

ADULT STEELHEAD RETURNS TO DWORSHAK NFH IN 2006-2007 AND PROGNOSIS FOR 2007-2008

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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. Some of the Clearwater "B" run steelhead actually arrive at Dworshak NFH in the fall. The remainder of the run may reach the Snake and Clearwater rivers in the fall where they over-winter until their final run into the hatchery in late winter and early spring. The Dworshak NFH trap is operated during the fall and in recent years the first half of October is sufficient to insure inclusion of adequate numbers of early arriving steelhead (~500 adults) into the hatchery brood stock. The trap is again operated, intermittently, from February through April to capture brood stock from the mid and late portions of the run. Steelhead are also trapped at Kooskia NFH located about 1.5 miles east of Kooskia, Idaho, near the confluence of Clear Creek and the Middle Fork Clearwater River. In low return years these steelhead are available for broodstock use at Dworshak NFH, normally they are recycled to the South Fork Clearwater fishery.

Summer steelhead smolt releases from Dworshak NFH began in 1970. The first adults returned to the hatchery in 1972. The 2006-2007 return marked the 35th 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 1972-2006. This report reviews the 2006-2007 run and lists projections for 2007-2008.

2006-2007 Adult Returns

The Dworshak NFH ladder was opened October 2, 2006 for steelhead collection and operated with intermittent openings for coho salmon (*Oncorhynchus kisutch*) collection until November 27. A total of 515 early-return steelhead were trapped October 2-13, 2006. The fish ladder was re-opened for steelhead collection on February 22 and operated intermittently until April 27, 2007. A total of 2,999 adult steelhead entered the ladder during the spring of 2007. Ladder operation was

also intermittent during the spring season to avoid collecting fish excess to broodstock needs, thereby allowing us to spawn fish that have not been held in the hatchery for more than a few days. Operating the ladder this way also keeps steelhead in the river where they are available for sport and tribal harvest. The total return to the hatchery rack was 3,514. We trapped 12 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 NMFS Biological Opinion on wild steelhead. In addition to the hatchery rack return, an estimated 20,901 steelhead were harvested in the sport fishery (IDFG). Nez Perce Tribal harvest estimate (by authors) was 1,000 (**Table1**).

Table 1. Number of steelhead returning to Dworshak NFH, estimates of hatchery fish harvested, and total hatchery returns to the Clearwater River, Idaho, 1972-2007 (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	Unharvested 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. ⁵	430	0	2,288
1976-77	3,100	N.S. ⁵	410	0	3,510
1977-78	12,272	14,000	(1,000) ⁶	0	27,272
1978-79	4,939	4,610	(500) ⁶	0	10,049
1979-80	2,519	N.S. ⁵	1,250	300	4,069
1980-81	1,968	4,510	(1,000) ⁶	500	7,978
1981-82	3,054	1,665	(1,000) ⁶	0	5,719
1982-83	7,672	13,967 ⁷	(1,500) ⁶	0	23,139
1983-84	3,284	6,500	(500) ⁶	100	11,384
1984-85	14,018	19,410	(1,500) ⁶	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

Table 1 (continued). Number of steelhead returning to Dworshak NFH, estimates of hatchery fish harvested, and total hatchery returns to the Clearwater River, Idaho, 1972-2007 (data from 1972-73 to 1983-84 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	Unharvested Dworshak Hatchery Fish ⁴	Total Dworshak Fish Returning to Clearwater River
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	22,774 ¹⁰	(1,000) ⁶	774	32,281 ¹⁰
2002-03	5,244 ⁸	25,030 ¹⁰	1,118	830	32,222 ¹⁰
2003-04	3,767 ⁸	20,806 ¹⁰	(1,336) ⁶	855	26,764 ¹⁰
2004-05	4,362 ⁸	19,252 ¹⁰	1,331	280	25,225 ¹⁰
2005-06	3,243 ⁸	14,916 ¹⁰	1,470	457	20,086 ¹⁰
2006-07	3,514 ⁸	13,301 ¹⁰	(1,000) ⁶	840	18,655

Table 1. Footnotes.

¹Return year is from October through May.

²Estimates of sport harvest in the Clearwater River provided by Idaho Department of Fish and Game.

³Estimates of tribal harvest in the Clearwater River provided by Nez Perce Tribe Department of Fishery, except as noted by Footnote 6.

⁴Estimated by using the return percentage to Kooskia NFH, applied to returning II-salts from offsite releases.

⁵N.S. = no sport fishing season.

⁶() guesstimate on tribal harvest by authors.

⁷Pettit, IDFG, Lewiston, Idaho (personal communication) included an additional 2,000 fish in harvest from Snake River for a total of 15,967.

⁸Ladder was operated intermittently for broodstock management.

⁹We 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.

¹⁰Sport harvest estimates have been modified from previous year's reports to account for only Dworshak's contribution to the steelhead harvest in the Clearwater River.

Age Composition

Age class of adult steelhead is determined by fork length measurements which have been determined using data from previous coded-wire tag returns from Dworshak NFH. The seasonal and total returns by sex and age are listed in **Table 2**. The steelhead I-salt return was 83.6 percent male. The combined II & III salt return was 68.3 percent female and 31.7 percent male.

Table 2. Adult steelhead broodstock returns by sex, age, and return time at Dworshak NFH rack, 2006-2007.

Ocean Age Class by Run Time	Males	Females	Total
Fall Run (10/2 to 10/13)			
I-Salt	106	16	122
II-Salt	141	249	390
III-Salt	2	1	3
Spring Run (2/28 to 5/02)*			
I-Salt	190	42	232
II-Salt	740	1,873	2,613
III-Salt	120	34	154
Combined Total*			
I-Salt	296	58	354
II-Salt	881	2,122	3,003
III-Salt	122	35	157
Total Measured Rack Return*	1,299	2,215	3,514

* Intermittent ladder operation during Spring Run for broodstock management.

Survival

The III-salt returns in 2007 complete the returns from the 1,210,919 smolts released at Dworshak NFH in 2003. Total rack returns to Dworshak NFH for each age class in that brood year were 408 I-salt, 2,837 II-salt, and 157 III-salt fish. The smolt to adult return rate for brood year 2003 was 0.2809 percent (**Table 3**). The mean hatchery rack return rate for the last 10 years is 0.3591 percent.

Table 3. Rack return vs. release numbers for summer steelhead at Dworshak NFH, release years 1980-2005.

Release Year	Smolts Released	I-Salt	II-Salt	Returns III-Salt	Total	Rack Return %
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	6,510	0.5297
1999	1,249,237	570	6,226	129 ²	6,925	0.5543
2000	1,311,447	1,330	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	34 ²	4,588	0.3359
2003	1,210,919	408 ²	2,837 ²	157 ²	3,402	0.2809
2004	1,202,055	372 ²	3,003 ²			
2005	1,122,064	354 ²				

¹Does not include twenty unmeasured fish.² Intermittent ladder operation for broodstock management.

Adult Outplanting

When we trap more adult steelhead at the hatcheries than are necessary for brood stock, they are transported and released into various streams throughout the Clearwater River basin. A total of 1,941 adults were trucked from Dworshak NFH and recycled back to the fishery during November 2006. Another 1,422 adults were outplanted from Dworshak and Kooskia NFHs in March 2007 and April 2007 for both supplementation and fishery recycle (**Table 4**). All Kooskia NFH rack returns are summarized in **Table 5**.

Table 4. Number, location, and purpose of summer steelhead outplanted or recycled from Dworshak and Kooskia NFHs in 2007.

Location	Purpose	Total
Hog Island, Lower Clearwater River	Fishery recycle	1,941
Peasly Cr, Mill Cr, Newsome Cr, SF Clearwater	Fishery supplementation & outplant	1,422
Total		3,363

Table 5. Rack returns and age class structure for hatchery steelhead and naturals captured at Kooskia NFH, 1995-2007.

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
2006	13	131	1	145	7
2007	21	368	3	392	0

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, 1987-2007.

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	637	630	7
2003 ⁴	1012	1011	1
2004 ⁴	713	708	5
2005 ⁴	285	277	8
2006 ⁴	577	574	3
2007 ⁴	229	225 ³	4

¹Includes NMFS transportation study marks.

Hatchery marks from the South Fork Clearwater River releases.

South Fork Clearwater and Clear Creek releases.

²Includes NMFS transportation study marks and Clearwater

³Includes Clearwater Hatchery marks from

⁴Intermittent ladder operation for broodstock management.

Evaluation of Run Projection for 2007 and Forecast for 2008

2007 Prediction. The 2007 run prediction and actual rack return by age class is listed in **Table 7**. Our 2007 prediction was a slight underestimate of the expanded return. 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 up from the previous year and still well above average.

Table 7. Comparison of predicted, expanded, and actual adult rack returns for summer steelhead at Dworshak NFH, 2006-2007.

Ocean Age Class	Predicted	Expanded Return	Actual Rack*
I-Salt	768	1,041	354
II-Salt	8,479	8,832	3,003
III-Salt	139	462	157
Total	9,385	10,335	3,514

*Ladder was operated intermittently for broodstock management.

2008 Steelhead Run Prediction. Based on the 354 I-salt rack returns (expanded) the predicted steelhead return to Dworshak NFH for 2007-2008 is shown in **Table**. The return should be about average, even though the current in-season hatchery “B” steelhead counts at Bonneville are slightly lower than the 10-year average the Lower Granite counts are above the 10-year average. Based on this prediction we will continue with intermittent ladder operation to prevent excess fish collection. As mentioned intermittent ladder operation 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 returns to Dworshak NFH rack, 2007-2008.

Ocean Age Class	2007-08 Prediction
I-Salt	430
II-Salt	6,247
III-Salt	218
Total	6,895