Fish Passage Design: Climate Resilience and Vulnerability

Julie Heilman, P.E.
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Fish Passage Design: Climate Resilience and Vulnerability

Design Goals:

• Accommodate the increased frequency of severe storms expected in the future as a result of a changing climate.

• Ensuring structure stability and functionality throughout the life of the asset.
Designing for Resiliency:

- **Step 1**: Design Methodology  
  - (Stream Sim. or Bridge)
- **Step 2**: BFW vs 2-yr flow vs accommodating 100-yr flow
- **Step 3**: Evaluate Stream Dynamics
- **Step 4**: Assess Site Vulnerability
- **Step 5**: Design for Scour 500-yr flow
### Fish Passage Design: Climate Resilience and Vulnerability

#### WSDOT vs WDFW:

<table>
<thead>
<tr>
<th></th>
<th>Trib to Tawes Creek</th>
<th>Grovers Creek</th>
<th>Olsen Creek</th>
<th>Gribble Creek</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured BFW (FT)</td>
<td>7.1</td>
<td>8.8</td>
<td>24</td>
<td>11</td>
</tr>
<tr>
<td>2040 predicted BWF (FT)</td>
<td>7.6</td>
<td>9.4</td>
<td>26.3</td>
<td>11.8</td>
</tr>
<tr>
<td>2080 predicted BFW (FT)</td>
<td>7.8</td>
<td>9.6</td>
<td>27</td>
<td>12.9</td>
</tr>
<tr>
<td>100-yr flow (CFS)</td>
<td>115</td>
<td>58.9</td>
<td>306</td>
<td>130</td>
</tr>
<tr>
<td>500-yr flow (cfs)</td>
<td>145</td>
<td>76.5</td>
<td>410</td>
<td>177</td>
</tr>
<tr>
<td>2040 predicted flow (CFS)</td>
<td>136</td>
<td>73.8</td>
<td>351</td>
<td>129</td>
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<tr>
<td>2080 predicted flow (CFS)</td>
<td>145</td>
<td>82.5</td>
<td>379</td>
<td>141</td>
</tr>
<tr>
<td>Stream-sim/bridge design (FT)</td>
<td>12</td>
<td>12.6</td>
<td>32</td>
<td>16</td>
</tr>
<tr>
<td>2040 Stream-sim/bridge design (FT)</td>
<td>11.1</td>
<td>13.3</td>
<td>34.7</td>
<td>17</td>
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<tr>
<td>2080 Stream-sim/bridge design (FT)</td>
<td>11.4</td>
<td>13.5</td>
<td>36</td>
<td>18</td>
</tr>
<tr>
<td>Final Structure Size (5 steps)</td>
<td>12-foot box culvert</td>
<td>13-foot box culvert</td>
<td>45-foot bridge</td>
<td>19-foot box culvert</td>
</tr>
</tbody>
</table>
SR 542 Anderson Creek Before
SR 542 Anderson Creek After
SR 542 Anderson Creek After
Lake Creek Before
Lake Creek After
Lake Creek After
...you can’t design for everything.
…except Resiliency
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QUESTIONS?

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