ANNUAL REPORT

FISCAL YEAR 1990

IDAHO FISHERY RESOURCE OFFICE

AHSAHKA, IDAHO

William H. Miller — 12/14/90

Project Leader — Date

Associate Manager — Date

Assistant Regional Director — Date

Table of Contents

INTRODUCTION

The Idaho Fishery Resource Office (IFRO) was originally established as Dworshak Fisheries Assistance Office in 1981 and became fully operational in FY-82. The name change to Idaho Fishery Resource Office occurred this year as part of a region-wide change. The change was made to better reflect the office's responsibility and function. IFRO is located on the grounds of Dworshak National Fish Hatchery, Ahsahka, Idaho. This facility is located approximately 40 miles upstream of the Snake-Clearwater River confluence at Lewiston, Idaho. The office is staffed by five full-time employees.

The primary goal of IFRO is to assist in management and evaluation of fishery resources which relate to federal issues, i.e., fishery resources of national significance, fishery mitigation for federal projects, assistance of Indian tribes, fishery work on federal lands and other fishery projects as called for under federal law. Activities under these goals are primarily directed toward protection, restoration and enhancement of anadromous fish resources in the Lower Snake River Basin.

A primary area of work includes evaluation and fish management planning for the three federal hatcheries in Idaho; Dworshak National Fish Hatchery (DNFH), Hagerman National Fish Hatchery (HNFH), and Kooskia National Fish Hatchery (KNFH).

In the hatchery evaluation phase, we compile the information base to assess how each of the three hatchery facilities are meeting their established mitigation goals. Our office also helps set up and design studies to evaluate hatchery effectiveness and various management scenarios. We work quite closely with Idaho Department of Fish and Game (IDFG), Nez Perce Tribe, and Shoshone-Bannock Tribe in evaluation of various fish management programs in Idaho.

STATION OPERATIONS

During 1990 we continued the cryopreservation of male steelhead gamete research. We had Mr. Barry Stout from Divide Creek Genetics in New Castle, Colorado to demonstrate his freezing techniques and we plan to use sperm frozen from the spring of '90 for fertilization in the spring of '91. With Mr. Stout's method, we improved fertility over our previous method significantly. We feel this research has tremendous management implications, especially in the areas of preserving genetic integrity of our endemic stock of steelhead.

In an effort to increase the efficacy of 0-age release of spring chinook salmon (SCS), we explored accelerated maturation of adults. We did this first in 1989 and advanced maturation 5-6 weeks over hatchery production. In 1990 we advanced maturation approximately 4 weeks. The progeny from the 1989 accelerated spawning were released with 1988 production smolts. The accelerated fish were PIT-tagged prior to release to evaluate their migration performance. We recorded a rapid migration rate for these fish, indicating that they were functional smolts. Complete analysis of smoltification are still incomplete at this time. Progeny from the 1990 accelerated spawning are currently being reared at Kooskia NFH and are scheduled for release in spring of 1991.

We continue to sample feral fish for disease background. Samples were collected and analyzed from the tributaries of Dworshak Reservoir, Lolo Creek, Eldorado Creek, and Leggett Creek. This is a continuation on a smaller scale of the 1987 survey, when we sampled nine streams. The primary diseases of interest are the IHN virus and whirling disease (Myxobolus cerebralis). This year we collected 481 kokanee salmon spawners and seven tested positive for IHN virus. The feral and natural samples collected from Lolo, Eldorado, and Leggett Creeks had a clean bill of health.

IFRO personnel assisted in an ongoing study of Dworshak Reservoir. We are planting two strains of rainbow trout, Arlee and Shasta, from HNFH. Studies by the Nez Perce Tribe and IDFG are documenting production and return to creel. In the past, (1987) we also planted kamloops rainbow trout strain into Dworshak Reservoir.

We determined the coded-wire tag (CWT) retention for steelhead and chinook salmon smolts tagged at DNFH. Adipose clips (ad-clips) were also evaluated on steelhead smolts. It was determined that 2.3 percent were partial clips and 0.6 percent were missed. Adult hatchery returns in 1990 had 1.6 percent hatchery fish with non-clipped aadipose fins.

Steelhead and spring chinook salmon (SCS) run summaries and run prediction information were prepared for Dworshak and Kooskia NFH's (see Appendix 2). This information, in conjunction with IDFG and Nez Perce Tribe information, is used to set fishing seasons and future hatchery production plans.

We continued our data summary and analysis of adult steelhead "A" vs. "B" passage data at Bonneville Dam. We correlated age data recorded at Bonneville with age data we see in the Snake River. Length data on DNFH steelhead was

ided to IDFG to use in analysis of "A" vs. "B" at Bonneville and Lower Granite Dams. Length data is now being used at the dams to separate "A" and "B" steelhead.

IFRO personnel continued snorkeling surveys to estimate number of yearling and sub-yearlings steelhead and spring chinook salmon in selected subbasin streams where outplanting has occurred. This data is compiled along with IDFG and Forest Service data to provide a broad background of salmon and steelhead production for Idaho.

IFRO personnel participated on the Lower Snake River Compensation Plan (LSRCP) team. We evaluated LSRCP released fish (spring chinook salmon at DNFH and steelhead at HNFH) which included the following projects: a 0-age release, analysis of age at return, and calculation of return percentage for spring chinook salmon to DNFH.

We developed a Fishery Management Plan for the Shoshone-Paiute Tribe, Duck Valley Indian Reservation. This Plan provided recommendations for rehabilitating their fishery, evaluated the prospects for additional fisheries, and investigated the potential for hatchery development.

We completed an extensive literature review (published and unpublished) of salmonid supplementation in the Pacific Northwest. This study was funded by Bonneville Power Administration and its objectives were to define the direction of supplementation research in the Columbia Basin.

IFRO has the responsibility for the fishery database for all three federal hatcheries in Idaho and for Leavenworth NFH Complex in Washington. IFRO is gathering and computerizing distribution and return data as well as completing summary release files.

The major accomplishments for our fishery database for 1990 were:

1. 100% of desired data ascension for the Idaho federal hatcheries was completed.
2. 80% of the current data ascension for the Leavenworth Complex was completed, but there is still a backlog of early data.
3. Most of the bugs are worked out of our file structures. There has been a concerted effort to resolve these problems and data discrepancies between our databases and archive files. Our end products are now in high demand from other federal and state agencies.
4. We now have the most comprehensive anadromous salmonid database in Idaho.

IFRO personnel have participated on the following Technical Advisory Committees (TAC) and study teams in 1990:

1. Member of the Nez Perce Tribal TAC on the development of a anadromous salmon hatchery.
2. Member of the Nez Perce Tribal TAC on the production potential for the main stem Clearwater River.

3. Outplanting subcommittee to establish priority, numbers, and places for outplanting steelhead fingerlings, smolts, adults, and spring chinook fingerlings from DNFH.
4. Idaho fish tagging coordination. We assist in planning for upcoming tagging work at the various hatcheries particularly at the three federal hatcheries, DNFH, HNFH, and KNFH.
5. Subbasin Planning Technical Work Group. We are members of the Salmon and Clearwater groups.
6. Idaho Supplementation Technical Advisory Committee. As a member on this committee, we review and provide technical guidance on developing the Idaho Supplementation project.
7. Supplementation Technical Work Group. We completed a contract with BPA which reviewed past supplementation work.
8. Anadromous fish production committee.
9. Pacific States Marine Fishery Commission/Pacific Salmon Commission. We contribute to their regional coded-wire tag database for release and recovery data.
10. Redband Trout Management Committee. A multi-state/federal group that develops management guidelines to protect native redband trout.
11. Idaho Stream Segment of Concern Working group. We provide technical fishery information to the group upon request.
12. Endangered Species Technical Team. Member of a team reviewing endangered species issues relating to anadromous salmon in the Columbia Basin.

EQUIPMENT PURCHASED

A Compaq SLT 286 Laptop computer was added to our ADP equipment to use in various meetings and as a portable work station.

Coded-wire tags were purchased to continue a steelhead broodstock study. Tags were also purchased for spring chinook salmon bacterial kidney disease study and U.S. Canada marking agreement.

Miller aluminum jet boat and Tricker trailer, Johnson 115 motor, and jet pump.

Cost Summary:

2 Miller aluminum boats	- $5795 $6267
2 trailers	- $1330 each
1 motor, 115 HP	- $3980
1 jet pump	- $1050

1 computer (laptop), case, software - $4330

Remodel Office:

carpet	}	
furnishings	}	$11,851
blinds	}	
paneling	}	

2 contracts:

NMFS - tag (reading) contract - $20,000
IDFG - Fish above Brownlee - $40,000

FUTURE OUTLOOK

Idaho FRO will continue to function as a key player in the complex problems stemming from anadromous salmonid production and management in the headwaters of the Columbia Basin. The outlook on the horizon is greater demand by more user groups for fewer resources.

We will be analyzing CWT returns from the steelhead broodstock study in the future. We will also be analyzing freeze brand data to determine if run timing, i.e. early or late adult arrival, is a heritable trait.

We will continue to explore programs to produce spring chinook salmon smolts in one year. If we can produce large enough smolts, we believe we can increase return survival. This program may also have potential to lessen BKD exposure time and susceptibility.

We are excited about the possibilities of cryopreservation of "wild" fish sperm as a means of maintaining genetic integrity of a stock, as well as broodstock management. This is especially critical in years when we experience less than 25 percent males return to the hatcheries. We believe that technology is on the threshold of successful cryopreservation of fish sperm.

Our personnel will become more involved in determining fishery contribution and project area escapements of adults produced by FWS operated facilities in the Columbia River Basin, especially the lower river fisheries.

This office will continue to provide a lead role in providing interagency coordination on hatchery operations and evaluation. We believe this role will expand in value as new hatcheries come on line in the Clearwater drainage.

We will continue to be involved in fishery management on the Duck Valley Indian Reservation. Future work will mainly be implementation of recommendations made in the Management Plan.

Our office is also becoming more and more involved in endangered species issues relating to proposed listings of anadromous salmon stocks in the Columbia Basin.

We are presently proposing to investigate fall chinook spawning issues in the Lower Snake River.

APPENDIX I

OPERATIONS/MAINTENANCE COST DATA

Station: Idaho FRO

Fiscal Year: 19 90

	Funding Source			
	Operations (Fisheries) 1	Cyclical Maintenance (Fisheries) 2	Quarters Maintenance 3	Other Funding 4
1. Salaries, Permanent (Including Benefits):	196,233			
2. Salaries, Temporary (Including Benefits):	13,911			
3. Operating Costs:				
A. Utilities				
1. Telephone	3,774			
2. Electricity				
3. Heating Oil				
4. Natural Gas				
5. Other				
B. Vehicle Maintenance				
1. Distribution Vehicles				
Total Mileage:				

Form 3-110 (Rev. 1/89)

OPERATIONS/MAINTENANCE COST DATA

Station: Idaho FRO

Fiscal Year: 19 90

	Funding Source			
	Operations (Fisheries) 1	Cyclical Maintenance (Fisheries) 2	Quarters Maintenance 3	Other Funding 4
3. B. Vehicle Maintenance (continued)				
2. Non-Distribution Vehicles				
Total Mileage: 31,385	552			
C. Fuel for Vehicles/Equipment	1,278			
D. Supplies				
1. Fish Food				
2. Chemicals/Drugs	190			
3. Fertilizer				
4. Tags and Tagging Supplies	24,868			
5. Office Supplies/Custodial/Other Supplies	3,214			
E. Travel	15,012			

Form 3-110 (Continued) (Rev. 1/89)

OPERATIONS/MAINTENANCE COST DATA

Station: Idaho FRO

Fiscal Year: 1990

	Funding Source			
	Operations (Fisheries) 1	Cyclical Maintenance (Fisheries) 2	Quarters Maintenance 3	Other Funding 4
3. F. Moving Expense				
G. Miscellaneous (List)	20,000 - NMFS tag contract 544 - Computer repair 1,169 - Training 1,147 - Boat (motor install, etc.) 11,851 - Office remodel, furnish 40,000 - IDFG Brownlee contract			
4. Operations (Total: Lines 1, 2, 3A-G)	691 - Pr Gear 3,306 - Miscellaneous			
5. Vehicles/Equipment Purchased (Over $1,000)	19,752 - Boats, motor, trailers			
6. Cyclical Maintenance	5,742 - New computer software, office equip. 1,065			
7. Quarters Maintenance				
8. Total Maintenance (Total: Lines 5, 6, and 7)				
9. Column Totals (Total: Lines 4 and 8)				
10. Total Expenditures (Add Totals of Column 1-4)	$ 364,299			

Form 3-110 (Continued) (Rev. 5/89)

REPORT OF STATION PERSONNEL

Station: Idaho FRO

Fiscal Year: 19 90

Part I - Permanent Personnel (FTE's:)				
Name Of Employee	Functional Title	Grade	Period Worked	Remarks
William H. Miller	Project Leader	GS-12	10/01/89-9/30/90	Full-Time
Travis C. Coley	Assistant Project Leader	GS-11	10/01/89-9/30/90	Full-Time
Ralph B. Roseberg	Fishery Biologist	GS-9	10/01/89-9/30/90	Full-Time
Howard L. Burge	Fishery Biologist	GS-11	10/01/89-9/30/90	Full-Time
Diane E. Praest	Secretary (Typing)	GS-5	10/01/89-9/30/90	Full-Time

Part II - Temporary Personnel (FTE's:)				
Name Of Employee	Functional Title	Grade	Period Worked	Remarks
Mary-Ann Kelley	Biological Aid (Fisheries)	GS-4	10/01/89-7/28/90	Temporary

Form 3-114 (Rev. 1/89)

PUBLIC RELATIONS

Station: Idaho FRO

Fiscal Year: 19 90

1. Presentations:	Number of Groups	Number of People
On Site	3	60
Off Site	2	40

2. Number of Visitors:

Official	78
Public	56

3. Other Public Relation Activities:

Type of Activity	
Presentations to Cub Scouts	

Remarks:

Available for presentation and briefings with Service organizations and sportman's clubs.

Form 3-172 (Rev. 1/89)

Adult Spring Chinook Salmon Returns to Dworshak-Kooskia NFH Complex in 1990 and Prognosis For 1991

U.S. Fish and Wildlife Service
Idaho Fishery Resource Office
Ahsahka, Idaho

Prepared by:

Ralph Roseberg
Fishery Biologist

Howard Burge
Fishery Biologist

Travis Coley
Assistant Project Leader

William Miller
Project Leader

APPENDIX II

Introduction

Dworshak National Fish Hatchery (DNFH) began production scale rearing of spring chinook salmon (SCS) in 1982. In 1981 the Lower Snake River Compensation Plan authorized and funded the construction of 30 raceways for the production of 1.05 million SCS smolts. Construction was completed by June 1982 and the first direct release took place in 1983. The DNFH trap on the North Fork Clearwater River was operated for returning SCS adults for the first time in 1984.

Kooskia National Fish Hatchery (KNFH) has been in the SCS business since 1972. KNFH is approximately 30 miles upstream from DNFH, on Clear Creek near its confluence with the Middle Fork Clearwater River. KNFH is responsible for rearing and releasing SCS into the Middle Fork Clearwater River. KNFH is funded by the U.S. Fish and Wildlife Service.

Run Size

The 1990 adult SCS return to the Dworshak-Kooskia NFH Complex was the most successful in recent years. DNFH had a record high rack return of 2,042 adults replacing the 1987 return as our all time high (Table 1). The adult SCS return to KNFH was the third highest ever for that facility (Table 2) and by far the highest in over a decade. Rack returns alone underestimate the 1990 SCS run in comparison with earlier years. The Nez Perce tribal harvest of 513 fish and the first sport season ever on hatchery SCS (369 fish) yielded an additional 882 SCS from the North Fork Clearwater River. An additional 124 SCS were harvested by the Tribe in Clear Creek. These harvest figures help push the record return number much higher. The 1990 SCS run was the first return from 3 consecutive full production releases from both hatcheries. Therefore the 1990 SCS run is a benchmark for return levels from normal production releases. The landmark 1990 run supported a tribal fishery, a sport fishery, and provided enough eggs for both federal hatcheries, as well as three Idaho Department of Fish and Game satellite facilities.

In 1990, 2480 adults were spawned at DNFH and 4.833 million eggs were taken (Table 3). This is the combined take for the Dworshak-Kooskia NFH Complex since all spawning operations occurred at DNFH.

Table 1. Hatchery returns and age composition of spring chinook salmon to Dworshak NFH.

Year	I-salt	II-salt	III-salt	Unmeasured	Total Return
1984	14	52	16	0	82
1985	13	281	35	5	334
1986	78	346	91	0	516
1987	25	1604	376	12	2017
1988	163	569	1240	0	1972
1989	156	1322	221	1	1700
1990	7	1892	135	8	2042

Table 2. Hatchery returns and age composition of spring chinook salmon to Kooskia NFH.

Year	I-salt	II-salt	III-salt	Unmeasured	Total Return
1972	5	0	0	0	5
1973	5	45	0	0	50
1974	16	35	2	0	53
1975	15	284	27	0	326
1976	409	286	106	0	801
1977	333	2539	154	0	3026
1978	23	1676	336	0	2035
1979	11	100	264	0	375
1980	9	55	3	0	67
1981	1	168	78	0	247
1982	3	116	139	0	258
1983	1	231	141	0	373
1984	55	80	206	0	341
1985	26	449	54	0	529
1986	21	159	103	0	283
1987	16	607	64	0	687
1988	39	363	193	0	595
1989	107	717	142	7	973
1990	11	921	209	0	1141

Table 3. Dworshak-Kooskia NFH Complex spring chinook salmon spawning data for 1990.

	Males	Females	Total
Adults Sexed	1,339	1,627	2,966
Adults Spawned	1,147	1,333	2,480
% Mortality			6.8
Green Eggs	--	--	4,833,104
Eyed Eggs	--	--	4,333,105
Percent Eye-up	--	--	94.2
% IHN Positive	--	--	11.1
% BKD Positive	--	--	13.3

Stock Description

We have complete rack returns for the 1987 release year at DNFH. We realized a 0.095 percent return with a genetic makeup of 100 percent Rapid River stock. The 1988 release year (also 100 percent Rapid River stock) returned 1892 II-salt fish to the DNFH rack (For a complete stock breakdown see Appendix A). The 1989 release returned only 7 I-salts, a record low. The 244 I-salts counted at Lower Granite Dam in 1990 was also a dramatic record low, down from a previous low of 924. (For the genetic make-up of DNFH releases see Table 4).

We also have complete rack returns for 1987 release year at KNFH. We had a smolt-to-adult return of 0.126 percent from Kooskia stock. The 1987 release year returned 209 III-salt fish. The 1988 release year (Clearwater stock) returned 921 II-salt fish. The 1989 release (only half the production was released on-site) returned only 11 I-salts. (For the genetic make-up of KNFH releases see Table 5.)

Table 4. Genetic make-up of Dworshak NFH spring chinook salmon releases at the hatchery as smolts.

Release Year	Genetic Make-up*	% Rack Return
1983	75.1% LW	0.074
	12.3% RR	
	12.6% LE	
1984	100% LE	0.283
1985	67.8% LW	0.257
	32.2% LE	
1986	100% LE	0.161
1987	100% RR	0.095

*KK - Kooskia
RR - Rapid River
CA - Carson
LW - Little White Salmon
LE - Leavenworth

Table 5. Genetic make-up of Kooskia NFH spring chinook salmon released in Clear Creek as smolts.

Release Year	Genetic Make-up*	% Rack Return
1971	85.6% RR - 14.4% WR	0.034
1972	100% RR	0.070
1973	100% CA	0.080
1974	100% CA	0.150
1975	58% RR - 42% CA	0.409
1976	100% SS -	0.234
1977	84% CA - 11% KK - 5% LW	0.009
1978	75% RR - 25% CA	0.012
1979	69% KK - 31% CA	0.033
1980	31% KK - 69% CA	0.034
1981	64% CA - 19% KK	0.039
	17% RR	
1982	100% CA	0.027
1983	65% KK - 35% LE	0.097
1984	89% KK - 11% RR	0.053
1985	100% KK	0.272
1986	100% KK	0.148
1987	100% CL	0.126

*RR - Rapid River
CA - Carson
SS - South Santiam
LW - Little White Salmon
KK - Kooskia
LE - Leavenworth
CL - Clearwater

Age Composition

Age composition of the run is based on fork length categories. These length categories were derived from known age/length/sex data from CWT returns. I-salts are 56 cm or less, II-salts are 57 through 81 cm, and III-salts are larger than 81 cm. The age composition is displayed in Table 6.

Table 6. Age composition for 1990 spring chinook salmon returning to Dworshak-Kooskia NFH Complex.

Dworshak NFH			Kooskia NFH		
Age	Number	Percent	Age	Number	Percent
I-salt	7	0.3	I-salt	11	1.0
II-salt	1892	93.0	II-salt	921	80.7
III-salt	135	6.6	III-salt	209	18.3
TOTAL MEASURED	2034	100	TOTAL MEASURED	1141	100

Survival

The III-salt returns in 1990 complete the returns from the 1,710,710 smolts released at DNFH and the 763,900 smolts released at KNFH in 1987. Total returns to DNFH from the 1987 release were 163 I-salts, 1323 II-salts, and 193 III-salts for a hatchery return survival rate of 0.095 percent (Table 7). Total returns to the KNFH from the 1987 release were 39 I-salts, 717 II-salts, and 209 III-salts for a hatchery return survival rate of 0.126 percent (Table 8).

For evaluation purposes it is important to realize that the 1988 release was much more successful than the DNFH rack return alone would indicate. If we add the harvest by the Nez Perce Tribe ladder fishery and the harvest by the experimental sport fishery in the Clearwater, the total II-salt survival of the 1988 release increases from 0.122% (DNFH rack only) to 0.175 (rack plus fishery).

Table 7. Return vs. release numbers for the 1990 adult spring chinook salmon return to Dworshak NFH.

Release Year	Smolts Released at Hatchery*	I-salts (% return)	II-salts (% return)	III-salts (% return)	Total (% return)
1987	1,710,710	163 (0.010%)	1323 (0.077%)	135 (0.008%)	1621 (0.095%)
1988	1,547,219	156 (0.010%)	1892 (0.122%)		
1989	1,651,472	7 (0.0004%)			

*Includes smolt releases at hatchery only. Does not include off-site releases or fry/fingerling releases.

Table 8. Return vs. release numbers for the 1990 adult spring chinook salmon return to Kooskia NFH.

Release Year	Smolts Released at Hatchery*	I-salts (% return)	II-salts (% return)	III-salts (% return)	Total (% return)
1987	763,900	39 (0.005%)	717 (0.094%)	209 (0.060%)	965 (0.126%)
1988	778,407	107 (0.014%)	921 (0.121%)		
1989	384,235	11 (0.001%)			

*Includes smolts released at hatchery only. Does not include off-site releases or fry/fingerling releases.

Coded-wire Tag (CWT) Recoveries

Our facilities have increased the levels of fish marking because of the need to verify our contributions to various fisheries as well as test rearing and/or release schemes. As a result, the formerly meager SCS CWT recovery database has expanded to the point where it is useful for ongoing hatchery evaluation efforts. The 1987 rack yielded 25 total recoveries, 19 of which

were DNFH releases. The 1988 rack contained 55 total recoveries, 49 of which were DNFH marks. The 1989 rack yielded 77 total recoveries, 47 of which were DNFH marks. The 1990 rack yielded 306 total adult recoveries, 302 of which were DNFH marks. Almost all adult recoveries, that are not DNFH marks, were part of the National Marine Fisheries Service transportation study. Occasional adult strays from other hatcheries appear. This year CWT smolts and mini-jacks from Oregon and Washington hatcheries showed up in the DNFH rack. The 1990 rack recoveries are summarized in Appendix B.

1990 Preseason Predictions

The 1990 SCS returns to Dworshak-Kooskia NFH Complex was both gratifying and disappointing. The very successful II-salt return gave us cause to celebrate but the abysmal I-salt return may forecast a grim future. We also overestimated the return rate for III-salts. We believe that this may be because of the shift in recent years to Rapid River stock which has a higher population of II-salt returns.

Dworshak NFH-1990

1990 Run Prediction		1990 Rack Return		1990 Total Return (includes harvest)	
I-salt =	88	I-salt =	7	I-salt =	10
II-salt =	1409	II-salt =	1892	II-salt =	2709
III-salt =	1351	III-salt =	135	III-salt =	193
Total n =	2848	Unmeasured =	8	Total =	2912
		Total Run =	2042		

(If we compare the Total Run Prediction of 2,848 to the Total Return of 2,912, our totals are quite close. However, the predicted age breakdown was in error.)

Kooskia NFH-1990

1990 Run Prediction		1990 Rack Return		1990 Total Return (includes harvest)	
I-salt =	29	I-salt =	11	I-salt =	12
II-salt =	1034	II-salt =	921	II-salt =	1021
III-salt =	399	III-salt =	209	III-salt =	232
Total =	1462	Unmeasured =	8	Total =	1265
		Total Run =	1147		

1991 Run Predictions

The following is our prediction for the 1991 SCS run. Our estimate for Dworshak-Kooskia NFH Complex has very wide confidence limits because the ultra low 1990 I-salt count was out of the range of our previous regression data.

Dworshak NFH		Kooskia NFH	
I-salts	75	I-salts	35
II-salts	250	II-salts	350
III-salts	500	III-salts	300
TOTAL	825	TOTAL	685
Prediction	825 ± 400	Prediction	685 ± 200

Total predicted to return both hatcheries in 1991 is 1500 ± 600.

The total hatchery spring chinook salmon predicted to return to Dworshak and Kooskia NFH's in 1991 will not meet the hatchery needs for eggs. The number of adults needed for supplying eggs to fill both hatcheries is estimated at 2500. Actual number needed varies, depending on number of eggs per female (which varies with size and age of fish returning) and sex ratio. The Dworshak-Kooskia NFH Complex 1990 spawning operation satisfied their needs as well as the egg requirements for Idaho Department of Fish and Games's Powell, Red River, and Crooked River satellite stations in 1990. Unfortunately, this will not be the case in 1991.

APPENDIX A

APPENDIX A. Spring chinook salmon stocks used in the development of Dworshak-Kooskia NFH Complex spring chinook salmon program.

KOOSKIA	This designation was used when adults returning to Kooskia were spawned separately and their progeny reared separately. Our definition for adult returns to Kooskia, regardless of parentage, was "Kooskia stock".
RAPID RIVER	Developed from wild spring chinook, captured at Snake River dams, after their construction. Destined for Snake River tributaries in Idaho and Oregon.
CARSON	From Carson NFH on the Wind River, Washington, tributary to the Columbia in Bonneville pool. Originally developed from spring chinook collected at Bonneville Dam from 1955-63. A heterogeneous collection of spring chinook destined to upriver areas.
SOUTH SANTIAM	From ODFW's South Santiam hatchery, a Willamette River tributary, which maintained two spring chinook stocks; one of Santiam River origin; the other from Carson NFH stock. Kooskia's fish came from the Carson stock.
LITTLE WHITE SALMON	From Little White Salmon NFH on the Little White River, Washington, tributary to the Columbia River in Bonneville pool. Developed from Carson stock.
LEAVENWORTH	From Leavenworth NFH on Icicle Creek, Washington, tributary to the Wenatchee River. Originally, from upriver spring chinook captured at Rock Island Dam in the early 1940s. Leavenworth went out of spring chinook production in the mid-1960s. In the 1970s, the hatchery stock was rebuilt primarily with Carson stock. The run is now self-perpetuating.
CLEARWATER	From a mixture of Dworshak NFH and Kooskia NFH adult returns. These fish were held and spawned at Dworshak NFH.

APPENDIX B

APPENDIX B. Coded-wire tag recoveries of spring chinook salmon adults in the 1990 Dworshak and Kooskia NFH rack.

TAGCODE	RECOVERIES	STUDY
III-OCEAN		**********IFRO STUDIES**********
102936	1	CONTRIBUTION , AGE 1+, SPRING RELEASE
II-OCEAN		**********IFRO STUDIES**********
102813	9	FALL RELEASE, AGE 1+, REP 1
102814	5	FALL RELEASE, AGE 1+, REP 1
51751	18	FALL RELEASE, AGE 1+, REP 2
102943	6	FALL RELEASE, AGE 1+, REP 2
102930	3	FALL RELEASE, AGE 1+, REP 3
102934	25	FALL RELEASE, AGE 1+, REP 3
104055	69	CONTRIBUTION , AGE 1+, SPRING RELEASE
104056	107	CONTRIBUTION , AGE 1+, SPRING RELEASE
104057	58	CONTRIBUTION , AGE 1+, SPRING RELEASE
I-OCEAN		**********IFRO STUDIES**********
54011	1	FALL RELEASE, AGE 1+
0-OCEAN		**********IFRO STUDIES**********
52162	7	CONTRIBUTION, MEDICATED FEED
52163	4	CONTRIBUTION, MEDICATED FEED
52205	3	CONTRIBUTION, NO MEDICATED FEED
52260	3	PASCHO LOW BKD PROGENY
52261	7	PASCHO LOW BKD PROGENY
52262	7	PASCHO LOW BKD PROGENY
52305	2	PASCHO HIGH BKD PROGENY
52306	3	PASCHO HIGH BKD PROGENY
III-OCEAN		**********NMFS STUDIES**********
231943	1	
II-OCEAN		**********NMFS STUDIES**********
232237	1	
232240	1	
I-OCEAN		**********NMFS STUDIES**********
232256	1	
0-OCEAN		**********NMFS STUDIES**********
232930	6	ADVANCED PHOTOPERIOD
232931	6	ADVANCED PHOTOPERIOD
0-OCEAN		**********LYONS FERRY STRAYS**********
635501	1	
0-OCEAN		**********STRAYS FROM OREGON **********
75101	1	
75106	2	
75109	1	
75111	2	

Adult Steelhead Returns to Dworshak NFH in 1989-90 and Prognosis For 1990-91

U.S. Fish and Wildlife Service
Idaho Fishery Resource Office
Ahsahka, Idaho

Prepared By:

Howard Burge
Fishery Biologist

Travis Coley
Assistant Project Leader

William Miller
Project Leader

Ralph Roseberg
Fishery Biologist

INTRODUCTION

Releases of steelhead smolts from Dworshak National Fish Hatchery (DNFH) began in 1970 with the first hatchery produced adults returning in 1972. The 1990 return marked the 18th year that artificially spawned North Fork Clearwater River ("B" run) steelhead have returned to DNFH. This report reviews the statistics of the 1989-90 run and the prognosis for 1990-91.

1989-90 Adult Returns

The 89-90 return year started off with a bang when we again opened our ladder in early October. Early ladder opening insured that we include a portion of the early returning spectrum in our broodstock. We held approximately 550 of these fish overwinter.

The 1990 Dworshak NFH rack return was 10,613, the third largest in the hatchery's history (Table 1). This above average return was assisted by excellent river passage conditions. The sport fishery was also considered excellent with catch rates dropping as low as 7 hours per fish in the Lower Clearwater River in January 1990.

1990 Brood Year

The Infectious Hematopoietic Necrosis Virus (IHNV) problem has greatly improved over 1989. Loss of over 2.4 million fish (78%) was experienced at DNFH in 1989. Brood Year 1990 was almost an order of magnitude lower at 0.28 million fish (14%). No single definite reason for the improvement can be given. Some possible explanations include;

(1) Losses throughout the northwest are down.
(2) Possible higher flows in North Fork Clearwater River in the period of early fingerling rearing.
(3) If there is vertical transmission of IHNV, 1990 brood year fish were the first of second generation IHNV survivors. Also, the 1986 brood year (parents of 1990 brood) experienced only a 15 percent mortality to IHNV. Additionally, river flows for returning adults in 1990 were high, thereby, allowing easier, less stressful passage. One thing that is true of IHNV is that it mutates, therefore, if one generation is resistant to the virus, the next generation is not necessarily facing the same strain.

Because of the improved survival of DNFH steelhead smolts in 1990, there was excess of 661,056 "B" steelhead being reared at Hagerman NFH. These excess fish were outplanted, in September-October 1990, to six sites on the East Fork of the Salmon River and one site on Hazard Creek on the Little Salmon River. The remainder of the 1990 brood fish are due for release in April-May, 1991.

Stock Description

Dworshak NFH maintains the North Fork Clearwater River steelhead stock which was cut off from its ancestral spawning grounds by Dworshak Dam in 1968. Size-wise, this stock ("B" run) of steelhead is unique. At maturity, males

and females average about 91 cm (36 inches) and 82 cm (33 inches) in length, respectively. Spawning stock is comprised primarily of three age classes; I-, II-, and III-"salt" fish. This nomenclature refers to the number of complete years fish have spent in salt water. Chronologically, the fish are 2 years older than this system indicates as they are reared for 1 year in the fresh water hatchery environment and, also, spend another year emigrating and returning.

The "B" run steelhead enter the Columbia River in August, later than the smaller size "A" run fish. The "B" run reaches the Snake and Clearwater Rivers in the fall, then overwinter until their final spawning run into the hatchery.

Preseason Predictions

Predictions by the Idaho Fishery Resource Office (IFRO) are based primarily on the strength of returns of younger age classes for any given brood. For example, there is a strong linear correlation (r=0.95) for predicting the number of II-salt steelhead returning in a year based upon the number of I-salt fish that returned the previous year. A similar regression is used for predicting the III-salt return from the number of II-salt fish which returned the previous year. We do not have a consistent and accurate prediction method for I-salts. Instead, an average percentage return for I-salt fish is applied to the number of smolts released for the appropriate brood year. These three estimates are summed to predict the total hatchery return.

Table 1 summarizes Dworshak NFH steelhead runs to the Clearwater River. For the 1989-90 steelhead run, we had predicted 7,702 ± 1000 fish back to the DNFH rack (see our 1989 annual report). We had also predicted a total return to the Clearwater River of 30,425. We underestimated the return to DNFH rack which was 10,613 fish. The point estimate was off 38 percent and the range estimate was off 22 percent. However, we believe the estimate of 30,425 hatchery fish to the Clearwater River (as measured at Lower Granite Dam) was fairly close to the actual number. Using the survival rates to Lower Granite of our CWTed branded II-salt fish, 1.68 percent for hatchery released fish and 0.96 percent for off-site released fish, we estimated that 31,000 DNFH fish crossed Lower Granite Dam during the fall of 1989 and spring of 1990. If there was a difference between survival of tagged fish and untagged fish, then we underestimated the total return to the river.

Using the estimated sport harvest figure from Idaho Department of Fish and Game, 15,953 fall harvest and 12,000 spring harvest, adding in the hatchery return, the estimated Nez Perce tribal harvest of 1710, and potential escapement, we get an estimated number of over 43,000 DNFH fish to the Clearwater. This is all the hatchery "B's" recorded at Lower Granite Dam. It also suggests a sport harvest rate of 75 percent for the Clearwater which is considerably higher than the normal 50 percent. We believe this is an overestimate of as much as 25 percent in the sport harvest figure.

Table 1. Number of steelhead trout returning to Dworshak National Fish Hatchery and estimates of hatchery fish harvested and total hatchery returns to the Clearwater River.

Return[1]	Number Back To DNFH	Estimated Sport Fisherman Harvest Clearwater R.	Estimated Tribal Harvest Clearwater R.	Hatchery Fish Return Upriver of North Fork (unharvested)[8]	Total Hatchery Fish Returning to Clearwater R.
1972-73	9,938	2,068	-	0	12,006
1973-74	7,910	2,320	-	0	10,230
1974-75	1,698	N.S.[3]	290	0	1,988
1975-76	1,858	N.S.	430	0	2,288
1974-77	3,100	N.S	410	0	3,510
1977-78	12,727	14,000	(1,000)[5]	0	27,727
1978-79	4,939	4,610	(500)	0	10,049
1979-80	2,519	N.S.	1,250	300	4,069
1980-81	1,968	4,510	(1,000)	500	7,978
1981-82	3,054	1,665	(1,000)	0	5,719
1982-83	7,672	13,967[4]	(1,500)	0	23,139
1983-84	3,284	6,500	(1,500)	100	11,384
1984-85	14,018	19,410	(1,500)	2,700	37,628
1985-86	4,462	7,240	1,471	1,800	15,002
1986-87	5,286[2]	15,679	4,210[6]	3,000	28,175
1987-88	3,764	8,766[9]	1,478[7]	2,000	16,008
1988-89	6,041	11,332[9]	1,242[10]	3,700	22,315
1989-90	10,613	27,953[9]	1,710[10]	3,650	43,926[11]

(1972-73 to 1983-84 data based on report from Pettit, 1985, IDFG Federal Aid Report, Project F-73-6, January, 1985.)

[1]Return year is from October through May.
[2]Actual number returned, ladder closed, not a complete return figure.
[3]N.S., no sport fishing season.
[4]Pettit included an additional 2,000 fish in harvest from Snake River for a total of 15,967.
[5]( ) guesstimate on tribal harvest by author.
[6]Mauney, J.L. et al. 1988. A survey of the Nez Perce subsistence fishery for steelhead trout (Oncorhynchus mykiss) the Dworshak National Fish Hatchery ladder North Fork of the Clearwater River, Idaho, 1986-87.
[7]Mauney, J.L. et. al. 1990. A survey of the Nez Perce subsistence fishery for steelhead trout (Oncorhynchus mykiss) North Fork of the Clearwater River, Idaho, 1987-88.
[8]Based on return percentage back to hatchery to calculate returning of II-salts from upstream releases.
[9]Kent Ball, IDFG, Salmon, Idaho, Personal Communication.
[10]Paul Kucera, Nez Perce Tribe, Lapwai, Idaho, Personal Communication.
[11]We believe the sport estimate of 27,953 is around 8,000 too high and the total number of Dworshak steelhead to the Clearwater River was in the range of 31,000 to 35,000. (See last paragraph on the previous page)

Hatchery Operation

The hatchery ladder was opened October 11 and remained open until October 27 (558 steelhead entered the trap). Ladder was reopened February 13, then closed on February 16 after 2,300 adults entered the trap. It was reopened on February 22, then operated continuously until May 8, the last spawning date. The initiation of ladder operation in October was a continuing attempt to insure inclusion of early arriving SST in the hatchery gene pool. Over 11.2 million green eggs were collected over a twelve-week period (Table 2).

Table 2. Dworshak NFH steelhead spawning data for 1989.

		Male	Female	Total
Total rack return		3,343	7,260	10,613[1]
Total SST spawned		831	1,632	2,463
Green eggs	11,278,564[2]			
Eyed eggs	8,561,914			
Percent eye up	84.1%[3]			

[1]This total includes 10 fish that were not measured or sexed.
[2]Green egg values are not adjusted for culled eggs.
[3]Percent eye-up values are based on adjusted green egg numbers.
Pers. Comm. - Jon Streufert

Excess fish and carcasses from spawned adults and health samplings were donated to the Idaho Department of Education food bank. The food bank received 9,308 steelhead (111,696 lbs).

Adult Outplanting

On occasions when we have more adult steelhead than the hatcheries can accommodate, they are outplanted into streams. Usually the outplanting is to, hopefully, allow some natural spawning, but some 1990 outplanting was solely to provide for a specific sport fishery. In 1990, DNFH outplanted 806 adult steelhead. Table 3 summarizes numbers and release locations of the outplanted adults.

Table 3. Dworshak NFH Adult Steelhead Outplants, 1990.

Date	Males	Females	Total	Site	Purpose
3/01/90	124	151	275	Boise River	Sport fishery
3/08/90	22	132	154	Boise River	Sport fishery
4/18/90	89	162	251	Crooked River	Natural spawning
3/01/90	13	12	25	Payette River	Sport fishery
3/05/90	34	67	101	Rock Creek near Twin Falls (Tributary to Snake River)	Sport fishery
TOTAL	282	524	806	Dworshak outplants	

Coded-Wire Tag Returns (CWT)

The 1987 Dworshak NFH release contained eight CWT groups from IFRO studies.

Four groups were off-site releases, of these two groups went to Clear Creek and two to Crooked River. Recoveries of these fish in the rack are essentially strays so comparing the rack return rate (0.03 to 0.22%) is not useful in evaluating success of the release. It is, however, useful as a measure of the significance of straying that occurs as a result of stocking smolts upriver from the rearing facility. Recoveries of these CWT groups in the Zone 6 fishery and IDFG sport harvest are useful in determining contribution of off-site releases to downstream fisheries.

To determine contribution of direct releases from Dworshak NFH, steelhead from each system were tagged. System I release had the best return, at 0.73 percent. System II releases returned at 0.39 percent, compared to System III fish which returned at 0.30 percent. System I had no reuse while System II and III had reuse.

Progeny from IHN+ parents returned at 0.33 percent to the rack. Table 4 shows CWT codes and origin of the 47 groups recovered from the 1990 rack.

Age Composition

The age composition entering DNFH was as follows:

I-salt = 487
II-salt = 9,901
III-salt = 215

The run was made up of 4.6 percent I-salts, 93.4 percent II-salts and 2.0 percent III-salts.

Adults were comprised of 68.5 percent females and 31.5 percent males.

Table 4. Coded-wire tag recoveries of steelhead adults in the 1990 Dworshak NFH rack.

Tag Code	Recoveries	Study	Return Rate
III-Ocean		IFRO Studies	
51729	2	Off-site release, S.F. Clearwater	
51753	2	No reuse, System I	
51754	7	Normal reuse, Compare with 51753	
102856	1	IHN survivors, System II	
II-Ocean		IFRO Studies	
51834	37	Off-site release, Clear Creek	0.1760%
51835	6	Off-site release, Clear Creek	0.0309%
51836	65	IHN+ parents	0.3304%
102931	137	System I contribution-no reuse	0.7278%
102932	81	System II contribution-reuse	0.3927%
102933	57	System III contribution-reuse	0.2992%
102940	59	Off-site release, Crooked River	0.2258%
102941	12	Off-site release, Crooked River	0.0499%
I-Ocean		IFRO Studies	
51711	4	Pond 36, fall return progeny-rod & reel	
51712	1	Pond 36, fall return progeny-rod & reel	
51713	3	Pond 36, fall return progeny-rod & reel	
51714	4	Pond 28, late spring return progeny	
51739	1	Pond 28, late spring return progeny	
51846	6	Pond 2, I-salt progeny	
51849	0	Pond 10, System II contribution	
51850	15	Pond 24, System II contribution	
51851	1	Pond 17, System II contribution	
51852	8	Pond 33, System I contribution, 21028 FB	
51853	0	Pond 60, System III contribution	
51854	4	Pond 55, System III contribution, 18090 FB	
102928	1	Pond 34, fall return progeny-shocked	
102929	2	Pond 34, fall return progeny-shocked	
III-Ocean		NMFS Studies	
231903	1	Marked at Granite-barged to Little Goose	
231913	1	Marked at Granite-barged to Bonneville	
231914	1	Marked at Granite-barged to Bonneville	
II-Ocean		NMFS Studies	
231943	13	Marked at Granite-barged to Bonneville	
231944	23	Marked at Granite-barged to Bonneville	
231945	7	Marked at Granite-barged to Bonneville	
231946	2	Marked at Granite-barged to Bonneville	
231947	5	Marked at Granite-barged to Bonneville	
232030	2	Marked at Granite-barged to Bonneville	
II-Ocean		Lyons Ferry Strays	
633703	1	Lyons Ferry release at Lyons Ferry	
633844	1	Lyons Ferry-Curl Lake-Tucannon River	
633903	1	Lyons Ferry-Curl Lake-Tucannon River	
633913	1	Lyons Ferry release at Lyons Ferry	
633914	1	Lyons Ferry release at Lyons Ferry	
I-Ocean		Lyons Ferry Strays	
634941	1	Lyons Ferry fish released at Curl Lake	
634944	3	Lyons Ferry fish released at Touchet River	
634947	3	Lyons Ferry fish released at Lyons Ferry	
635013	1	Lyons Ferry fish released at Lyons Ferry	
635014	1	Lyons Ferry fish released at Lyons Ferry	
635016	1	Lyons Ferry fish released at Lyons Ferry	
635019	1	Lyons Ferry fish released at Lyons Ferry	

Survival

The return of DNFH fish to the rack was comprised of an estimated 93.4 percent II-salt fish. If this factor is applied to our estimated total of 31,000+ steelhead to the Clearwater River, then 28,954+ II-salt fish returned to the Clearwater. In 1987, DNFH released 2,105,748 steelhead smolts in the Clearwater River. Based on the estimated II-salt returns to the Clearwater of 28,954, this equals a 1.37 percent smolt to adult return.

If we use IDFG sport harvest estimate for a total return of 43,926 steelhead to the Clearwater River, we obtain an estimate of 41,026 II-salt fish. Based on this estimate, we calculate a 1.95 percent smolt-to-adult return. The previous high return to the river was the 1982 release at 1.45 percent. For the 1982 release, we had a II-salt return to the hatchery of 12,679. When compared to the 1990 II-salt return of 9,901, one can see why we believe the IDFG sport harvest is overestimated.

1990-91 Run Prediction for DNFH Steelhead

Based on correlation of I-salts to II-salts and average return rate for I- and III-salts, we are estimating the following for hatchery returns:

II-salts =	6800	
III-salts =	250	
I-salts =	150	
TOTAL	7200	back to hatchery

With an estimated Idaho sport harvest of 50 percent of hatchery fish entering the Clearwater, a 25 percent straying rate of upriver outplanted fish back into Dworshak, a survival rate of outplanted fish one-third less than hatchery fish, and an estimated Nez Perce Tribal harvest in the Clearwater of 2000 fish, we have estimated the following 1990-91 return for the Clearwater River.

7,200	DNFH rack return
7,200	Sport harvest of fish destined for DNFH
3,150	Return of upstream outplants - rest sport harvested
3,150	Upstream outplants - sport harvested
2,000	Nez Perce Tribal harvest in Clearwater River
22,700	TOTAL DNFH fish entering Clearwater

Putting a range estimate on the above, we feel comfortable in estimating between 18,000 and 27,000 DNFH steelhead will enter the Clearwater River during the 1990-1991 run year. A lot will depend on river flows, water temperature, and Zone 6 harvest rates.

All in all, the 1990-91 steelhead season for the Clearwater looks to be a good one. This run is expected to compare closely with the run we had in 1988-89 where a total of 22,500 DNFH fish are estimated to have entered the Clearwater. However, it will be less than the 31,000+ fish we had last year.