Annual Report
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Dworshak Fisheries Assistance Office
Ahsahka, Idaho

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INTRODUCTION

Dworshak Fisheries Assistance Office (DFAO) is located on the Dworshak National Fish Hatchery grounds at Ahsahka, Idaho. The office has a staff of four full-time employees and two part-time employees. The primary goal of DFAO is to assist in the 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.

DFAO personnel conducted a wide range of activities during 1987. In the winter and spring of 1987, we continued collecting adult steelhead for a broodstock study. In the spring of 87, we installed an adult fish weir on two streams in the Lochsa Basin to collect natural spawning steelhead for sperm cryopreservation. Field work also included collecting samples for fish disease analyses. Key diseases of interest were whirling disease, Myxobolus cerebralis, and Infectious Hematopoietic Necrosis (IHN) virus. DFAO personnel produced the Dworshak National Fish Hatchery Mitigation Report; a report that chronicles the history and mitigation record of the hatchery. Much effort was expended on continued hatchery database development and data ascension on our computer. The hatchery computer database system changed names from HED (Hatchery Evaluation Database) to FRED (Fishery Resources Evaluation Database). Additional computer work this past year included FRED data entry for the Leavenworth Complex. DFAO personnel also coordinated the Lower Snake River Compensation Plan (LSRCP) hatchery evaluation work and assisted other agencies in doing needed field and hatchery work relative to the management of upper Snake River salmon and steelhead. Some work continued at Hagerman National Fish Hatchery (HNFH) on fin erosion--its possible cause and correlation to other factors. A synopsis report of the various studies and research work being done at the Idaho federal hatcheries was completed.

ACTIVITIES

Broodstock Study, Dworshak National Fish Hatchery

The husbandry of North Fork Clearwater River steelhead was started in 1969 with a temporary weir to trap the wild returning adults. For the past 16 years, Dworshak National Fish Hatchery (DNFH) has taken eggs from fish returning to the North Fork Clearwater River. During the first 4 years of trappings (1969 to 1973), adult steelhead consisted of all or part wild stock. From 1973 until present, adult fish returning to DNFH were primarily from smolts reared and released at the hatchery, and a few wild fish which stray into the hatchery periodically. Maintenance of the biological and genetic integrity of the North Fork Clearwater River steelhead is now dependent entirely upon broodstock and egg management programs at DNFH.

Since the early 1970's, DNFH has been taking eggs throughout the time spectrum of the run as fish enter the hatchery. Eggs are generally kept in proportions equivalent to the number of adults spawning each week throughout the run. With the present paucity of genetic data relative to the DNFH broodstock this is probably the best approach for now. However, there are indicators that original run timing and spawning patterns are changing. The early years of hatchery operations saw steelhead spawning from early March until early June. In recent years, spawning has taken place from about the first of February to the first part of May. Generally, time of spawning has occurred one month earlier in recent years. Prior to 1973, when the Lewiston Dam was on the lower Clearwater River and fish were counted going into the Clearwater, the steelhead run was generally described as being 50 percent in the fall and 50 percent in the spring; that is half of the run entered the Clearwater River in the fall of the year and half remained in the Snake River and entered the Clearwater in the spring. This percentage varied between 30 and 70 percent over the last 12 years that the Lewiston Dam count data was taken (1961-73). It is suspected that the percent of the run entering in the spring and fall is changing in recent years. However, data to document any changes are not now available.

One reason given for the advance of spawning time has been the increase in river water temperature and fish maturation rates as a result of Dworshak Reservoir operations. Other genetic factors bear consideration: (1) fish that arrive in the Clearwater River in early fall are subjected to much more angling pressure than later-arriving fish. This could result in an ever diminishing contribution of this part of the run to the spawning stock; (2) the genetic component of river entry, hatchery arrival, and spawning time is strong and any hatchery broodstock, egg or fish cultural practices which inadvertently selects for one segment over the other could shift run timing and spawning characteristics of the run.

Two studies were initiated by DFAO in 1983 and 1984 to help determine heritability of stock performance characteristics. Marked groups of progeny from crosses of I-salt, II-salt, and III-salt parents were released in 1983 and will look at heritability of age upon return. Marked lots of progeny from parents spawning in early, middle, and late portions of the run as it enters the hatchery were released in 1984 and will help determine the genetic component of hatchery spawning time. If run timing is genetically controlled as early analyses of the two studies indicate, then we need to follow up with studies to determine if one time segment of the run is exploited more than another. The 1987 broodstock study was designed to help answer these questions.

The objectives of this study are as follows:

1. Determine if run timing of Dworshak NFH fish past Lower Granite Dam is genetically controlled.

2. Determine if the catchability of Dworshak NFH steelhead in the Clearwater River is genetically influenced either directly (i.e. certain genetic strains being more susceptible to angling) or indirectly through being in the right area at the right time to be caught.

3. Determine the heritability of the length of marine residence (age at maturity) for Dworshak NFH broodstock.

During the fall of 1986 and spring of 1987, adult fish were captured from the Clearwater River to initiate this broodstock study. Thirty-five adult steelhead were captured in the fall of 1986 with sport fishery gear and another 41 adults were captured with electrofishing gear. An additional 82 adult steelhead destined for DNFH were taken at Lower Granite Dam in the spring of 1987. Adult test fish were injected with a hormone to induce spawning. All fish were spawned and the progeny reared in separate containers for the three lots of test fish. In the spring of 1988, marked lots of smolts will be released from these groups and compared with marked lots of normal hatchery release groups.

Return data from these marked groups will consist of: numbers and time that returning adults cross Lower Granite Dam; numbers, time, and place adults are harvested; and number and time of adult entry into DNFH.

Supplementation of "Wild/Natural" Gametes into the DNFH Gene Pool

As a means of introducing "wild/natural" traits into the DNFH brood stock gene pool, trapping was conducted on two Lochsa River tributaries (Papoose and Squaw creeks) to collect sperm from late-spawning steelhead. Sperm from captured fish was frozen by a technique being developed at the University of Idaho Biological Science Department. We will use this preserved sperm to fertilize eggs from DNFH stock females captured in late spring of 1988. Progeny from crosses with the "wild/natural" stock will be followed through the hatchery and if adequate smolts can be reared, will be marked for determining contribution and timing back to the hatchery.

In summary, we captured 24 adult steelhead in Papoose and Squaw Creeks between May 5 and June 2. The weirs were not very successful at capturing fish with only one fish entering the trap. However, electrofishing above and below the weirs was quite successful in capturing adult steelhead. This is the method we used to take the remaining 23 fish. Many of the fish captured appeared to have already spawned, but we did collect sperm from six fish. The sperm is now frozen and will be used in spring of 1988.

Cryopreservation of fish sperm can have some direct hatchery production benefits. Not only from a genetic point of view, but also from a broodstock management point of view. Some hatcheries such as DNFH, have a low ratio of males less the 50 percent returning to the hatchery. With the present hatchery spawning technique of spawning, only one male per female, the low number of males can cause bottlenecks in the egg taking program. With a

frozen reserve of sperm, the egg taking could be put on a more programmed basis. It could also be used to infuse selected genetic traits into a hatchery gene pool.

Hagerman NFH Fin Erosion

Fin erosion has long been a problem when rainbow trout/steelhead are reared in concrete raceways in 12° - 15°C. water. This condition has plagued Hagerman NFH (HNFH) for many years. However, it does not cause significant mortalities and is primarily an aesthetics problem. The etiology is unknown, although poor nutrition and/or mechanical damage have been postulated as contributing factors. There have been no adequate explanations or solutions found at HNFH, although investigations date back to the 1960's. Nipping has been postulated as one explanation. Why this nipping occurs is not understood, but appears to be related to behavior, hunger, feeding rate and water temperature.

DFAO began an investigation on Brood Year (BY) 85 steelhead at HNFH. Samples were taken from four raceways in all three decks (tiers of raceways) after the split in September, again in December, at the next pond split and finally in March before outplanting. Sixty fish were sampled from each test raceway each month. Each fish was measured to the nearest mm and fin erosion was recorded for dorsal, anal, pelvic and pectoral fins using the following criteria.

Rank	Criteria
0	No erosion
1	<50% erosion
2	> = 50% erosion
3	100% erosion

It was determined that the person doing the sampling could make a subjective visual estimate of whether a fin was less or greater than 50 percent eroded.

Statistical comparisons were made using the Kruskal-Wallis Analysis of Variance test.

Our results showed that there was no significant difference ($P < .05$) in fin erosion or fish length between decks. However, there was a significant difference ($P < .05$) in dorsal fin erosion with fish densities, with low densities having better growth and less dorsal fin erosion. Our results between stocks are not clear. Between "A" and "B" stocks, there was greater dorsal fin erosion in "B" at age 65 days. Although, this contrasts with another test that showed no difference in dorsal fins at age 77-78 days ("A's" were greater length). We failed to detect a difference in fin erosion between stocks through approximately 230 days. At age 276 and 290 days, there was a significant difference in length, dorsal and left pectoral fin erosion with "A" being greater in all respects.

The finding of this study may be suspect. We suspect that probably 50 percent or more of the dorsal fin is eroded on 90 percent of the steelhead at release regardless of strain. However, with the sample design and ranking factors used, we violated several important assumptions. The primary concern is the amount of subjectivity because the same person did not rank the fins on each sampling occasion. We probably should have used fin-to-body length ratio measurements to eliminate this subjectivity and increase the power of tests to determine differences.

In July of 1987, we began to film steelhead while they were in the deep tanks to try to detect nipping. We used an underwater camera with video monitor and recorder. Fish were filmed and recorded at different hours of the day and while being fed. We continued to monitor and make recordings on approximately monthly intervals after the fish were placed in the raceways. We have monitored at night, in the morning prior to feeding as well as daylight hours. However, to date, we have not been able to detect nipping. We will continue to monitor until release.

The direction this project will go in the future is currently being assessed by various groups in the FWS.

We plan to coordinate our efforts with Abernathy Salmon Culture and Technology Center and do time series histological sections monthly to determine time of infection and, hopefully, what etiological agent is responsible.

Hagerman NFH Comparison of Size of Smolts at Release

In the past several years (79-80 and 83-84), the Idaho Department of Fish and Game in cooperation with HNFH have varied size of steelhead "A" strain smolts at release to determine if there is a benefit in releasing larger smolts (Table 1). If we just examine commercial and sport harvest, there appears to be a very positive correlation between size at release and return. However, Ball (1988)[1/] stated that the larger smolts return as 80 percent I ocean and 20 percent II ocean. The normal percentage is 50 percent I ocean and 50 percent II ocean. This means that 80 percent of the larger smolts come back as smaller adults which does not make happy sport fishermen. The larger smolts also returned as 50 percent males and 50 percent females which is a abnormal. Normally "A" strain steelhead return as 70 percent females and 30 percent males. This has obvious advantages in terms of eggs needed to meet hatchery stocking commitments.

[1/] Kent Ball, Idaho Department of Fish and Game, Box 1336, Salmon, Idaho, pers. commun.

Table 1. Size at release comparison of HNFH steelhead.

Tag Code	Release Year	#/lb. Release Size	# Release	EXPANDED I Ocean Rack Returns	II Ocean Rack Returns	I Ocean Col. R. Net	II Ocean Col. R. Net	% Return Rack	Col. R.
50423	1979	3.4	56,300	2	112	1	57	0.202	0.103
50424	1979	9.5	41,423	1	57	0	23	0.140	0.056
50637	1980	4.0	34,300	24	180	7	48	0.595	0.160
50636	1980	5.1	39,825	11	105	2	38	0.291	0.100
51333	1983	2.1	38,875	21	2	42	68	0.059	0.283
51334	1983	5.3	39,125	3	1	14	20	0.010	0.087
51029	1984	2.1	36,800	33	3	149	75	0.092	0.609
51028	1984	5.3	38,775	11	1	34	47	0.031	0.209
Means									
Larger smolts								0.237	0.289
Smaller smolts								0.118	0.113

FRED Database

This year the database name changed from the Hatchery Evaluation Database (HED) to Fishery Resource Evaluation Database (FRED). DFAO has the responsibility for all three federal hatcheries in Idaho. We were also asked to be responsible for data collection and ascension for Leavenworth Complex until their computers become operational. DFAO is gathering and computerizing distribution and return data as well as completing the quarterly FRED release and transfer summary files.

The major accomplishments for FRED in 1987 were:

1. 95% of desired data ascension for the Idaho federal hatcheries was completed.
2. Most of the bugs are now worked out of our file structures. There has been a concerted effort to resolve these and data discrepancies between release database and archive files or other databases. Our end products are now in high demand from other federal and state agencies.
3. We now have the most comprehensive Idaho salmon and steelhead database available.

Our data gathering effort has been so successful that we are outgrowing our computer data storage capacity. At present, we only have eight to nine megabites of storage remaining. This must remain free as "working space" for manipulating large files and making backup tapes. We anticipate we will need additional data storage by FY 89.

Disease Sampling

DFAO personnel routinely collect fish samples for disease background. We attempt to collect samples on all streams where DNFH or Kooskia National Fish Hatchery (KNFH) fish are planted. We also collect fish samples in Dworshak Reservoir tributaries and Clear Creek to monitor the hatchery complex's water sources, especially for IHNV.

In calendar year 1987, DFAO personnel collected 1072 fish for IHNV samples (Table 2). We electrofished tributaries of the South Fork of the Clearwater and the Lochsa Rivers as well as our normal sampling areas on the North Fork River and Breakfast Creek (areas above the reservoir).

DFAO personnel also collected 696 salmonids from July 13 through October 8, 1987 in an effort to determine if whirling disease (*Myxobolus cerebralis* had made its way into the Clearwater River drainage (Table 3). In the Lochsa River, we sampled Squaw Creek and White Sands Creek.

Dworshak Fish Health Center (DFHC) processed all the samples for disease analysis. The majority of the fish were delivered on ice to DFHC where tissue samples were prepared and analyzed. However, some ovarian fluid from kokanee salmon was taken in the field and subsequently analyzed by the DFHC.

Only four fish from our samples tested positive for IHNV. Positive fish were all female kokanee salmon from Dworshak Reservoir tributaries. Three of these were collected from Isabella Creek on September 8, 1987 and the other was collected from Skull Creek (tributary of the upper North Fork River) on October 5, 1987.

No whirling disease was detected in any of the sampled fish.

Table 2. IHNV survey in the Clearwater River drainage conducted by Dworshak Fisheries Assistance Office in 1987.

Date	Site	Steelhead/ Rainbow Trout	Spring Chinook Salmon	Bull Trout	Cutthroat Trout	Brook Trout	White-fish	Sculpin	Shiner	Pumpkin-seed	Squaw-fish	Dace	Suckers	Pea-mouth	Lamprey	Kokanee
		Species														
5/21/87	Wendover, Post Office, Pack Cr.	6	0	1	0	0	0	5	0	0	0	0	0	0	0	0
6/08/87	N. Fork below Dworshak Dam	7	9	0	0	0	0	0	0	0	0	0	3	0	0	0
6/11/87	Clear Creek	2	0	0	0	0	1	1	0	0	1	0	0	0	0	0
6/18/87	Lolo Creek	10	41	0	0	0	0	1	0	0	0	7	0	0	0	0
6/23/87	N. Fork below Dworshak Dam	10	0	0	0	0	7	1	2	0	0	0	1	0	0	0
7/01/87	Clear Creek head gate	13	0	0	0	0	0	6	1	0	10	0	2	0	0	0
7/06/87	Clear Creek below weir	16	0	0	0	0	0	5	6	9	7	3	20	4	0	0
***7/13/87	Red River corrals	1	23	0	1	4	3	10	0	0	0	0	0	0	0	0
***7/13/87	Red River camp-grounds	4	8	0	0	2	3	11	0	0	0	1	5	0	0	0
***7/13/87	Red River Ranch	0	38	0	0	0	0	2	0	0	0	9	0	0	0	0
***7/13/87	Red River 4 mi. above mouth	2	1	0	0	0	0	0	0	0	0	8	0	0	1	0
***7/13/87	Crooked River, Orogrande	10	0	1	4	0	1	1	0	0	0	0	0	0	0	0
***7/13/87	Crooked River, mouth	19	0	0	0	0	3	3	0	0	4	0	0	0	0	0
***7/13/87	Newsome Creek, mouth	26	0	0	0	0	0	0	0	0	4	0	0	0	0	0
***7/13/87	Newsome Creek, townsite	29	0	0	0	0	0	5	0	0	0	0	0	0	0	0
***7/15/87	American River, old airstrip	26	1	0	0	1	2	1	0	0	0	11	0	0	0	0
***7/15/87	American River Bridge above office	22	0	0	0	1	2	3	0	0	0	10	0	0	0	0
*9/08/87	Isabella Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26
9/09/87	Breakfast Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22
9/22/87	Isabella Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58
9/22/87	N.F. Clearwater	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65
9/23/87	Breakfast Creek	1	0	0	0	0	0	0	0	0	0	0	0	0	0	68
9/29/87	N. F. Clearwater	0	0	0	0	0	13	8	0	0	0	0	0	0	0	40
9/29/87	Isabella Creek	6	0	0	0	0	0	2	0	0	0	0	0	0	0	81
9/30/87	Breakfast Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55
10/05/87	Dog Creek	16	0	0	0	0	0	0	0	0	0	0	0	0	0	31
**10/05/87	Skull Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35
TOTALS		226	121	2	2	8	35	65	9	9	26	49	31	4	1	481 = 1072

*3 females, kokanee, were positive for IHNV
**1 female was positive
***Also sampled for whirling disease (*Myxobolus cerebralis*)

Table 3. Whirling disease (*Myxobolus cerebralis*) survey in the Clearwater Basin conducted by Dworshak Fisheries Assistance Office in 1987.

		Species					
Date	Site	Steelhead/ Rainbow Trout	Spring Chinook Salmon	Bull Trout	Cutthroat Trout	Brook Trout	Whitefish
*7/13/87	Red River Corrals	1	23	0	1	4	3
*7/13/87	Red River campground	4	8	0	0	2	3
*7/13/87	Red River Ranch	0	38	0	0	0	0
*7/13/87	Red River 4 mi. above mouth	2	1	0	0	0	0
*7/13/87	Crooked River, Orogrande	10	0	1	4	0	1
*7/13/87	Crooked River, mouth	19	0	0	0	0	3
*7/13/87	Newsome Creek, mouth	26	0	0	0	0	0
*7/13/87	Newsome Creek, townsite	29	0	0	0	0	0
*7/15/87	American River, old airstrip	26	1	0	0	1	2
*7/15/87	American River Bridge above office	22	0	0	0	1	2
10/01/87	Crooked River stocking bridge	43	0	0	1	0	1
10/01/87	Crooked River, Orogrande ford	113	0	0	0	0	0
10/01/87	Crooked River, backwater	52	7	0	0	0	0
10/01/87	Crooked River, dredge spoil	124	3	0	0	0	0
10/08/87	Squaw Creek	60	10	1	1	0	0
10/08/87	White Sands Creek bridge	26	4	0	0	0	0
10/08/87	White Sands Creek 1 mi. above bridge	6	5	0	0	1	0
	TOTALS	563	100	2	7	9	15 = 696

*Also sampled for IHNV

LSRCP Hatchery Evaluation

We held several meetings with production personnel of Hagerman and Dworshak NFH's to discuss the progress of their respective LSRCP programs, identify problems and coordinate other state and LSRCP activities that affect their programs. The LSRCP five year hatchery evaluation study plan was revised through FY 91.

We have two areas of problem resolution we want to focus on in FY 88. We continue to have poor returns in our spring chinook salmon (SCS) at DNFH. Bacterial Kidney Disease (BKD) appears to be one of the major reasons upriver chinook salmon are failing to increase. DFAO personnel plan to continue to evaluate 0-age releases in this program. Initially we plan to test a 0-age SCS release that average 90 to 120 mm in April-May at age 9-10 months.

Hagerman NFH - Steelhead Releases

HNFH released 534,818 "B" strain and 679,723 "A" strain steelhead smolts in 1987 (Table 4). This does not include any pre-smolts released (Yankee Fork 1986 and Snake River 1987). Table 5 lists HNFH steelhead smolts outplanted since 1973.

Table 4. Hagerman NFH 1987 steelhead totals by strain.

	Lot 22 (East Fork "B"'s	Lot 23 (Sawtooth "A"'s)
Eyed eggs	957,476	975,480
Smolts released	534,818	679,723

Table 5. Steelhead smolt outplants, Hagerman NFH, 1983-1987.

	Year				
Site	1983	1984	1985	1986	1987
Deer Cr. Bridge					13,801
East Fork Trap	232,935	393,452	270,208	525,316	485,078
Pahsimeroi	84,194				
Little Salmon Hazard Creek	0	192,049	308,103	427,890	299,098
Sawtooth	107,294	477,164	786,096	1,652,921	687,634
Slate Creek					49,740
Snake River		50,487			
TOTAL	**424,423**	**1,117,794**	**1,364,407**	**1,652,921**	**1,535,351**

Dworshak NFH Outplants - 1987

DFAO assisted and in some instances monitored outplanted steelhead and spring chinook salmon in 1987. We outplanted 659 adult steelhead to Crooked River (a tributary of the South Fork of the Clearwater River) for natural spawning. We also outplanted 644 and 506 into the North Fork and main stem Clearwater rivers respectfully. These outplants were tagged at DNFH and released to the sport and Indian fishery to evaluate the impact of ladder closure (see attachment 3). We also outplanted 115,000 (130/lb.) presmolts in Lolo Creek. There was 742,616 steelhead smolts released in drainages of the South Fork of the Clearwater River and 2,105,748 smolts in drainages of the main stem Clearwater River (Table 6). We also outplanted 119,090 and 133,158 spring chinook salmon fingerlings (260/lb.) to Eldorado Creek and Lolo Creek respectfully.

Table 6. Steelhead smolt outplants, DNFH, 1983, 1984, 1985, 1986, 1987.

	Year					
Site	1983	1984	1985	1986	1987	1988 (proposed)
American River	--	117,177	162,111	247,695	41,527	--
Crooked River	--	15,850	42,235	140,820	200,162	200K
Newsome Creek	--	62,132	95,286	212,188	202,857	200K
Legget Creek	--	--	--	8,904	--	--
Red River	--	82,929	--	--	--	--
M.S. South Fork	496,471	228,842	--	746,584	298,070	650K**
TOTAL South Fork	**496,471**	**506,930**	**299,632**	**1,356,191**	**742,616**	**1050K**
Clear Creek	250,428	246,123	145,206	165,483	156,552	250K
Lolo Creek	--	--	--	--	--	200K
Eldorado Creek	--	--	121,284	204,662	0	200K
M.S. Clearwater River	1,225,935	1,208,319	1,035,573	1,222,141	1,206,580	1200K
TOTAL Rel.	**1,972,834***	**1,961,372**	**1,601,695**	**2,948,477**	**2,105,748**	**2900K**

*136,876 Lewiston-truck-barge NMFS not included
**500,000 to be planted from Mill Creek bridge and 150,000 to be planted from Crooked River bridge.

Fish Tagging

Fish marking programs at federal hatcheries in Idaho were coordinated by DFAO with IDF&G doing the actual marking. DNFH BY 87 spring chinook salmon are scheduled to be coded-wire tagged by IDF&G in early January 1988. Hagerman and Dworshak NFH's steelhead were marked in the first quarter of FY 88. These marked groups are to verify smolt to adult survival rates, sport, commercial and Indian fishery contribution rates as well as answer biological questions on size and site of release and stock performance.

Dworshak National Fish Hatchery Mitigation Report

A review of DNFH mitigation record was compiled. Identifying the mitigation goal for the hatchery was discussed and it was concluded that the goal was for adults back to the Clearwater River. Smolt production was also discussed and conclusions were that DNFH is now operating under the smolt production goal of 2,300,000 smolts at 6.0/lb. (200 mm total length). This smolt release is considered appropriate to bring back a return to the Clearwater River of 20,000 adults.

Since 1972-73, when the first hatchery fish started returning from DNFH releases, the hatchery has meet a mitigation goal of returning 20,000 adults to the Clearwater River in 4 of 15 years. It should be noted that in 3 of the last 5 years, 1982-87, the hatchery has met the goal and returned a minimum of 20,000 adults to the Clearwater River. The better hatchery return rates in recent years are attributable in part to: (1) smolt collection and transportation at the dams, (2) better quality smolts produced, (3) larger smolts on average being released, and (4) better timing and coordination on smolt releases. The benefits that increased the return rates these past few years should remain and with increased knowledge may in fact improve. Therefore, unless we see major changes in downstream harvest or smolt survival, DNFH will in most years be able to meet its mitigation goal of returning 20,000 adults back to the Clearwater River. Of course, this is contingent upon the Columbia River Zone 6 harvest being limited to 33 percent or less of the "B" run coming in to the Columbia River and to water conditions in the Snake and Columbia Rivers remaining conducive to downstream passage of smolts and upstream passage of adults.

Coordination With Other Agencies

Subbasin planning started with DFAO involvement in the Clearwater, Salmon and Snake River subbasins. We expect more effort in the area in FY 1988. The Nez Perce Tribe is the lead on the Clearwater subbasin and IDF&G is the lead on the Salmon subbasin planning effort.

DFAO sponsored a Clearwater Fishery Coordination meeting the spring of 1987 to bring all parties together that are doing fishery work on the Clearwater River. The objective was to familiarize various workers with what activities were planned for 1987 field season and coordinate efforts where possible. Agencies represented included

Idaho Department of Fish and Game, Bureau of Land Management, Fish and Wildlife Service, Forest Service (both Clearwater and Nez Perce forests), Idaho Cooperative Fishery Unit, and Nez Perce Tribe.

Data on the 1987 run of steelhead to Dworshak was taken, analyzed and a report was prepared. Data on the 1987 spring chinook salmon run to Kooskia and Dworshak NFH's was gathered and analyzed and a summary report was prepared.

Coordination was begun with the Nez Perce Tribe on undertaking a habitat improvement project on Clear Creek. KNFH uses Clear Creek water and there is potential habitat for salmon and steelhead rearing in Clear Creek. The Nez Perce Tribe BPA project proposes to improve habitat in the drainage with particular emphasis on the lower 10 miles. This project could offer improved water quality to our Kooskia hatchery. DFAO is a cooperator on this project and will be involved in gathering fish population information.

DFAO is compiling the coded-wire tagging (CWTing) data from Dworshak, Hagerman and Kooskia NFH's. Data on tagged fish released, number and place of returns are summarized and put in our computer database. This CWTing information requires coordinating and sharing data with a number of states and various agencies. The objective is to be able to analyze and interpret CWT data earlier for the various studies initiated at the federal hatcheries. From time of tagging a smolt to getting return data, can take over five years. We are trying to speed up the CWTing data processing so that within a year of the salmon and steelhead III-salt data being taken at the various places we can have a summary of returns. In the past, 2 or 3 years have elapsed before all data was compiled in one place.

Other Reports and Studies Completed

Reports on adult steelhead and spring chinook salmon returns to Dworshak NFH were completed (see attachments 1 and 2). Both of these reports also contain sections on projected runs for 1988. A report on adult steelhead outplanting was also done during 1987 (see attachment 3). This report was prepared to evaluate the impact of ladder closure on return numbers to Dworshak NFH.

ATTACHMENT 1

Summary Report

Adult Steelhead Returns to Dworshak NFH in 1986-87 and Prognosis for 1987-88

U.S. Fish and Wildlife Service
Dworshak Fisheries Assistance Office
Ahsahka, Idaho

By:
Travis C. Coley
William H. Miller
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INTRODUCTION

Releases of steelhead smolts from Dworshak National Fish Hatchery (DNFH) began in 1970 with the first hatchery produced adults returning in 1972. The 1987 return marked the 16th year that artificially-spawned and -reared North Fork Clearwater ("B" run) steelhead have returned to Dworshak NFH. This report reviews the statistics of the 1987 run and the prognosis for next year.

Stock Description

Dworshak NFH maintains the North Fork Clearwater River steelhead stock, cut off in 1968 from its ancestral spawning grounds by Dworshak Dam. Size-wise, this stock ("B" run) of steelhead is unique. At maturity, males and females average about 36 and 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. Occasionally, a fish returns after having spent 4 years in the ocean. 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 1 year in riverine environment.

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

Preseason Predictions

Predictions of potential hatchery returns are made each year at a fall coordination meeting held with U.S. Fish and Wildlife Service, Idaho Department of Fish and Game, Nez Perce Tribe, and Corps of Engineers. Estimates of run strength are used for planning harvest and for brood stock management programs each year.

Predictions by Dworshak Fisheries Assistance Office (DFAO) are based primarily on the strength of returns of younger year classes for a 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 3-salt return from the number of I- and II-salt fish which returned in the two previous brood years. We do not have a consistent and accurate prediction method for I-salt. Instead, an average percentage return for I-salt fish is applied to the number of smolts released for that brood year. These three estimates are then summed to predict the total hatchery return. The 1987 hatchery return prediction was 492 I-salt, 8,530 II-salt, and 500 III-salt. Actual returns were 274 I-salt, 4,869 II-salt, and 143 III-salt for the three age groups respectively. However, the DNFH ladder was closed for a portion of the run and an expanded estimate for what would have entered if the ladder remained open, was 8,988, with estimates of 431 I-salt, 8,318 II-salt and 239 III-salt.

Run Size

The return of DNFH steelhead in the 1986-87 run was considered to be good. We estimated 28,296 DNFH steelhead entered the Clearwater River during the 1986-87 run. This total breaks down to an estimated 15,800 harvested in the sport fishery (Ball[1/]); 4,210 harvested in the Nez Perce tribal snag fishery (Statler[2/]); 5,286 returning to DNFH; and an estimated 3,000 returning to areas upriver of the North Fork Clearwater that were not harvested. The latter number returning upstream is a result of the recent smolt outplanting to areas upriver.

Table 1 displays past DNFH steelhead runs to the Clearwater River. As can be seen, this run rates fairly well with past runs. In November of 1986, we made a run prediction of 30,000 DNFH steelhead back to the Clearwater, with 9,500 to the rack, 13,000 sport harvest, 4,000 tribal harvest. Predictions were fairly accurate. The rack return estimate was off, but this is because of the partial ladder operation in 1987. For about 3 weeks during the peak of the run, the ladder was only operated two days out of seven. Releasing tagged fish and looking at increased harvest, we estimated that had the ladder been open as in the past, the hatchery return would have been 8,988.

An estimated 129 Lyons Ferry hatchery steelhead strayed into DNFH. These fish were not spawned and were removed from the hatchery.

Hatchery Operation

The hatchery ladder was open January 5 through May 12. Partial ladder operation of 45-48 hours per week occurred March 2-30. A total of 8,465,986 green eggs were collected at DNFH. IHN incidence was fairly low; 6.3 percent in females and 6.7 percent in males (Rockowski et al. 1987). Steelhead egg requirements for the hatchery were met. Table 2 shows spawning data.

Age Composition

The age composition of the run as it entered the hatchery was as follows: I-salt = 274, II-salt = 4,869 and III-salt = 143. The II-salt made up 92.1 percent of the 1987 run. Adults were comprised of 70.1 percent females and 29.9 percent males.

Coded-wire Tags (CWT)

A total of 18 different CWT groups were recovered. Table 3 shows the tag codes and where they originated.

1/ Kent Ball, Idaho Department of Fish and Game, Box 1336, Salmon, Idaho 83467, Pers. Commun.

2/ David Statler, Department of Fisheries Management Nez Perce Tribe, P.O.Box 365, Lapwai, Idaho 83540, Pers. Commun.

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

Return[1]	Number Back To DNFH	Estimated Sport Fisherman Harvest Clearwater R.	Estimated Tribal Harvest Clearwater R.	Estimated Hatchery Fish Return Upriver of North Fork (unharvested)[7]	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	1,500	1,800	15,002
1986-87	5,286[2]	15,800[8]	4,210[6]	3,000	28,296

[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]Personal communication from Dave Statler, 9/24/87.
[7]Based on return percentage back to hatchery to calculate returning of II-salt from upstream releases.
[8]Preliminary estimate.

Table 2. Dworshak NFH steelhead spawning data for 1987.

	Male	Female	Total
Total return	1589	3826	5415
Females spawned		1324	
% Mortality			
Green eggs			8,465,986
Eyed eggs			6,369,107
Percent eye up			75.2
x Incubation Temp (^{o}F)			
IHN positive (% of eyed eggs)	7.1	6.3	6.7

Table 3. Coded-wire tag recoveries from steelhead in 1987 at Dworshak NFH rack.

Tag Code	Number of Tags Recovered	Origin
51335	84	DNFH
102516	94	DNFH
102517	158	DNFH
102806	1	HNFH
231616	2	DNFH-NMFS study
231619	3	DNFH-NMFS study
231639	1	DNFH-NMFH study
231640	4	DNFH-NMFS study
231644	9	Lower Granite-NMFS
231645	0	Lower Granite-NMFS
231646	6	Lower Granite-NMFS
231651	7	Lower Granite-NMFS
231652	19	Lower Granite-NMFS
621629	1	WDG-Tucannon R.
621644	3	WDG-Lyons Ferry
633212	1	WDG-Lyons Ferry
633214	2	WDG-Lyons Ferry
633215	2	WDG-Lyons Ferry

Survival

The returns of DNFH fish to the rack was comprised of an estimated 92.1 percent II-salt fish. If this factor is applied to the estimated total to the Clearwater River, then 26,061 II-salt fish returned to the Clearwater. In 1984, DNFH released 1,961,000 steelhead smolts in the Clearwater River. This calculates out to a 1.33 percent smolt-to-adult return to the Clearwater River which is considered a very good upriver survival rate.

The run prediction for the 1987-88 steelhead return to Dworshak NFH will be more difficult to make this year because of the partial ladder operation. The best steelhead run predictor that we have is the previous year's I-salt returns. Using this predictor, we have been able to use regression to predict the run size of II-salt. This regression, quite accurate over the past few years, has over 90 percent correlation. We have also used a smolt survival estimate based on the number of smolts released and a survival percentage based on CWT returns. We observed 274 I-salt back to Dworshak NFH this year. If we expand that to reflect partial ladder operation, the I-salt return may have been as high as 428. Using all this information, We are predicting a run back to the hatchery of between 4500 and 7500 with a point predictor of 6200. The release for Dworshak NFH in 1985 was slightly less than in other years; 1,035,573 compared to 1,200,000 the previous 2 years. Also, IHN losses were significant on the 1985 release year steelhead.

The 1986 release year, which will be producing the jacks of 1987-88, was extremely good. Including outplants, DNFH released over 2,900,000 smolts, which is expected to return a large number of I-salt back this year.

DNFH outplanted 566,122 smolts in 1985. If these smolts return at the same projected rate as hatchery-released smolts, then we estimate between 1950 and 3260 hatchery adults will return to area upstream of the hatchery to spawn (includes a DNFH straying reduction of 20 percent on this estimate). These estimates reflect fish that will not be harvested. Total hatchery fish back to the Clearwater River would need to include the harvest which may be equal to those that escape to spawn. Harvest would include sport fishing and Nez Perce tribal harvest at the DNFH ladder and Clear Creek.

1988 Run Prediction

Following is the 1988 run prediction for DNFH steelhead. Estimate is based on previous years' returns and smolts released and as in previous reports by DFAO.

Estimated Total Hatchery Fish Back to Clearwater

6,200	estimated rack return DNFH
6,200	estimated harvest of fish destined for DNFH[1]
2,600	estimated return upstream from outplants (not harvested)[2]
2,600	estimated for harvest of outplanted fish[1]
4,000	estimated Nez Perce tribal harvest
21,600	total hatchery fish back to Clearwater River

[1]Based on 50 percent harvest rate
[2]Upstream returns from outplants include an adjustment of 20 percent adult straying back to Dworshak NFH

Overall, the 1987-88 steelhead run to the Clearwater is estimated to be about one-third less than the 1986-87 run where we predicted 30,000 fish back to the Clearwater River.

Literature Cited

Rockowski, Jim, Ralph Roseberg, Joe Lientz, and Greg Pratschner. 1987. Brood Year 1987 Final Steelhead Spawning Report. Dworshak-Kooskia NFH Complex. 8 p.

ATTACHMENT 2

SUMMARY REPORT

Adult Spring Chinook Salmon Returns to Dworshak NFH in 1987 and Prognosis for 1988

U.S. Fish and Wildlife Service
Dworshak Fisheries Assistance Office
Ahsahka, Idaho

Prepared by: Travis C. Coley
Assistant Project Leader

Adult Spring Chinook Salmon Returns to Dworshak-Kooskia NFH Complex in 1987 and Prognosis for 1988

Introduction

Dworshak National Fish Hatchery (DNFH) began large scale production of spring chinook salmon (SCS) in 1982. In 1981 Lower Snake River Compensation Plan (LSRCP) authorized and funded the construction of 30 raceways for the production of 1.05 million SCS smolts. Construction was completed by June 1982. Brood year 1987 is the fifth year of production.

Kooskia National Fish Hatchery (KNFH) has been in the SCS business since 1972. KNFH is approximately 30 miles upstream from DNFH and is located 1.5 miles southeast of Kooskia, Idaho, near the confluence of Clear Creek and the Middle Fork of the Clearwater River. KNFH is responsible for rearing and releasing SCS into the Middle Fork of the Clearwater River. KNFH is funded by the Fish and Wildlife Service.

Run Size

The 1987 adult SCS return to the Dworshak-Kooskia NFH Complex was a dramatic success. DNFH had a record return of 2,017 adults. This 1987 adult return was 3.9 times greater than any past year (Table 1). The adult SCS return to the KNFH was the fourth highest (Table 2) for this facility.

In 1987, 2,704 adults were spawned at DNFH and 4.075 million eggs were taken (Table 3). This is the combined take for the Dworshak-Kooskia NFH Complex since all spawning 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

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

Table 3. Spring chinook salmon spawning data for 1987.

	Kooskia		Dworshak		
	Male	Female	Male	Female	Total
Total Return*	323	364	807	1,210	2,704
Adults Spawned	184	226	661	930	2,001
Mortality	69	140	99	220	528
Green Eggs	759,326		3,316,340		4,075,666
Eyed Eggs	686,750		3,082,500		3,769,250
Percent Eye	90.4		93.0		92.5
xIncubation Temperature (°F)					54.5
IHN Positive (% of eyed eggs)	12.5		7.7		9.3

*Male and female numbers are estimates based on the observed composition: 40.7% males, 59.3% females. (From Dworshak NFH Production Narrative, September, 1987.)

Stock Description

At DNFH we have complete rack returns for the 1984 release year. We realized a 0.28% return with the genetic makeup 64.1% Little White Salmon stock, and 24.6% Leavenworth stock and 11.3% Kooskia stock. (See Table 4 for stock definitions.)

The 1986 release year returned 25 jacks to DNFH. This stock is 100% Leavenworth. The 1987 release year was comprised of 100% Rapid River stock. (For a complete stock breakdown see Table 5.)

We also have complete rack returns for 1984 release year at KNFH. We had a smolt to adult return of 0.048% with a mix of 80% Kooskia stock, 10% Little White Salmon stock and 10% Rapid River stock. The 1985 release year returned 607 II salts and the 1986 release year returned 16 jacks in 1987. (For a complete stock breakdown on KNFH see Table 6.)

Table 4. Spring chinook salmon stocks used in the devlopment of of Dworshak-Kooskia NFH Complex spring chinook salmon program.

KOOSKIA	Our present definition for any adult returning to Kooskia, regardless of its parentage, is "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 Salmon 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 1940's. Leavenworth went out of spring chinook production in the mid-1960's. In the 1970's, the hatchery stock was rebuilt primarily with Carson stock. The run is now self-perpetuating.

Table 5. Genetic make-up of Dworshak NFH spring chinook salmon releases at the hatchery as smolts.

Release Year	Brood Year	Genetic Make-up*	% Rack Return
1981	1979	54.8% KK	
		45.2% RR	
1982	1980	100% CA	
1983	1981	75.1% LW/RR	
		12.3% LW	
		12.6% LE	
1984	1982	100% LE	0.283
1985	1983	67.8% LW - 32.2% LE	
1986	1984	100% LE	
1987	1985	100% RR	

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

Age Composition

Age composition of the run is based on length categories. These length categories have been verified using known age/length/sex data from CWT returns. Jacks are $\leq$ to 56 cm, II-salt are 57 to 81 cm and III-salt are $\geq$ to 82 cm.

The age composition is displayed in Table 7.

Table 7. Age composition for 1987 of spring chinook salmon returning to Dworshak-Kooskia NFH Complex.

Dworshak NFH			Kooskia NFH		
Age	Number	Percent	Age	Number	Percent
I-salt	25	1.24	I-salt	16	2.32
II-salt	1604	79.52	II-salt	607	88.36
III-salt	376	18.64	III-salt	64	9.32
Unmeasured	12	0.6			
TOTAL	**2017**	**100**	**TOTAL**	**687**	**100**

Survival

The return of III-salt in 1987 completes the returns from the 259,589 smolts released at DNFH and the 520,677 smolts released at KNFH. Total returns to DNFH from this release were 13 I-salt, 346 II-salt and 376 III-salt for a hatchery return survival rate of 0.283% (Table 8). Total returns to the KNFH from this release were 26 I-salt, 159 II-salt, and 64 III-salt for a hatchery return survival rate of 0.048% (Table 9). This is not the total survival rate to the river as the Indian snag fishery harvest in the Clearwater is not known.

Table 8. Return vs. release numbers for the 1987 adult spring chinook salmon return to Dworshak National Fish Hatchery.

Release Year	Smolts Released at Hatchery*	Jacks	II-salt	III-salt	% Return
1984	259,589	13 (85) (0.005)	346 (86) (0.133)	376 (87) (0.145)	0.283
1985	1,137,139	78 (86) (0.007)	1604 (87) (0.141)	--	--
1986	506,320	25 (87) (0.005)	--	--	--

*Includes only smolt releases at hatchery, i.e. does not include off-site releases or fry/fingerling releases.

Table 9. Return vs. release numbers for the 1987 adult spring chinook salmon return to Kooskia NFH.

Release Year	Smolts Released at Hatchery*	Jacks	II-salt	III-salt	% Return
1984	520,677	26 (85) (0.005)	159 (86) (0.031)	64 (87) (0.012)	0.048
1985	355,176	21 (86) (0.006)	607 (87) (0.171)		
1986	351,405	16 (87) (0.005)			

*Includes only smolts released at hatchery, i.e. does not include off-site releases or fry/fingerling releases.

Coded-wire Tag Recoveries (CWT)

We had 24 CWT fish return to DNFH and one to KNFH in 1987. Five of these tags were the National Marine Fisheries Service transportation index. Thirteen of the 25 CWT returns were II-salt fish that were raised at KNFH and released in November 1984 in the North Fork of the Clearwater River. The return rate for this fall release of CWT fish (48,100 taged) was 0.027% for II-salt. Four CWT recoveries were from III-salt fish raised at Hagerman NFH and hauled to Dworshak for release.

Preseason 1987 Predictions

The 1987 prediction for the SCS run was a slight underestimation. Needless to say, a few wine coolers traded hands around the FAO office. The 1987 SCS prediction and actual returns are as follows:

Kooskia NFH-1986 I-salt Returns = 21

1987 Prediction		1987 Actual Return	
II-salt =	150	II-salt =	607
III-salt =	81	III-salt =	64
I-salt =	25 jacks	I-salt =	16
Total Prediction =	**256**	**Total Run =**	**687**

Dworshak NFH-1986 I-salt Returns = 78

1987 Prediction		1987 Actual Return	
II-salt =	550	II-salt =	1604
III-salt =	246	III-salt =	376
I-salt =	40	I-salt =	25
		Unmeasured =	12
Total Prediction =	**886**	**Total Run =**	**2005***

Table 6. Genetic make-up of Kooskia NFH spring chinook salmon released in Clear Creek as smolts.

Release Year	Brood Year	Genetic Make-up*	% Rack Return
1971	1969	100% RR	0.07
1972	1970	38.7% RR - 61.3% CA	0.07
1973	1971	100% CA	0.13
1974	1972	100% CA	0.30
1975	1973	58% RR - 42% CA	0.19
1976	1974	71% SS - 5% LW	0.02
1977	1975	91% CA - 19% CA - 5% KK	0.01
1978	1976	75% RR - 25% CA	0.03
1979	1977	69% KK - 31% CA	0.02
1980	1978	31% KK - 69% CA	0.05
1981	1979	75.3% CA - 12.8% KK	
		11.9% RR	0.04
1982	1980	83% CA - 17% KK	0.03
1983	1981	53% KK - 47% LW	0.10
1984	1982	85% KK - 15% LW	
		9.9% RR	0.02
1985	1983	100% KK	
1986	1984	100% KK	
1987	1985	100% KK	

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

SCS Run Predictions - 1988

Kooskia returns based on correlation of smolts -

I-salt 83-87 = 0.85 correlation coefficient
I-salt - II-salt 83-87 = 0.97 correlation coefficient
II-salt - III-salt 83-87 = 0.85 correlation coefficient

Estimate by Age Class:

I-salt -	56
II-salt -	637
III-salt -	195
Total	888

Guesstimate = 850 ± 200 expected back to Kooskia NFH

Dworshak returns based on correlation of smolts -

I-salt 83-87 = 0.95 correlation coefficient

I-salt - II-salt 84-87 = 0.99 correlation coefficient

II-salt - III-salt 84-87 = 0.83 correlation coefficient

Estimate by Age Class:

I-salt - 110

II-salt - 532

III-salt - 1330

<u>Guesstimate</u> = 2000 ± 200 expected back to Dworshak NFH

ADULT STEELHEAD OUTPLANTING - 1987

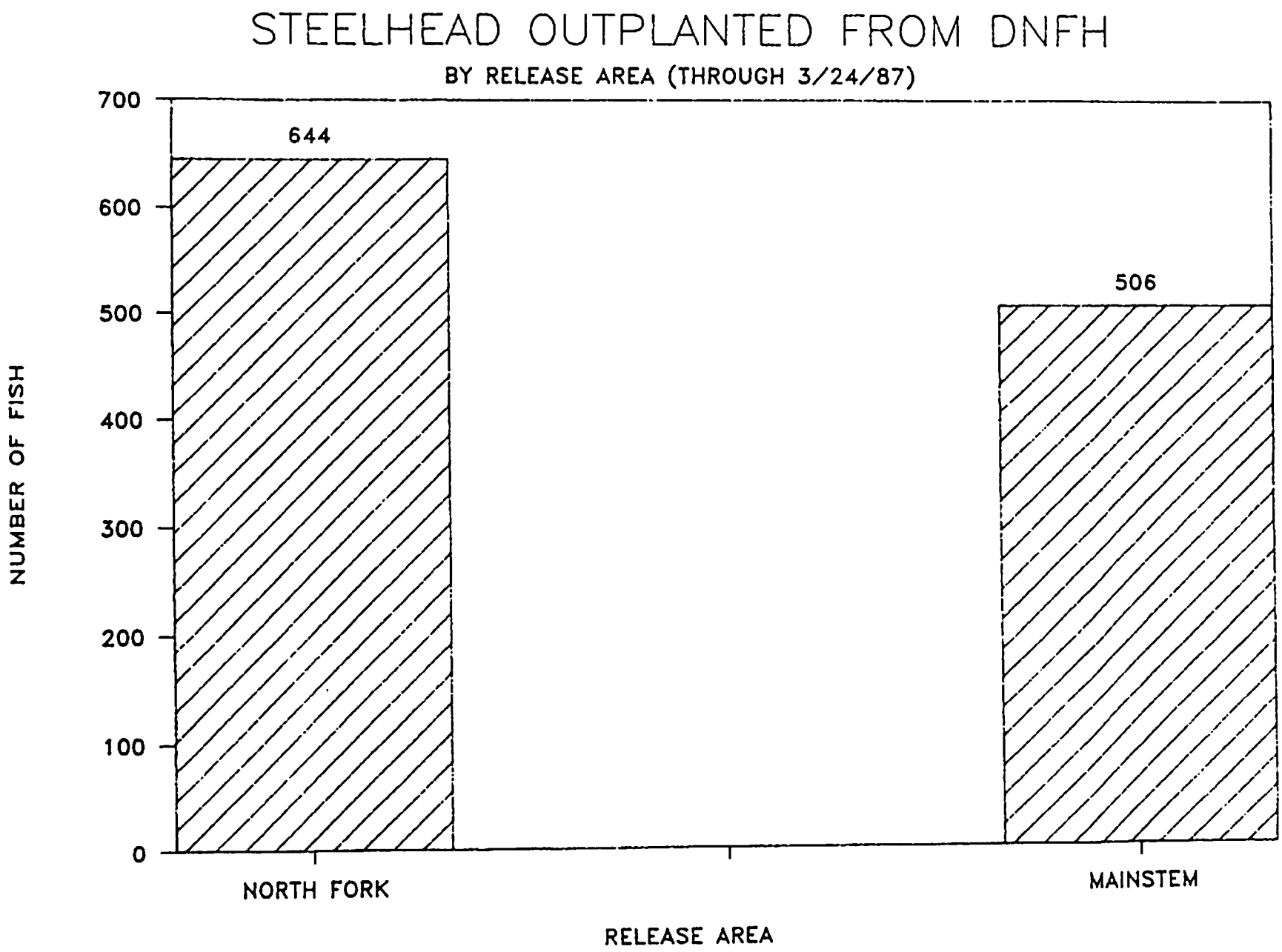
Dworshak National Fish Hatchery (DNFH) and Dworshak Fisheries Assistance Office (DFAO) have outplanted excess adult steelhead (STT) on two occasions. Fish were tagged with colored, nylon cable ties with an operculum punch as a short-term marker. Tag retention has been 98.7 percent to date. The first outplant was on 5-6 March 1987, when a total of 639 adults were released. There were 303 females and 107 males successfully outplanted in the North Fork of the Clearwater River (right red operculum tag). There were 210 females and 19 males successfully outplanted in the main stem of the Clearwater River at the Slaughter House boat ramp (right yellow operculum tag).

The second adult outplanting occurred 18-19 March 1987. There were 511 adult STT successfully released at this time. The Peck boat ramp was added as a main stem release site and 124 females and 42 males were released. There were 75 females and 36 males released at the Slaughter House boat ramp. At the North Fork release site (boat ramp), there were 143 females and 91 males outplanted.

To date, DNFH and DFAO has outplanted a total of 1,150 adult STT. The hatchery has recovered 87 out of 644 of the North Fork releases for a 13.51 recovery rate. From creel data collected by Idaho Fish and Game (IDFG) it was estimated (by DFAO) that the sport fishery recovered at least 25 percent of the North Fork released fish. If we examine recapture by sex, females from the North Fork releases returned at a rate of 12.78 percent, while males returned at a rate of 15.15 percent (based on returns as of 24 March).

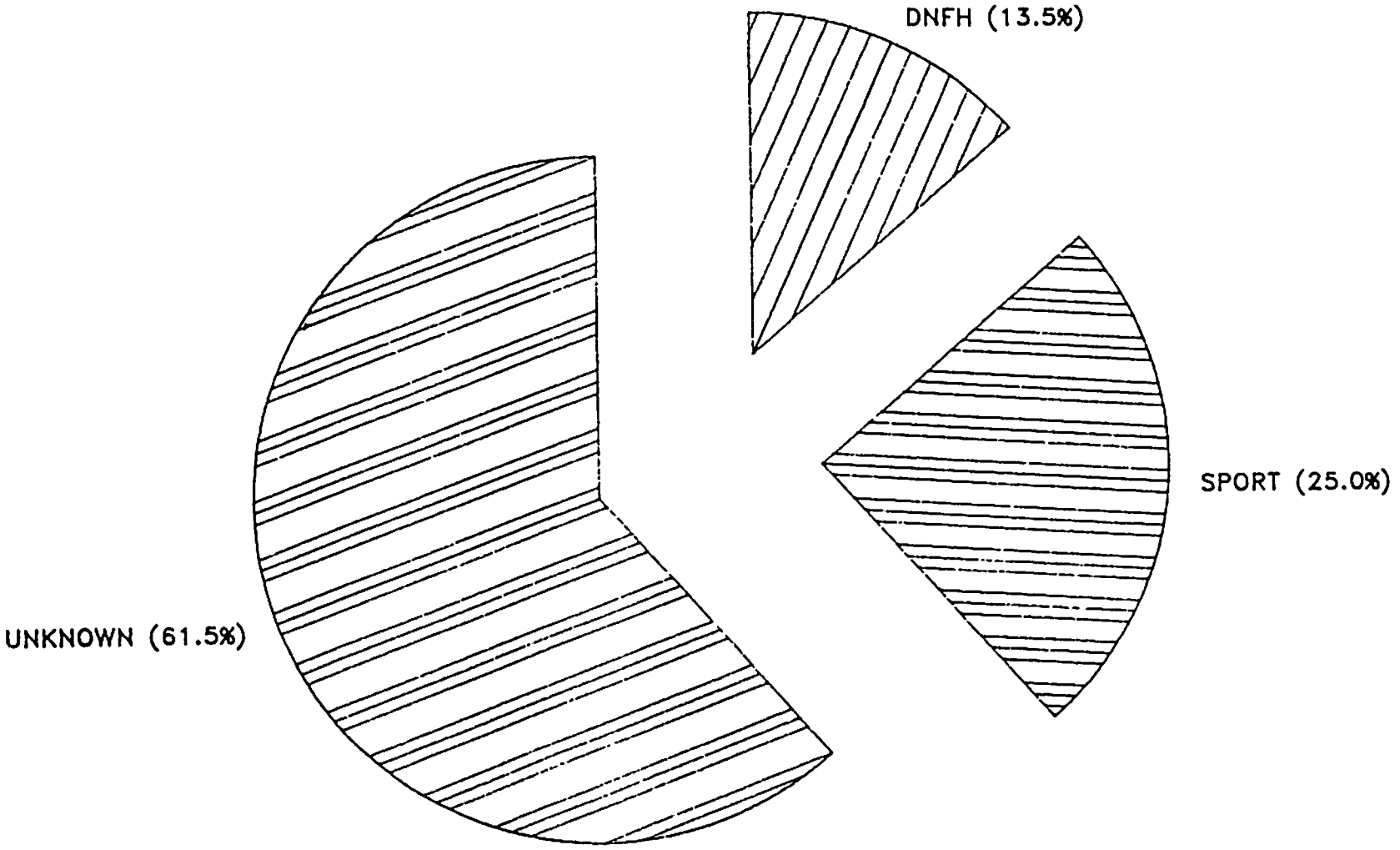
From the main stem releases, 60 out of 506 have returned to the hatchery for a recovery rate of 11.86 percent. Creel data collected by IDFG, indicated a poor return on these fish, DFAO quesstimated about a 10 percent sport harvest. Females released in the main stem Clearwater River returned at a rate of 12.47 percent, while males returned at a rate of 9.28 percent.

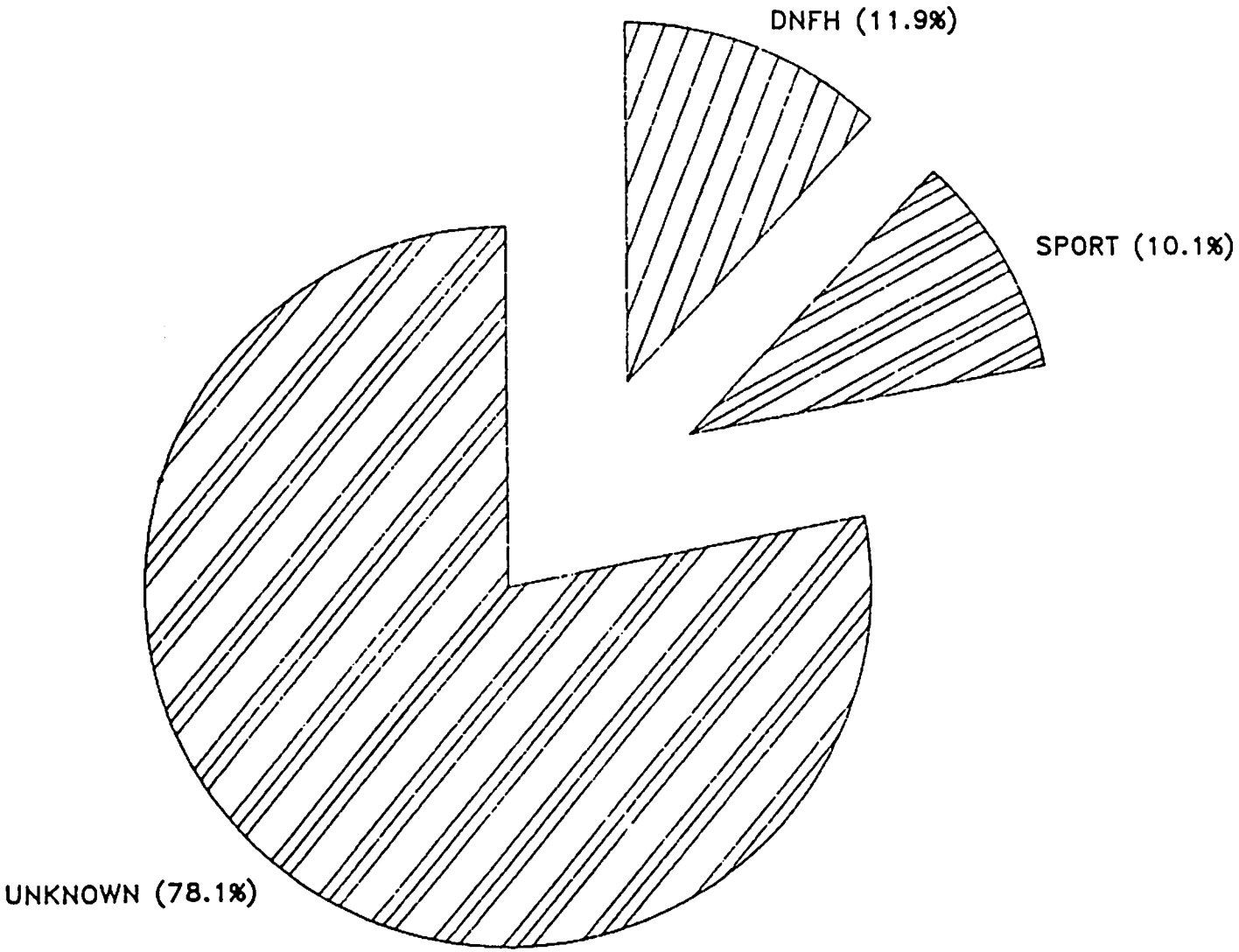
The Indian fishery data and fish returning since 24 March were not included in these data.


STEELHEAD OUTPLANTED FROM DNFH
BY RELEASE AREA (THROUGH 3/24/87)
NUMBER OF FISH
700
600
500
400
300
200
100
0
644
506
NORTH FORK
MAINSTEM
RELEASE AREA

RECOVERY RATES FOR MARKED FISH

NORTH FORK RELEASES (THROUGH 3/24/87)



RECOVERY RATES OF MARKED FISH

MAINSTEM RELEASES (THROUGH 3/24/87)