

ANNUAL REPORT

Fiscal Year 1982

Dworshak

National Fish Hatchery

Ahsahka, Idaho

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Dworshak-Kooskia NFH Complex

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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 three miles west of Orofino (population 3,800) on the north bank of the Clearwater River, one 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 from construction funds for 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.

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), 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 have recently been modified into twelve 8-foot by 75-foot raceways to hold rainbow production.

Operations began in Fall 1968 with completion of the first phase 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 has modified some of the existing features and added new design concepts to the hatchery.

Construction was completed in June 1982 providing thirty 8-foot by 80-foot concrete raceways for production of spring chinook salmon. The new facilities are an expansion to the Dworshak hatchery. Authorized and funded under the Lower Snake River Fish and Wildlife Compensation Plan, site selection was approved in 1981 with construction beginning in September.

Starting production was from eggs received in late 1981 from Rapid River State Hatchery and Little White National Fish Hatchery. First release of 700,000 chinook smolts from the facility will be made in Spring 1983.

Kooskia National Fish Hatchery, located 35 miles upriver, operates as a complex with Dworshak.

This report covers the period of hatchery activities from October 1, 1981 to September 30, 1982.

STATION OPERATIONS

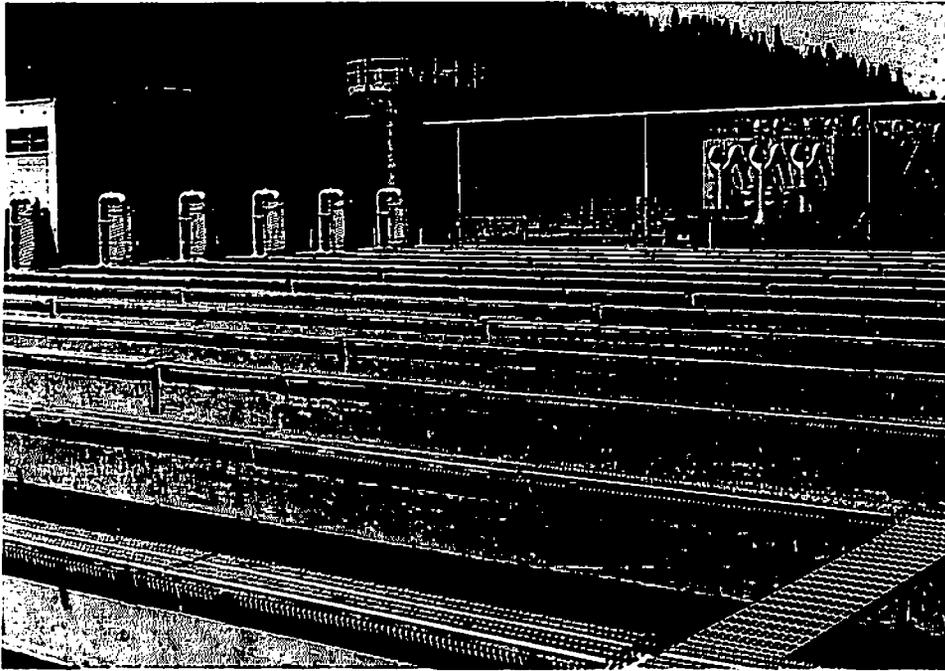
Hatchery funding from the Corps of Engineers (Activity 1930) for operation and maintenance totaled \$925,000. Included in this total was \$27,000 for support of the Dworshak laboratory. A total of \$127,500 was made available from the Fish and Wildlife Service (Activity 1300), for start-up and initial operation under the Lower Snake River Compensation Plan (LSRCP), to rear spring chinook salmon.

Total cost per pound of all fish produced was \$2.45. (Costs include equipment repair and maintenance, facility maintenance, rehab expenses and direct production outlay.) Cost per pound of fish produced is \$1.80 for direct production expenditures only (labor and feed).

A total of 21.8 staff years was employed to produce nearly 420,000 pounds gain during the year; or 19,250 pounds per employee when considering the full complement of personnel. Pounds produced per staff year increases to 30,400 pounds based only on those employees directly responsible for production.

Feed conversion (pounds of food to produce a pound of fish gained) again was a respectable 1.66. This figure is based upon nearly 700,000 pounds of food fed to gain 418,000 pounds of fish. Total fish food cost was slightly over \$200,000.

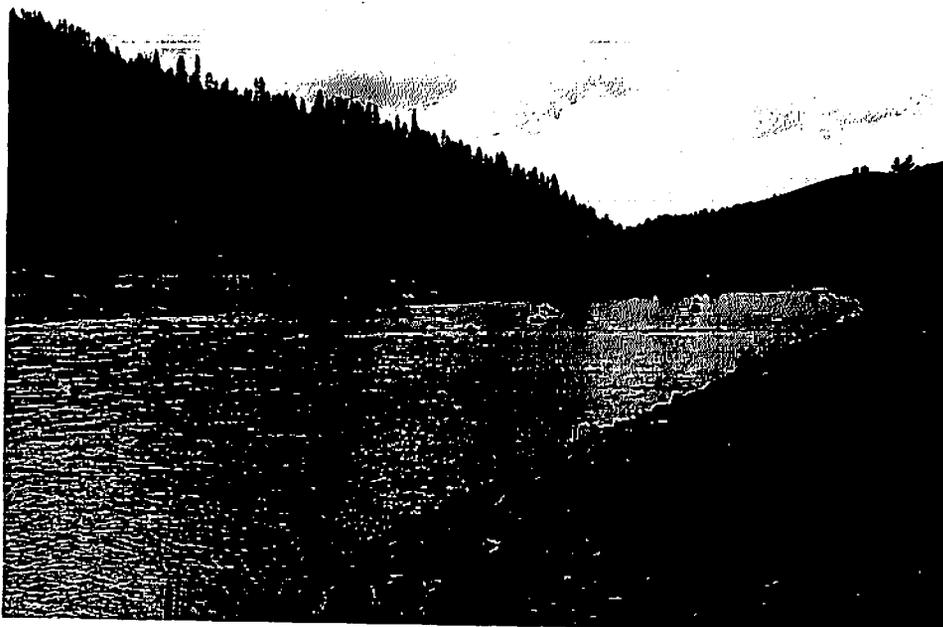
This year found two major construction projects being completed simultaneously. Station operations were sometimes curtailed because of the activities. Simes Construction of Kennewick, Washington, moved onto the hatchery grounds in early October to begin site preparation for LSRCP chinook expansion. System I modifications, under contract with Sletten Construction, Great Falls, Montana, started their work in August 1981. Labor disputes between union and non-union members caused some delays to hatchery operations due to construction shutdowns in November. Winter weather conditions caused further delays in completing the new raceways. Scheduled for use by April 1, chinook production could not be moved into the new facilities until early June.



View of new raceway facilities for rearing spring chinook salmon.

A record 14-inches of snow fell at the hatchery on January 23. It was apparent by late winter that a good spring run-off would occur because of an excellent snow pack at higher elevations.

After it was determined that the hatchery would collect a sufficient number of fish for broodstock, a catch-and-keep steelhead season was opened on March 27 to end April 30.



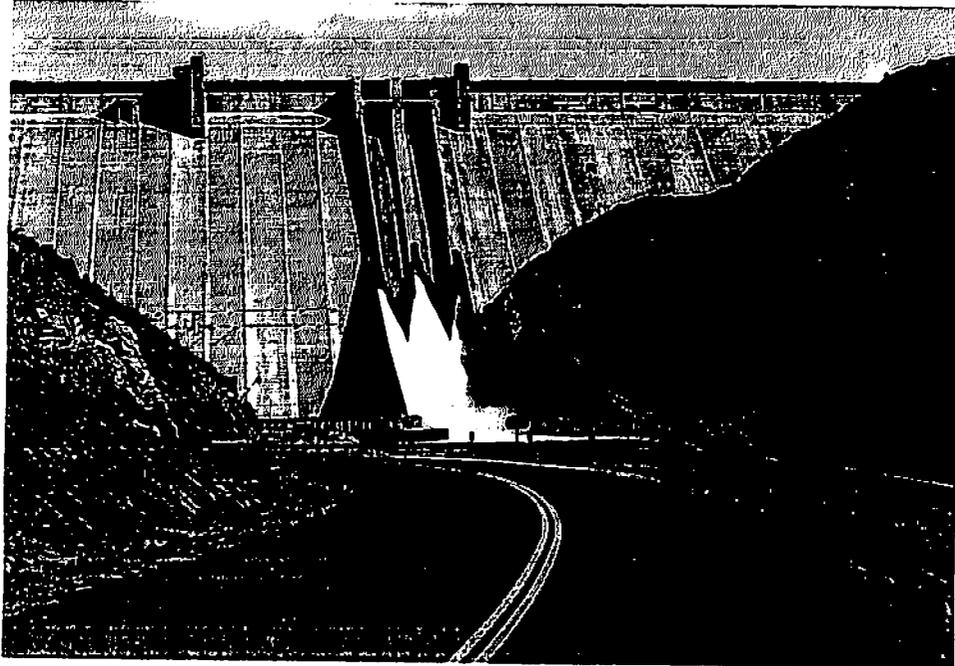
Opening day of steelhead season showing fishing activity adjacent to the hatchery.

The Young Adult Conservation Corps (YACC) program officially closed on March 26 with ten enrollees (four at Kooskia and six at Dworshak) being terminated. A farewell party marking the closure was held on March 22. The program was highly successful since its inception in November 1977. Success could be attributed to an excellent work leader, Larry Marchant, who was with the program for its entirety. Many work projects, that would not otherwise have been completed, were accomplished at both hatcheries.



YACC enrollees from Dworshak and Kooskia on final day of program with Work Leader, Larry Marchant.

Some 15,000 to 20,000 cfs of water spilled daily through Dworshak Dam in March. Kokanee from the reservoir were lost through the dam. Many were caught in the adult steelhead trap at the base of Dworshak Dam. As a result, trapping operations ceased on March 15.



Spilling at Dworshak Dam caused large numbers of kokanee to be lost from the reservoir.

Coded-wire tagging of 500,000 steelhead and spring chinook at Dworshak was completed during March by National Marine Fisheries Service (NMFS) and State of Idaho. This was the largest marking operation in the history of Dworshak. Several studies are being evaluated between various groups of fish, such as transportation effects, size of fish released and time of release. Reports received from Lower Granite Dam showed marked groups identified in the collection system within three and one-half days after release. Water conditions, again, proved ideal for downriver migration.

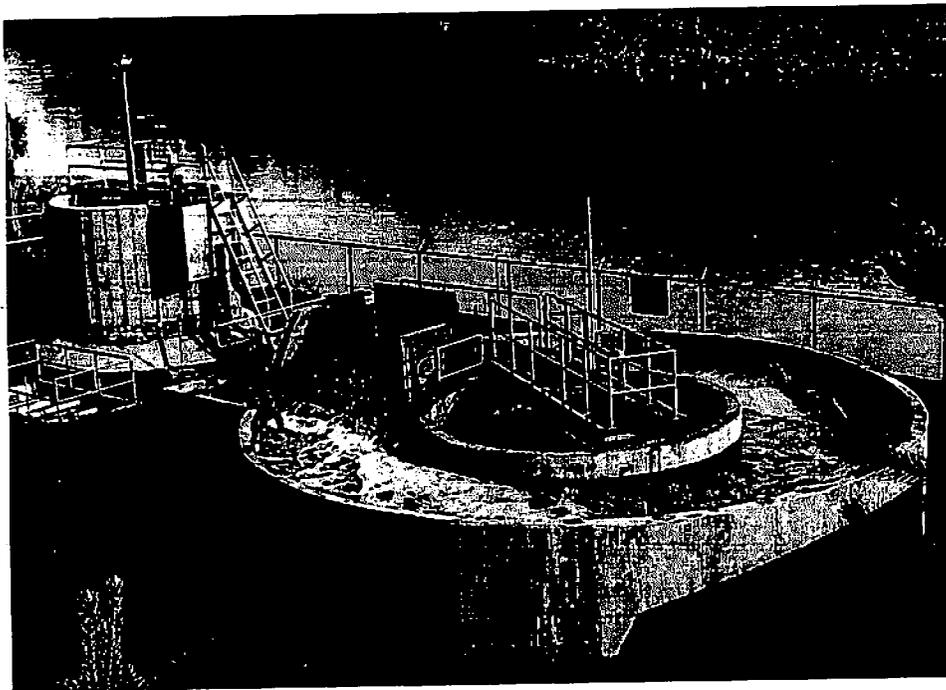
The final steelhead release was made on May 31 when 35,000 marked fish were transferred by truck to a barge at Lewiston. This was one of several test groups under study by NMFS. Dworshak's total smolt release, which began in early April, was 2.7 million weighing 345,000 pounds. Beginning with 1980's excellent release and followed by 1981 and 1982's record years, Dworshak has sent downriver 8 million steelhead weighing nearly 1 million pounds, over a 3-year period.

Steelhead spawning was completed on May 18. Nearly 3,100 adults returned to the hatchery, and 10 million eggs were collected. This number of eggs assured the hatchery of meeting their production needs and providing excess eyed eggs and fry to the State of Idaho. The increase of 1-ocean fish in this year's return should indicate a noticeable improvement in numbers returning in the 1982-83 season.

IHN virus in early steelhead caused high mortalities. Losses attributed to the virus in 1982 (the first positive identification of IHN) were 50 percent. Construction conflicts and an aborted start-up of the nursery water system after disinfection of facilities was completed resulted in a changeover to raw water without pretreatment. Next year's program (Broodyear 1983) will have available pretreated water, using a recycled flow. It will be a major breakthrough if UV lamps, etc. are found effective toward reducing IHN losses.

Thirty 8-foot by 80-foot raceways were turned over to Dworshak by the contractor on June 10. Those new units are part of the chinook expansion program in which the hatchery will produce and release 1 million spring chinook as part of LSRCF. Some 700,000 spring chinook, scheduled for release from Dworshak in April 1983, were immediately moved into the raceways. Future years will see the facilities in full operation rearing chinook salmon. The first broodstock return to Dworshak is expected in Summer 1985.

The Ahsahka sewer plant, constructed on the grounds of Dworshak hatchery, began operation during the year. Odor problems in the area were apparent from the beginning. Dave Owsley, Sanitary Engineer and hatchery employee, contributed considerable time during the year addressing the problem with the Ahsahka Sewer District, Corps, and contractor of the facility.



Newly constructed Ahsahka sewer plant serving the town of Ahsahka, Dworshak Dam, and Hatchery is located adjacent to the river and near hatchery housing.

A final inventory of steelhead was made in September prior to ponding Systems I, II and III for the coming year. A total of 2.6 million fish was onhand for rearing until release next spring. A shipment to Kooskia of 1.2 million eyed eggs earlier in the season was used to supplement Dworshak's fingerling program in August and September due to serious IHN losses. The Kooskia hatchery had experienced excellent success with steelhead; no IHN virus was identified at the station.

FISH CULTURAL OPERATIONS

STEELHEAD PRODUCTION

Fiscal year 1982 began with 2.9 million steelhead (85,475 lbs.) on station. Raw water System I, held 691,000 Broodyear 1980 steelhead. Systems II and III held 968,000 and 1,220,000 Broodyear 1981 steelhead respectively on reuse water.

Benefits from mineral addition were once again proven in the reuse systems (II and III).

System III fish performed very well without mineral supplementation to the water, through November. However, major changes took place in System III fish quality in December.

Two ponds (Take 1) went off feed on December 5, and extensive gill swelling was observed in those fish on December 7. Reduction in feeding activity and gill swelling became progressively evident in all System III fish during the week of December 7-11. Although fish experienced a total loss of appetite and extensive gill swelling, mortality did not begin increasing until December 15.

Mortality increased steadily December 15-24, and feed intake dropped to practically nothing.

Monitoring by Terry Bradley (research physiologist) indicated that the low ion levels of sodium and potassium, coupled with higher environmental ammonia levels, had caused the gill swelling.

Maintaining system water temperature at 55° F. was only adding to the stress of the situation with the fish not feeding. For that reason, System III water temperature was reduced to 51° F. on December 21.

Prospects for an improved situation, without the addition of sodium and potassium ions, worsened as mortality approached 2,000 daily. On December 25, a mineral package of 20 mg/l Na⁺ and 8 mg/l K⁺ was initiated in System III.

Mortality peaked at 2,000/day on December 26; and by December 30, mortality and gill swelling were on an obvious downward trend with feeding activity increasing somewhat.

Continued improvement was observed through January. By February 1, System III fish had returned to normal and excellent performance was displayed for the remainder of the year. Smolts released were of excellent quality.

Mineral addition was initiated on November 9 in System II. An initial package of 10 mg/l Na⁺ and 4 mg/l K⁺ was added.

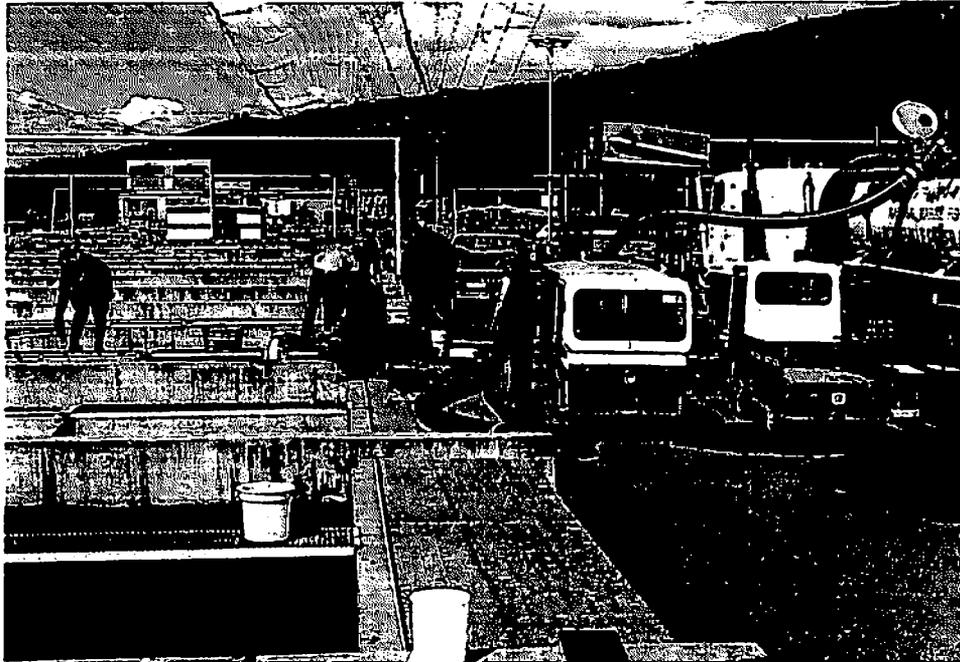
With one exception, System II fish performed beautifully throughout and were released in excellent shape. The exception was an interesting phenomenon which occurred in mid-February. A delay in a dry feed shipment resulted in running out of feed in System II demand fed ponds on February 14. At approximately the same time, a malfunction in one of the chemical feeders resulted in loss of potassium from the System's water supply. With the arrival of feed on February 17, frenzied feeding activity was observed throughout the day. Mortality was up sharply in those demand fed ponds the next day. Potassium addition was reinstated on February 19. By February 21, mortality was once again down to a normal level. Through discussion with Terry Bradley, it was theorized that rapid satiation of the fish, in the absence of environmental potassium, caused mortality through a buildup of blood ammonia. This theory is supported by the fact that demand fed fish in System III also ran out of feed and displayed the same frenzied feeding activity when once again given food. Potassium, however, was present in System III water supply and no increased mortality was observed.

Final smolt release figures for 1982 were as follows:

Lot	Number	Size(no/lb)	Weight(lbs)	T.L.(mm)	Date	Remarks
System I 0-DS-I-6	653,483	9.2	71,031	171	4/21-5/3/82	Age II
System II 1-DS-II-9	883,455	7.4	119,386	188	4/5-5/31/82	Age I
System III 1-DS-III-10	1,141,559	7.4	154,265	188	4/12-5/21/82	Age I
TOTAL	2,678,497		344,682			

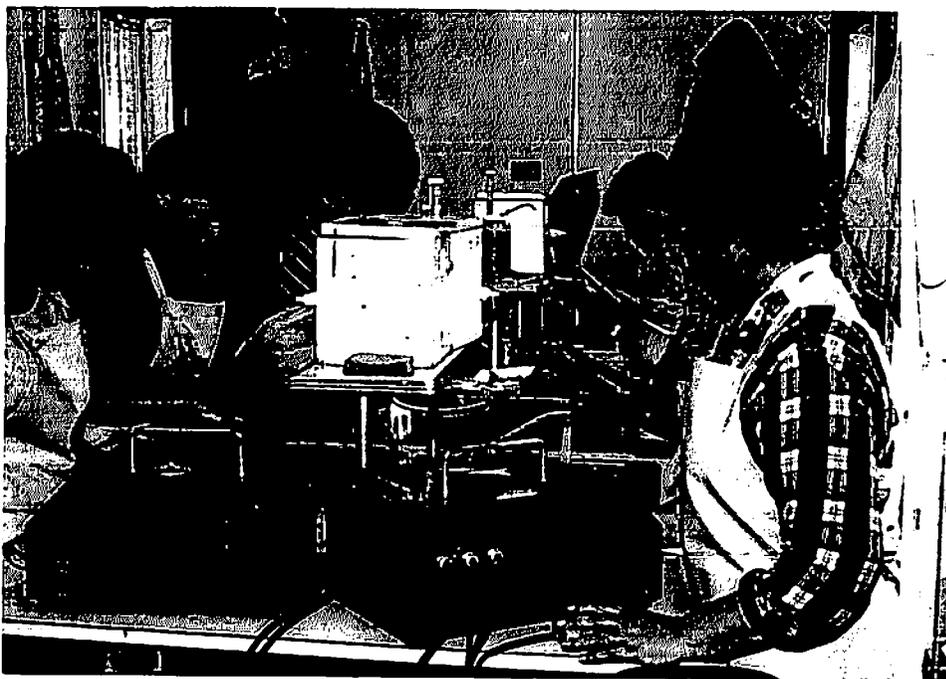
Steelhead smolt releases began on April 5 and were completed on May 31. All fish were in excellent shape at release time.

National Marine Fisheries Service (NMFS) marked a total of 296,000 steelhead in System II. This study was a repeat of an earlier homing study. Approximately half of the total were trucked to Lewiston where they were transferred to a barge for transportation below Bonneville Dam.

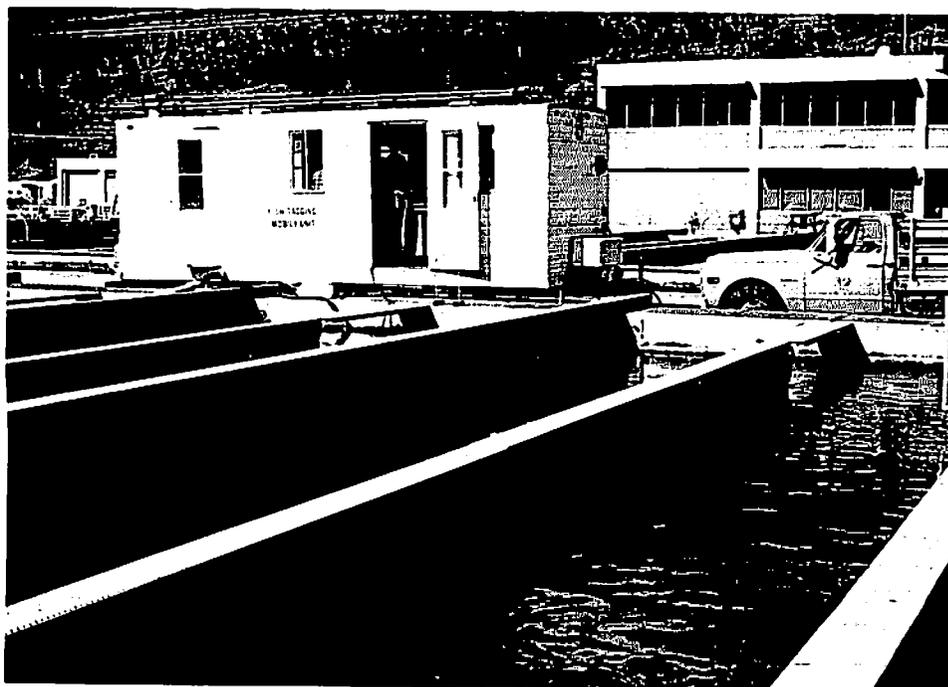


Sampling steelhead smolts prior to truck transport by NMFS.

In addition, some 85,000 fish were coded-wire tagged in System III in early March. This number is composed of two tag groups. A total of 42,000 were used as a control on the South Fork Clearwater plant and the remaining 43,000 were for a system comparison. A total of 45,000 were also tagged in System I for System comparison.



Coded wire tagging of steelhead smolts

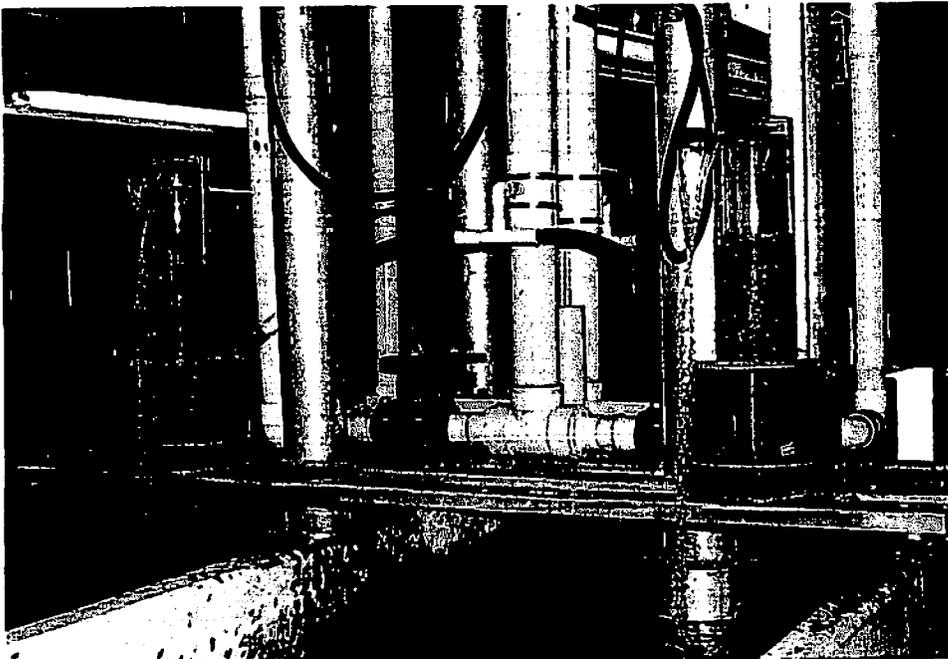


D FG marking trailer on station for tagging steelhead smolts.

Smolts plants to the South Fork consisted of 381,000 from Dworshak and 140,000 from Kooskia (to Clear Creek).

1982 Steelhead Spawning Summary

Ladder Opened	December 9, 1981
Ladder Closed	May 18, 1982
Spawning Began	February 2, 1982
Spawning Ended	May 18, 1982
Females Spawned	1567
Males Spawned	1237
Mortality	250
TOTAL in RUN	3054
Green Eggs	10,183,422
Eyed Eggs	8,363,454 (82.1%)



Hatching jars in use on nursery tanks for incubating eggs and hatch out of steelhead fry.

Disposition of Eyed Eggs

4,224,892	Dworshak NFH
2,608,700	IDFG as eyed eggs
229,462	IDFG as feeding fry
20,000	University of Rhode Island
1,280,400*	Kooskia NFH

*Originally designated as excess to be supplied to IDFG for upper drainage fingerling plants.

Infection Hematopoietic Necrosis (IHN) was confirmed for the first time in returning adult steelhead at Dworshak in 1982.

Fingerling from the early takes (1-5) were moved to the nursery tanks in early April in excellent shape. Mortality flared up in a few tanks in May, but other than a slower than normal growth rate, quality remained very good. In early June, however, mortality increased dramatically and IHN was confirmed.

During the months of June and July, over two million fingerling died as a result. All takes were effected in varying degrees of severity. Mortality gradually decreased in August and September and the surviving fish were moved to the outside rearing units. Total mortality attributed to IHN was estimated at 47.7 percent. Because of the severe losses, fingerling being held at Kooskia NFH were incorporated into Dworshak's program.

Growth losses prior to and during the IHN outbreak resulted in Broodyear 1982 fish being 4-6 weeks behind projected size and therefore late in being ponded. Ponding was begun on August 16 and was completed by late September. All three systems were started on single-pass raw water. Because the plan called for raw water rearing through late fall (in the reuse systems) disinfection was not conducted in 1982. Systems I, II and III were scheduled to be switched to reuse in mid-November.

Twelve ponds in System II and the first eight ponds filled in System III were loaded with 73,000 fish each. Loadings were reduced when it became obvious that an adequate number of fish was not available to fill the remaining ponds in System III and System I at 73,000. The final nine ponds in System III were loaded with 63,000 fish each. Even with the reduced loadings in System III, only 650,000 fish were available for System I.

Demand feeders were installed on the remaining 18 ponds in System III. With the addition of those ponds, 85 percent of the Burrows ponds were now equipped with demand feeders. Only twelve ponds in System II will continue to be hand fed OMP.

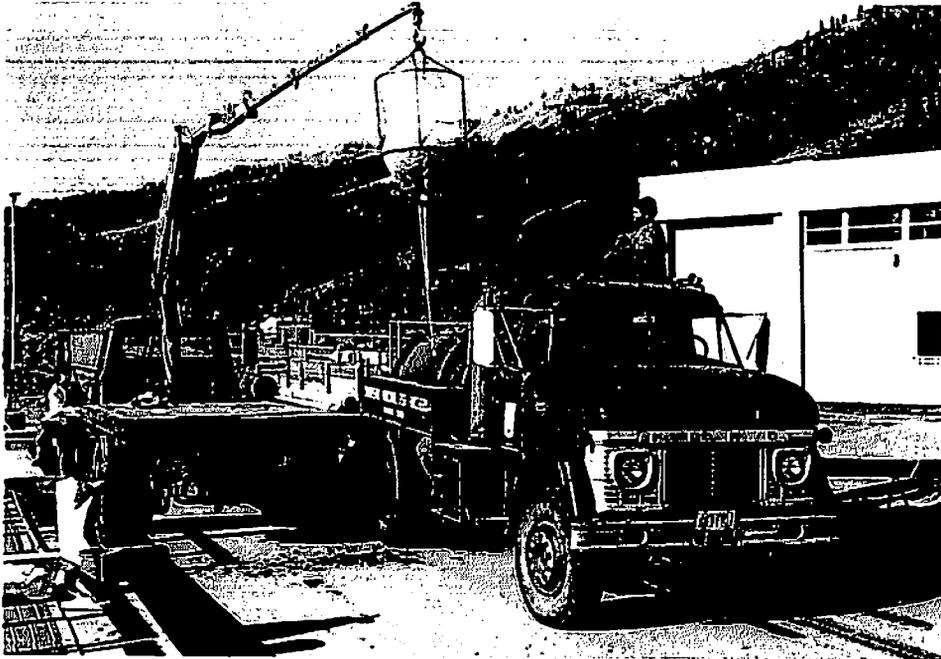
Mineral addition will begin in System II when it is switched to reuse. System III will receive mineral addition in mid-December. System I will not receive mineral addition unless circumstances require it.

RAINBOW TROUT PRODUCTION

Sub-yearling rainbow trout displayed exceptional growth when placed on demand feeders in September (FY 81). As a result of the high rate of growth, sub-catchable and catchable plants had to be made in October and November to reduce pond loadings. Catchable plants were continued in April and completed in May. Although IHN was diagnosed in October and several treatments for *Gyrodactylus* had to be administered, fish quality was excellent.

Total reservoir plants of rainbow trout fingerling, sub-catchable* and catchables for FY 82 was as follows:

Number	Size(No/lb)	Weight (lbs)	Date	Planting Site
61,708	6.9*	9000	10/81	Dworshak Reservoir
172,325	2.7	6,3824	11/81-5/82	Dworshak Reservoir
88,970	160	556	4/82	Dworshak Reservoir



Loading rainbow trout onto distribution truck for transfer to Dworshak Reservoir.

One million eyed eggs were received from White Sulphur Springs NFH in early October. These eggs were from 2-year-old broodstock and survival to feeding was only 60 percent.

Early performance of fingerling was poor. Slow growth and heavy loads of *Epitheliocystis* was observed through most of the tank rearing cycle. All fingerling were moved to System I ponds in January and February. In early April, 89,000 fingerling rainbow were planted by barge in Dworshak Reservoir.

Remaining fingerling will be kept for sub-catchable and catchable plants to the reservoir in FY 83.

CHINOOK PRODUCTION

Fall Chinook Spawning

Fall chinook salmon were once again transported to Dworshak from Ice Harbor Dam for holding, spawning and early incubation. A total of 200 adults and 33 jacks were received at the end of FY 81. Increased malachite treatments and the addition of a pond cover held mortality to a minimum.

Spawning began on October 27 and was completed on December 9. A total of 600,887 green eggs was taken from 126 females. An excellent survival of green-to-eyed eggs (92.4%) provided the station with 555,193 eyed eggs. From this total, 530,943 were shipped to Hagerman NFH. The remaining 24,250 were retained at Dworshak for a Bacterial Kidney Disease (BKD) study. Fingerling chinook were released in Spring 1982 as part of the LSRCF.



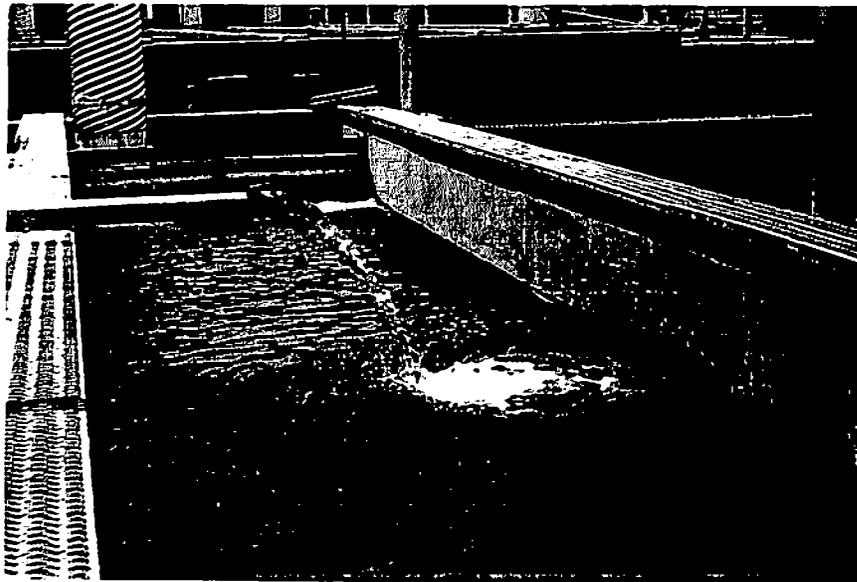
Adult fall chinook salmon collected at Ice Harbor Dam for spawning at Dworshak Hatchery.

Spring Chinook

Spring chinook fingerling being reared for Kooskia NFH (200,000) showed an increase in BKD during the first quarter of FY 82. In late September (FY 81) one pond in Systems II and III received 35,000 each to test chinook in reuse rearing. Release to the mainstem Clearwater River was made on April 16. At release time, BKD was considerably higher in the two raw water ponds than in either of the reuse ponds.

Eyed eggs were received from Little White Salmon NFH (1.4 million) and Rapid River SFH (450,000) in October for Dworshak's LSRC program. *Epitheliocystis* ████████ took a toll on the fingerling in terms of mortality and slowed growth during the nursery rearing period.

Performance remained poor from the time of ponding in February until early June when improvement was noticed. Construction was completed on the new LSRC raceways in early June and the chinook fingerling were moved in from System I Burrows ponds. Demand feeders were installed and the fish immediately began utilizing them. Growth was very good and by the end of FY 82, mean size was beyond projection.



Transferring S G fingerling from nursery tanks to new raceway facilities.

BKD increased gradually during the final quarter, but had not reached a serious level.

Spring Chinook Spawning

A total of 250 adults and five jacks were transferred to Dworshak from the trap at Kooskia NFH. Spawning began on August 24 and was completed on September 14. From 111 females, 477,454 green eggs supplied 410,000 eyed eggs.



sorting spring chinook salmon from broodstock collected at Kooskia NFH.

A BKD study is being conducted with the eggs and resultant fry (fingerling) from this year's spawning. Gametes from individual males and females were combined for each lot and isolated (when possible) until kidney samples from the adults could be analyzed for infection levels of BKD.

Direct fluorescent antibody technique (DFAT) was used for analysis. Categories of clean (no BKD), light, moderate and heavy were arbitrarily established.

Dworshak will rear all fingerling from crosses of clean males and clean females and compare their performance and subsequent infection rate of BKD with an equivalent number of fish from males and females with moderate and heavy infections of BKD. All additional eggs will be transferred to Hagerman NFH (when eyed) for test rearing of spring chinook salmon at that station.

The hypothesis being tested is that progeny from infected adults are more likely to contract BKD at some point in the rearing cycle.

DISTRIBUTION - 5 Year Totals

Steelhead

	<u>Number</u>	<u>Smolt Releases</u> <u>Weight</u>	<u>Drainage</u>
1978	1,597,695	188,187	Clearwater River
1979	1,708,600	128,258	" "
1980	2,696,601	339,636	" "
1981	2,632,861	279,189	" "
1982	2,678,497	344,682	" "

	<u>Eggs</u>	<u>Fry</u>
1978	5,779,950	3,365,000
1979	3,462,900	2,740,890
1980	767,000	2,319,751
1981	2,964,750	1,771,250
1982	2,628,700	216,000

Nearly all of the above released to Snake River drainage via Idaho Department Fish and Game.

Rainbow

	<u>Type</u>	<u>Number</u>	<u>Weight</u>
1978	No planting - stocking was assigned to Hagerman NFH; IPN disease cancelled any releases.		
1979	Fingerling	893,534	4,982
	Subcatchable	302,494	40,564
	Catchable	118,000	47,206
1980	Fingerling	1,504,232	8,449
	Subcatchable	37,200	2,335
	Catchable	78,000	26,120
1981	Fingerling	1,048,932	5,179
	Catchable	178,756	51,612
1982	Fingerling	88,970	556
	Subcatchable	61,708	9,000
	Catchable	172,325	63,834

Above releases to Dworshak Reservoir.

Kokanee

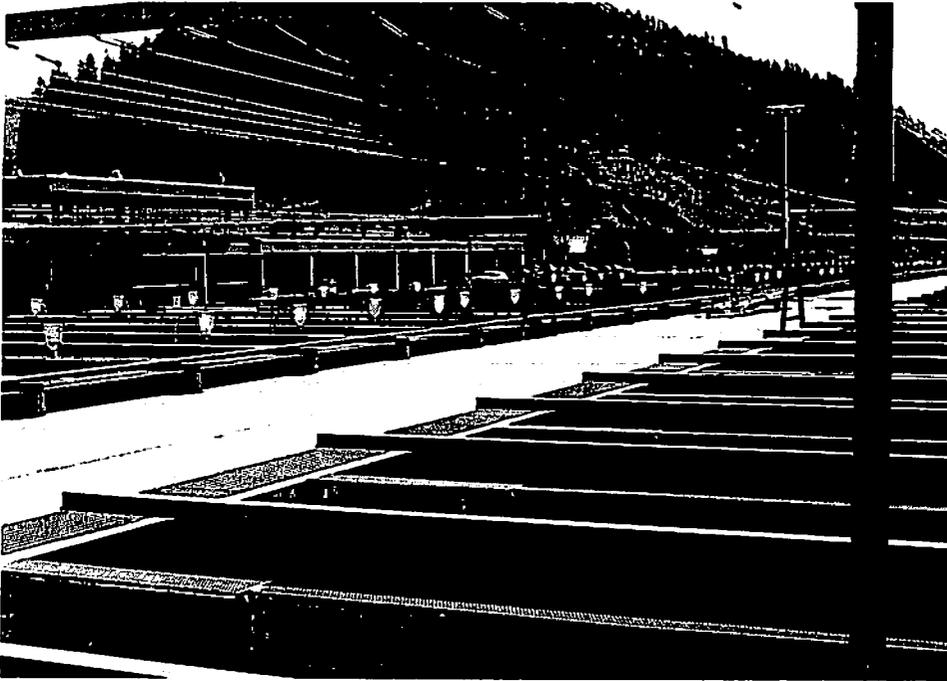
	<u>Number</u>	<u>Weight</u>	<u>Drainage</u>
1978	None	-	-
1979	1,117,464	.985	Dworshak Reservoir
1980	None	-	-
1981	None	-	-
1982	None	-	-

Spring Chinook

1982	28,100	2,303	Clearwater River
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IMPROVEMENTS

Self feeders (228) on outside ponds have replaced 90 percent of hand feeding when using a 1/8" size pellet. Early testing over a period of three years, justified changeover to Babington demand feeders.



A view showing several of the 228 demand feeders in operation on the ponds.

Jars are replacing stacked trays for egg incubation. Each nursery tank has an incubator jar installed on the tank. "X" number of green eggs are placed in the jar for the desired number of fingerling to be reared in the tank. This process eliminates use of malachite green, additional handling, picking egg losses and transferring from stacks to tanks. Swimming fry move from jars to tanks for feeding. Station personnel redesigned the original hatchery jar to enable completion of the incubation process from green eggs to swimming fry.

Packed column degassers, designed by employee Dave Owsley, Sanitary Engineer, have replaced the original aeration devices at Dworshak. The columns are almost 100 percent effective in reducing supersaturated nitrogen gas. Fish health problems in the past attributed to nitrogen have been eliminated. This same design has been incorporated in many water supplies throughout the United States and in several foreign countries where problems were identified. The new LSRCF facilities were designed with columns on each raceway. System I modification also incorporated the new degasser design.



Packed column degassers shown installed on each of the new LSRCF raceways.

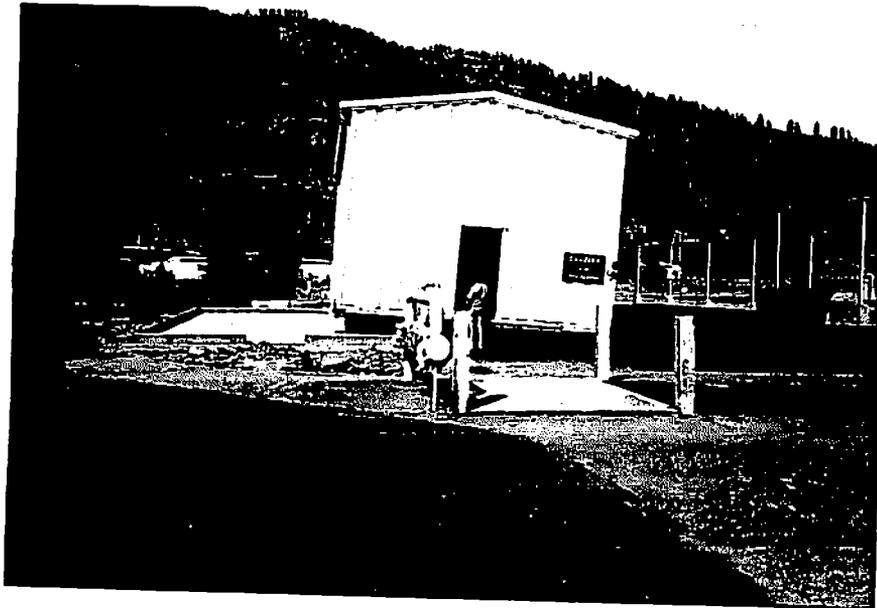
Transferring of fish from one hatchery location to another (often a distance of 700 feet) is done with a fish pump and irrigation pipe. Recent fabrication of a small portable tank in the nursery facility has facilitated moving fish from 128 tanks to outside rearing units in the same manner as moving fish between ponds.

A very thorough disinfection program, with plans and procedures outlined, of all water systems and rearing facilities is done prior to start-up on reuse. A 50 ppm chlorine treatment is recirculated through the hatchery.

A new concept in biological filtration was recently completed in System I. Fluidized sand is the media, with storage in large silos. An upflow through the sand breaks down the ammonia with a water drain-off at the top. The new filter system was placed on-line in November 1982.

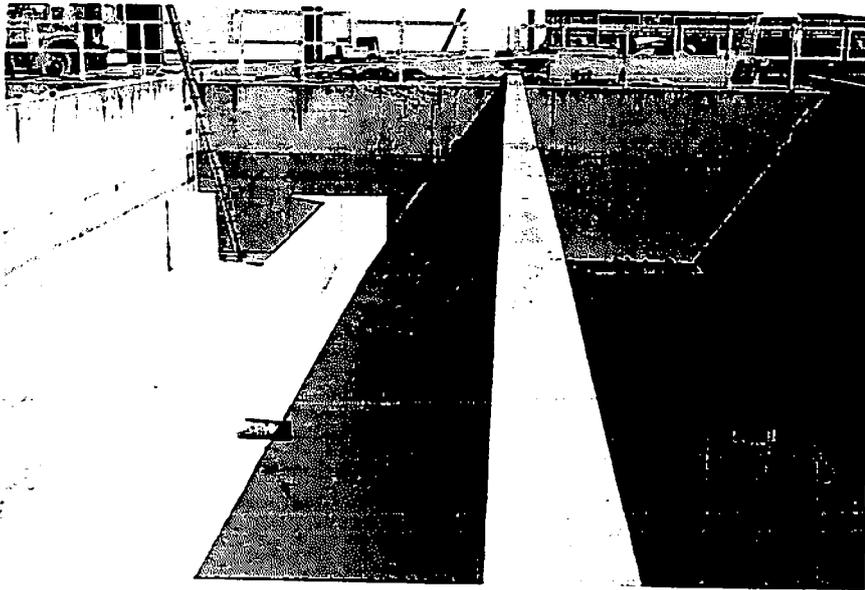
Systems II and III air backwash system of PVC piping was replaced with aluminum at a material cost of \$4,100. Two months of labor was used employing station workers to complete the job.

A 20-foot by 52-foot metal building, used for mineral storage was relocated from an area adjacent to Mechanical Building II to one near the new LSRCF raceways for use in fish feed and production equipment storage. Cost to move the building and pour a concrete slab was \$3,100.



Relocating metal storage building to area adjacent to new raceway facilities.

Six adult holding ponds were modified by station labor into 8-foot by 80-foot raceways for rainbow trout production. Material costs for the new production facilities was \$13,400; a savings of an estimated \$50,000 on the total job if work had been contracted.



Modifying an adult holding pond into two raceways by pouring a common wall between units.

Several changes were necessary to correct design problems on the new LSRCF raceways. Individual headers on each raceway (15) in Bank "A" were lowered to increase head pressure and to provide an additional 2,000 gpm water to the system. Column degassers were also reset to operate more efficiently. Station personnel completed the work at an approximate savings of \$4,500.

Other improvements and major costs were as follows:

Bus bar replacement at No. 2 substation resulting from a blow-up of original equipment. Cost \$17,700 for materials.

A parking area for station equipment, located west of the new raceway facilities, was leveled and graveled at a cost of \$1,900.

Fish pump modifications were made in the nursery building to allow transfer of fingerling from inside tanks to outside ponds through a piping system. Costs for the modifications were \$1,100.

The station's three fish distribution units were repainted a beige color. Station labor performed the work.

A \$3,800 Cushman electric cart was purchased for use in the feeding program.

The oyster shell bays for System III reuse were modified into brine tanks for use in dispensing potassium and sodium chloride salts. Cost was \$1,200.

A flush line was added to Mechanical No. 2 system at a cost of \$1,700.

A decorative rock wall was constructed between the laboratory and nursery building to prevent public visitors from taking a shortcut route to the production facilities. Cost was \$725.

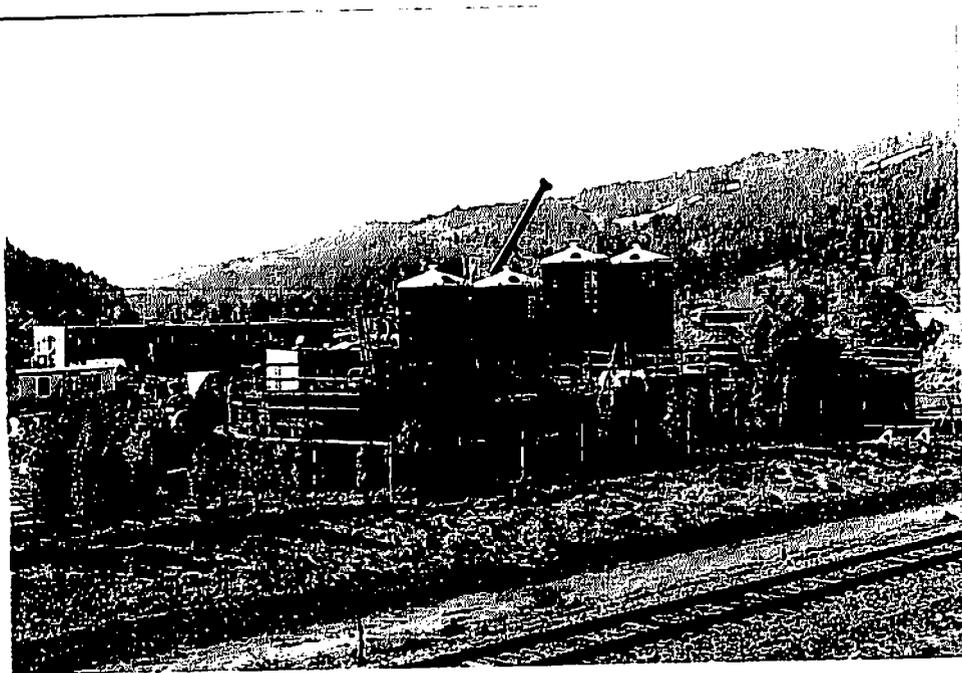
Six fiberglass nursery tanks were purchased for \$8,200. Tanks will be installed in the incubator room for added rearing.

A Canon copy machine, costing \$5,500, was purchased with funds provided by the Dworshak and Kooskia hatcheries, Fisheries Assistance Office and Dworshak Fish Health Clinic.

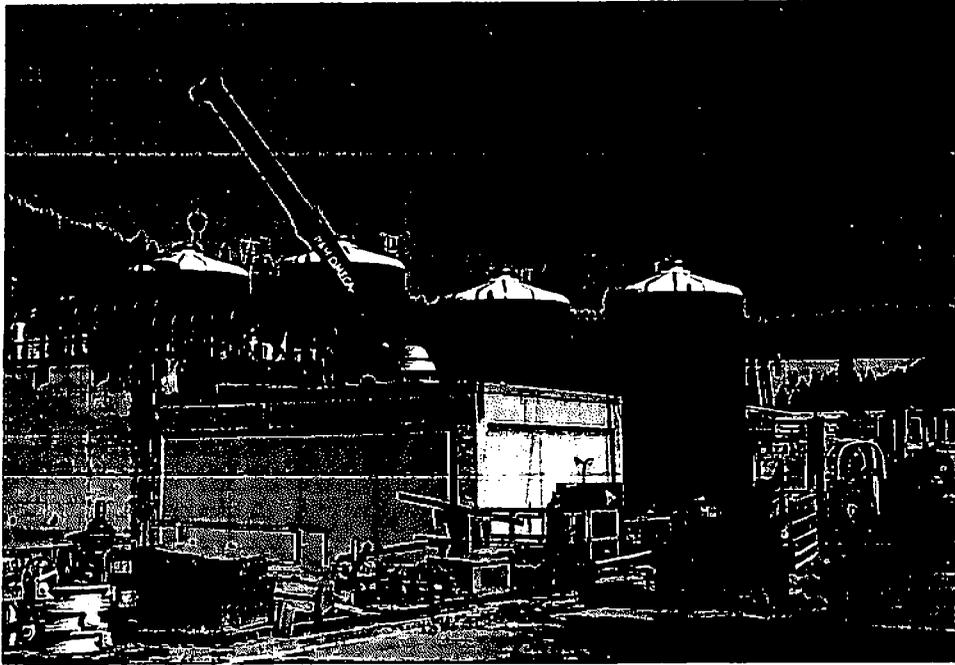
CONSTRUCTION

Two major construction programs by the Army Corps of Engineers were completed during the year at a cost of five million dollars.

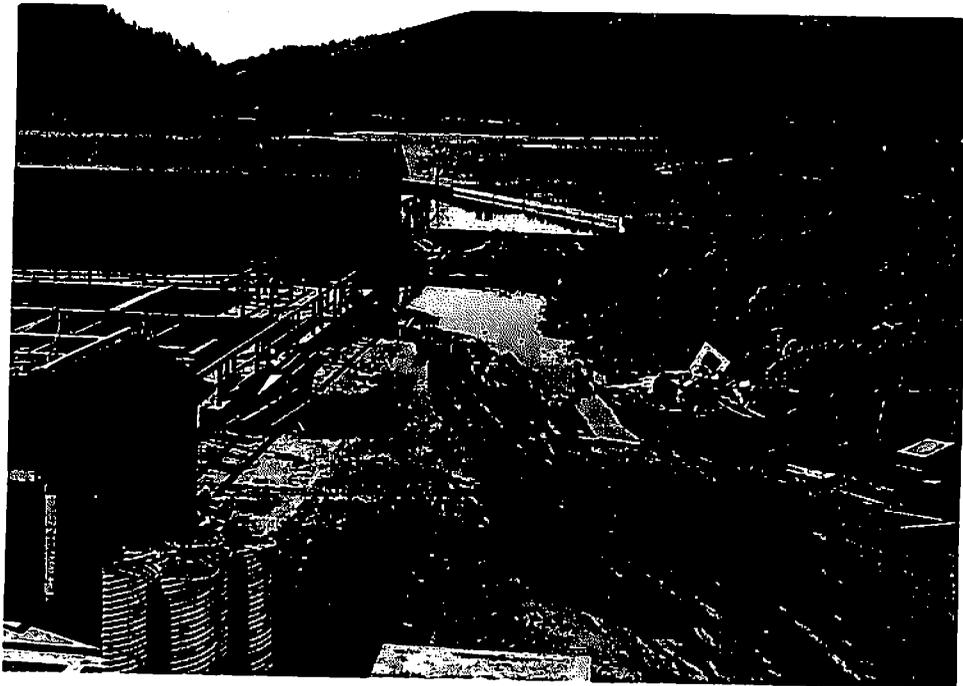
System I modification included installation of new fluidized sand filters, replacement of the oyster shell-rock combination used in the earlier years for biological filtration; hydraulic separation of the water systems between nursery tanks and outside ponds; modification of existing filter chambers into clarifiers; and treatment of effluent water. Work, nearly completed by September 1981, cost approximately three million dollars.



Construction of System I modification showing biofilters with effluent storage tanks in foreground.



System I biofilter tanks in place and aeration chamber under modification.



View downriver showing construction area for sludge drying beds.



Sludge drying beds - March 1982.

Facilities were completed in June 1982 to add 30 8-foot by 80-foot raceways for rearing spring chinook salmon. Work was begun in October 1981 to expand Dworshak's program into the Lower Snake River Compensation Plan (LSRCP). Approximate cost of completion was one and a half million dollars.



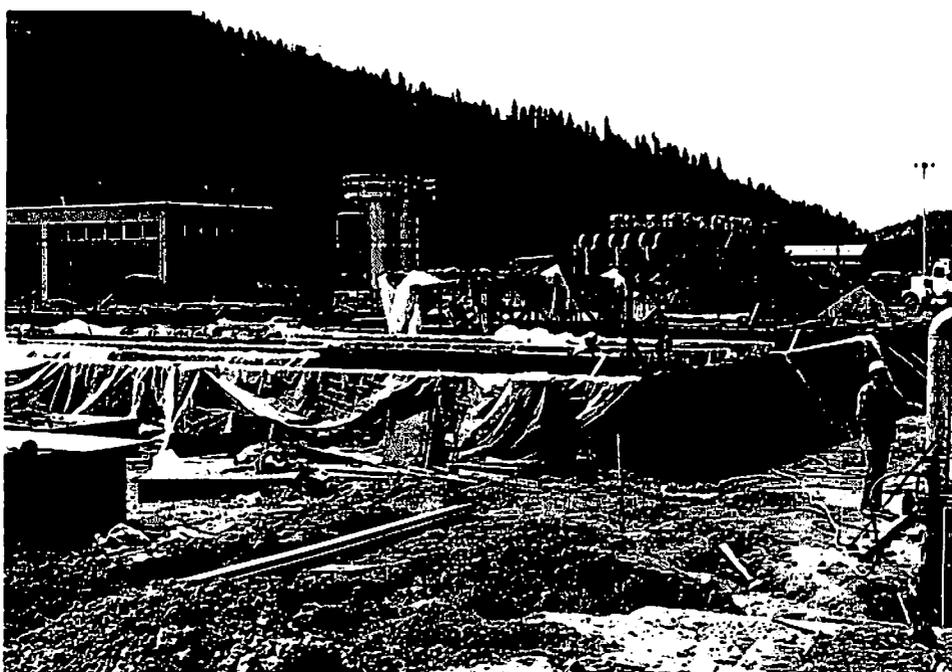
Early ground breaking for pipeline and raceway construction.



Construction site for 15 lower bank raceways - March 1982.



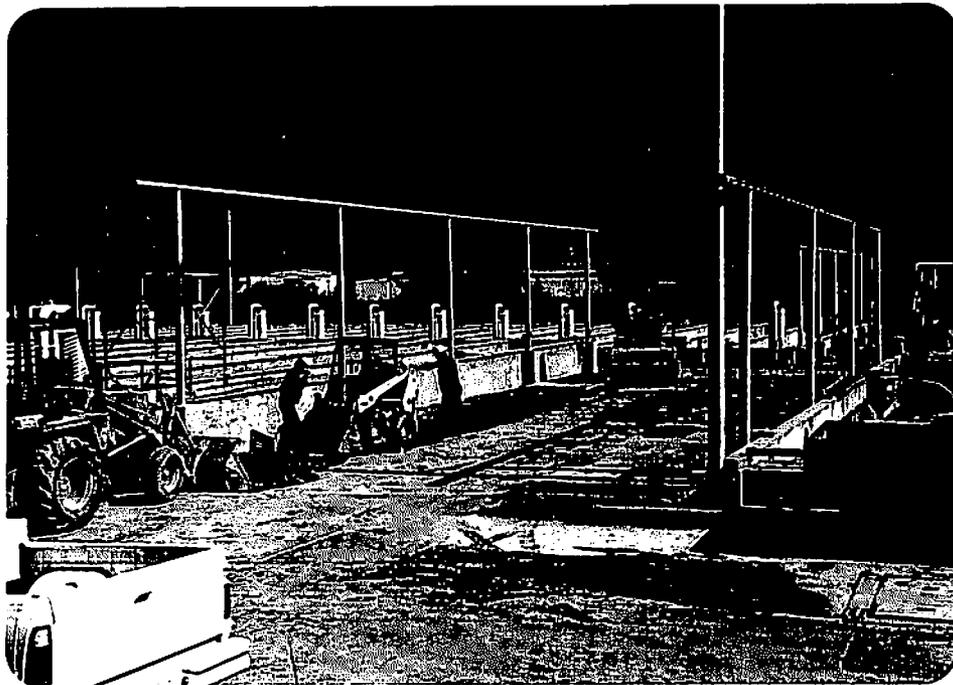
View of piping and conduit between Banks A and B of LSRCF facility.



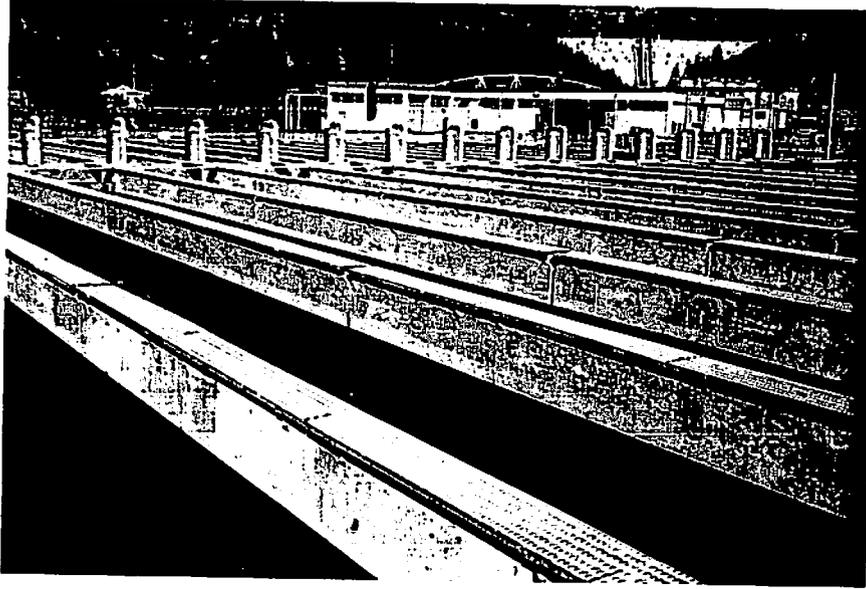
Raceway facility nearing completion - April 1982.



Preparing final concrete pour.



Paving preparation of new raceway facility - June 1982



Raceway facility completed and in operation - June 9, 1982.

MEETINGS/TRAVEL/TRAINING

Dave Owsley, Sanitary Engineer, was a guest instructor at the Fisheries Academy, Leetown, West Virginia, October 19 through 23. Mr. Owsley presented a session on water quality to the fishery students.

Wayne Olson and Dave Owsley attended the 32nd Annual Northwest Fish Cultural Conference held in Olympia, Washington, December 1 through 3. Mr. Owsley presented a paper, "Fluidized Beds; the Latest Technique in Reuse Systems".

Jerry McClain attended a workshop during the week of March 7, in Boulder, Colorado, on fish quality sponsored by the American Fisheries Society.

Training was provided to the following station employees:

Susan Espinosa, 80-hour session, "Cold Water Fish Culture", Fisheries Academy, Spearfish, South Dakota, December 7-18.

Wayne Olson, George Williams and Ray Rosales, 16-hour session on procurement practices, Boise, Idaho, April 21-22.

Dave Statler, 40-hour session, "Introduction to Basic Supervision", U. S. Forest Service, Orofino, Idaho. April 19-23.

Sharon Russell, 16-hour session on procurement practices, Reno, Nevada, May 19-20.

Mary Schaack, 16-hour training session, "Proofreading with Precision", Coeur d'Alene, Idaho, July 12-13.

Assistance was given by Dave Owsley to Lahontan and Leavenworth NFH's for on-site review and correction of their nitrogen gas problems. Mr. Owsley traveled to Denver the week of June 21 to visit the Regional Office and to accompany Regional engineers to Leadville NFH for an on-site review.

A coordination meeting with Idaho Department of Fish and Game and Corps of Engineers personnel was held at Dworshak on December 14, 1981 to review FWS fishery activities on the Clearwater River.

Staff members attended several meetings with IDFG and Corps to review construction programs and station operations.

Travel again was limited during the year due to ceiling restrictions. The station stayed well below the ceiling allotted.

PROGRAM INFORMATION

For the first time in Dworshak's 14 years of operation, the station did not employ summer tour guides. Construction activities and staffing ceilings were considered in the decision.

The number of public visitors was down some from previous years, which may have been attributed to major construction interfering with visitor flow. An estimated 29,000 visitors viewed the operation. A total of 960 students from several schools in the area toured the hatchery and observed steelhead spawning in the spring.



View of visitors parking lot on spawning day.

Included among special visitors to the hatchery were six Norwegian businessmen on tour of the area as part of a Rotary Group Study Exchange program; six engineers from China, representing the Chinese Sturgeon Passage Facilities and Artificial Propagation Technology Survey Team; Colonel Bob Williams, new District COE Engineer, Walla Walla; and numerous official COE, State and FWS personnel.

A number of radio interviews were given to local station KLER and Lewiston station KOZE regarding hatchery operations.

Station KLEW-TV of Lewiston reported on the new chinook facilities with on-site cameras taping a news story for viewing on June 15.

Several news stories concerning the spring steelhead run, spawning operation and smolt releases were carried in area newspapers.

One news release, prepared by the hatchery, was issued through the FWS news service of Region 1. This release summarizes another excellent production year for the hatchery.



Refer: John A. Sayre - 503/231-6121
June 10, 1982

STEELHEAD SPAWNING OPERATIONS AND RELEASES
COMPLETED AT DWORSHAK FISH HATCHERY

Manager Wayne Olson of Dworshak National Fish Hatchery reports that 3,054 adult steelhead returned to the hatchery this spring. Spawning operations, which began February 2 and ended May 18, resulted in the collection of 10 million eggs; a sufficient number to meet both hatchery and State of Idaho requirements.

The hatchery began releasing 8-inch size steelhead in early April. Ponds of 1-year-old fish continued to be emptied each week while water conditions remained ideal for the young smolts to move downriver. Observers at Lower Granite Dam, 75 miles from the hatchery on the Lower Snake River, reported seeing Dworshak steelhead as early as 3-1/2 days after leaving the hatchery.

The last of 2.7 million steelhead were released May 31 when a marked group of 35,000 fish, with coded-wire tags in their noses, was trucked to Lewiston and then barged to below Bonneville Dam. This group was one of several under study by the National Marine Fisheries Service to evaluate effects of trucking and barging on steelhead survival. A number of fish were also marked for study by the University of Idaho Cooperative Fisheries Research Unit under direction of Dr. Ted Bjornn. Recovery of these fish, upon their return as adults in 2-3 years, should provide biologists with valuable information upon which to base future production and management needs.

The 1981-82 program was another record production year for the hatchery in both quality and size of fish. Three successive years of excellent production, starting with 1980, has seen Dworshak release 8 million steelhead weighing nearly 1 million pounds to the Clearwater River.

Transportation of fish downriver by the Army Corps of Engineers' "Operation Fish Run" and Dworshak's improved production success should result in an increase of returning steelhead to the Clearwater beginning in fall 1982.

x .x x

COOPERATIVE PROGRAMS

The hatchery assists the Kooskia program in transferring their returning adult spring chinook to Dworshak's ponds for holding, spawning and incubating eggs. Some 400,000 fingerling are returned to Kooskia in the Spring and Fall of the following year for further rearing and for releasing as a yearling group.

Fall chinook adults are collected at Ice Harbor Dam, on the Lower Snake River, and hauled to Dworshak for spawning. Eyed eggs are shipped to Hagerman NFH.

Several contracts have been made and continue in effect with the University of Idaho, Cooperation Fisheries Research Unit (Dr. Ted Bjornn, Unit Leader).

The hatchery continues to work closely with National Marine Fisheries Service, Idaho Fish and Game Department, and Nez Perce Indian Tribe.

U. S. Army Corps of Engineers (Walla Walla District) and Dworshak Dam, with excellent cooperative arrangements between projects, provide an on-going exchange of equipment and services.

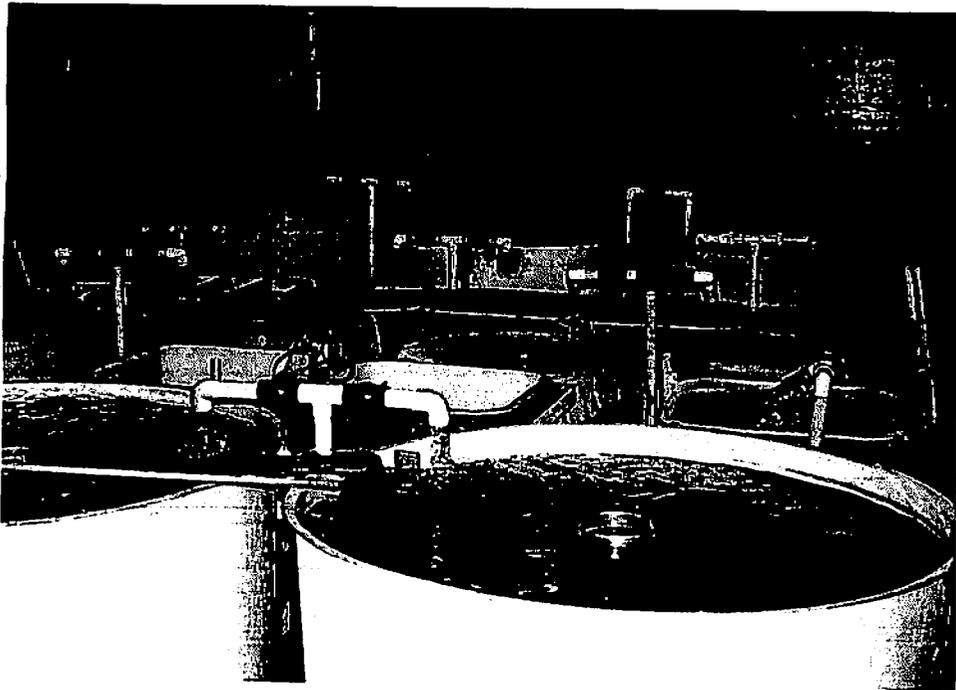
It is estimated that over 90 percent of Dworshak's Fish Disease Laboratory assistance is to the Dworshak-Kooskia Complex.

Establishment of a Fisheries Assistance Office in January ¹⁹⁸² 1981, with office space on the hatchery grounds, provides management services to the hatchery.

Several studies were initiated with the University of Idaho Cooperative Fisheries Research Unit, under direction of Dr. Ted Bjornn. A stress study, using chinook and steelhead, was set up in small nursery tanks at the hatchery. A bacterial kidney disease project included identifying and separating a small group of negative carriers from spring chinook broodstock. The production crew will be following this group and others within the testing program to study the BKD problem.

A research work order in the amount of \$35,845 was issued to the University of Idaho for continuing the evaluation of mineral addition to Dworshak's water supply. Terry Bradley, Research Associate, under direction of Dr. T. C. Bjornn, was assigned to the project. Mr. Bradley has been active in this work for the past three and a half years. Cooperative agreement No. 14-16-0009-1514 covers a period from August 15, 1982 to December 31, 1983. Three objectives are being addressed:

1. Test the effects of mineral enrichment in combination with production and environmental variables on steelhead trout reared at Dworshak National Fish Hatchery (NFH).
2. Develop a management schedule for the addition of environmental minerals in reallion to fish health, size and physiological state.
3. Examine the role of mineral enrichment in reducing physiological stress in spring chinook salmon reared at Dworshak NFH and Kooskia NFH.



Tanks set up to study stress effects on chinook salmon and steelhead trout-- Cooperative Fisheries Research Unit, University of Idaho.

STAFFING

A total of 21.2 staff years was employed during the year. This total included 16.0 permanent employees and 5.1 temporaries. Three permanent slots remained unfilled at the year's end; a maintenance worker, animal caretaker and clerk-typist. One fishery biologist (trainee) was in leave status pending a decision on medical disability. Temporary hires were used to fill vacancies.

Employee promotions included:

Sharon Russell, Administrative Assistant, GS-6.

Jerry McClain, Production Supervisor, GS-11.

Phyllis Barney, Fishery Biologist (trainee), GS-7.

Employee reassignments included:

Robert Austin, Fishery Biologist (trainee), from Lahontan NFH, Nevada, April 4, 1982.

Phyllis Barney, Fishery Biologist (trainee), to Fort Morgan Fish Disease Laboratory, Colorado, May 16, 1982.

Doug Lawson, Fishery Biologist (trainee), from Warm Springs NFH, Oregon, June 13, 1982.

Other personnel actions:

Rolf Simonsen, Animal Caretaker, retired after 28½ years of federal service, effective April 7, 1982.

Mary Schaack, Clerk-Typist, resigned effective July 31, 1982.

Mary Lou Galloway, Clerk-Typist, received a temporary appointment effective August 2, 1982.

Two positions were filled with temporary appointments to perform specific jobs during the summer. Frank Allen, painter worker, and Jacob Miller, welder, accomplished several large projects that required their specific skill to complete.

A total of 34 personnel actions were initiated and processed by the hatchery.

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

HATCHERY PRODUCTION SUMMARY

Station

Dworshak National Fish Hatchery

Period Covered

October 1, 1981 through September 30, 1982

Density Index 0.190				Flow Index 0.463				Total Flow 50,500					
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
STT													
0-DS-I-6	0	0	6.834	653.5	19,575	68,275	17,437.92	3.49	0.89	31.34	32.71	186.40	0.245
RBT													
0-WS-X:	0	0	10.758	231.7	71,556	103,884	27,822.22	1.45	0.39	185.53	15.15	150.10	0.000
STT													
1-DS-III-19	0	0	7.355	1,213.0	135,941	238,426	72,117.77	1.75	0.53	61.51	21.15	136.55	0.018
STT													
1-DS-II-9	0	0	7.355	959.3	108,212	170,364	48,433.28	1.57	0.45	54.89	16.27	100.90	0.203
STT													
1-DS-X-2	0	0	5.403	76.9	1,414	2,734	723.92	1.93	0.51	13.52	29.26	31.90	0.000
SCS													
1-LW-1	624.0	45,546	5.829	0	44,346	51,253	15,125.92	1.16	0.34	24.67	23.86	107.80	1.115
TOTALS													
AVERAGES													

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

HATCHERY PRODUCTION SUMMARY

Station

Dworshak National Fish Hatchery

Period Covered

October 1, 19 81 through September 30, 1982

Density Index			Flow Index				Total Flow								
0.190			0.463				50,500								
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	Per lb.	Per 1000						
1	2	3	4	5	6	7	8	9	10	11	12	13	14		
SCS															
1-RR-1	73.0	4,589	5.547	0	4,235	5,909	1,810.75	1.40	0.43	26.54	20.39	84.30	0.909		
RBT															
41 1-WS-11	135.2	10,098	5.689	89.0	10,005	19,724	5,713.35	1.97	0.57	42.50	14.75	71.40	0.698		
FCS															
1-SR-1	0	0	3.547	15.0	178	269	102.50	1.51	0.58	7.13	27.70	59.26	0.000		
STT															
2-DS-II-11	850.2	13,122	3.566	0	12,421	16,991	6,477.23	1.37	0.52	7.84	22.27	55.90	0.516		
STT															
2-DS-III-12	1,142.9	7,740	2.709	0	6,817	10,035	3,962.48	1.47	0.58	3.70	27.69	45.80	0.424		
STT															
2-DS-I-13	643.9	3,797	2.587	0	3,284	9,547	3,700.81	2.91	1.13	6.19	26.77	41.00	0.442		
TOTALS	3,469.2	84,892		3,238.4	417,984	697,411	203,428.15								
AVERAGES			3.634					1.66	0.48	29.41	23.20	89.28	0.721		

RCS: F280101

U S FISH AND WILDLIFE SERVICE

RUN DATE: 05-18-83
PAGE 17

TABLE 1: FISH AND FISH EGG DISTRIBUTION BY HATCHERY
QUARTER ENDING 09-30-82 (CONT)

REGION, HATCHERY, STATE, JURIS- DICTION, DESCRIPTION, SPECIES	NUMBER	EGGS POUNDS	FRY NUMBER	FINGERLINGS POUNDS	CATCHABLES NUMBER	TOTAL POUNDS
REGION 1						
14220 DWORSHAK NFH, AHSAHKA ID						
IDAHO						
CORPS OF ENGINEERS						
RESERVOIR						
RAINBOW TROUT	88,996			556	228,718	70,200
INDIAN-ON RESERVATION						
IMPOUNDMENT						
RAINBOW TROUT					3,000	1,500
STATE GOVERNMENT						
HATCHERY						
STEELHEAD TROUT	2,608,700	1,066	216,000		2,680,955	344,392
RHODE ISLAND						
INTERNATIONAL						
RESEARCH						
STEELHEAD TROUT	20,000	8			20,000	8

J. J. JONES
 WILLIAMS
 MCKEAN
 LITTON
 ...
 ...
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U S FISH AND WILDLIFE SERVICE

TABLE 1: FISH AND FISH EGG DISTRIBUTION BY HATCHERY
QUARTER ENDING 09-30-82 (CONT)

RCS: F280101

REGION, HATCHERY, STATE, JURIS- DICTION, DESCRIPTION, SPECIES	EGGS NUMBER	POUNDS	NUMBER	FRY POUNDS	FINGERLINGS NUMBER	POUNDS	NUMBER	CATCHABLES POUNDS	TOTAL NUMBER	POUNDS
REGION 1										
14220 DWORSHAK NFH, AHSAKHA ID										
WASHINGTON										
INTERNATIONAL										
PACIFIC OCEAN										
FALL CHINOOK SALMON					15,000	198			15,000	198
HATCHERY TOTAL	2,628,700	1,074	216,000	100	103,996	754	2,912,673	416,092	5,861,369	418,020
LESS NFH (TRANSFER										
TOTAL HATCHERY DISTRIBUTION	2,628,700	1,074	216,000	100	103,996	754	2,912,673	416,092	5,861,369	418,020

HATCHERY BIOLOGIST ACTIVITIES
JOSEPH C. LIENTZ - AREA BIOLOGIST

The primary function of the Fish Health Center was to provide monitoring support services. Intensified water quality and fish health monitoring programs were established to monitor various production tests and cooperative experiments. Production fish were monitored for fish health changes relating to production quality. Water parameters were monitored for EPA compliance, water source, and reuse system changes.

Fish health inspections were conducted at the federal hatcheries in Idaho, Nevada and California. Extension services were given to commercial, state and private individuals in the area of fish health and water quality problems.

COOPERATIVE STUDIES

Dworshak/Kooskia NFH

Monitoring of water quality parameters and fish health, conducting various tests and experiments relating to fish quality and facility operations.

University of Idaho

Dr. Bjornn - service to graduate students and collection of adult return data.

Dr. Klontz - cooperation concerning K.D., Proliferative Kidney Disease and IHN survey conducted in Idaho.

Dr. Chaco - cooperation for monitoring various test groups for fish health.

Water testing laboratory - samples sent to the lab for analysis of various water supplies.

Idaho Fish and Game Department

Adult return data collection and fish health exams for marking groups.

Cooperated with state disease biologist in fish health problems and statewide surveys for disease organisms.

Extension services concerning fish health problems at the McCall and Rapid River State fish hatcheries.

National Marine Fisheries Service

- Abernathy FCDC - Cooperation concerning fish food sampling and diet trials for K.D. studies.
- Bozeman FCDC - histological sampling for PKD, IHN and fish health problems.
- Little White Salmon Fish Health Center - viral sampling and cooperative studies for K.D. and IHN.
- Fort Morgan FDCC - commercial inspections for England egg shipments - Title 50.
- Fish Disease Biologists - exchange information concerning fish health problems, IHN surveys and controls, monitoring procedures discussed.
- Seattle National Fisheries Research Center - survey of K.D. and IHN problems in the northwest.
- Fisheries Assistance Office - Dworshak and Reno. Support services for K.D. studies and fish health monitoring of marked groups. Adult return sampling for marks and fish health.

Other Support Services

- Pyramid Lake Indian Tribal Enterprises - maintained a close working relationship for fish health monitoring. Sampling of fish health monitoring. Sampling of fish stock at Lahontan NFH and Pyramid Lake.
- Commercial fish producers in Idaho - extension service for fish health and water quality problems.
- Laboratory support to U. S. Forest Service, Army Corps of Engineers and Idaho Fish and Game Department.

Extension Service

Services and information provided to University students, visitors, private fish groups, interested public and individual students.

Diagnostic Services

Fish health inspections, examinations and consultation performed for six federal fish facilities. Diagnostic services extended to Idaho

Fish and Game Department, National Marine Fisheries Service, commercial trout farms, Title 50 exams to England, private individuals rearing fish.

Meetings

Participated in seminars, workshops, coordination meetings and group discussions. A paper was presented at the American Fisheries Society's Fish Quality Workshop in Boulder, Colorado in February 1982.

Discussed Dworshak IHN problems at the APC meeting in October and the IHN workshop in Portland in October.

Met with BPA (Terri Barrilla) concerning the function of the disease center.

Training Sessions

A cooperative training program with the Dworshak trainees was continued. Each trainee works in the laboratory for two-months training in water quality monitoring, fish health monitoring, understanding of reuse systems and disease treatments. Worked with trainees from other federal and state hatcheries discussing fish health problems and establishing water quality monitoring programs.

MAJOR RESPONSIBILITIES

Water Quality Monitoring

Monitoring of production water sources and reuse systems two to three days per week. EPA compliance sampling two times monthly, weekly nitrogen gas sampling of the river and water sources, sample collection for special water tests and maintenance of laboratory equipment and supplies.

Fish Health Monitoring

Fish health exams were conducted weekly. A close working relationship and monitoring of fish health has been established with the production staff. System changes and fish health changes are noted and reported to the staff. Support was given to production in monitoring fish health of ongoing tests and experiments.

Spawning Activities

Mark return data was collected for all interested agencies. Fish were sampled for fish diseases. Recorded data was forwarded to cooperating agencies. Samples were processed and results reported.



Hatchery Biologist collecting egg sample from adult fall chinook salmon.

Support Services

Fish health support services were given to the State of Idaho in monitoring fish lots for PDK, *Epitheliocystis* and IHN diseases. Extended back-up support to Idaho's Cooperative Fisheries Unit, FAO-Dworshak, universities in the area, and individual graduate students.

Major Contributions

1. Continuous fish health monitoring:
 - a. Support physiological investigations,
 - b. Station test groups.
 - c. University study groups.
 - d. State and federal marking programs.
 - e. Fish health quality in reuse systems.
2. Collect and maintain base line data:
 - a. Water quality parameters.
 - b. Fish health changes.
 - c. Adult returns.
3. Comply with National Fish Disease Policy:
 - a. Federal hatcheries (Idaho, Nevada and California).
 - b. Title 50 examinations for shipments to England.
 - c. Commercial fish hatcheries.
4. Fish health center tests conducted:
 - a. Kidney disease study using Erytheromycin, pH 7.5 buffered water and Nova Aqua.
 - b. Salt water challenge tests of production fish.
 - c. Treatments tested for control of *Epitheliocystis*.
 - d. Kidney disease incidence in fall and spring chinook and steelhead.
 - e. Sampling of kokanee from the reservoir for IHN and fish pathogens.
 - f. Testing of new treatment compounds on production fish.
 - g. Fish health monitoring of Pyramid Lake cutthroat at Lahontan NFH.
 - h. "Ich" vaccine in cooperation with Ken Wolf at Leetown, W. Va.

Major Findings

1. *Epitheliocystis* organism in FCS, SCS, STT, CUTT and RBT in Idaho, Nevada and California.
2. IHN virus in steelhead adult ovarian samples and losses in the fry. The first isolation in steelhead at Dworshak NFH.

Cooperation

Production testing of fish cultural techniques and fine tuning of the system's operations resulted again in quality releases from Dworshak.

The team effort of facility management, production, physiological testing and monitoring was beneficial in producing quality smolts.

Staffing

The biological aide position was important in providing the needed monitoring and laboratory assistance.