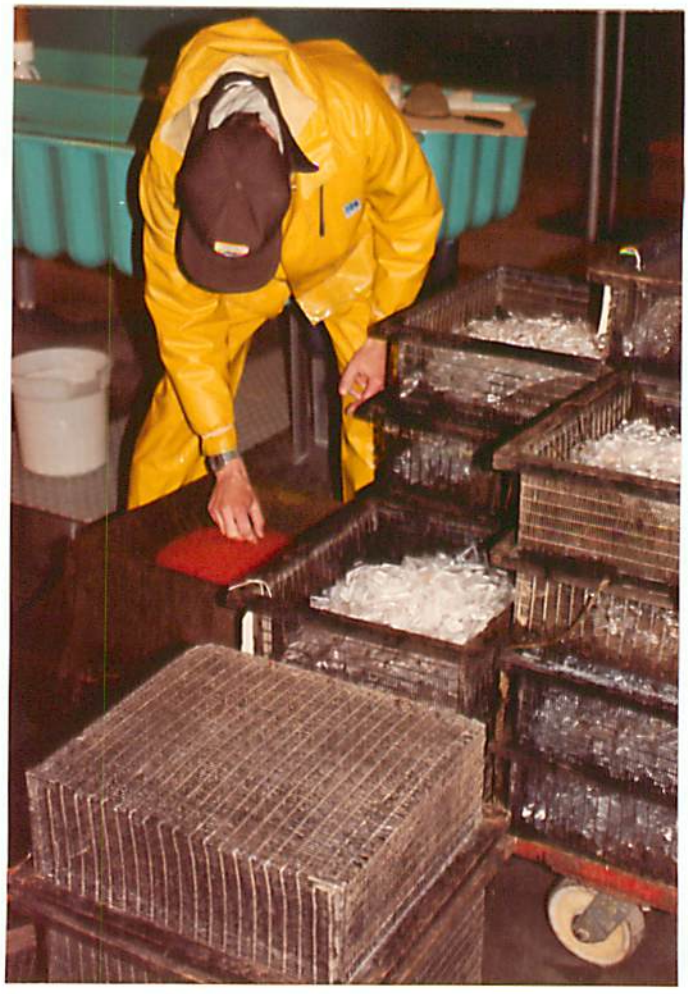
Chicken waterers for dispensing formalin as a fungicide in egg incubation.

Workers administering formalin treatment via pumping system to single colander egg incubators.

Numbering steelhead egg groups in colander incubation.

New piping system supplying vertical incubators to allow cold 40°F, warm 54°F and a mixed range of 40°-54°F temperatures for steelhead egg incubator.

Transferring eyed steelhead eggs to wire baskets for shipment to Kooskia NFH.



Icing and packing steelhead eggs in wire baskets for shipment to Kooskia NFH.

Loading excess steelhead brood fish for trucking to off-site release locations.

Releasing steelhead smolts from ponds directly to the river.

Hagerman steelhead to Dworshak ponds.

REPAIRS/IMPROVEMENTS/NEW EQUIPMENT

Numerous maintenance projects were accomplished during the year which added to the enhancement of station operations and improved existing facilities. The following describes some of the accomplishments.

A fish counter was designed and installed by station personnel for use in enumerating the collection of spring chinook and steelhead adults returning via the fish ladder. The counter consists of two dual light sensor units, spaced 18 inches apart, installed in a weir leading to holding pond No. 9. The system itself would work if the design allowed for the fish to be elevated before passing through the counter to a lower elevation of the pond. Considerable work remains for next year to improve accuracy of the counter.

A rehabilitation of Dworshak's incubator room was begun in December with completion in late January. The room was repainted, replumbed with new piping, old piping and fixtures removed, added lighting installed, and new incubation units purchased. Total rehab cost was $12,600 with additional Heath incubators added at $13,000.

In addition to rehab of the incubator room, a water supply line to the incubators was replumbed to allow use of either a colder (41°F) or warmer (54°F) temperature. It is also possible to mix the two supplies to vary temperatures between the range of 41 to 54°F. New temperature patterns allowed increased flexibility in egg shipping dates and also added a real challenge to the fish culturists in programming temperature units.

Two new computers (Everex) complete with printers (Okidata) and accessories replaced existing KayPro units in the office. Funds of $6400 were made available from Fiscal Year 1987 dollars.

Outside overnight broodstock holding tanks, adjacent to the spawning area, were filled with 170 yards of material and a concrete slab poured. All crowding hardware, electrical, etc., were dismantled and removed. The area will be used for additional storage space.

Cedar paneling of tiled walls in the administration offices was completed. Contract labor at $1995 was used to assist in the project. Doors and hardware were repainted adding to the attractiveness of the rooms.

A major fencing project was completed in the residence area. Over 600 feet of 6-foot cedar fencing was installed to replace a chain-link fence. New metal posts and brackets were fabricated by station maintenance.

The Corps of Engineers installed a debris barrier in front of the river intake. The barrier, constructed of floating logs tied together, replaced a design of 1985 that proved inoperable.

Considerable efforts were made to correct low flow ponds in System III by repairing several underground pond valves. Additional work will be necessary on a yearly basis to assure corrections are made to nearly all outside ponds.

The Federal Highway Administration (U.S. Department of Transportation) completed inspection of the timber trestle railroad overpass structure in September. A report is forthcoming identifying their findings and recommendations.

A rehabilitation plan identifying all major improvements necessary to update existing facilities was prioritized with the Walla Walla District Office (COE), reviewed on site by with the engineers, for incorporation into a Design Memorandum and later funding.

Corps of Engineers awarded a contract of $78,000 to provide interpretive displays, including signs, exhibits and a fish diorama. Work was to be completed by November 1989.

Project Costs:

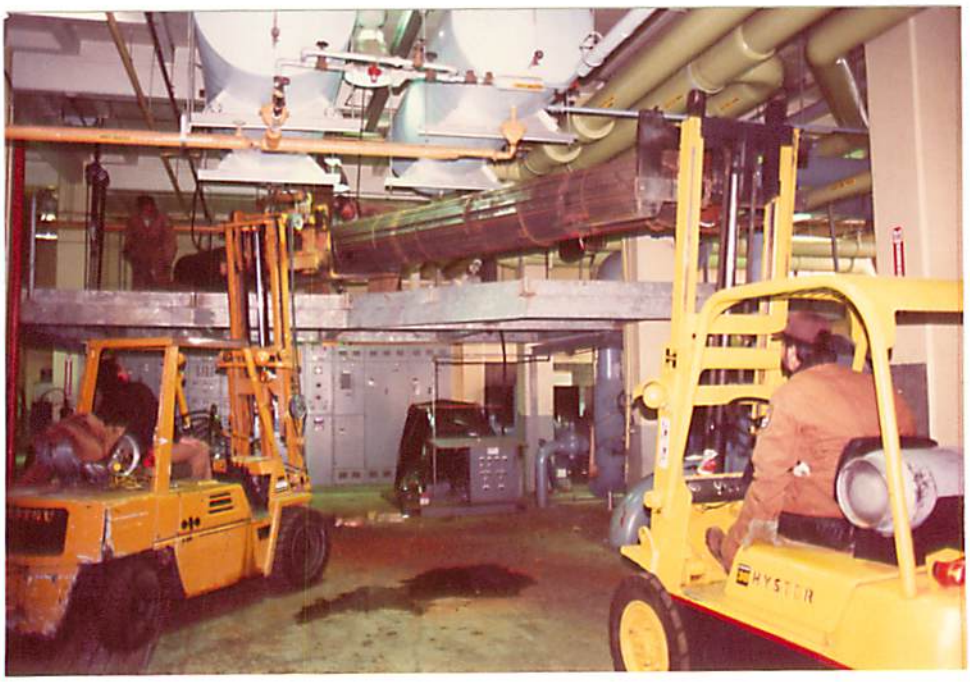
Fish counter - optics, controller, digital counter	$ 1,100
Paving repairs - Poe Asphalt	2,300
Electro retrofits on 3 emergency breakers - Eastern Electric contract	6,000
Pump, controller and meters for iodine testing study to control IHN virus	3,100
Complete rehab of incubation room with added incubation units	25,000
Dismantle and fill outside broodstock holding overnite tanks and repair broodstock holding ponds	5,700
Repair of holding pond raceway headers	1,100
Completion of cedar paneling and installation of new lighting	3,500
Cedar fencing material, etc. for perimeter of station residences	2,000
Grade and replace gravel area near holding pond #1 with concrete slab	2,600
Material purchases to replace System II drive chain and related hardware - repairs to be completed in Fiscal Year 1990	19,800
Bird netting repairs including new netting material and holding clips	3,000

Equipment:

Two 1/2 ton Chevrolet pickup trucks delivered June 1989	14,700
Two major pump replacements for pumps No. 3 and 4. Awarded Peabody Floway, Fresno, California	71,000

Computer (Intel) for production use	3,000
Twelve Heath (16 trays) incubator units	13,000
1-ton cab and chassis Dodge truck - FY 1987 funding, delivered November 1988	8,385
Shop equipment including paint sprayer	4,200

PHOTOS



Heat exchanger in Mechanical Building No. I being removed to allow installation of electrical hardware to new boiler.

Site preparation for new electrical boiler installation in Mechanical Building No. I.

Rehabilitation of egg incubation room showing early stages of work prior to placement of incubator units.

Workers completing painting of incubation room facilities.

Incubation room rehab.

Incubator room rehab.

Incubator room rehab - new piping, incubation units, painting and lighting.

New Heath incubator units for added egg capacity.

New cedar fencing installed in vicinity of hatchery housing.

Workers replacing a 4′ chain-link fence in housing area with 6′ cedar material.

Filling overnight holding tanks near spawning room with rock and other fill material to later be used for storage.

Concrete slab replaces open gravel area near broodstock holding pond No. 1.

Inline mixer designed and installed by hatchery crew for administering formalin evenly to colander egg incubators.

New debris barrier in front of hatchery main water intake replaces a slick boom that had been inoperable since installation in 1985.

Debris collected from pipes found when repairing valves in ponds having low pond flows.

Repairing pond valves in locations of leakage and clogged pipe lines.

MEETINGS/TRAVEL/TRAINING

A meeting on October 18 was attended by Olson, Joe Lientz (FHC) and Bill Miller (FAO) with Pete Hayes, chairman Nez Perce Tribal fisheries committee, regarding various fishery issues on the Clearwater River.

Jo-Ann Leong, research, Oregon State University, met at the hatchery on November 1 to outline a vaccine study for Brood Year 1989 steelhead production.

John Miller, Regional Office, and Jim Winton, Seattle National Fishery Research Center, were at Dworshak on November 2 to review Brood Year 1989's steelhead program as it relates to IHN virus.

Manager Olson attended a briefing meeting in Lapwai with Bill Miller, FAO Project Leade,r on November 28. Nez Perce Tribal Executive Committee was especially concerned over the issue of returning Hagerman steelhead to north central Idaho and also matters regarding management of production activities on the Clearwater River.

Olson traveled to Vancouver, Washington to attend a Region One Fish Health Workshop on November 29-30. The afternoon of November 30 was spent in the Portland Regional Office to review matters concerning Dworshak's steelhead production program.

The 39th Annual Northwest Fish Culture Conference, held in Richmond, British Columbia, December 6-8 was attended by Wayne Olson, Dave Owsley and Jim Rockowski. A paper, "IHN Virus at Dworshak NFH - Past and Future" was presented by the attendees.

Olson and Owsley met with Corps of Engineers officials in Walla Walla, Washington, on December 19 to discuss the need for additional water from Dworshak Reservoir available through the LSRCP Clearwater Hatchery design. Further review is planned before a decision can be made.

Wayne Olson attended a meeting in Lewiston on January 11 with IDFG, Nez Perce Tribe and FWS to review the fish stocking of spring chinook salmon and to make decisions on the various release sites for smolts and fingerlings in spring 1989.

Olson, together with Bill Miller, FAO Project Leader, attended a briefing session with Regional Director Marvin Plenert, in Portland, on February 6.

A meeting was held in Dworshak's conference room on February 10 to discuss the Hagerman "B" issue. Representatives from FWS, IDFG, Nez Perce Tribe and Inter-Tribe were in attendance.

Olson attended a coordination meeting held at Hagerman NFH on March 16. Of particular interest was the transfer status of steelhead "B's" from Hagerman and the disposition of Dworshak's Brood Year 1989 steelhead eggs to hatcheries in the Hagerman valley.

A Treaty Rights Workshop, hosted by the Nez Perce Tribe, and held in Clarkston, Washington, was attended by Olson on April 17.

An IHN work group meeting was held at the University of Idaho on April 27 with Olson and Owsley attending from Dworshak.

Olson traveled to Portland on May 18 to meet with Regional fisheries staff.

A regional Project Leaders fisheries meeting, held in Reno, Nevada, June 20-22, was attended by Olson, Grande, Maskill and Owsley.

Travel during July was quite extensive. Manager Olson attended the Leadville NFH centennial, held July 8-9, representing Region 1 and also as a former station employee from 1959-1962. Olson was also part of a group (LSRCP, Regional Office and FAO) at an overnight fisheries meeting on the Snake River to discuss state, tribal and Service cooperative ventures in the new Clearwater State Hatchery program. An anadromous hatchery meeting in McCall, Idaho was held on July 24-25 for the purpose of IDFG and FWS stations to review and discuss a variety of related fish culture subjects. Olson, Streufert and Hanson attended.

The State's Powell satellite rearing station was visited by Olson, Streufert and Owsley on August 18. A meeting was also held the same day at Lochsa Lodge, Powell, with Bill Miller, Dworshak FAO, and Bruce McLeod, Kooskia, to briefly review Kooskia's production program and to discuss new rearing options.

An EEO workshop, in Boise, on July 31 was attended by Olson and Streufert.

Manager Olson and Fishery Biologist trainee, Kerry Grande, attended a fisheries retreat in Portland on August 3. This was a meeting of key staff members from the Regional fisheries office.

An IHN disease meeting was held at Dworshak on September 26. Dworshak FAO, Dworshak FHC, SNFRC (Jim Winton), Idaho Cooperative Fisheries Research Unit (Ted Bjornn), Regional OFfice (Dan Diggs) and Hagerman NFH (Dave Bruhn) were present at the meeting. Discussion centered on Brood Year 1989 and 1990 steelhead production programs.

On September 27, Olson and Owsley attended a meeting in Walla Walla with Corps of Engineers representatives to review water supply options for the hatchery. The Service requested a 20,000 gpm pumped river supply to be ozonated.

Instruction in cardiopulmonary resuscitation (CPR) was offered to station employees on September 27-28. A total of 24 people received the training as part of Dworshak's safety program.

A number of employees participated in formal training sessions:

Kerry Grande	Fish Culture/Fishery Mgmt, Leetown	5/8-26/89
Jim Rockowski	DBASE (computer class), LCSC	10/88
Jim Rockowski	IDAHOST Program, Orofino	11/30/88
Jon Streufert	IDAHOST Program, Orofino	11/30/88
Mary Lou Galloway	IDAHOST Program, Orofino	11/30/88
Dawna Nichols	IDAHOST Program, Orofino	11/30/88
Mary Lou Galloway	DBASE (computer class), LCSC	10/88
Mary Lou Galloway	Workshop-Imprest Fund Cashiers, Seattle	4/17-18/89
Mary Lou Galloway	Human Relations (Supervisory), LCSC	5/10/89
Mary Lou Galloway	Effective Oral Communications (Supervisory) LCSC	5/03/89
Mary Lou Galloway	So Now You're the Supervisor, LCSC	5/17/89
Mary Lou Galloway	WordPerfect (computer), LCSC	10/13/88
Dawna Nichols	Federal Supply Service Seminar, Coeur d'Alene	8/22-23/89
Ray Rosales	Federal Supply Service Seminar, Coeur d'Alene	8/22-23/89
Mark Maskill	Fish Culture/Fishery Mgmt, Leetown	8/7-25/89
Chris Hanson	Instruction to Supervision, Seattle	9/11-15/89
Wayne Olson	EEO Workshop, Boise	7/31-8/1/89
Jon Streufert	EEO Workshop, Boise	7/31-8/1/89

PUBLIC INFORMATION/VISITORS

Nancy Hopper, EEO Officer (R-1) and Dale Tankersley, IDFG personnel officer, visited Dworshak on October 12.

Joe Webster and Dave Goldthwaite, Washington Central Office and Boston Regional Office respectively, visited Dworshak on October 19 as part of a fisheries evaluation team.

Steve Wright, Director, Vermont Fish and Game, visited Dworshak on November 4 for a tour of the facilities.

Lt. Col. Jim Walter, District Engineer, Walla Walla COE, visited the hatchery on December 22 and met with Manager Olson.

Eighteen state employees, representing Idaho Department of Commerce and Department of Transportation, met with Manager Olson on December 1 for a briefing on Dworshak hatchery operations.

Rich Haire, Regional Office Portland, and Jimmie Brown, COE Walla Walla, were at Dworshak on December 14, to review plans for the new hatchery exhibits scheduled during the year.

Visitors from Alberta, Canada on January 26 included several biologists and engineers to meet with staff on hatchery operations. Heading this group was Terry McFadden, Chief of Fish Hatcheries for Alberta.

Dan Diggs, newly selected Associate Manager, Regional Office, Portland, visited projects on January 23-25. Diggs and Olson met with the Nez Perce Tribal Executive Committee on January 24.

Two visiting Chinese professors to Washington State University were given a tour of Dworshak hatchery by Manager Olson on February 11.

Bill Loftus, Lewiston Tribune, was at Dworshak on March 21 to report on spawning activities.

John Thomas, KRLC radio, in Lewiston, reported regularly on the hatcheries' weekly steelhead spawning operations.

Over 500 visitors representing 13 different groups were provided formal tours at Dworshak during April. Included was a group of 105 forestry students representing several western universities.

Idaho representatives to the Northwest Power Planning Council were given a tour of Dworshak by Manager Olson on April 18. John McKern, Corps of Engineers, Walla Walla, accompanied the group.

Several perspective bidders from various design companies were at Dworshak for an on-site review of a Corps of Engineers contract pertaining to new station exhibits and signing.

News articles appeared in the Lewiston Tribune and the local Clearwater Tribune regarding Dworshak's steelhead spawning operations.

Manager Olson attended a meeting in Walla Walla on May 31, as a member of an evaluation board, to review bidder submitted proposals for interpretive display work at Dworshak.

A news release was given to the Lewiston Tribune on Kooskia's IHN virus losses for publication on May 18. Northwest Public radio also carried a similar story as reported from an interview with the hatchery.

Bill Martin, Fred Olney and Brian Kinnear, Regional Office, Portland, were given a tour of the Dworshak facilities on June 29.

Jimmie Brown, Corps of Engineers, Walla Walla, visited Dworshak on June 27 to make a final site review for the new visitor signs and exhibits.

News media gave special coverage to the IHN virus outbreak in July and also to the low expected return of adult chinook. KLEW-TV, Lewiston, was on station in July for an interview with Manager Olson for an evening and nightly news story.

A management intern group from the COE, Walla Walla District, was hosted by Olson in August for a 2-hour session. Fifteen participants were given a general overview of hatchery operations followed by a candid question and answer period.

The Lewiston Tribune carried an article on August 20 regarding IHN disease and its effect on steelhead production. Several interviews were held with area radio stations reporting on the disease.

Senior citizens Clayton McGill and Jesse Lyda provided nearly 70 hours of volunteer services to the hatchery. Hours of service were given to the general public in assisting with information regarding steelhead spawning activities.

New exhibits, signing and displays were designed and awarded by contract to Promotion Products, Portland, Oregon for $78,000 to assist visitors in touring the hatchery facilities.

PHOTOS

Nearly 1000 school students visited the hatchery during steelhead spawning operations.

Viewing steelhead spawning activities.

STAFFING

Recruitment actions were initiated in January 1989 for three Fishery Biologist positions; temporary GS-5, permanent GS-5 and GS-9. The latter GS-9 position replaced Jim Rockowski who was selected with promotion as Assistant Hatchery Manager, Hotchkiss, Colorado in February. The station continued to participate fully in an employee development training program with several trainees currently in positions.

Richard Bottomley, GS-0482-7, Fishery Biologist, transferred to Hagerman NFH, effective 1/29/89.

Kerry Grande, GS-0482-7, Fishery Biologist, transferred to Dworshak effective 1/29/89 from Hagerman NFH.

Greg Lang, Seattle, Washington, was appointed to a temporary GS-5 Fishery Biologist effective 2/21. Mr. Lang resigned position 9/25/89 to return to school.

Mark Maskill, Biological Technician, GS-6, Tunnison Research Laboratory, Hagerman, was selected for a Fishery Biologist GS-5 trainee position effective 3/26/89.

Richard Mueller, Fishery Biologist, GS-7, received a medical disability retirement effective 6/16/89.

Christine Hanson, Fishery Biologist GS-7, Iron River NFH, Wisconsin, transferred with promotion to GS-9 effective 6/18/89, replacing Rockowski as Assistant Production supervisor.

Personnel actions resulted in promotions to the following employees:

Richard Bottomley, Fishery Biologist to GS-0482-7 effective 10/09/88.

Mary Lou Galloway, Budget Assistant, from GS-0561-5 to GS-0561-6 effective 3/26/89.

Temporary personnel actions included:

Rocky Greenland, Laborer, WG-3502, extension of appointment, effective 12/01/88.

Dawna Nichols, Clerk-Typist, GS-0322-3, extension of appointment, effective 1/03/89.

High school students meeting family financial requirements were employed during the school year to work 15-20 hours each week (40 hours when school was not in session).

Kristi Harvey, Student Aid, YW-3506-00, temporary appointment, effective 11/12/88.

Denise Stamper, Student Aid, resignation, effective 8/16/89 near end of appointment.

Recruitment was initiated to fill one (1) student vacancy with position expected to be filled by October 1989.

A YCC program began on June 12 and ended August 4. Six enrollees with Chad Easterbrook, Social Services Assistant, GS-5, recruited as Crew Leader, participated in the program.

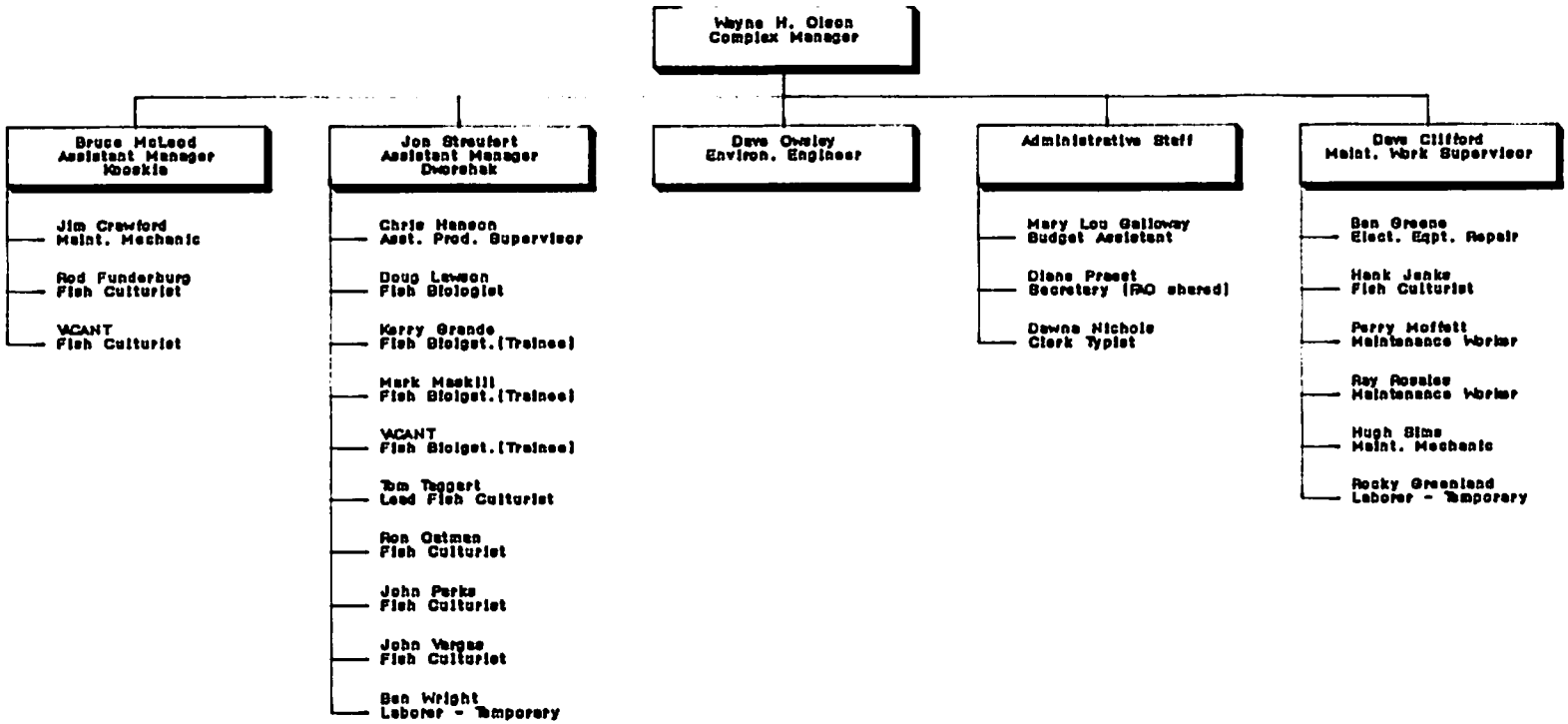
Dworshak Employees
- FY 89 -

Name	Position Title	Period of Employment		Status
Bottomley, Richard J.	Fishery Biologist	10/01/88 1/29/89	-	Permanent
Bryant, Chad L.	YCC Enrollee	6/12/89 8/04/89	-	YCC Program
Clifford, David E.	Work Supervisor (Maint.)	10/01/88 9/30/89	-	Permanent
Easterbrook, Chad L.	YCC Crew Leader	6/12/89 8/04/89	-	YCC Program
Galloway, Mary Lou	Budget Assistant	10/01/88 9/30/89	-	Permanent
Gilmore, Melanie A.	YCC Enrollee	6/12/89 8/04/89	-	YCC Program
Grande, Kerry W.	Fishery Biologist	1/29/89 9/30/89	-	Permanent
Greene, Benny C.	Electrical Equipment Repairer	10/01/88 9/30/89	-	Permanent
Greene, Shelly D.	YCC Enrollee	6/12/89 8/11/89	-	YCC Program
Greenland, Rocky E.	Laborer	10/01/88 9/30/89	-	Temporary
Hanson, Christine L.	Fishery Biologist	6/18/89 9/30/89	-	Permanent
Harvey, Kristi A.	Student Aid	11/12/88 9/30/89	-	Temporary
Jenks, Alfred H.	Animal Caretaker	10/01/88 9/30/89	-	Permanent
Lang, Gregory J.	Fishery Biologist	2/21/89 9/15/89	-	Temporary
Laws, Ryan S.	YCC Enrollee	6/12/89 8/04/89	-	YCC Program
Lawson, Douglas L.	Fishery Biologist	10/01/88 9/30/89	-	Permanent
Maskill, Mark G.	Fishery Biologist	3/26/89 9/30/89	-	Permanent
Mechling, Travis W.	YCC Enrollee	6/12/89 8/25/89	-	YCC Program
Moffett, Clarence P.	Maintenance Worker	10/01/88 9/30/89	-	Permanent
Mueller, Richard A.	Fishery Biologist	10/01/88 6/17/89	-	Permanent
Nichols, Dawna M.	Clerk-Typist	10/01/88 9/30/89	-	Temporary
Norman, Michele L.	YCC Enrollee	6/12/89 8/25/89	-	YCC Program
Oatman, Ronald W.	Animal Caretaker	10/01/88 9/30/89	-	Permanent
Olson, Wayne H.	Hatchery Manager	10/01/88 9/30/89	-	Permanent

Name	Position Title	Period of Employment		Status
Owsley, David E.	Environmental Engineer	10/01/88 9/30/89	-	Permanent
Parks, Richard J.	Animal Caretaker	10/01/88 9/30/89	-	Permanent
Praest, Diane E.	Secretary (Typing)	10/01/88 9/30/89	-	Permanent
Rockowski, James J.	Fishery Biologist	10/01/88 3/11/89	-	Permanent
Rosales, Raymundo A.	Maintenance Worker	10/01/88 9/30/89	-	Permanent
Sims, Hubert M.	Maintenance Worker	10/01/88 9/30/89	-	Permanent
Stamper, Denise R.	Student Aid	3/05/89 8/16/89	-	Temporary
Streufert, Jonathan M.	Assistant Manager	4/24/88 9/30/89	-	Permanent
Taggart, Thomas M.	Animal Caretaker Leader	10/01/88 9/30/89	-	Permanent
Vargas, John J.	Animal Caretaker	10/01/88 9/30/89	-	Permanent
Wright, Benjamin A.	Laborer	10/01/88 9/30/89	-	Temporary

Dworshak-Kooskia Complex NFH

September 30, 1989



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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 Tribe
  - Nez Perce Tribal Executive Committee (NPTEC)
  - Fishery Technical Staff
- -National Marine Fisheries Service (NMFS)
- -University of Idaho
- -Washington State University
- -Clearwater National Forest
- -Clearwater County Sheriff Office
- -Oregon State University

Dworshak Fish Health Center and Dworshak Fisheries Assistance Office shared facilities on the hatchery. Training assignments for personnel included various work between the two offices. The three Service groups are cooperatively involved in FWS activities on the Clearwater River.

The hatchery distribution truck was made available in June through August to the Cooperative Fisheries Research Unit, in Moscow, for hauling spring chinook broodstock from the Ice Harbor Dam collecting site to the university for an erythromycin drug study.

Steelhead carcasses were, as in recent past 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 41,000 pounds of processed fish until distribution was made.

Eggs and small fish were again furnished other agencies and university groups for study purposes, i.e., environmental testing genetic experiments, and on-going bacterial kidney disease monitoring.

Provided instructor for a Leetown Academy courses:

- -Dave Owsley, Engineer, instructed a nitrogen gas session at a Cold Water Fish Culture Course in Portland, February 1989.

Assistance in distribution of Dworshak's fish production was provided by IDFG and COE with trucks and drivers as requested.

Dave Owsley co-chaired the second Bioengineering Symposium held in Portland during the week of October 24. Dave also presented a paper on ozonation along with chairing a session.

A coordination meeting was held at Dworshak on November 3. Attendees represented IDFG, Nez Perce Tribe, Yakima Nation, Umatilla Tribe, Columbia River Inter-Tribe Fish Commission and USFWS. Purpose of the semi-annual meeting was to review Clearwater River fish production programs and activities.

Mr. Owsley traveled to Los Angeles to attend the Aquaculture '89 conference February 12-16. Dave presented a session on water disinfection and effluent treatment.

A semi-annual coordination meeting was held at Dworshak on March 16. Idaho Fish and Game, Nez Perce Tribe, Corps of Engineers, and the Service were represented.

Dave Owsley was appointed to a Region 1 Service task force on using formalin for treating eggs and brood fish. The group met in Abernathy on March 29-31 to tour several hatchery facilities and to formulate plans for replacing malachite green.

Mr. Owsley traveled to Seattle on March 15 to assist Montgomery Engineers on review of the Merwin hatchery (Tacoma City and Light) design.

Dave Owsley accompanied a group of engineers and biologists to tour several sites, in California, using ozone in water treatment. Mr. Owsley traveled to Coleman NFH, "Sea World", and to a major Los Angeles domestic water treatment plant during the week of March 6-10.

Dave Owsley, attended a formalin work group meeting, in Portland, on April 17-18, to formulate plans for using formalin as a fungus control on eggs and broodstock.

Jerry Thiesen, Idaho Fish and Game (IDFG), Regional Supervisor, Lewiston, visited Dworshak on June 13 to arrange a meeting and dinner for the Joint Finance Committee - State Legislators at the Dworshak hatchery on June 20. Accolades were received by the hatchery from both IDFG and the legislators for a job well done.

Manager Olson represented the "Complex" at a meeting in Lapwai on June 6 between the Fish and Wildlife Service and Nez Perce Tribe (Fisheries) to review Service activities in Idaho.

Pat Dwyer, Bozeman FCDC, was at Dworshak in August to set up and test an oxygenation system. Base data was collected at several locations to determine proper sizing and media usage for most efficient O_2 performance.

Dave Owsley traveled to Alaska on August 28 to provide engineering assistance to Alaska Fish and Game and attend the American Fisheries Society meeting week in Anchorage beginning September 4. Mr. Owsley served as vice chairman of the Society's Bioengineering section in 1989.

PHOTOS

Bozeman FCDC testing packed column degassing to monitor different column sizes and water flows.

FWS and IDFG anadromous fish culturists meet in McCall, Idaho in July 1989 to discuss hatchery operations of mutual interest.

FIVE YEAR HATCHERY PRODUCTION SUMMARY

Station: Dworshak NFH

	Fiscal Year				
	1989	1988	1987	1986	1985
I. Fish Production Data					
Intensive Culture:					
Fish Weight Gain (pounds)	361,872	534,863	499,038	448,840	294,539
Fish Numbers	8.7m	9.0m	8.8m	7.8m	6.7m
Percent Survival					
Feed Conversion	1.46	1.59	1.50	1.48	1.78
Extensive Culture:					
Fish Weight Gain (pounds)					
Fish Numbers					
Percent Survival					
Pounds per Acre					
II. Broodstock Production Data:					
Number of Females Spawned					
Number of Eggs					
Number of Fish					
III. Management Data:					
Full-Time Equivalents	22.2	21.7	21.7	22.9	23.2
Operational Costs					
Vehicle/Equipment Costs (Items over $1,000)					
Cyclical Maintenance Costs					
Quarters Costs					

Form 3-115 (Rev. 1/89)

WILD BROODSTOCK SUMMARY

Station:			Period Covered: October 1, 19 through					
Species/Strain and Stock	Total Number Returned or Captured		Number Spawned		Eggs (E) Taken or Fish (F) Harvested		Eggs Retained for On-Station Production	Remarks
	Females	Males	Females	Males	Number	% Eyed		
1	2	3	4	5	6	7	8	9
STT/CRW	4,264	1,777	1,821	963	12,331,081E	86.7	3,166,750	
SCS/RRW	?*	?*	950	800	3,516,306E	92.8	2,379,804	
*2,673 adults returned to Dworshak/Kooskia Complex. Unable to clearly sex adults at time of in-processing								
Totals/Averages	?*	?*	2,771	1,763	15,847,387	88.1	5,546,554	[redacted]

Form 3-101 (Rev. 1/89)

PUBLIC RELATIONS

Station: Dworshak NFH

Fiscal Year: 19 89

1. Presentations:	Number of Groups	Number of People
On Site	47	1,350
Off Site	13	410

2. Number of Visitors:

Official	31,000
Public	

3. Other Public Relation Activities:

Type of Activity	

Remarks:

Refer to narrative

Form 3-172 (Rev. 1/89)