



FISH PASSAGE CENTER

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MEMORANDUM

TO: FPAC

FROM: Michele DeHart

DATE: July 12, 2011

RE: Fallback and conversion rates of adult Chinook at Lower Granite Dam (2007-2011) (Amended)

In response to your request on June 28, 2011, the FPC staff has analyzed data on adult PIT-tagged Snake River spring/summer Chinook to determine fallback and conversion rates for this year (2011) compared to historical years (2007-2010). Below is a brief summary of our results, followed by a more detailed explanation.

- Estimating “fallback” rates with PIT-tags is dependent on adult fallbacks re-ascending into the adult ladder and being detected. Therefore, estimated “fallback” rates using PIT-tag technology are really re-ascension rates and should be considered a minimum estimate, as some adult fallbacks may not re-ascend and, thus, not be counted.
- For the period of April 3-June 30, the average spill volume at LGR in 2011 is the highest among the last five years. However, the average spill proportion at LGR for the same time period in 2011 is lower than what was observed in 2010, 2008, and 2007.
- The LGR ‘fallback rate’ in 2011 (as of June 28, 2011) is 12.8%, which is close but higher than what was observed in 2008 (10.8%) and higher than 2007 (4.1%), 2009 (7.9%), and 2010 (4.8%).
 - The 2011 LGR ‘fallback rate’ through July 10, 2011 is 12.9%.
- The LGR ‘total re-ascension rate’ in 2011 (as of June 28, 2011) is 14.8%, which is close but higher than what was observed in 2008 (12.4%), and higher than what was observed in 2007 (4.6%), 2009 (8.8%), and 2010 (5.1%).

- The 2011 LGR ‘total re-ascension rate’ through July 10, 2011 is still 14.8%
- For return years 2007-2010, the average IHR-LGR conversion rate for Snake River spring/summer Chinook was 95.2% (range: 94.0%-97.1%). For adult spring/summer Chinook detected at IHR on or before June 27, 2011, the conversion rate is 89.7%.
- Based on the PIT-tagged adults, it appears that the 2011 ‘fallback rates’ and ‘total re-ascension rates’ are higher than what has been seen in the previous five years. However, the 2011 ‘fallback rates’ and ‘total re-ascension rates’ are only slightly higher than what was observed 2008, which was also a high flow year.

Adult Spring/Summer Chinook Re-ascension Rates at Lower Granite Dam:

There has been concern that the high spill volumes at Lower Granite Dam (LGR) in 2011 may be increasing the fallback rate of adult spring/summer Chinook at that project. From April 3 to June 30th, spill at LGR in 2011 has averaged 50.9 Kcfs, which is the highest seasonal average spill observed over the past 5 years (Table 1, Figure 1). This is mostly due to the high spill volumes in early to mid-April, particularly when compared to 2008 (Figure 1). While the seasonal average spill volume in 2011 is the highest over the past five years, the seasonal spill proportion is not the highest, as 2007, 2008, and 2010 all had higher seasonal average spill proportions than 2011 (Table 1, Figure 2).

Table 1. Seasonal average spill volume (Kcfs) and spill proportion at Lower Granite Dam in 2007-2011 (April 3-June 30).

Year	Average Spill (Kcfs)	Average Spill Proportion
2007	19.68	0.37
2008	43.05	0.40
2009	28.53	0.26
2010	28.63	0.37
2011	50.90	0.34

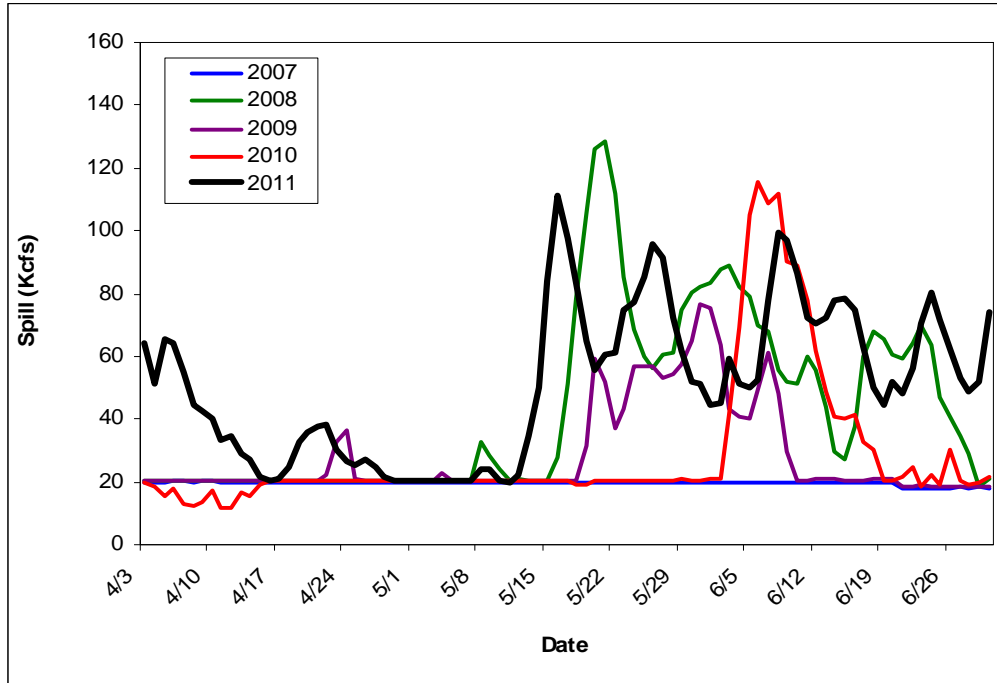


Figure 1. Daily average spill volume (Kcfs) at Lower Granite Dam in 2007-2011 (April 3-June 30).

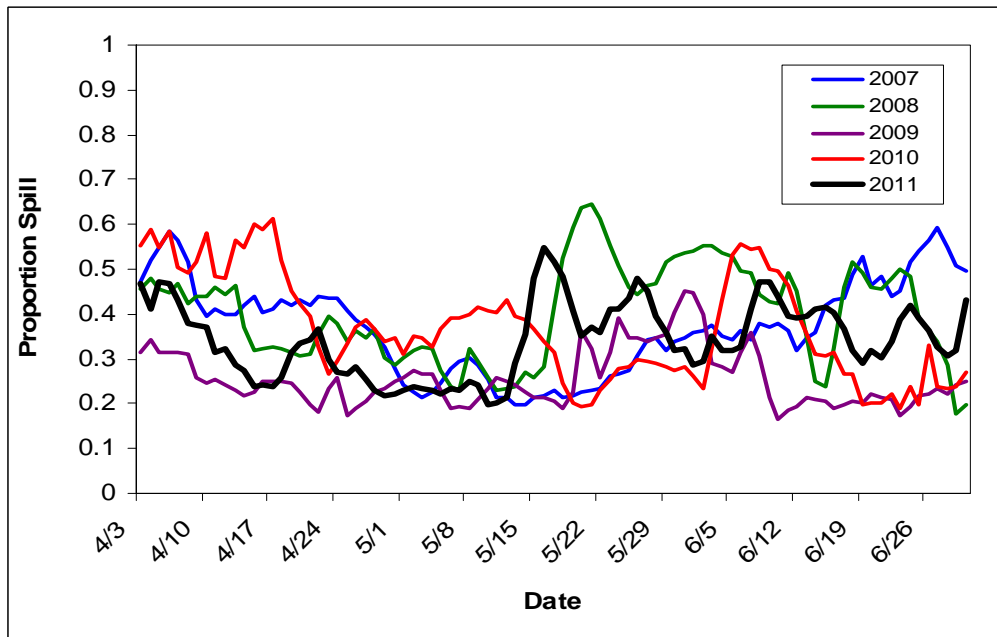


Figure 2. Daily average spill proportion at Lower Granite Dam in 2007-2011 (April 3-June 30).

Among the Snake River projects, only Ice Harbor and Lower Granite (LGR) dams have PIT-tag detection capability in their adult ladders. To assess re-ascension rates, we relied on PIT-

tag detections of adult spring/summer Chinook at Lower Granite Dam. Specifically, we evaluated PIT-tag detections by coil from PTAGIS data for hatchery and wild spring/summer Chinook detections for the years 2007 to 2010 during the period of March 1 to September 1 and 2011 from March 1 to July 10.

Our analysis looked at the proportion of adult PIT-tagged fish (including jacks) that were detected re-ascending the adult ladder at LGR. Fish were considered to have exited the ladder up-river if a detection at an uppermost coil was their last detection. Fish were considered to re-ascend if, once they successfully exited, they were again detected at a lowermost downstream coil at least 3 hours later. Typically the gap between upstream exit and downstream re-detection was in the order of 24 hours (or longer), however, a few fish were found to have re-ascended relatively quickly (4 to 5 hours) so that a shorter “time-gap” was necessary. In addition, many fish ascended and descended within the ladder. A fish that was detected moving down the ladder was not considered to have re-ascended the ladder.

Below we provide two methods of estimating re-ascension rates. The first (here-in referred to as ‘fallback rate’), estimates re-ascension rates based on PIT-tagged individuals that were detected re-ascending the adult ladder, regardless of how many times each individual re-ascended. In other words, if an individual fell back and re-ascended multiple times, that individual would only be considered a single ‘fallback’. The second method (here-in referred to as ‘total re-ascension rate’), estimated re-ascension rates based on the total number of re-ascensions that were determined to occur, regardless of how many times a single individual re-ascended. For example, if a single fish fell back three times and re-ascended three times, that fish would be counted as three re-ascensions.

The results of our analysis found that the ‘fallback rate’ of PIT-tagged adult spring/summer Chinook at LGR ranged 4.1% in 2007 to 12.8% in 2011 (Table 2a). At 12.8%, the ‘fallback rate’ rate for 2011 (through June 28th) is the highest among the 5 years analyzed, but similar to what was seen in 2008 (10.8%) (Table 2a). Through July 10, 2011, the ‘fallback rate’ was 12.9% (Table 2b).

The same pattern is true when considering ‘total re-ascension rates’. The ‘total re-ascension rate’ of PIT-tagged adult spring/summer Chinook at LGR ranged 4.6% in 2007 to 14.8% in 2011 (Table 2b). At 14.8%, the ‘total re-ascension rate’ for 2011 (through June 28th) is the highest among the 5 years analyzed, but similar to what was seen in 2008 (12.4%) (Table 2a). Through July 10, 2011, the ‘total re-ascension rate’ was also 14.8% (Table 2b).

Table 2a. ‘Fallback Rates’ and ‘Total Re-ascension Rates’ for PIT-tagged adult spring/summer Chinook at Lower Granite Dam (2007-2011). **2011 adult returns are through June 28, 2011**

Return Year	PIT-tag Adult Count	Number of ‘Fallbacks’	Percent ‘Fallbacks’	Total Number of Re-ascensions	Total Percent Re-ascensions
2007	820	34	4.1%	38	4.6%
2008	1,997	215	10.8%	248	12.4%
2009	3,188	253	7.9%	280	8.8%
2010	3,543	169	4.8%	182	5.1%
2011 [†]	2,024	260	12.8%	300	14.8%

[†] 2011 detection data were through June 28 and may not capture all re-ascending fish since all detection information may not be complete.

Table 2b. ‘Fallback Rates’ and ‘Total Re-ascension Rates’ for PIT-tagged adult spring/summer Chinook at Lower Granite Dam (2007-2011). **2011 adult returns are through July 10, 2011**

Return Year	PIT-tag Adult Count	Number of ‘Fallbacks’	Percent ‘Fallbacks’	Total Number of Re-ascensions	Total Percent Re-ascensions
2007	820	34	4.1%	38	4.6%
2008	1,997	215	10.8%	248	12.4%
2009	3,188	253	7.9%	280	8.8%
2010	3,543	169	4.8%	182	5.1%
2011 [†]	2,448	315	12.9%	362	14.8%

[†] 2011 detection data were through July 10 and may not capture all re-ascending fish since all detection information may not be complete.

Adult Spring/Summer Chinook Conversion Rates (IHR-LGR):

Another concern of the fish managers is that the high spill volumes in the Lower Snake River (LGR, LGS, and LMN) in 2011 may be decreasing the conversion rates of adult spring/summer Chinook from Ice Harbor Dam (IHR) to Lower Granite Dam (LGR). To assess IHR-LGR conversion rates, the FPC staff relied on PIT-tag detection of adult spring/summer Chinook at IHR in 2007 through 2011. Annual conversion rates were estimated as the proportion of spring/summer Chinook adults detected at IHR that were later detected at LGR. For those adults that were detected at both IHR and LGR, we also estimated adult travel time from IHR to LGR.

For 2011, we used adult PIT-tag detections at IHR through July 5, 2011. Based on detections through July 5th, the median IHR-LGR travel time in 2011 is 6.90 days. Given this median travel time, we only used fish that we observed at IHR on or before June 27th to estimate the conversion rate for 2011. This conversion rate should be considered a minimum estimate of conversion, as some fish detected at IHR on or before June 27th may still be detected at LGR at a later date. For this reason, it is difficult to assess conversion rate estimates until the entire adult migration has finished. Therefore, these results should be considered with caution.

From 2007 through 2010, the IHR-LGR conversion rates have been consistently high, with an average of 95.2% (range: 94.0%-97.1%) (Table 3). Median IHR-LGR travel times have also been fairly consistent, in the 4-6 day range (Table 3). For adult spring/summer Chinook detected at IHR on or before June 27th, the conversion rate for 2011 is 89.7%. Through July 5, 2011, the median IHR-LGR travel time for adult spring/summer Chinook in 2011 is 6.9 days.

Table 3. Annual IHR-LGR conversion rates and median travel time for PIT-tagged adult Snake River spring/summer Chinook.

Return Year	IHR Detects	LGR Detects	Conversion Rate	Median IHR-LGR Travel Time (days)
2007	863	811	94.0%	4.71
2008	2027	1969	97.1%	5.09
2009	3302	3139	95.1%	4.07
2010	3719	3518	94.6%	5.36
2011	1815	1628	89.7%	6.90



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DATA REQUEST FORM

Request Taken By: Brandon Chockley Date: 28-June-2011

Data Requested By:
Name: Paul Wagner (NOAA/FPA) Phone: _____
Address: _____ Fax: _____
_____ Email: _____

Data Requested:

Is there any indication that adult fallbacks
in 2011 are bigger than past years, given high
flows?

Data Format: Hardcopy Text Excel
Delivery: Mail Email Fax Phone

Comments:

[Signature]

Data Compiled By: [Signature] Date: 11-July-2011

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