



# FISH PASSAGE CENTER

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## MEMORANDUM

TO: Jeff Fryer, CRITFC

FROM: Michele DeHart

DATE: January 30, 2013

RE: Estimates of adult timing and smolt-to-adult returns (SARs) of PIT-tagged Hanford Reach wild fall Chinook.

In response to your request, the Fish Passage Center (FPC) staff has reviewed historic PIT-tagging efforts for wild Hanford Reach fall Chinook in order to determine the applicability of estimating adult timing and smolt-to-adult returns (SARs). The adult fishways at Bonneville Dam did not have full PIT-tag detection capabilities until return year 2002. Therefore, estimates of adult timing of PIT-tagged Hanford Reach fall Chinook adults are limited to return years 2002 through 2012. Furthermore, estimates of SARs to Bonneville Dam are limited to migration years 2000 (without jacks only) through 2010. It is important to note, because Hanford Reach fall Chinook sometimes spend up to 5 years in the ocean, SARs for migration years 2008 through 2010 may be incomplete. Herein, we provide results from these analyses. We hope you find these data useful in answering any questions you may have had.

### **Adult Timing:**

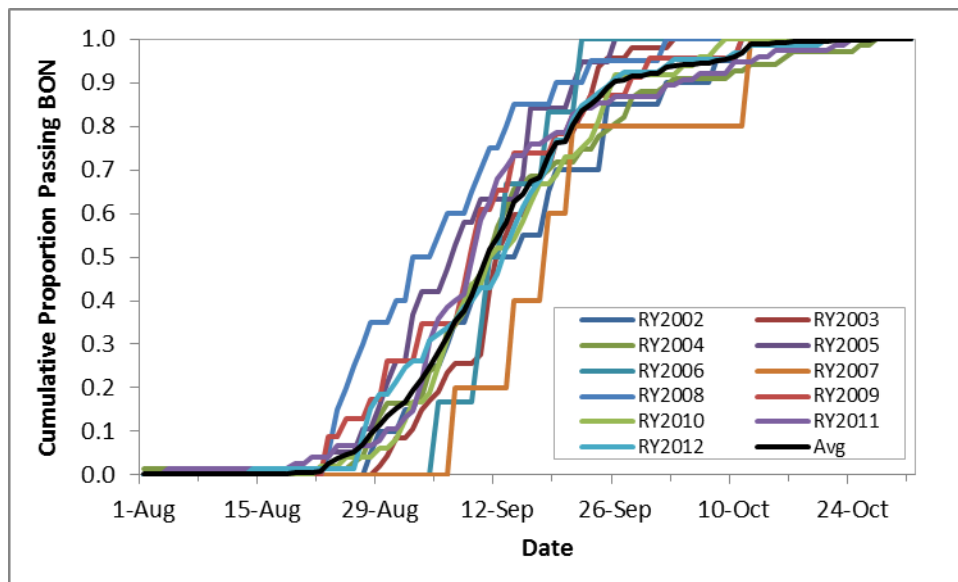
As mentioned above, estimating adult timing of PIT-tagged Hanford Reach wild fall Chinook adults at Bonneville Dam was limited to return years 2002 through 2012 for this analysis. Table 1 provides estimates of the 10%, 50%, and 90% passage dates for these PIT-tagged adults. For illustrative purposes, cumulative passage curves for each of the return years

are also provided (Figure 1). PIT-tagging of wild Hanford Reach fall Chinook did not occur in 2002 and 2006.

**Table 1.** Estimated 10%, 50%, and 90% passage date of PIT-tagged Hanford Reach wild fall Chinook adults (with jacks) at Bonneville Dam.

Return Year	Estimated Bonneville Dam Passage Date		
	10%	50%	90%
2002	29-Aug	11-Sep	2-Oct
2003 <sup>A</sup>	2-Sep	12-Sep	24-Sep
2004 <sup>B</sup>	29-Aug	11-Sep	3-Oct
2005 <sup>C</sup>	27-Aug	7-Sep	22-Sep
2006 <sup>D</sup>	5-Sep	11-Sep	22-Sep
2007 <sup>E</sup>	7-Sep	18-Sep	12-Oct
2008 <sup>F</sup>	24-Aug	2-Sep	19-Sep
2009 <sup>G</sup>	25-Aug	9-Sep	28-Sep
2010 <sup>H</sup>	1-Sep	11-Sep	26-Sep
2011 <sup>I</sup>	30-Aug	10-Sep	4-Oct
2012	28-Aug	13-Sep	26-Sep
<b>Average</b>	29-Aug	11-Sep	26-Sep

- <sup>A</sup> No returns of PIT-tagged jacks in RY 2003 due to no PIT-tag releases in 2002
- <sup>B</sup> No returns of PIT-tagged 2-salts in RY 2004 due to no PIT-tag releases in 2002
- <sup>C</sup> No returns of PIT-tagged 3-salts in RY 2005 due to no PIT-tag releases in 2002
- <sup>D</sup> No returns of PIT-tagged 4-salts in RY 2006 due to no PIT-tag releases in 2002
- <sup>E</sup> No returns of PIT-tagged 5-salts or jacks in RY 2007 due to no PIT-tag releases in 2002 or 2006
- <sup>F</sup> No returns of PIT-tagged 2-salts in RY 2008 due to no PIT-tag releases in 2006
- <sup>G</sup> No returns of PIT-tagged 3-salts in RY 2009 due to no PIT-tag releases in 2006
- <sup>H</sup> No returns of PIT-tagged 4-salts in RY 2010 due to no PIT-tag releases in 2006
- <sup>I</sup> No returns of PIT-tagged 5-salts in RY 2011 due to no PIT-tag releases in 2006



**Figure 1.** Cumulative passage timing of PIT-tagged Hanford Reach wild fall Chinook adults (with jacks) at Bonneville Dam.

**SARs:**

As mentioned above, estimates of SARs to Bonneville Dam were limited to migration years 2000 (without jacks only) through 2010, due to PIT-tag detection capabilities in the Bonneville Dam adult fishways. For this data request, we estimated SARs of PIT-tagged Hanford Reach wild fall Chinook over two different reaches: Release to Bonneville Dam (Rel-to-BOA) and McNary Dam to Bonneville Dam (MCN-to-BOA).

Table 2 contains the estimates of Rel-to-BOA SARs. These Rel-to-BOA SAR estimates were calculated using the same methodology that the Comparative Survival Study (CSS) used to estimate Rel-to-BOA SARs for Carson NFH spring Chinook in Chapter 4 of their 2012 Annual Report (Tuomikoski et. al. 2012).

**Table 2.** Overall Rel-to-BOA SARs for Hanford Reach wild fall Chinook, 2000-2010. SARs are calculated with and without jacks. 90% confidence intervals are in parentheses.

<b>Migration Year</b>	<b>Number Released</b>	<b>Rel-to-BOA SAR (with Jacks)</b>	<b>Rel-to-BOA SAR (Without Jacks)</b>
2000	10,967	N/A <sup>A</sup>	1.10 (0.94-1.28)
2001	9,973	0.26 (0.18-0.36)	0.25 (0.17-0.35)
2002	0	N/A	N/A
2003	2,975	0.13 (0.05-0.31)	0.13 (0.05-0.31)
2004	2,989	0.07 (0.01-0.21)	0.07 (0.01-0.21)
2005	22,634	0.08 (0.05-0.12)	0.08 (0.05-0.11)
2006	0	N/A	N/A
2007	21,007	0.17 (0.12-0.22)	0.13 (0.09-0.18)
2008 <sup>B</sup>	16,651	0.76 (0.65-0.88)	0.67 (0.57-0.78)
2009 <sup>C</sup>	13,728	0.23 (0.16-0.30)	0.17 (0.11-0.24)
2010 <sup>D</sup>	4,850	0.31 (0.19-0.48)	0.21 (0.11-0.35)

<sup>A</sup> SAR with jacks not possible for MY 2000 due to incomplete adult PIT-tag detection at BOA in 2001.

<sup>B</sup> Incomplete return, missing 5-salt returns

<sup>C</sup> Incomplete return, missing 4- and 5-salt returns

<sup>D</sup> Incomplete return, missing 3-, 4-, and 5-salt returns

Table 3 contains the estimates of MCN-to-BOA SARs. These MCN-to-BOA SAR estimates were calculated using the same methodology that the CSS used to estimate MCN-to-BOA SARs for other Upper Columbia Chinook and steelhead stocks in Chapter 4 of their 2012 Annual Report (Tuomikoski et. al. 2012).

**Table 3.** Overall MCN-to-BOA SARs for Hanford Reach wild fall Chinook, 2000-2010. SARs are calculated with and without jacks. 90% confidence intervals are in parentheses.

Migration Year	Smolts Arriving at MCN <sup>A</sup>	MCN-to-BOA SAR (with Jacks)	MCN-to-BOA SAR (Without Jacks)
2000	4,521	N/A <sup>B</sup>	2.68 (2.29-3.09)
2001	3,662	0.71 (0.50-0.97)	0.68 (0.48-0.93)
2002	0	N/A	N/A
2003	930	0.43 (0.11-0.81)	0.43 (0.11-0.81)
2004	1,000	0.20 (0.00-0.45)	0.20 (0.00-0.45)
2005	6,602	0.29 (0.18-0.40)	0.26 (0.15-0.37)
2006	0	N/A	
2007	7,790	0.45 (0.33-0.59)	0.35 (0.23-0.47)
2008 <sup>C</sup>	5,543	2.27 (1.86-2.71)	2.00 (1.63-2.41)
2009 <sup>D</sup>	4,433	0.70 (0.50-0.92)	0.52 (0.35-0.70)
2010 <sup>E</sup>	1,344	1.12 (0.65-1.66)	0.74 (0.38-1.20)

<sup>A</sup> Estimated population of tagged study fish alive to MCN tailrace (includes fish detected at the dam and those estimated to pass undetected). CJS estimation of S1 uses PIT-tags detected on bird colonies in the Columbia River estuary to augment the NOAA Trawl detections below BON.

<sup>B</sup> SAR with jacks not possible for MY 2000 due to incomplete adult PIT-tag detection at BOA in 2001.

<sup>C</sup> Incomplete return, missing 5-salt returns

<sup>D</sup> Incomplete return, missing 4- and 5-salt returns

<sup>E</sup> Incomplete return, missing 3-, 4-, and 5-salt returns

### Literature Cited:

Tuomikoski, J., J. McCann, B. Chockley, H. Schaller, P. Wilson, S. Haeseker, J. Fryer, C. Petrosky, E. Tinus, T. Dalton, R. Ehkle, and R. Lessard. 2012. Comparative Survival Study (CSS) of PIT-tagged Spring/Summer Chinook and summer steelhead, 2012 Annual Report. BPA Contract #19960200  
<http://www.fpc.org/documents/CSS/2012%20CSS%20Annual%20Report--Final.pdf>