Salmon Habitat Assessment for Conservation Planning on the Lower White Salmon River

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USGS, Columbia River Research Laboratory
Background

- Condit Dam breached Oct 26, 2011
- Dam Removal complete Sept 14, 2012
- Re-vegetation projects in progress 2013-2014
- PacifiCorp owns 500-600 acres along the lower 6 river miles
- Mid-Columbia Fisheries Enhancement Group receives grant from Salmon Recovery Funding Board for conservation planning
Conservation Planning Grant

• Provide habitat information
• Hold public meeting
• Promote discussion among interest groups
• Explore habitat protection scenarios and funding strategies for protecting highest priority habitat
Interests

• ESA listed species-LCR salmon recovery domain and the MCR steelhead recovery sub-domain
• Tribal rights “to hunt and fish at all usual and accustomed places”
• PacifiCorp, neighboring property owners, cabin owners, public, and local community
• Skamania and Klickitat Counties
• Columbia Gorge National Scenic Area
• Recreational resource – fishing, private & commercial boating, access, conservation, and other recreation
• Timber, agriculture (and irrigation), residential, business
# ESA Listed Salmonids

<table>
<thead>
<tr>
<th>Species</th>
<th>ESU/DPS</th>
<th>Status</th>
<th>Federal Register Notice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinook salmon <em>(Oncorhynchus tshawytscha)</em></td>
<td>LCR Chinook salmon</td>
<td>Threatened</td>
<td>70 FR 37160 6/28/2005</td>
</tr>
<tr>
<td>Coho salmon <em>(O. kisutch)</em></td>
<td>LCR coho salmon</td>
<td>Threatened</td>
<td>70 FR 37160 6/28/2005</td>
</tr>
<tr>
<td>Chum salmon <em>(O. keta)</em></td>
<td>CR chum salmon</td>
<td>Threatened</td>
<td>70 FR 37160 6/28/2005</td>
</tr>
<tr>
<td>Steelhead <em>(O. mykiss)</em></td>
<td>MCR steelhead</td>
<td>Threatened</td>
<td>71 FR 834 1/5/2006</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>70 FR 52630 9/2/2005</td>
</tr>
<tr>
<td></td>
<td>LCR Chinook salmon, CR</td>
<td></td>
<td>75 FR 2269 1/14/2010</td>
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</tbody>
</table>

Critical Habitat Designation

- LCR Chinook salmon, CR
- MCR steelhead
- CR bull trout

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Salmonid Life History Stages

- Adult: migratory, holding, and spawning
- Incubation (eggs, alevin)
- Emergent (fry)
- Parr (juveniles)
- Smolt out migration
Salmonid Habitat Criteria

- Adult holding and spawning
  - Pools, cover, varied substrate, fines < 20%
- Incubation (eggs and alevin)
  - Fines < 20%, limited scour/high flows
- Emergent (fry)
  - Low velocities, shallow depths, cover
- Parr (juveniles) and smolt migrants
  - Faster, deeper water, cover, LWD, boulder, cobble
Conservation Planning Area

PacifiCorp provided Lidar data and orthophotos for the project area from August 2013

Site of former Northwestern Lake and PacifiCorp property
Digital Elevation Model

Habitat characteristics
• Moderate in-stream complexity - boulders, overhanging bedrock, and large woody debris
• Narrow basalt canyons
• Riffles, runs, fewer pools, some cascades
Shoreline Slopes

Identify areas more likely for development and aid in conservation habitat discussions

Legend

- **0 - 9.0**
- **9.0 - 18.7**
- **18.7 - 29.1**
- **29.1 - 39.5**
- **39.5 - 53.0**
- **53.0 - 88.3**
Water Surface Elevation and Reaches

Legend
Water surface elevation
Value feet
- High: 332.392
- Low: 78.441

Reach Breaks
- B1 (Buck Cr)
- Condit Dam Site
- M1 (Mill Cr)
- WS 6 (end of lidar)
- WS 5 (Mouth Buck Cr)
- WS 4 (Mouth Mill Cr)
- WS 3 (Steelhead Falls)
- WS 2 (Powerhouse)
- WS 1 (Bonneville influence)
- WS 0 (confluence)
## Study Reaches

<table>
<thead>
<tr>
<th>Reach name</th>
<th>Description</th>
<th>River miles</th>
<th>Length (ft)</th>
<th>Slope (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WS1</td>
<td>Confluence to end of Bonneville influence</td>
<td>0 – 1.1</td>
<td>6,255</td>
<td>0.2</td>
</tr>
<tr>
<td>WS2</td>
<td>End of Bonneville influence to powerhouse</td>
<td>1.1 – 2.2</td>
<td>5,746</td>
<td>0.7</td>
</tr>
<tr>
<td>WS3</td>
<td>Powerhouse to steelhead falls</td>
<td>2.2 – 2.6</td>
<td>2,130</td>
<td>1.1</td>
</tr>
<tr>
<td>WS4</td>
<td>Steelhead falls to Mouth of Mill Creek</td>
<td>2.6 – 4.2</td>
<td>8,251</td>
<td>1.2</td>
</tr>
<tr>
<td>WS5</td>
<td>Mouth of Mill Creek to mouth of Buck Creek</td>
<td>4.2 – 5.2</td>
<td>5,172</td>
<td>0.7</td>
</tr>
<tr>
<td>WS6</td>
<td>Mouth of Buck Creek to end of Study area (Lidar data set)</td>
<td>5.2 – 5.7</td>
<td>2,284</td>
<td>0.7</td>
</tr>
<tr>
<td>M1</td>
<td>Mill Creek mouth to PacifiCorp property line</td>
<td></td>
<td>1,906</td>
<td>4.4</td>
</tr>
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<td>B1</td>
<td>Buck Creek mouth to PacifiCorp property line</td>
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<td>715</td>
<td>4.3</td>
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River 2D Hydrodynamic Model

Legend

Model 880 cfs

Velocity (m/s)

- High : 4.67244
- Low : 0

2012 Bars
Chinook Redd Observations USFWS 2012
2013 Redd WDFW Survey Update

- Surveys from early August to mid-December
- High density spawning between RM 2.1 downstream to mouth for Fall Chinook
- For Spring Chinook, ~50% of observed spawning occurred above former Dam site
2013 WDFW Chinook Salmon Redd Observations

Map courtesy of WDFW
White Salmon R. Reach Ranking based on redd observations in 2012 and 2013

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* Data is preliminary, **Approximately equal
Temporal Distribution Based on Chinook Live Counts

Graph courtesy of WDFW
Potential threats to salmon habitat

• Development/land use
  – New construction, roads, homes
  – Altered/diminished riparian areas
  – Clear cuts, grazing

• Increased recreation
  – Potential for harassment
  – Gravel bed, spawning site disturbances

• Invasive Species
  – Alter ecosystem processes
Data gaps

- Substrate and bathymetry for entire study area
- Hydrodynamic model extended
- Update habitat types (riffles, runs, pools) within reaches
- Extent of Bonneville pool influence
- Continued redd monitoring (coho and steelhead)
- River in flux
  - Gravel bars, LWD, pool formation
  - Riparian establishment, sediment

Legend

- 2012 Bars
- 2013 Bars

Gravel bar change 2012 to 2013
Summary

• Study area meets suitable habitat criteria for all salmonid life history stages
• Lower reaches have highest observed redd densities (RM 2.2 to mouth)
• Redd densities higher in reaches with lower slopes/gradients
• Re-vegetation projects will likely enhance habitat
  – Sediment stabilization, cover, and insect/leaf litter inputs
• LWD recruitment would enhance pool development and cover
Next steps

• Incorporate 2013 redd data into GIS
• Review and finalize habitat classification scheme based on life history stages and species
• Final fish habitat assessment report
Thank you

- WDFW – Jeremy Wilson and crew
- USFWS- Rod Engle and crew
- USGS- Brady Allen, Jim Hatten, and Tom Batt
- Washington State - Salmon Recovery Funding Board
- Andy Maser and Steve Stampfli