MEMORANDUM

TO: Chuck Chamberlain, USACOE
Fish Technical Team

FROM: Michele DeHart, FPC

DATE: January 27, 2020


In response to your request, email dated January 27, 2020, we are providing additional data from the latest CSS modeling of CRSO-EIS Alternatives, including modeling of the Federal Agencies’ Preferred Alternative (PA).

PITPH

As described in detail in previous memoranda to the CRSO Fish Technical Team (FPC 2019), PITPH is an index that is used as a covariate in the CSS models to describe the effects of spill and incorporates the operation of spillway surface passage structures. Analyses of relative variable importance have shown that the combination of PITPH, water transit time, and seasonality are important factors for explaining variation in juvenile survival and juvenile travel time. Analyses of relative variable importance have also shown that combinations of PITPH, water transit time, seasonality, and ocean indices are important factors for explaining patterns of variation in Smolt-to-Adult Return rates (SARs). The PITPH index by itself, without consideration of the other factors that have been identified, provides an incomplete characterization of the biological impacts of hydrosystem operations alternatives on juvenile survival and SARs.
Recognizing these issues, Table 1, below provides the PITPH values for Snake River spring/summer Chinook that were plotted in Figure 2 of the CSS/FPC memorandum dated January 24, 2020 (FPC 2020). In addition, estimates of seasonal average PITPH for Snake River steelhead are provided.

When considering the CSS analyses of the Preferred Alternative and specifically the estimated PITPH resulting from the Preferred Alternative, which you have requested, it is important to recognize that the PITPH estimates generated in CSS Analyses of the Preferred Alternative are probably underestimates of PITPH. The CSS analyses is based on the 80 year water data set generated by the federal agencies. The data set presents the Preferred Flex Spill operation alternative, in terms of daily average flow and spill, although the Preferred Flex Spill alternative is implemented on an hourly, not daily average time step. Therefore the PITPH generated on the basis of the federal data set, does not reflect the higher PITPH that would result from implementing the lower flex spill during evening and night time hours. This would result in potentially overestimating the benefits of the PA.

Table 1. Mean seasonal average PITPH (95% confidence intervals) for spring/summer Chinook and steelhead over the 80-year water record for each CRSO-EIS Alternative used in the CSS modeling. PSP refers to the addition of Powerhouse Surface Passage Structures, with assumed 10%, 20%, and 30% efficiencies.

<table>
<thead>
<tr>
<th>Species</th>
<th>EIS Alternative</th>
<th>No PSP</th>
<th>PSP – 10% Efficiency</th>
<th>PSP – 20% Efficiency</th>
<th>PSP – 30% Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinook</td>
<td>NAA^</td>
<td>2.15 (2.06-2.23)</td>
<td>---</td>
<td>1.78 (1.35-1.90)</td>
<td>1.74 (1.62-1.87)</td>
</tr>
<tr>
<td></td>
<td>MO1</td>
<td>1.85 (1.72-1.97)</td>
<td>1.81 (1.69-1.94)</td>
<td>3.62 (3.54-3.70)</td>
<td>3.48 (3.41-3.56)</td>
</tr>
<tr>
<td></td>
<td>MO2</td>
<td>3.90 (3.82-3.98)</td>
<td>3.76 (3.68-3.84)</td>
<td>0.58 (0.53-0.63)</td>
<td>0.56 (0.51-0.61)</td>
</tr>
<tr>
<td></td>
<td>MO3</td>
<td>0.62 (0.57-0.67)</td>
<td>0.60 (0.55-0.65)</td>
<td>0.83 (0.78-0.88)</td>
<td>0.88 (0.84-0.92)</td>
</tr>
<tr>
<td></td>
<td>MO4</td>
<td>0.45 (0.40-0.50)</td>
<td>0.41 (0.37-0.46)</td>
<td>0.38 (0.33-0.42)</td>
<td>0.34 (0.30-0.38)</td>
</tr>
<tr>
<td></td>
<td>PA^</td>
<td>0.98 (0.89-1.07)</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Steelhead</td>
<td>NAA^</td>
<td>1.96 (1.85-2.06)</td>
<td>---</td>
<td>1.66 (1.53-1.79)</td>
<td>1.64 (1.51-1.77)</td>
</tr>
<tr>
<td></td>
<td>MO1</td>
<td>1.69 (1.56-1.83)</td>
<td>1.68 (1.54-1.81)</td>
<td>3.39 (3.3-3.48)</td>
<td>3.26 (3.18-3.35)</td>
</tr>
<tr>
<td></td>
<td>MO2</td>
<td>3.65 (3.55-3.75)</td>
<td>3.52 (3.43-3.62)</td>
<td>0.46 (0.41-0.51)</td>
<td>0.46 (0.41-0.51)</td>
</tr>
<tr>
<td></td>
<td>MO3</td>
<td>0.47 (0.42-0.52)</td>
<td>0.47 (0.42-0.52)</td>
<td>0.31 (0.26-0.36)</td>
<td>0.28 (0.24-0.32)</td>
</tr>
<tr>
<td></td>
<td>MO4</td>
<td>0.36 (0.31-0.42)</td>
<td>0.34 (0.29-0.39)</td>
<td>0.31 (0.26-0.36)</td>
<td>0.28 (0.24-0.32)</td>
</tr>
<tr>
<td></td>
<td>PA^</td>
<td>0.88 (0.78-0.97)</td>
<td>---</td>
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<td>---</td>
</tr>
</tbody>
</table>

^ There are no PSP structures under the NAA and PA. Therefore, the CSS did not estimate PITPH under the 10%, 20%, and 30% efficiencies for these alternatives.

Proportion Transported
As was conducted in previous CSS modeling of CRSO-EIS Alternatives, the CSS estimated the proportion of smolts that were transported under the PA. Details on the methods and equation that were used to estimate proportion transported were provided in the FPC/CSS memorandum dated on June 7, 2019 (FPC 2019). Table 2 provides the seasonal average estimates of proportion transported that were plotted in Figure 4 of the CSS/FPC memorandum dated January 24, 2020 (FPC 2020).
Table 2. Mean estimates of proportion transported (95% confidence intervals) for Chinook over the 80-year water record for each CRSO-EIS Alternative used in the CSS Life Cycle modeling. PSP refers to the addition of Powerhouse Surface Passage Structures, with assumed 10%, 20%, and 30% efficiencies.

<table>
<thead>
<tr>
<th>EIS Alternative</th>
<th>No PSP</th>
<th>PSP – 10% Efficiency</th>
<th>PSP – 20% Efficiency</th>
<th>PSP – 30% Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAA</td>
<td>0.192  (0.176-0.208)</td>
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</tr>
<tr>
<td>MO1</td>
<td>0.265  (0.243-0.288)</td>
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</tr>
<tr>
<td>MO2</td>
<td>0.338  (0.314-0.363)</td>
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<td>---</td>
</tr>
<tr>
<td>MO3(^A)</td>
<td>---</td>
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</tr>
<tr>
<td>MO4(^B)</td>
<td>0.075  (0.071-0.079)</td>
<td>0.073 (0.069-0.076)</td>
<td>0.071 (0.068-0.074)</td>
<td>0.0639 (0.066-0.071)</td>
</tr>
<tr>
<td>PA</td>
<td>0.102  (0.093-0.111)</td>
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<td>---</td>
</tr>
</tbody>
</table>

\(^A\) With breach, no transportation is provided under MO3
\(^B\) MO4 is the only alternative that proposed PSP structures at transportation sites. Therefore, this is the only alternative that had different estimates for proportion transported across the estimated 10%, 20%, and 30% efficiencies.

Population Estimates
Consistent with previous submittals of analytical results of CRSO-EIS alternatives, the “population” numbers that the CSS Modeling has reported to the CRSO Fish Technical Team in the past are estimates of predicted abundance from the CSS Life Cycle Model. These estimates of predicted abundance were provided in Table 4 of the FPC/CSS memorandum dated on January 24, 2020 (FPC 2020).

Literature Cited
