



# FISH PASSAGE CENTER

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## MEMORANDUM

TO: Brent Snider, IDFG

FROM: Brandon R. Chockley

DATE: January 4, 2017

RE: 2016 McCall Hatchery Report

The Fish Passage Center has been marking Chinook from the McCall Hatchery facility over the last several years as part of the Comparative Survival Study (CSS). The CSS is a multi-year program that estimates survival rates over different life stages for spring and summer Chinook produced in major hatcheries. We would like to share with you an update of some of the information we developed under the CSS for the Chinook used from the McCall Hatchery facility in 2016 as well as past years.

With the marking efforts over the past several years, data on the timing and migration speed from release to Lower Granite Dam are also available. 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.

Table 1 provides estimates of minimum, median, and maximum travel time from each year's release of summer Chinook from McCall Hatchery to Lower Granite Dam. Also provided are estimates of the 95% confidence limits around the estimated median travel time.

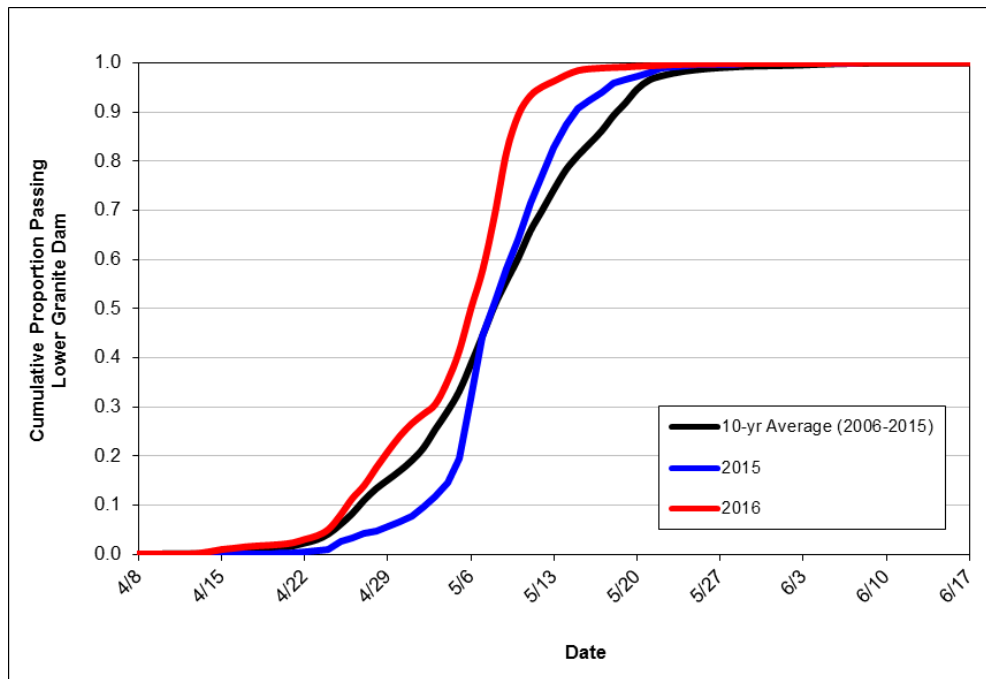
**Table 1.** McCall Hatchery Summer Chinook Travel Times to Lower Granite Dam

| Release Date | Migration Year | Travel Time (Days) |      |       | Confidence Limits 95% |       |
|--------------|----------------|--------------------|------|-------|-----------------------|-------|
|              |                | Min                | Med  | Max   | Lower                 | Upper |
| 20-Mar       | 1997           | 9.9                | 49.4 | 100.2 | 49.1                  | 49.7  |
| 30-Mar       | 1998           | 14.4               | 36.5 | 109.7 | 36.4                  | 36.5  |
| 6-Apr        | 1999           | 13.8               | 39.9 | 129.0 | 39.7                  | 40.5  |
| 5-Apr        | 2000           | 11.3               | 34.1 | 114.0 | 34.0                  | 34.2  |
| 26-Mar       | 2001           | 24.2               | 48.5 | 114.8 | 48.2                  | 48.6  |
| 25-Mar       | 2002           | 20.2               | 51.3 | 82.5  | 51.0                  | 51.5  |
| 31-Mar       | 2003           | 12.4               | 42.0 | 101.3 | 41.9                  | 42.1  |
| 22-Mar       | 2004           | 16.4               | 43.5 | 96.1  | 43.4                  | 43.6  |
| 18-Mar       | 2005           | 24.4               | 49.4 | 93.1  | 49.4                  | 49.5  |
| 21-Mar       | 2006           | 17.5               | 46.1 | 76.0  | 45.9                  | 46.3  |
| 19-Mar       | 2007           | 20.0               | 47.0 | 71.8  | 46.8                  | 47.2  |
| 17-Mar       | 2008           | 32.9               | 54.7 | 100.5 | 54.5                  | 54.9  |
| 24-Mar       | 2009           | 17.1               | 50.1 | 92.8  | 49.9                  | 50.4  |
| 23-Mar       | 2010           | 29.5               | 49.5 | 89.4  | 48.9                  | 50.4  |
| 3/22,3/24    | 2011           | 14.5               | 50.2 | 117.4 | 50.0                  | 50.3  |
| 3/19-3/21    | 2012           | 12.9               | 41.4 | 86.1  | 40.9                  | 41.8  |
| 3/25-3/28    | 2013           | 16.6               | 44.6 | 150.1 | 44.6                  | 44.7  |
| 3/31         | 2014           | 12.6               | 36.5 | 78.4  | 36.4                  | 36.5  |
| 4/1-4/2      | 2015           | 16.6               | 36.6 | 67.4  | 36.5                  | 36.9  |
| 4/4-4/5      | 2016           | 8.0                | 32.1 | 64.8  | 32.0                  | 32.3  |

As with previous years, we are providing a table that presents the estimated 10%, 50%, and 90% passage dates of McCall yearling summer Chinook juveniles at Lower Granite Dam for each of the years of tagging (Table 2). Also, Figure 1 is provided as an illustration of how the arrival timing of the 2016 smolt release compared to last year's release, as well as the average of the most recent 10 years (2006–2015).

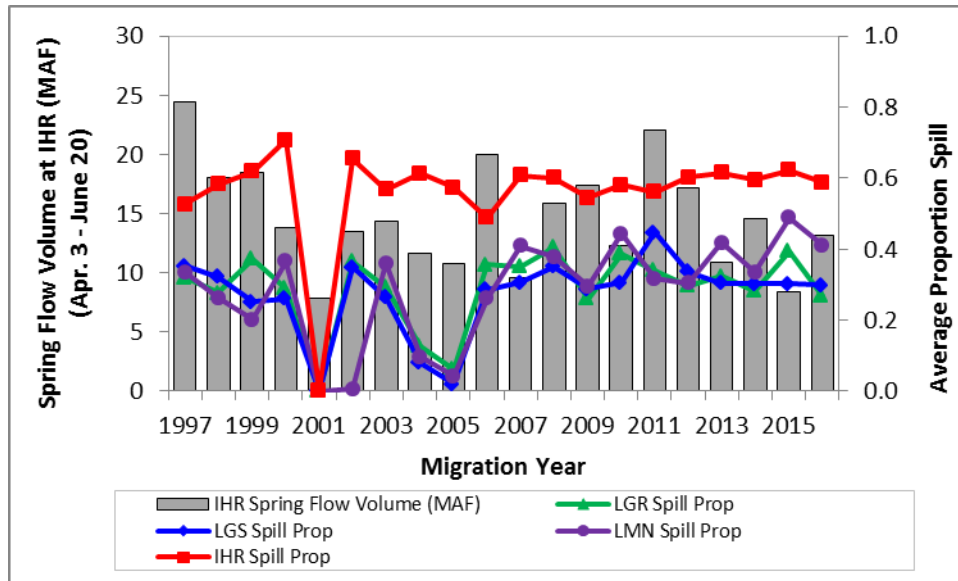
**Table 2.** Estimated 10%, 50%, and 90% passage dates of McCall Hatchery yearling summer Chinook at Lower Granite Dam.

| Migration Year | Release Date(s) | 10% Passage Date | 50% Passage Date | 90% Passage Date |
|----------------|-----------------|------------------|------------------|------------------|
| 1997           | 20-Mar          | 27-Apr           | 10-May           | 16-May           |
| 1998           | 30-Mar          | 28-Apr           | 6-May            | 14-May           |
| 1999           | 6-Apr           | 2-May            | 16-May           | 26-May           |
| 2000           | 5-Apr           | 1-May            | 9-May            | 22-May           |
| 2001           | 26-Mar          | 30-Apr           | 13-May           | 17-May           |
| 2002           | 25-Mar          | 3-May            | 15-May           | 21-May           |
| 2003           | 31-Mar          | 27-Apr           | 12-May           | 20-May           |
| 2004           | 22-Mar          | 27-Apr           | 4-May            | 10-May           |
| 2005           | 18-Mar          | 29-Apr           | 7-May            | 12-May           |
| 2006           | 21-Mar          | 26-Apr           | 6-May            | 16-May           |
| 2007           | 19-Mar          | 25-Apr           | 5-May            | 15-May           |
| 2008           | 17-Mar          | 5-May            | 11-May           | 20-May           |
| 2009           | 24-Mar          | 26-Apr           | 13-May           | 21-May           |
| 2010           | 23-Mar          | 29-Apr           | 11-May           | 22-May           |
| 2011           | 3/22, 3/24      | 6-May            | 13-May           | 18-May           |
| 2012           | 3/19-3/21       | 25-Apr           | 28-Apr           | 14-May           |
| 2013           | 3/25-3/26       | 4-May            | 9-May            | 13-May           |
| 2014           | 3/31            | 26-Apr           | 6-May            | 17-May           |
| 2015           | 4/1-4/2         | 3-May            | 8-May            | 15-May           |
| 2016           | 4/4-4/5         | 26-Apr           | 7-May            | 11-May           |

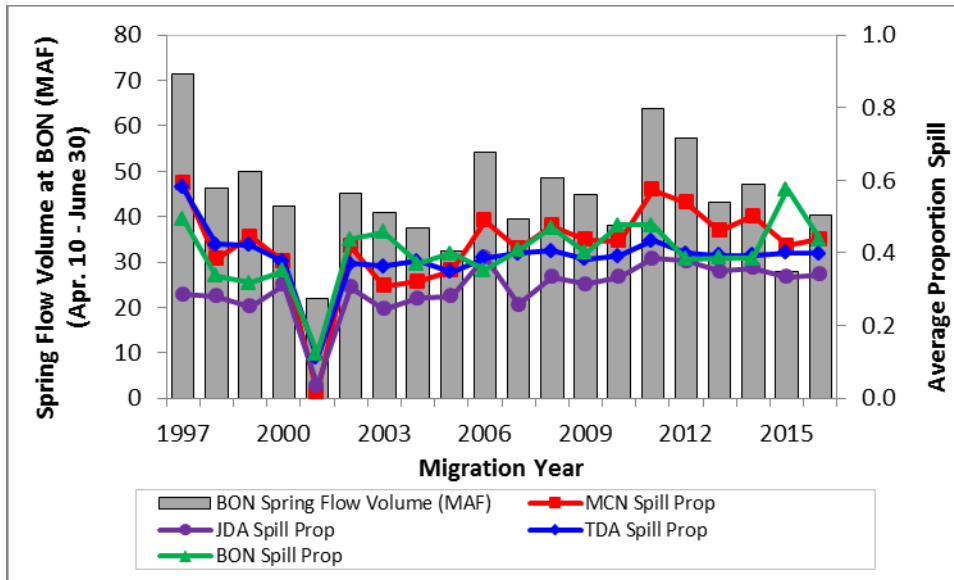


**Figure 1.** Cumulative passage timing of McCall Hatchery yearling summer Chinook to Lower Granite Dam.

Figures 2 and 3 are provided below to put into context out-migration conditions that these spring migrants may have experienced over the years. Figure 2 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 3 provides the total spring flow volume (April 10–June 30) for the Middle 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 2.** 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 3.** Total spring flow volume in the Middle 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, Tables 3 and 4 contain estimates calculated for McCall Hatchery Chinook by the CSS. The estimates provided include: (1) juvenile survival in the hydrosystem between Lower Granite and Bonneville Dams (Table 3), (2) the proportion of the juvenile population destined for transportation (Table 3), and (3) the smolt-to-adult survival (SAR) for several passage categories (Table 4). Those passage categories are SAR(T), SAR(C<sub>0</sub>), and Overall SAR, 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 is the estimated SAR for the overall hatchery release. All SAR estimates are for the LGR-to-GRA reach with jacks excluded. The data presented in Tables 3 and 4 were taken from various chapters and appendices of the 2016 CSS Annual Report, and previous reports, which can be downloaded from the FPC webpage [www.fpc.org/documents/CSS.html](http://www.fpc.org/documents/CSS.html). Figure 4 below is a time series of the Overall SAR over the eighteen years of available data from McCall Hatchery.

**Table 3.** McCall Hatchery summer Chinook juvenile survivals and estimated proportion transported (with 90% confidence intervals) from CSS.

| <b>Release Date</b> | <b>Migration Year<sup>A</sup></b> | <b>Juvenile Survival (LGR-BON)</b> | <b>Proportion Transported<sup>B</sup></b> |
|---------------------|-----------------------------------|------------------------------------|-------------------------------------------|
| 20-Mar              | 1997                              | 0.43 (0.32-0.59)                   | 0.51                                      |
| 30-Mar              | 1998                              | 0.56 (0.50-0.64)                   | 0.86                                      |
| 6-Apr               | 1999                              | 0.52 (0.46-0.61)                   | 0.73                                      |
| 5-Apr               | 2000                              | 0.61 (0.51-0.83)                   | 0.58                                      |
| 26-Mar              | 2001                              | 0.27 (0.22-0.34)                   | 0.97                                      |
| 25-Mar              | 2002                              | 0.58 (0.51-0.68)                   | 0.68                                      |
| 31-Mar              | 2003                              | 0.70 (0.62-0.77)                   | 0.54                                      |
| 22-Mar              | 2004                              | 0.44 (0.35-0.59)                   | 0.93                                      |
| 18-Mar              | 2005                              | 0.53 (0.45-0.65)                   | 0.86                                      |
| 21-Mar              | 2006                              | 0.60 (0.54-0.67)                   | 0.65 (0.64-0.66)                          |
| 19-Mar              | 2007                              | 0.82 (0.73-0.92)                   | 0.27 (0.27-0.28)                          |
| 17-Mar              | 2008                              | 0.50 (0.45-0.57)                   | 0.52 (0.51-0.53)                          |
| 24-Mar              | 2009                              | 0.57 (0.50-0.67)                   | 0.40 (0.39-0.41)                          |
| 23-Mar              | 2010                              | 0.59 (0.53-0.66)                   | 0.28 (0.27-0.29)                          |
| 3/22, 3/24          | 2011                              | 0.57 (0.50-0.65)                   | 0.43 (0.42-0.44)                          |
| 3/19-3/21           | 2012                              | 0.79 (0.73-0.85)                   | 0.32 (0.32-0.33)                          |
| 3/25-3/26           | 2013                              | 0.92 (0.80-1.01)                   | 0.35 (0.34-0.35)                          |
| 31-Mar              | 2014                              | 0.67 (0.61-0.73)                   | 0.44 (0.43-0.45)                          |
| 4/1-4/2             | 2015                              | 0.54 (0.46-0.64)                   | 0.06 (0.05-0.06)                          |

<sup>A</sup> Estimates for migration years 2006 through 2015 reflect use of new methodology developed for random pre-assignment of “monitor mode” and “return-to-river mode” operations. See 2016 CSS Annual Report for details.

<sup>B</sup> Confidence interval for proportion transported not available for migration years 1997-2005.

**Table 4.** McCall Hatchery summer Chinook TIR, SAR by study category (T vs. C<sub>0</sub>), and Overall SARs (with 90% confidence intervals). SAR estimates are for LGR-to-GRA reach and are without jacks.

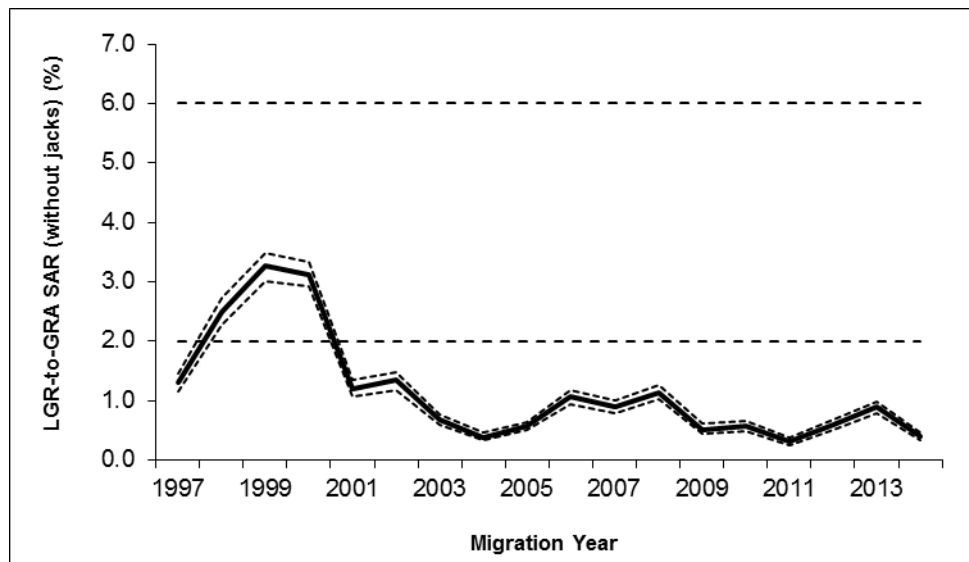
| Release Date | Migration Year      | TIR              | SAR(T)<br>%      | SAR(C <sub>0</sub> )<br>%     | Overall SAR (%)  |
|--------------|---------------------|------------------|------------------|-------------------------------|------------------|
| 20-Mar       | 1997                | 1.38 (1.06-1.80) | 1.51 (1.26-1.77) | 1.09 (0.88-1.34)              | 1.31 (1.15-1.46) |
| 30-Mar       | 1998                | 1.96 (1.54-2.56) | 2.69 (2.44-2.96) | 1.38 (1.05-1.69)              | 2.50 (2.28-2.73) |
| 6-Apr        | 1999                | 1.49 (1.29-1.73) | 3.59 (3.29-3.87) | 2.40 (2.12-2.69)              | 3.26 (3.02-3.49) |
| 5-Apr        | 2000                | 1.89 (1.67-2.15) | 3.88 (3.60-4.18) | 2.06 (1.84-2.29)              | 3.12 (2.92-3.33) |
| 26-Mar       | 2001                | 31.9 (17.9-88.4) | 1.24 (1.10-1.38) | 0.04 <sup>A</sup> (0.01-0.07) | 1.20 (1.07-1.34) |
| 25-Mar       | 2002                | 1.44 (1.18-1.79) | 1.48 (1.27-1.70) | 1.03 (0.87-1.20)              | 1.34 (1.18-1.49) |
| 31-Mar       | 2003                | 1.47 (1.18-1.83) | 0.79 (0.68-0.92) | 0.54 (0.45-0.62)              | 0.68 (0.60-0.76) |
| 22-Mar       | 2004                | 1.59 (0.87-4.37) | 0.40 (0.34-0.48) | 0.25 (0.09-0.44)              | 0.39 (0.33-0.46) |
| 18-Mar       | 2005                | 3.02 (2.32-4.12) | 0.62 (0.54-0.71) | 0.20 <sup>B</sup> (0.16-0.26) | 0.57 (0.50-0.64) |
| 21-Mar       | 2006 <sup>C</sup>   | 1.11 (0.90-1.38) | 1.15 (1.01-1.30) | 1.04 (0.85-1.22)              | 1.06 (0.95-1.18) |
| 19-Mar       | 2007 <sup>C</sup>   | 2.09 (1.63-2.65) | 1.48 (1.20-1.75) | 0.71 (0.60-0.82)              | 0.90 (0.78-1.01) |
| 17-Mar       | 2008 <sup>C</sup>   | 1.54 (1.26-1.94) | 1.35 (1.17-1.54) | 0.88 (0.73-1.03)              | 1.14 (1.02-1.26) |
| 24-Mar       | 2009 <sup>C</sup>   | 2.00 (1.45-2.71) | 0.76 (0.60-0.94) | 0.38 (0.30-0.47)              | 0.52 (0.44-0.61) |
| 23-Mar       | 2010 <sup>C</sup>   | 1.37 (1.01-1.84) | 0.71 (0.54-0.91) | 0.52 (0.44-0.61)              | 0.58 (0.49-0.67) |
| 3/22, 3/24   | 2011 <sup>C</sup>   | 1.43 (0.94-2.25) | 0.33 (0.24-0.43) | 0.23 (0.17-0.31)              | 0.31 (0.25-0.38) |
| 3/19-3/21    | 2012 <sup>C</sup>   | 1.11 (0.79-1.48) | 0.69 (0.52-0.86) | 0.63 (0.51-0.76)              | 0.59 (0.51-0.68) |
| 3/25-3/26    | 2013 <sup>C</sup>   | 1.01 (0.81-1.28) | 0.89 (0.73-1.07) | 0.89 (0.78-0.99)              | 0.89 (0.79-0.99) |
| 31-Mar       | 2014 <sup>C,D</sup> | 1.65 (1.22-2.21) | 0.54 (0.43-0.65) | 0.33 (0.26-0.39)              | 0.41 (0.34-0.47) |

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

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

<sup>C</sup> Estimates for migration years 2006 through 2014 reflect use of new methodology developed for random pre-assignment of “monitor mode” and “return-to-river mode” operations. See 2016 CSS Annual Report for details.

<sup>D</sup> Migration year 2014 is incomplete with Age 2-salt adult returns through 9/16/2016.



**Figure 4.** Overall SAR<sub>LGR-to-GRA</sub> (without jacks) for McCall Hatchery summer Chinook releases (with 90% confidence intervals). The 2014 NPCC 2-6% SAR objective for listed wild populations are shown for reference. Migration year 2014 is incomplete with Age 2-salt adult returns through 9/16/2016.

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.

c: Lance Hebdon, IDFG  
Tim Copeland, IDFG  
Bill Tweit, WDFW  
Jay Hesse, Nez Perce  
Tom Rien, ODFW  
Steve Haeseker, USFWS  
Kyle Hanson, USFWS  
Erik Merrill, NPSS  
Tony Grover, NPCC  
Leslie Bach, NPCC  
FPAC