APPENDIX B

ADULT STEELHEAD RETURNS TO DWORSHAK NFH IN 2004-2005 AND PROGNOSIS FOR 2005-2006

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Introduction

Dworshak National Fish Hatchery (NFH) is located at the confluence of the North Fork and the main stem of the Clearwater River near Ahsahka, Idaho. Construction of the hatchery was included in the authorization for Dworshak Dam and Reservoir (Public Law 87-847, October 23, 1962) to mitigate for losses of steelhead (*Oncorhynchus mykiss*) caused by the dam and reservoir.

The hatchery was designed and constructed by the U.S. Army Corps of Engineers and has been administered and operated by the U.S. Fish and Wildlife Service since the first phase of construction was completed in 1969. At that time, the hatchery had 25 Burrows ponds on a single reuse system and 59 other Burrows ponds on single-pass water. In 1972, a second phase of construction placed all these ponds on three reuse systems with the option of operating on either reuse or single-pass. In 1986, the oldest system (25 ponds) was taken off reuse and put on single-pass. In 2004, a rehabilitation project was completed that will again allow reuse in this system.

The North Fork Clearwater River steelhead stock maintained by Dworshak NFH is unique. At maturity, males and females of this particular stock of "B" run steelhead average about 91 cm (36 inches) and 82 cm (33 inches) in length, respectively. Spawning stock is comprised 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. Fish are actually two years older than this system indicates, as they are reared for one year in the hatchery and spend another year migrating to and from the ocean.

Most adult "B" run steelhead leave the ocean to return to the Columbia River in August through September. This is usually later than the smaller "A" run steelhead. The Clearwater "B" run steelhead may reach the Snake and Clearwater rivers in the fall where they over-winter until their final run into the hatchery. Some of the fish actually arrive at Dworshak NFH in the fall. The Dworshak NFH trap is operated during the fall to insure inclusion of sufficient early arriving steelhead (~500 adults) into the hatchery gene pool. The trap is then reopened from February through April to capture brood stock from the mid and late portions of the run.

Summer steelhead smolt releases from Dworshak NFH began in 1970. The first adults returned to the hatchery in 1972. The 2004-2005 return marked the 33rd year that artificially spawned North Fork Clearwater River steelhead have returned to Dworshak NFH. **Table 1** summarizes the Dworshak NFH steelhead returns to the Clearwater River from 1972-2005. This report reviews the 2004-2005 run and lists projections for 2005-2006.

2004-2005 Adult Returns

The Dworshak NFH ladder was opened October 4 and operated until October 27 with some intermittent openings after that for coho salmon (*Oncorhynchus kisutch*) collection. A total of 725 early-run steelhead were trapped during that period. The fish ladder was re-opened for steelhead collection on February 18 and was closed for the final time on May 3, 2005. Ladder operation was intermittent during the spring season to avoid collecting excess fish. A total of 3,537 adult steelhead entered the ladder during the spring of 2005. We trapped 13 adult steelhead that were not adipose fin clipped and had no dorsal fin erosion. These fish were immediately transported and released upstream in the main stem Clearwater just above Dworshak NFH, in accordance with the Biological Opinion on wild steelhead. In addition to the hatchery rack return, an estimated 20,608 steelhead were harvested in the sport fishery (IDFG). The estimated number harvested by Nez Perce Tribal subsistence fishermen was 1,331 (Table1).

Table 1. Number of steelhead returning to Dworshak NFH, estimates of hatchery fish harvested, and total hatchery returns to the Clearwater River, Idaho, 1972-2005
(1972-73 to 1983-84 data based on report from Pettit, 1985, IDFG Federal Aid Report, Project F-73-6, January, 1985).

Return[1]	Number Back to Dworshak NFH	Estimated Clearwater Sport Harvest[2]	Estimated North Fork Tribal Harvest[3]	Un-harvested Dworshak Hatchery Fish[4]	Total Dworshak Fish Returning to Clearwater River
1972-73	9,938	2,068	-	0	12,006
1973-74	7,910	2,320	-	0	10,230
1974-75	1,698	N.S.[5]	290	0	1,988
1975-76	1,858	N.S.	430	0	2,288
1976-77	3,100	N.S.	410	0	3,510
1977-78	12,272	14,000	(1000)[6]	0	27,272
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	(1000)	500	7,978
1981-82	3,054	1,665	(1000)	0	5,719
1982-83	7,672	13,967[7]	(1,500)	0	23,139
1983-84	3,284	6,500	(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[8]	15,679	4,210	3,000	28,175
1987-88	3,764	8,766	1,478	2,000	16,008
1988-89	6,041	11,332	1,242	3,700	22,315
1989-90	10,630	27,953	1,710	3,650	43,944[9]
1990-91	7,876	12,974	1,211	2,250	24,311

1991-92	3,700	10,415	1,326	1,650	17,091
1992-93	7,900	19,351	1,184	3,368	31,803
1993-94	3,757	11,538	675	1,457	17,427
1994-95	1,394	5,954	730	1,307	9,385
1995-96	4,480	2,319	992	1,315	9,106
1996-97	2,980	4,926	513	779	9,198
1997-98	3,601	7,611	145	479	11,836
1998-99	5,419	8,774	1,007	1,137	16,337
1999-00	2,882	7,177	1,000	720	11,779
2000-01	6,411	12,230	(1,000)[6]	513	20,154
2001-02	7,733[8]	25,196	(1,000)	774	34,703
2002-03	5,244	30,168	1,118	830	37,360
2003-04	3,767	22,106	(1,336)	855	28,064
2004-05	4,362	20,608	1,331	280	26,581

Table 1. Footnotes.

[1]Return year is from October through May.
[2]Unless otherwise noted, estimates of sport harvest in the Clearwater River taken from Idaho Department of Fish and Game annual reports.
[3]Unless otherwise noted, estimates of tribal harvest in the Clearwater River were taken from Nez Perce Tribe Department of Fishery Resource Management annual reports.
[4]Based on return percentage back to hatchery to calculate returning II-salts from upstream releases.
[5]N.S., no sport fishing season.
[6]( ) guesstimate on tribal harvest by authors.
[7]Pettit, IDFG, Lewiston, Idaho (personal communication) included an additional 2,000 fish in harvest from Snake River for a total of 15,967.
[8]Ladder was operated intermittently due to high number of returns; not a total hatchery return figure.
[9]We believe the sport estimate of 27,953 is about 8,000 too high and the total number of Dworshak steelhead to the Clearwater River was in the range of 32,000 to 35,000.

Age Composition

Age class of adult steelhead is determined by fork length measurements and based on data from previous coded-wire tag returns from Dworshak NFH. The total returns by sex, age, and time of return is listed in **Table 2**. The 408 I-salt returns to the Dworshak NFH rack was above average but not even close to a record. The adult (II & III salt) return was comprised of 76.0 percent females and 24.0 percent males, I-salt returns were 86.3 percent male.

Table 2. Adult steelhead broodstock returns by sex, age, and return time at Dworshak NFH rack, 2004-2005.

Ocean Age Class by Run Time	Males	Females	Total
Fall Run (10/04 to 10/27)			
I-Salt	64	17	81
II-Salt	210	417	627
III-Salt	10	7	17
Spring Run (2/18 to 5/03)*			
I-Salt	288	39	327
II-Salt	678	2,571	3,249
III-Salt	51	10	61
Combined Total*			
I-Salt	352	56	408
II-Salt	888	2,988	3,876
III-Salt	61	17	78
Total Measured Rack Return*	1,301	3,061	4,362

* Intermittent ladder operation due to high number of returns.

Survival

The III-salt returns in 2005 complete the returns from the 1,247,550 smolts released at Dworshak NFH in 2001. Total rack returns to Dworshak NFH from the 2001 release were 560 I-salts, 2,988 II-salts, and 78 III-salts for a hatchery return survival rate of 0.2906 percent (**Table 3**). The mean hatchery rack return rate for the last 10 years is 0.3426 percent.

Table 3. Rack return vs. release numbers for summer steelhead at Dworshak NFH, release years 1980-2000.

Release Year	Smolts Released	Returns				Rack Return %
		I-Salt	II-Salt	III-Salt	Total	
1980	2,666,085	400	6,613	652	7,665	0.2875
1981	1,930,047	124	1,538	1,219	2,881	0.1493
1982	2,108,319	1,094	12,679	403	14,176	0.6724
1983	1,259,110	120	3,359	239	3,718	0.2953
1984	1,208,319	700	8,318	119	9,137	0.7562
1985	1,035,573	431	3,487	317	4,235	0.4090

1986	1,239,541	168	5,296	215	5,679	0.4582
1987	1,206,580	428	9,896	314	10,638	0.8817
1988	1,432,125	487	7,339	250	8,076	0.5639
1989	1,073,900	218	3,132	162	3,512	0.3270
1990	1,466,664	313	7,349	153	7,815	0.6699
1991	1,192,503	389	3,543	76	4,008	0.3361
1992	1,224,101	61	1,270	71	1,331	0.1087
1993	1,217,990	48	4,005[1]	83	4,136	0.3396
1994	1,153,417	384	2,537	38	2,959	0.2565
1995	1,213,577	349	3,308	87	3,744	0.3085
1996	1,377,435	253	4,976	69	5,298	0.3846
1997	1,361,034	356	2,225	96	2,677	0.1967
1998	1,228,944	588	5,745	177[2]	6,510	0.5297
1999	1,249,237	570	6,226[2]	129[2]	6,925	0.5543
2000	1,311,447	1,330[2]	4,555[2]	101[2]	5,986	0.4564
2001	1,247,550	560[2]	2,988[2]	78[2]	3,626	0.2906
2002	1,365,823	678[2]	3,876[2]			
2003	1,210,919	408[2]				

Does not include twenty unmeasured fish.
[2] Intermittent ladder operation due to high number of returns.

Adult Outplanting

When we trap more adult steelhead at the hatcheries than are necessary for broodstock they are outplanted into various streams throughout the Clearwater River basin. A total of 1,657 adults were outplanted from Dworshak and Kooskia NFHs for fishery recycle during December 2004, March 2005, and April 2005 (**Table 4**). Kooskia NFH rack returns are summarized in **Table 5**.

Table 4. Number, location, and purpose of summer steelhead outplanted from Dworshak and Kooskia NFHs in 2005.

Location	Purpose	Total
South Fork at Stites	Fishery recycle	8
Other S F sites	Fishery recycle	1,458
	Total	1,657

Table 5. Rack returns and age class structure for hatchery steelhead and naturals captured at Kooskia NFH, 1995-2005.

Return year	I-Salt	II-Salt	III-Salt	Total Hatchery	Naturals
1995	20	381	20	421	48
1996	72	307	6	385	24
1997	26	420	4	450	61
1998	18	217	0	235	18
1999	36	685	1	722	53
2000	83	232	5	320	17
2001	12	253	1	266	10
2002	75	367	2	444	8
2003	40	350	4	394	16
2004	14	361	5	380	22
2005	2	100	2	104	4

Coded-Wire Tag Recoveries

A summary of adult steelhead coded-wire tag (CWT) recoveries in the Dworshak and Kooskia NFHs racks are shown in **Table 6**.

Table 6. Summary of coded-wire tag recoveries for adult summer steelhead in the Dworshak and Kooskia NFH racks, 1987-2005.

Year	Total Recoveries	Recoveries of Dworshak Stock	Recoveries of Marks from Strays
1987[4]	397	388[1]	9
1988	50	44	6
1989	284	279[1]	5
1990	587	571[1]	16
1991	738	738	0
1992	325	322[1]	3
1993	511	508	3

1994	238	234	4
1995	108	108[1]	0
1996	330	326[2]	4
1997	342	341[2]	1
1998	378	368[3]	10
1999	446	445[3]	1
2000	378	375	3
2001	405	403	2
2002[4]	637	630	7
2003[4]	1012	1011	1
2004[4]	713	708	5
2005[4]	285	277	8

[1]Includes NMFS transportation study marks.
[2] Includes NMFS transportation study marks and Clearwater Hatchery marks from the South Fork Clearwater River releases.
[3] Includes Clearwater Hatchery marks from South Fork Clearwater and Clear Creek releases.
[4] Intermittent ladder operation due to high number of returns.

Evaluation of Run Projection for 2005 and Forecast for 2006

2005 Prediction. The 2005 run prediction and actual rack return by age class is listed in **Table 7**. Our 2005 prediction was an overestimate. The prediction of II-Salts is based on the number of jacks the previous year. The predictions for I-salts and III-salts are based on average return rates. The hatchery fish return to the Clearwater River (see **Table 1**) was down from the previous year, but was still well above average.

Table 7. Comparison of predicted, expanded, and actual adult rack returns for summer steelhead at Dworshak NFH, 2004-2005.

Ocean Age Class	Predicted	Expanded return	Actual Rack
I-Salt	688	759	408
II-Salt	13,258	7,209	3,876
III-Salt	134	145	78
Total	14,080	8,113	4,362

2006 Steelhead Run Prediction. Based on the 759 I-salt rack returns (expanded) the predicted steelhead return to Dworshak NFH in 2005-2006 should be above average **(Table 8**). In-season hatchery "B" steelhead estimates at both Bonneville and Lower Granite dams have caused the estimate to be revised slightly downward. Based on this prediction we are considering intermittent ladder operation to prevent excess fish collection. Intermittent ladder operation also keeps steelhead in the river where they are available for sport and tribal harvest and allows us to spawn fish that have not been held in the hatchery for more than a few days.

Table 8.. Predicted steelhead to Dworshak NFH rack, 2005-2006.

Ocean Age Class	2005-06 Prediction
I-Salt	753
II-Salt	6,801
III-Salt	154
Total	7,708

References

Dworshak National Fish Hatchery. 2005. Spawning Report: Broodyear 2005 Steelhead. U.S. Fish and Wildlife Service. 10 p.