



# FISH PASSAGE CENTER

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## MEMORANDUM

TO: Mark Drobish (USFWS)

FROM: Brandon R. Chockley

DATE: December 16, 2013

RE: Dworshak National Fish Hatchery Report (1997–2013)

The Fish Passage Center has been marking Chinook and steelhead from the Dworshak National Fish Hatchery facility over the last several years as part of the Smolt Monitoring Program (SMP) and the Comparative Survival Study (CSS). For purposes of these studies data are collected on either the juvenile life stage, or both the juvenile and adult life stages. The SMP provides information for in-season management of the hydrosystem and post-season analyses to the federal, state, and tribal fishery agencies. The CSS is a multi-year program that estimates survival rates over different life stages for spring and summer Chinook and steelhead produced in major hatcheries. We would like to share with you an update of some of the information we developed under these studies for the spring Chinook and summer steelhead used from the Dworshak Hatchery facility in 2013 and past years.

Under the Smolt Monitoring Program, information is collected on the timing and migration speed from the hatchery to Lower Granite Dam. In addition, as part of the CSS study, juvenile survival estimates are developed for the hydrosystem between Lower Granite and Bonneville Dams, as well as survival to adulthood of different passage histories.

The tables below describe the median travel times for each year's release to Lower Granite Dam, along with the minimum and maximum travel time estimates for both spring Chinook (Table 1) and steelhead (Table 2) from Dworshak NFH. They also provide the 95% confidence limits around the estimated median travel time. Beginning in 2008, Dworshak NFH began releasing additional PIT-tagged steelhead into the Clearwater River Basin. For

comparison purposes, separate travel times are provided for each of the steelhead release sites in 2013 (Table 3).

**Table 1.** Dworshak NFH Spring Chinook Travel Times to Lower Granite Dam

Release Date	Migration Year	Travel Time (Days)			95% Confidence Limits	
		Min	Med	Max	Lower	Upper
4/7	1997	3.2	31.9	97.6	31.0	32.8
3/23-3/26	1998	2.8	28.1	78.2	27.8	28.1
4/7-4/8	1999	4.6	27.7	133.7	27.4	28.2
3/23, 4/5-4/6	2000	3.9	27.3	86.8	27.2	27.3
3/28	2001	3.9	30.4	151.1	30.3	30.4
3/27-3/28	2002	3.4	38.1	77.6	38.1	38.2
3/19-3/20	2003	6.0	49.4	121.4	49.0	49.7
3/31-4/1	2004	6.2	32.2	74.9	32.0	32.4
4/4-4/6	2005	5.6	30.2	76.0	30.2	30.2
3/27-3/29	2006	2.7	35.6	78.7	35.4	35.9
3/28-3/29	2007	4.4	27.8	76.9	27.4	28.4
4/2-4/3	2008	5.6	34.6	88.3	34.5	34.9
3/25-3/26	2009	5.5	43.5	89.2	43.3	43.6
3/31	2010	10.1	27.2	66.2	27.2	27.2
3/23-3/24	2011	2.8	40.0	77.4	39.4	40.2
3/26, 4/1	2012	4.3	31.2	93.6	30.8	31.4
4/1-4/2	2013	4.1	30.4	67.3	30.3	30.4

**Table 2.** Dworshak NFH Steelhead Travel Times to Lower Granite Dam

Release Date(s)	Release Site(s)	Migration Year	Travel Time (Days)			95% Confidence Limits	
			Min	Med	Max	Lower	Upper
4/28-5/2	DWOR	1997	1.2	3.3	64.8	2.7	4.0
4/27-4/30	DWOR	1998	2.3	4.7	48.8	4.5	5.0
4/26-4/30	DWORMS	1999	1.5	6.2	60.1	5.8	6.5
5/3-5/5	DWORMS	2000	1.6	3.5	66.6	3.5	3.5
4/23-4/26	DWORMS	2001	2.5	6.8	110.0	6.7	7.0
4/22-4/25	DWORMS	2002	2.4	5.7	47.4	5.5	6.4
4/24	DWORMS	2003	0.6	7.1	54.8	6.6	7.7
4/29-4/22	DWORMS	2004	2.9	8.8	34.0	8.4	9.3
4/18-4/22	DWORMS	2005	3.4	11.2	60.8	10.4	11.6
4/17-4/21	DWORMS	2006	1.0	10.5	52.7	8.1	12.6
4/16-4/19	DWORMS	2007	1.9	14.6	52.7	13.0	15.8
4/14,4/21-4/24	DWORMS, CLEARC, CLWRSF	2008	0.5	11.5	56.5	11.1	11.9
4/14-4/17	DWORMS, CLEARC, CLWRSF	2009	2.5	7.5	64.2	7.48	7.54
4/15-4/22	DWORMS, CLWRSF	2010	2.4	9.9	66.3	9.7	10.2
3/21-3/31	DWORMS, CLEARC, CLWRSF	2011	1.7	12.6	100.4	12.4	12.8
4/3-4/12	DWORMS, CLEARC, CLWRSF, LOLOC	2012	1.5	9.6	64.4	9.4	10.4
4/9-4/17	DWORMS, CLEARC, CLWRSF, LOLOC	2013	2.4	6.6	61.0	6.4	6.8

**Table 3.** 2013 Dworshak NFH Steelhead Travel Times from each release site to Lower Granite Dam

Release Date(s)	Release Site	Travel Time (Days)			95% Confidence Limits	
		Min	Med	Max	Lower	Upper
4/17	DWORMS	3.4	5.0	42.3	4.8	5.3
4/9-4/10	CLEARC	3.3	6.6	49.6	6.3	7.5
4/10	CLWRSF	3.5	11.8	61.0	11.4	14.7
4/15-4/16	LOLOC	2.4	28.3	51.8	27.4	28.5

As with last year, we are providing you with tables that present the estimated 10%, 50%, and 90% passage dates of yearling spring Chinook (Table 4) and steelhead (Table 5) juveniles at Lower Granite Dam for each of the years of tagging. As with the travel time tables, we are also providing the estimated 10%, 50%, and 90% passage dates for each of the steelhead release sites in 2013 (Table 6).

**Table 4.** Estimated 10%, 50%, and 90% passage dates of Dworshak NFH yearling spring Chinook at Lower Granite Dam.

Migration Year	Release Date(s)	10% Passage Date	50% Passage Date	90% Passage Date
1997	4/7	26-Apr	11-May	18-May
1998	3/23-3/26	11-Apr	23-Apr	2-May
1999	4/7-4/8	25-Apr	6-May	21-May
2000	3/23, 4/5-4/6	23-Apr	3-May	12-May
2001	3/28	18-Apr	28-Apr	5-May
2002	3/27-3/28	15-Apr	4-May	15-May
2003	3/19-3/20	23-Apr	8-May	26-May
2004	3/31-4/1	17-Apr	3-May	8-May
2005	4/4-4/6	27-Apr	6-May	10-May
2006	3/27-3/29	8-Apr	2-May	11-May
2007	3/28-3/29	11-Apr	22-Apr	8-May
2008	4/2-4/3	21-Apr	8-May	18-May
2009	3/25-3/26	20-Apr	8-May	19-May
2010	3/31	22-Apr	27-Apr	7-May
2011	3/23-3/24	10-Apr	2-May	11-May
2012	3/26, 4/1	14-Apr	26-Apr	12-May
2013	4/1-4/2	19-Apr	2-May	10-May

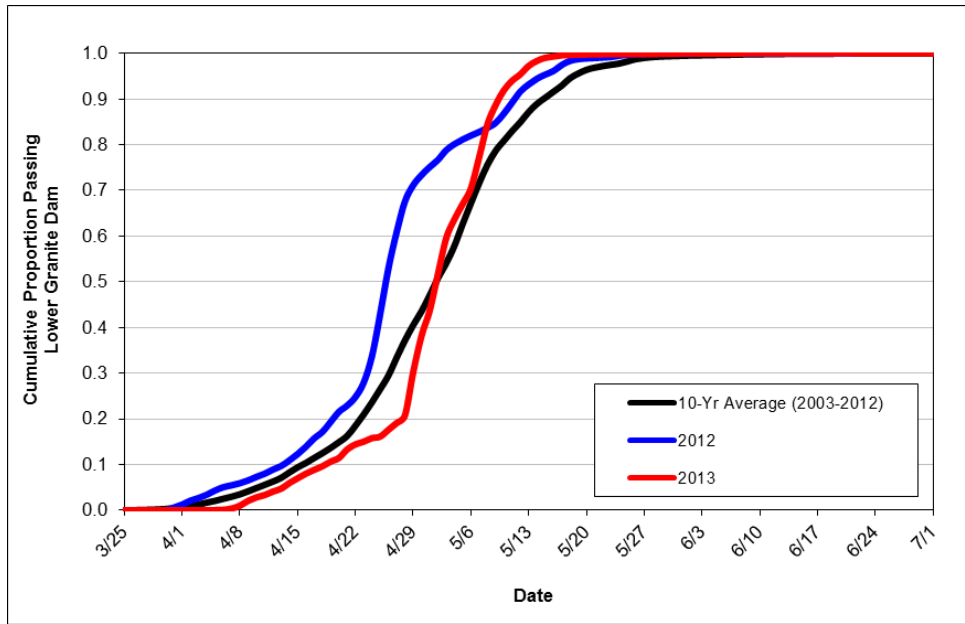
**Table 5.** Estimated 10%, 50%, and 90% passage dates of Dworshak NFH steelhead at Lower Granite Dam.

<b>Migration Year</b>	<b>Release Date(s)</b>	<b>Release Site(s)</b>	<b>10% Passage Date</b>	<b>50% Passage Date</b>	<b>90% Passage Date</b>
1997	4/28-5/2	DWOR	1-May	3-May	15-May
1998	4/27-4/30	DWOR	2-May	3-May	13-May
1999	4/26-4/30	DWORMS	30-Apr	4-May	25-May
2000	5/3-5/5	DWORMS	6-May	7-May	16-May
2001	4/23-4/26	DWORMS	29-Apr	2-May	17-May
2002	4/22-4/25	DWORMS	26-Apr	30-Apr	21-May
2003	24-Apr	DWORMS	25-Apr	28-Apr	20-May
2004	4/19-4/22	DWORMS	25-Apr	29-Apr	9-May
2005	4/18-4/22	DWORMS	26-Apr	1-May	10-May
2006	4/17-4/22	DWORMS	21-Apr	1-May	18-May
2007	4/16-4/19	DWORMS	22-Apr	1-May	13-May
2008	4/14, 4/21-4/24	DWORMS, CLEARC, CLWRSF	27-Apr	2-May	17-May
2009	4/14-4/17	DWORMS, CLEARC, CLWRSF	20-Apr	23-Apr	8-May
2010	4/15-4/22	DWORMS, CLWRSF	25-Apr	1-May	20-May
2011	3/21-3/31	DWORMS, CLEARC, CLWRSF	1-Apr	6-Apr	14-May
2012	4/3-4/12	DWORMS, CLEARC, CLWRSF, LOLOC	14-Apr	22-Apr	8-May
2013	4/9-4/17	DWORMS, CLEARC, CLWRSF, LOLOC	17-Apr	22Apr	11-May

**Table 6.** Estimated 10%, 50%, and 90% passage dates of Dworshak NFH steelhead at Lower Granite Dam. Separate estimates are provided for each of the release sites in 2013.

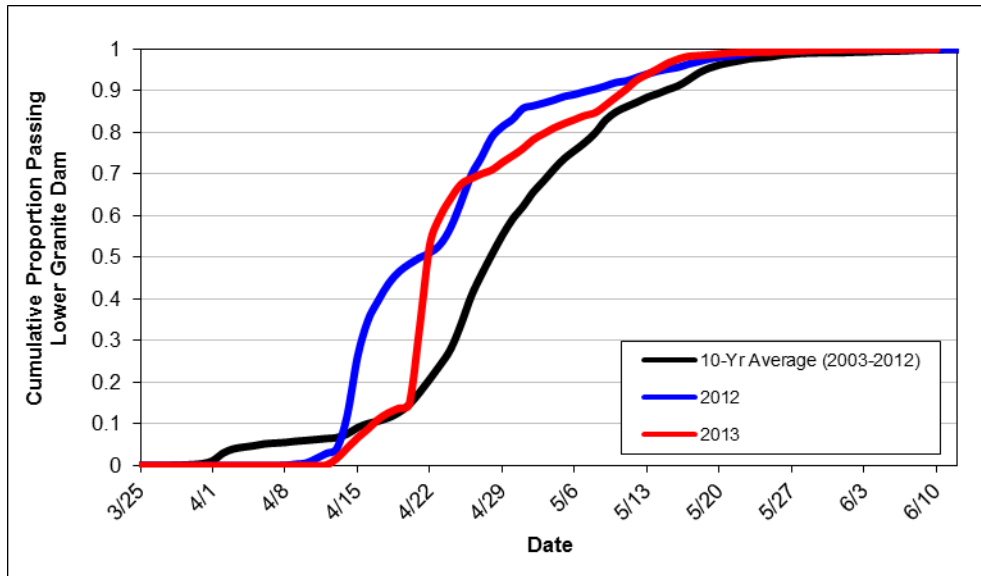
<b>Release Date</b>	<b>Release Site</b>	<b>10% Passage Date</b>	<b>50% Passage Date</b>	<b>90% Passage Date</b>
4/17	DWORMS	21-Apr	22-Apr	6-May
4/9-4/10	CLEARC	13-Apr	16-Apr	9-May
4/10	CLWRSF	16-Apr	21-Apr	12-May
4/15-4/16	LOLOC	29-Apr	13-May	20-May

Figure 1 is provided as an illustration of how the arrival timing of the 2013 release of yearling spring Chinook compares to last year's release, as well as the average of the most recent 10-years (2003–2012).

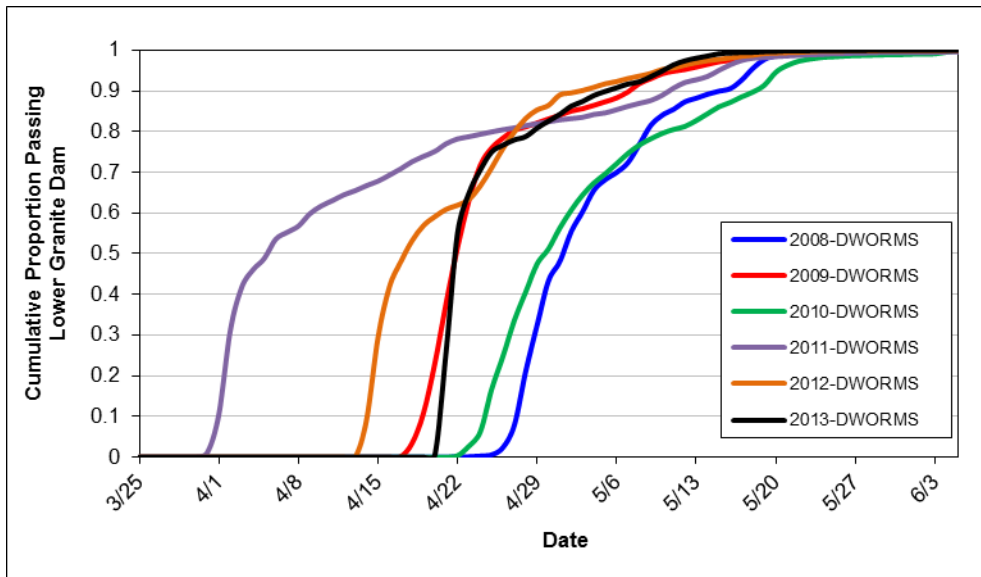


**Figure 1.** Cumulative passage timing of Dworshak NFH yearling spring Chinook to Lower Granite Dam.

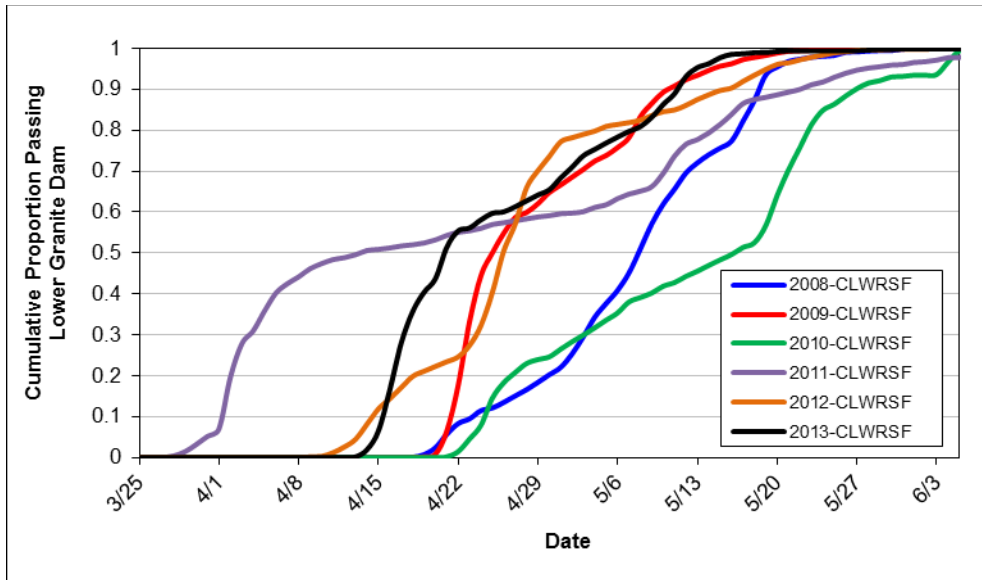
We are providing five figures to illustrate the 2013 passage timing for steelhead released by Dworshak NFH (Figures 2–6). The first of these figures (Figure 2) illustrates the collective timing of the 2013 releases, compared to those in 2012 and the 10-year average (2003–2012). The second (Figure 3) is a comparison of the timing from the DWORMS release site in 2013 versus the 5 previous years (2008–2012). The third (Figure 4) is a comparison of the timing from the CLWRSF release site in 2013 versus the 5 previous years (2008–2012). The fourth (Figure 5) is a comparison of the timing from the CLEARC release site in 2013 versus the 4 previous years (2008–2009 and 2011–2012). Finally, Figure 6 is a comparison of the timing from the LOLOC release site in 2013 to that in 2012.



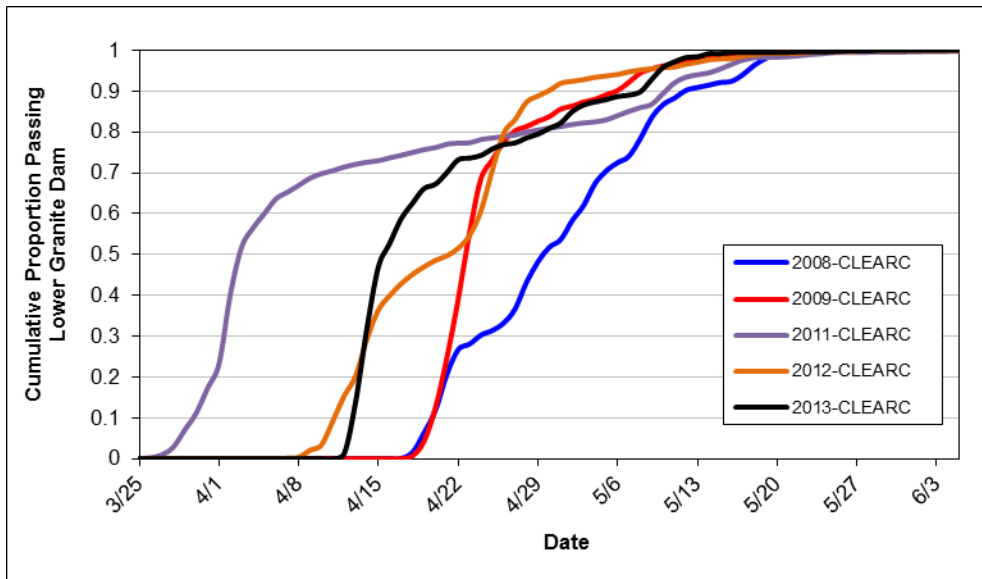
**Figure 2.** Cumulative passage timing of Dworshak NFH steelhead to Lower Granite Dam. Timing plots are collective timing of the all release sites for each year.



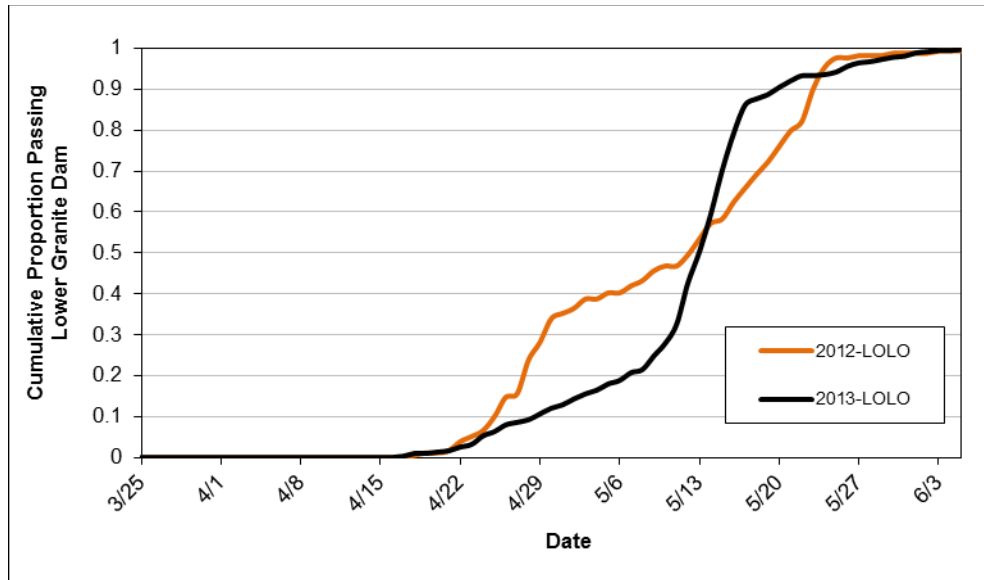
**Figure 3.** Cumulative passage timing of Dworshak NFH steelhead released at DWORMS release site to Lower Granite Dam.



**Figure 4.** Cumulative passage timing of Dworshak NFH steelhead released at CLWRSF release site to Lower Granite Dam.



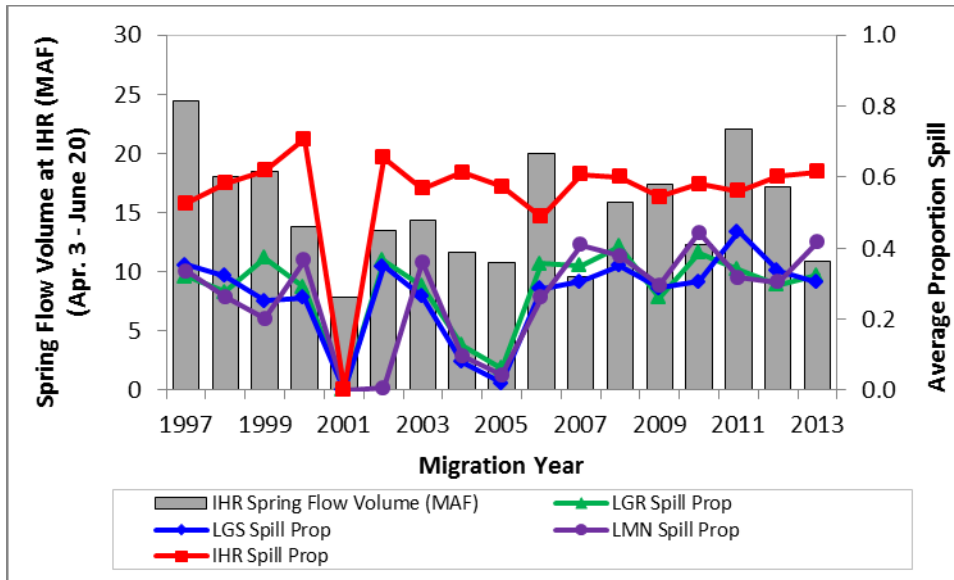
**Figure 5.** Cumulative passage timing of Dworshak NFH steelhead released at CLEARC release site to Lower Granite Dam.



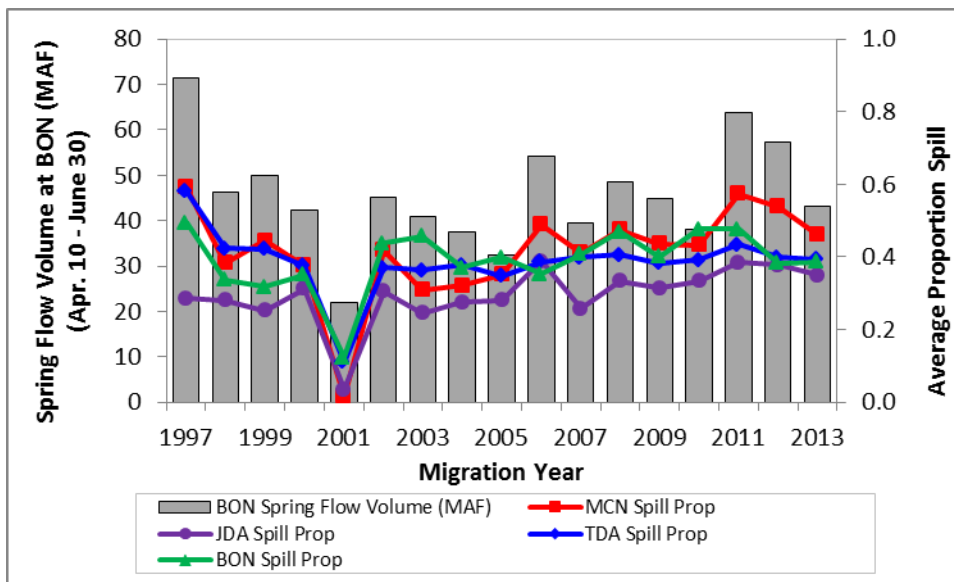
**Figure 6.** Cumulative passage timing of Dworshak NFH steelhead released at CLEARC release site to Lower Granite Dam.

Figures 7 and 8 are provided below to illustrate the out-migration conditions that these spring migrants may have experienced in the Snake and Lower Columbia rivers. Figure 7 provides the total spring flow volume (April 3–June 20) for the Snake River (as measured at Ice Harbor), along with the average spring spill proportions at each of Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams, for each migration year. Figure 8 provides the total spring flow volume (April 10–June 30) for the Lower Columbia (as measured at Bonneville), along with the average spring spill proportions at each of McNary, John Day, The Dalles, and Bonneville dams, for each migration year.





**Figure 7.** Total spring flow volume in the Snake River (at Ice Harbor Dam) and average spill proportion at Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams. Spring period in the Snake River is April 3–June 20.



**Figure 8.** Total spring flow volume in the Lower Columbia River (at Bonneville Dam) and average spill proportion at McNary, John Day, The Dalles, and Bonneville dams. Spring period in the Lower Columbia River is April 10–June 30.

Finally, Table 7 contains estimates calculated in the CSS study of juvenile survival in the hydrosystem between Lower Granite and Bonneville Dams and the survival to adulthood of spring Chinook in several categories. Those categories are SAR(T), SAR(C<sub>0</sub>), and Overall SAR<sub>LGR-10-LGR</sub>, where SAR(T) represents smolts transported from Lower Granite, Little Goose, or Lower Monumental Dam, SAR(C<sub>0</sub>) represents smolts migrating in river (undetected at

Snake River transportation collector sites), and the Overall SAR<sub>LGR-10-LGR</sub> is an estimate that is obtained by taking the proportion of the total population of smolts (tagged and untagged) at Lower Granite Dam in each study category and multiplying by the respective study category's SAR<sub>LGR-10-LGR</sub>. The Overall SAR<sub>LGR-10-LGR</sub> includes fish that were bypassed during non-transport operations (C<sub>1</sub>) and is, in effect, the estimated SAR for the overall hatchery release (without jacks). The data presented in Table 7 were taken from various chapters and appendices of the 2013 CSS Annual Report, which can be downloaded from the FPC webpage (<http://www.fpc.org/documents/CSS.html>). Figure 9 shows a time series of the Overall SAR<sub>LGR-10-LGR</sub> over the years of available data for Dworshak NFH spring Chinook.

**Table 7.** Dworshak NFH Spring Chinook Survivals from CSS, as presented in the 2013 CSS Annual Report

Release Date(s)	Migration Year	Juvenile Survival (LGR-BON)	Proportion Transported	T/C Ratio	Adult Survival		
					SAR(T) %	SAR(C <sub>0</sub> ) %	Weighted SAR <sub>LGR-10-LGR</sub>
4/7	1997	0.49	0.48	1.75	0.83	0.47	0.62
3/23-3/26	1998	0.51	0.71	0.72	0.90	1.25	1.00
4/7-4/8	1999	0.54	0.74	0.99	1.18	1.19	1.18
3/23, 4/5-4/6	2000	0.48	0.66	0.99	1.00	1.01	1.00
3/28	2001	0.24	0.98	8.76	0.36	0.04 <sup>B</sup>	0.36
3/27-3/28	2002	0.62	0.57	1.24	0.62	0.50	0.57
3/19-3/20	2003	0.68	0.54	1.21	0.26	0.21	0.24
3/31-4/1	2004	0.50	0.84	0.89	0.28	0.32	0.29
4/4-4/6	2005	0.51	0.84	1.43	0.20	0.14 <sup>C</sup>	0.19
3/27-3/29	2006 <sup>D</sup>	0.52	0.52	0.95	0.36	0.38	0.35
3/28-3/29	2007 <sup>D</sup>	0.67	0.08	1.84	0.59	0.32	0.36
4/2-4/3	2008 <sup>D</sup>	0.51	0.34	1.53	0.80	0.52	0.57
3/25-3/26	2009 <sup>D</sup>	0.44	0.34	1.59	0.71	0.45	0.53
3/31	2010 <sup>D</sup>	0.71	0.19	0.70	0.37	0.52	0.47
3/23-3/24	2011 <sup>A, D</sup>	0.42	0.35	0.63	0.13	0.21	0.16
3/26, 4/1	2012 <sup>D, E</sup>	0.60	0.20	N/A	N/A	N/A	N/A

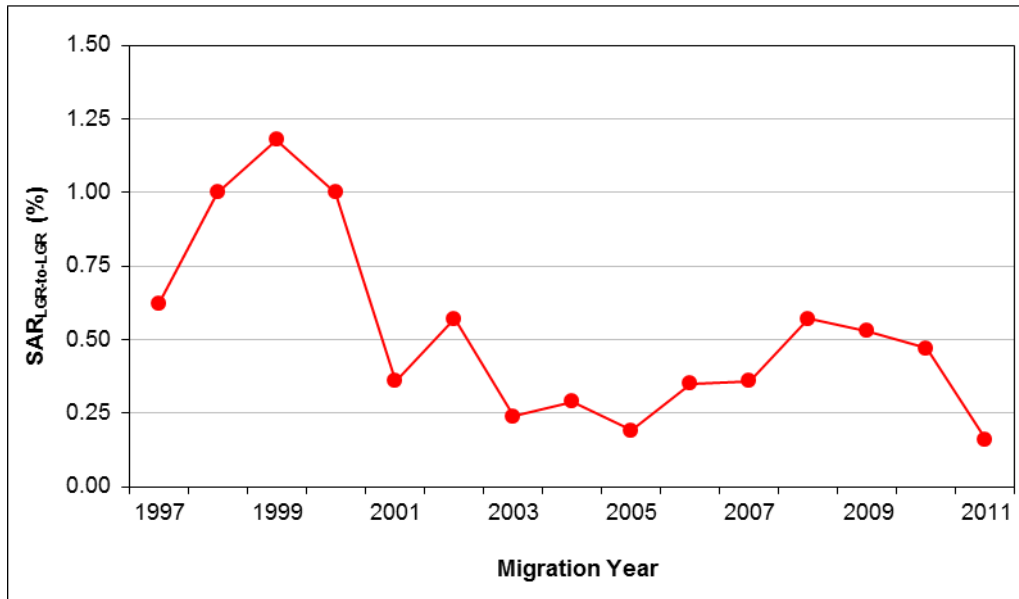
<sup>A</sup> Migration year 2011 is incomplete with Age 2-salt adult returns through 9/15/2013.

<sup>B</sup> Assumed SAR(C<sub>0</sub>) same as SAR(C<sub>1</sub>) for 2001.

<sup>C</sup> In-river SAR is combination of groups C<sub>1</sub> and C<sub>0</sub>.

<sup>D</sup> Estimates for migration years 2006 through 2012 reflect use of new methodology developed for random pre-assignment of "monitor mode" and "return-to-river mode" operations. See 2013 CSS Annual Report for details.

<sup>E</sup> No adult returns to date, only juvenile metrics are available.



**Figure 9.** Weighted SAR<sub>LGR-to-LGR</sub> for Dworshak NFH spring Chinook (1997–2011). Migration year 2011 is incomplete for yearling Chinook, with Age 2-salt adult returns through 9/15/2013.

Past years’ Dworshak NFH reports have included juvenile survival and SAR data for a single aggregate of hatchery steelhead above Lower Granite Dam. Hatchery steelhead smolts from Dworshak NFH were included in this aggregate group. More representative tagging for Snake River steelhead hatcheries began with coordination between CSS, LSRCP, and IPC in migration year 2008. This increased sample size of PIT tags allowed for finer scale analyses. The CSS currently groups and analyzes hatchery steelhead by run (A-run or B-run) and release drainage (e.g., Salmon River, Clearwater River, etc.). Several hatcheries throughout the Snake and Clearwater basins contribute hatchery steelhead for these analyses. Estimates of SARs are available for the 2008–2010 migration years in the 2013 CSS Annual Report (Chapter 4 and Appendix A). The 2013 CSS Annual Report also provides juvenile survival estimates through migration year 2012 (Appendix A). In future years, the Fish Passage Center hopes to compile a single Hatchery Steelhead report for distribution to all hatcheries that contribute PIT-tags to the CSS.

We hope that the information we have provided regarding the use and application of information from the marked groups over the last several years is of some use to you. If you would like any additional information regarding these releases please feel free to contact us.

Cc: Pete Hassemer, IDFG  
 Bill Tweit, WDFW  
 Jay Hesse, Nez Perce  
 Tony Nigro, ODFW  
 Howard Schaller, USFWS  
 FPAC