MEMORANDUM

TO: Brian Leth, IDFG

FROM: Brandon R. Chockley

DATE: January 4, 2017

RE: 2016 Clearwater Hatchery Report

The Fish Passage Center has been marking Chinook and steelhead from the Clearwater 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 and steelhead 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 and steelhead used from the Clearwater Hatchery facility in 2016 and 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.

Tables 1 and 2 provide estimates of minimum, median, and maximum travel times for each year’s release of spring and summer Chinook (Table 1) and steelhead (Table 2) to Lower Granite Dam. Also provided are estimates of the 95% confidence limits around the estimated median travel times. The annual data presented in Tables 1 (Chinook) and 2 (steelhead) are for all release sites combined. For comparison purposes, travel times for each of the different release sites are provided in Appendix A at the end of this memo (Table A.1 for Chinook, Table A.2 for steelhead).
Table 1. Travel times (release to LGR) of Clearwater Hatchery yearling spring and summer Chinook (all release sites combined).

<table>
<thead>
<tr>
<th>Migration Year</th>
<th>Species Released</th>
<th>Release Date(s)</th>
<th>Travel Time (Days)</th>
<th>95% Confidence Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Min</td>
<td>Med</td>
</tr>
<tr>
<td>2006</td>
<td>SpCH</td>
<td>3/22-4/3</td>
<td>8.5</td>
<td>40.6</td>
</tr>
<tr>
<td>2007</td>
<td>SpCH</td>
<td>3/6-3/31</td>
<td>8.3</td>
<td>33.2</td>
</tr>
<tr>
<td>2008</td>
<td>SpCH</td>
<td>3/19-4/3</td>
<td>6.4</td>
<td>45.7</td>
</tr>
<tr>
<td>2009</td>
<td>SpCH</td>
<td>3/23-4/6</td>
<td>4.2</td>
<td>31.4</td>
</tr>
<tr>
<td>2010</td>
<td>SpCH</td>
<td>3/2-3/29</td>
<td>7.7</td>
<td>33.2</td>
</tr>
<tr>
<td>2011</td>
<td>Sp/Su CH</td>
<td>3/23-4/5</td>
<td>1.8</td>
<td>32.5</td>
</tr>
<tr>
<td>2012</td>
<td>Sp/Su CH</td>
<td>3/21-4/4</td>
<td>3.8</td>
<td>28.4</td>
</tr>
<tr>
<td>2013</td>
<td>Sp/Su CH</td>
<td>3/18-4/3</td>
<td>10.0</td>
<td>41.1</td>
</tr>
<tr>
<td>2014</td>
<td>Sp/Su CH</td>
<td>3/20-3/31</td>
<td>1.3</td>
<td>31.0</td>
</tr>
<tr>
<td>2016</td>
<td>Sp/SuCH</td>
<td>3/14-4/14</td>
<td>2.4</td>
<td>25.5</td>
</tr>
</tbody>
</table>

Table 2. Travel times (release to LGR) of Clearwater Hatchery steelhead (all release sites combined).

<table>
<thead>
<tr>
<th>Migration Year</th>
<th>Release Date(s)</th>
<th>Travel Time (Days)</th>
<th>95% Confidence Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Min</td>
<td>Med</td>
</tr>
<tr>
<td>2008</td>
<td>4/7-4/21</td>
<td>3.8</td>
<td>29.0</td>
</tr>
<tr>
<td>2009</td>
<td>4/13-4/28</td>
<td>3.4</td>
<td>10.2</td>
</tr>
<tr>
<td>2010</td>
<td>4/12-4/20</td>
<td>2.6</td>
<td>14.0</td>
</tr>
<tr>
<td>2011</td>
<td>4/12-4/18</td>
<td>1.4</td>
<td>20.8</td>
</tr>
<tr>
<td>2012</td>
<td>4/10-4/12</td>
<td>4.4</td>
<td>18.1</td>
</tr>
<tr>
<td>2013</td>
<td>4/8-4/12</td>
<td>0.7</td>
<td>11.7</td>
</tr>
<tr>
<td>2014</td>
<td>4/14-4/17</td>
<td>2.5</td>
<td>8.7</td>
</tr>
<tr>
<td>2015</td>
<td>4/6-4/9</td>
<td>3.4</td>
<td>11.5</td>
</tr>
<tr>
<td>2016</td>
<td>3/28-4/7</td>
<td>3.3</td>
<td>14.5</td>
</tr>
</tbody>
</table>

In addition, we are providing you with the estimated 10%, 50%, and 90% passage dates of yearling spring and summer Chinook (Table 3) and steelhead (Table 4) at Lower Granite Dam. As with the travel time tables, Tables 3 and 4 provide these estimates for all release sites combined. Estimates of passage dates by release site can be found in Appendix A (Table A.3 for Chinook and Table A.4 for Steelhead). Finally, Figures 1 and 2 are provided as illustrations of the cumulative 2016 arrival timing compared to the previous year and the current 10-year average (2006–2015) for yearling Chinook (Figure 1) and 8-year average (2008–2015) for steelhead (Figure 2).
Table 3. Estimated 10%, 50%, and 90% passage dates of PIT-tagged Clearwater Hatchery yearling spring and summer Chinook at Lower Granite Dam (all release sites combined).

<table>
<thead>
<tr>
<th>Migration Year</th>
<th>Species Released</th>
<th>Release Date(s)</th>
<th>10% Passage Date</th>
<th>50% Passage Date</th>
<th>90% Passage Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>SpCH</td>
<td>3/22-4/3</td>
<td>4/26</td>
<td>5/6</td>
<td>5/14</td>
</tr>
<tr>
<td>2016</td>
<td>Sp/SuCH</td>
<td>3/14-4/14</td>
<td>4/5</td>
<td>4/16</td>
<td>5/3</td>
</tr>
</tbody>
</table>

Table 4. Estimated 10%, 50%, and 90% passage dates of PIT-tagged Clearwater Hatchery steelhead at Lower Granite Dam (all release sites combined).

<table>
<thead>
<tr>
<th>Migration Year</th>
<th>Release Date(s)</th>
<th>10% Passage Date</th>
<th>50% Passage Date</th>
<th>90% Passage Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>4/7-4/21</td>
<td>29-Apr</td>
<td>12-May</td>
<td>23-May</td>
</tr>
<tr>
<td>2010</td>
<td>4/12-4/20</td>
<td>25-Apr</td>
<td>1-May</td>
<td>21-May</td>
</tr>
<tr>
<td>2011</td>
<td>4/12-4/18</td>
<td>20-Apr</td>
<td>7-May</td>
<td>22-May</td>
</tr>
<tr>
<td>2012</td>
<td>4/10-4/12</td>
<td>17-Apr</td>
<td>28-Apr</td>
<td>8-May</td>
</tr>
<tr>
<td>2013</td>
<td>4/8-4/12</td>
<td>15-Apr</td>
<td>21-Apr</td>
<td>14-May</td>
</tr>
<tr>
<td>2014</td>
<td>4/14-4/17</td>
<td>21-Apr</td>
<td>25-Apr</td>
<td>16-May</td>
</tr>
<tr>
<td>2015</td>
<td>4/6-4/9</td>
<td>13-Apr</td>
<td>19-Apr</td>
<td>11-May</td>
</tr>
<tr>
<td>2016</td>
<td>3/28-4/7</td>
<td>8-Apr</td>
<td>15-Apr</td>
<td>30-Apr</td>
</tr>
</tbody>
</table>
Figure 1. Cumulative passage timing of Clearwater Hatchery yearling spring and summer Chinook (all release sites combined) to Lower Granite Dam in 2016, 2015, and the current 10-year average (2006–2015).

Figure 2. Cumulative passage timing of Clearwater Hatchery steelhead (all release sites combined) to Lower Granite Dam in 2016, 2015, and the current 8-year average (2008–2015).

Figures 3 and 4 are provided below to illustrate the out-migration conditions that these spring migrants may have experienced in the Snake and Middle Columbia rivers. Figure 3 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 4 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 3.** 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 4.** 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 5 and 6 contain estimates calculated for Clearwater Hatchery Chinook by the CSS. The estimates provided include: (1) juvenile survival in the hydrosystem between Lower Granite and Bonneville Dams (Table 5), (2) the proportion of the juvenile population destined for transportation (Table 5), and (3) the smolt-to-adult survival (SAR) for several passage categories (Table 6). Those passage categories are SAR(T), SAR(C0), and Overall SAR, where SAR(T) represents smolts transported from Lower Granite, Little Goose, or Lower Monumental Dam, SAR(C0) represents smolts migrating in-river (undetected at Snake River transportation collector sites), and Overall SAR is the estimated SAR for the overall hatchery release. All SAR estimates are for the LGR-to-GRA reach and jacks are excluded. The data presented in Tables 5 and 6 were taken from various chapters and appendices of the 2016 CSS Annual Report, which can be downloaded from the FPC webpage www.fpc.org/documents/CSS.html. Figure 5 is a time series of the Overall SAR over the years of available data for Clearwater Hatchery spring and summer Chinook.

Table 5 Clearwater Hatchery spring and summer Chinook juvenile survivals and estimated proportion transported (with 90% confidence intervals) from CSS.

<table>
<thead>
<tr>
<th>Release Date(s)</th>
<th>Migration Year(^A)</th>
<th>Species</th>
<th>Juvenile Survival (LGR-BON)</th>
<th>Proportion Transported</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/22-4/3</td>
<td>2006</td>
<td>SpCH</td>
<td>0.64 (0.54-0.75)</td>
<td>0.63 (0.61-0.64)</td>
</tr>
<tr>
<td>3/6-3/31</td>
<td>2007</td>
<td>SpCH</td>
<td>0.78 (0.74-0.83)</td>
<td>0.12 (0.12-0.13)</td>
</tr>
<tr>
<td>3/19-4/6</td>
<td>2008</td>
<td>SpCH</td>
<td>0.58 (0.48-0.72)</td>
<td>0.44 (0.43-0.45)</td>
</tr>
<tr>
<td>3/23-4/8</td>
<td>2009</td>
<td>SpCH</td>
<td>0.63 (0.56-0.73)</td>
<td>0.25 (0.24-0.25)</td>
</tr>
<tr>
<td>3/2-3/29</td>
<td>2010</td>
<td>SpCH</td>
<td>0.66 (0.60-0.71)</td>
<td>0.14 (0.14-0.15)</td>
</tr>
<tr>
<td>3/21-4/4</td>
<td>2011</td>
<td>SpCH</td>
<td>0.49 (0.41-0.63)</td>
<td>0.25 (0.25-0.26)</td>
</tr>
<tr>
<td>3/21-4/5</td>
<td>2012</td>
<td>SpCH</td>
<td>0.65 (0.62-0.70)</td>
<td>0.16 (0.15-0.16)</td>
</tr>
<tr>
<td>3/18-3/27</td>
<td>2013</td>
<td>SpCH</td>
<td>0.67 (0.60-0.75)</td>
<td>0.16 (0.15-0.16)</td>
</tr>
<tr>
<td>3/20-3/28</td>
<td>2014</td>
<td>SpCH</td>
<td>0.77 (0.61-1.10)</td>
<td>0.27 (0.26-0.27)</td>
</tr>
<tr>
<td>3/9-3/16</td>
<td>2015</td>
<td>SpCH</td>
<td>0.65 (0.56-0.78)</td>
<td>0.02 (0.02-0.03)</td>
</tr>
<tr>
<td>3/26</td>
<td>2011</td>
<td>SuCH</td>
<td>0.62 (0.53-0.73)</td>
<td>0.38 (0.37-0.39)</td>
</tr>
<tr>
<td>3/26</td>
<td>2012</td>
<td>SuCH</td>
<td>0.63 (0.57-0.69)</td>
<td>0.15 (0.15-0.16)</td>
</tr>
<tr>
<td>3/20</td>
<td>2013</td>
<td>SuCH</td>
<td>0.63 (0.48-0.89)</td>
<td>0.23 (0.22-0.24)</td>
</tr>
<tr>
<td>3/31</td>
<td>2014</td>
<td>SuCH</td>
<td>0.59 (0.46-0.82)</td>
<td>0.29 (0.28-0.30)</td>
</tr>
<tr>
<td>3/24</td>
<td>2015</td>
<td>SuCH</td>
<td>0.63 (0.52-0.76)</td>
<td>0.02 (0.01-0.02)</td>
</tr>
</tbody>
</table>

\(^A\) All migration years 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.
Table 6. Sawtooth Hatchery spring Chinook TIR, SAR by study category (T vs. C₀), and Overall SARs (with 90% confidence intervals). SAR estimates are for LGR-to-GRA reach and are without jacks.

<table>
<thead>
<tr>
<th>Release Date(s)</th>
<th>Migration Year¹</th>
<th>Species</th>
<th>TIR</th>
<th>SAR(T) %</th>
<th>SAR(C₀) %</th>
<th>Overall SAR %</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/22-4/3</td>
<td>2006</td>
<td>SpCH</td>
<td>1.11 (0.85-1.50)</td>
<td>0.63 (0.53-0.74)</td>
<td>0.57 (0.43-0.70)</td>
<td>0.57 (0.49-0.65)</td>
</tr>
<tr>
<td>3/6-3/31</td>
<td>2007</td>
<td>SpCH</td>
<td>1.47 (0.86-1.24)</td>
<td>0.41 (0.24-0.58)</td>
<td>0.28 (0.22-0.33)</td>
<td>0.30 (0.25-0.35)</td>
</tr>
<tr>
<td>3/19-4/6</td>
<td>2008</td>
<td>SpCH</td>
<td>0.91 (0.71-1.18)</td>
<td>0.93 (0.76-1.11)</td>
<td>1.03 (0.85-1.22)</td>
<td>0.97 (0.85-1.10)</td>
</tr>
<tr>
<td>3/23-4/8</td>
<td>2009</td>
<td>SpCH</td>
<td>1.35 (1.04-1.76)</td>
<td>0.89 (0.71-1.08)</td>
<td>0.66 (0.56-0.76)</td>
<td>0.71 (0.63-0.80)</td>
</tr>
<tr>
<td>3/2-3/29</td>
<td>2010</td>
<td>SpCH</td>
<td>1.33 (0.94-1.78)</td>
<td>0.60 (0.42-0.76)</td>
<td>0.45 (0.39-0.50)</td>
<td>0.48 (0.42-0.54)</td>
</tr>
<tr>
<td>3/21-4/4</td>
<td>2011</td>
<td>SpCH</td>
<td>0.63 (0.24-1.22)</td>
<td>0.09 (0.04-0.15)</td>
<td>0.14 (0.09-0.19)</td>
<td>0.15 (0.12-0.18)</td>
</tr>
<tr>
<td>3/21-4/5</td>
<td>2012</td>
<td>SpCH</td>
<td>1.22 (0.86-1.66)</td>
<td>0.67 (0.48-0.85)</td>
<td>0.55 (0.46-0.64)</td>
<td>0.51 (0.44-0.57)</td>
</tr>
<tr>
<td>3/18-3/27</td>
<td>2013</td>
<td>SpCH</td>
<td>1.11 (0.80-1.44)</td>
<td>0.82 (0.61-1.03)</td>
<td>0.73 (0.66-0.82)</td>
<td>0.73 (0.65-0.81)</td>
</tr>
<tr>
<td>3/20-3/28</td>
<td>2014B</td>
<td>SpCH</td>
<td>1.19 (0.83-1.70)</td>
<td>0.44 (0.32-0.58)</td>
<td>0.37 (0.29-0.45)</td>
<td>0.35 (0.30-0.42)</td>
</tr>
<tr>
<td>3/26</td>
<td>2011</td>
<td>SuCH</td>
<td>0.33 (0.07-0.80)</td>
<td>0.08 (0.00-0.17)</td>
<td>0.26 (0.14-0.38)</td>
<td>0.18 (0.12-0.26)</td>
</tr>
<tr>
<td>3/26</td>
<td>2012</td>
<td>SuCH</td>
<td>0.83 (0.17-2.08)</td>
<td>0.19 (0.06-0.39)</td>
<td>0.23 (0.12-0.35)</td>
<td>0.30 (0.22-0.40)</td>
</tr>
<tr>
<td>3/20</td>
<td>2013</td>
<td>SuCH</td>
<td>0.62 (0.23-1.15)</td>
<td>0.27 (0.09-0.45)</td>
<td>0.43 (0.31-0.55)</td>
<td>0.32 (0.22-0.41)</td>
</tr>
<tr>
<td>3/31</td>
<td>2014B</td>
<td>SuCH</td>
<td>1.05 (0.58-1.73)</td>
<td>0.37 (0.23-0.54)</td>
<td>0.35 (0.25-0.46)</td>
<td>0.30 (0.22-0.38)</td>
</tr>
</tbody>
</table>

¹ All migration years 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.

B Adult returns for migration year 2014 are incomplete with Age 2-salt adult returns through 9/16/2016.

Figure 5. Overall SAR_{LGR-to-GRA} (without jacks) for Clearwater Hatchery spring (A) and summer (B) Chinook (with 90% confidence intervals). The NPCC 2-6% SAR objectives for listed wild populations are shown for reference. Migration year 2014 is incomplete with Age 2-salt adult returns through 9/16/2016.

More representative tagging for Snake River steelhead hatcheries began in coordination among CSS, LSRC, and IPC in migration year 2008. This increased sample size of PIT tags allowed for finer-scale analyses than in previous years. Since this time, CSS has been grouping and analyzing hatchery steelhead by run (A-run or B-run) and release drainage (e.g., Salmon River, Clearwater River, etc.). Therefore, estimates of SARs are not available for individual hatcheries. However, steelhead reared at Clearwater Hatchery are part of the Clearwater-B group, which also includes hatchery steelhead from Dworshak NFH. Estimates of juvenile survival in the hydrosystem, proportion transported, and various SARs for Clearwater-B hatchery steelhead are provided in Tables 7 and 8 (2008–2013). All SAR estimates are for the LGR-to-GRA reach. The data presented in Tables 7 and 8 were taken from various chapters and
appendices of the 2016 CSS Annual Report, which can be downloaded from the FPC webpage www.fpc.org/documents/CSS.html. A time series of the Overall SAR for the Clearwater-B hatchery steelhead group is also provided in Figure 6.

Table 7. Hatchery Clearwater-B steelhead juvenile survivals and estimated proportion transported (with 90% confidence intervals) from CSS. The Clearwater-B hatchery steelhead group is comprised of hatchery steelhead reared at Clearwater Hatchery and Dworshak NFH.

<table>
<thead>
<tr>
<th>Migration Year</th>
<th>Juvenile Survival (LGR-BON)</th>
<th>Proportion Transported</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>0.47 (0.44-0.51)</td>
<td>0.30 (0.30-0.31)</td>
</tr>
<tr>
<td>2009</td>
<td>0.61 (0.55-0.68)</td>
<td>0.22 (0.21-0.22)</td>
</tr>
<tr>
<td>2010</td>
<td>0.52 (0.49-0.56)</td>
<td>0.31 (0.30-0.32)</td>
</tr>
<tr>
<td>2011</td>
<td>0.48 (0.46-0.50)</td>
<td>0.26 (0.25-0.26)</td>
</tr>
<tr>
<td>2012</td>
<td>0.69 (0.64-0.76)</td>
<td>0.14 (0.14-0.15)</td>
</tr>
<tr>
<td>2013&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.54 (0.47-0.64)</td>
<td>0.15 (0.14-0.15)</td>
</tr>
<tr>
<td>2014&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.67 (0.57-0.60)</td>
<td>0.25 (0.24-0.25)</td>
</tr>
<tr>
<td>2015</td>
<td>0.55 (0.50-0.60)</td>
<td>0.08 (0.07-0.08)</td>
</tr>
</tbody>
</table>

<sup>a</sup> All migration years 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.

Table 8. Hatchery Clearwater-B steelhead TIR, SAR by study category (T vs. C₀), and Overall SARs (with 90% confidence intervals) from CSS. The Clearwater-B hatchery steelhead group is comprised of hatchery steelhead reared at Clearwater Hatchery and Dworshak NFH.

<table>
<thead>
<tr>
<th>Migration Year&lt;sup&gt;a&lt;/sup&gt;</th>
<th>TIR</th>
<th>SAR(T)</th>
<th>SAR(C₀)</th>
<th>Overall SAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>1.55 (1.28-1.85)</td>
<td>1.96 (1.68-2.23)</td>
<td>1.26 (1.10-1.43)</td>
<td>1.46 (1.33-1.58)</td>
</tr>
<tr>
<td>2009</td>
<td>0.74 (0.57-0.97)</td>
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<sup>a</sup> All migration years 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> Incomplete adult returns until 3-salt returns (if any) occur after Sept. 16, 2016, at GRA.
Figure 6. Overall SAR$_{\text{LGR-to-GR}}$ for hatchery Clearwater-B steelhead (with 90% confidence intervals). The NPCC 2-6% SAR objectives for listed wild populations are shown for reference. Migration year 2013 may be incomplete, as Age 3-salt adults returning after through 9/16/2016 are not included.

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 Tweet, WDFW
   Stuart Rosenberger, IPC
   Jay Hesse, Nez Perce
   Tom Rien, ODFW
   Steve Haeseker, USFWS
   Kyle Hanson, USFWS
   Erick Merrill, NPCC
   Tony Grover, NPCC
   Leslie Bach, NPCC
   FPAC
### Appendix A

**Table A.1.** Travel times (release to LGR) of Clearwater Hatchery yearling sp/su Chinook, by release site.

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* 9 PIT-tagged fish from REDP were combined with the REDR release for estimation of timing data.
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<td>4/13</td>
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<td>CROOKR</td>
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<td>POWP</td>
<td>3/31</td>
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<td>4/24</td>
</tr>
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<td>CLEARC</td>
<td>3/12</td>
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<td>POWP</td>
<td>3/24</td>
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<td>SELWY1</td>
<td>3/9</td>
<td>3/26</td>
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</tbody>
</table>

*Only 9 PIT-tagged fish from the REDP release were detected at LGR. These 9 fish were combined with the REDR release.
Table A.3 (cont’d). Estimated 10%, 50%, and 90% passage dates of PIT-tagged Clearwater Hatchery yearling spring and summer Chinook at Lower Granite Dam, by release site.

<table>
<thead>
<tr>
<th>Migration Year</th>
<th>Species Released</th>
<th>Release Site</th>
<th>Release Date(s)</th>
<th>10% Passage Date</th>
<th>50% Passage Date</th>
<th>90% Passage Date</th>
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</thead>
</table>

*Only 9 PIT-tagged fish from the REDP release were detected at LGR. These 9 fish were combined with the REDR release for estimation of timing data.

Table A.4. Estimated 10%, 50%, and 90% passage dates of PIT-tagged Clearwater Hatchery steelhead at Lower Granite Dam, by release site.

<table>
<thead>
<tr>
<th>Migration Year</th>
<th>Release Site</th>
<th>Release Date(s)</th>
<th>10% Passage Date</th>
<th>50% Passage Date</th>
<th>90% Passage Date</th>
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<td>2008</td>
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<td>4/7-4/15</td>
<td>22-Apr</td>
<td>3-May</td>
<td>15-May</td>
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<td>7-May</td>
<td>18-May</td>
<td>29-May</td>
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<td>14-May</td>
<td>21-May</td>
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<tr>
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<tr>
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<td>22-Apr</td>
<td>24-Apr</td>
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