Channel and Habitat Monitoring in the Countyline Reach of the Lower White River

Presented by Sarah McCarthy and Terry Butler

River and Floodplain Management Section
King County Water and Land Resources Division

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King County Science Seminar
Monitoring Questions

Have the projects:

1. Met the design specifications?
2. Improved riverine processes and functions?
3. Reduced or maintained current levels of flood risk?
4. Reduced the need for remedial actions?

Implementation Monitoring

Project Effectiveness Monitoring
Project Effectiveness Monitoring Categories

- Channel Dynamics
- Aquatic Habitat
- Riparian Processes
- Fish & Amphibians
- Flood Risk
### Aquatic Habitat Monitoring

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Monitoring Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AH1</strong>: The area of slow-water rearing habitat will increase.</td>
<td>Map slow water edge habitat (&lt;1.5 ft/sec).</td>
</tr>
</tbody>
</table>
Aquatic Habitat Monitoring
## Fish Monitoring

<table>
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<tr>
<td><strong>FA1</strong>: Juvenile salmonids will occupy low velocity rearing habitats resulting from floodplain reconnection actions. Density will increase proportional to habitat availability.</td>
<td>Map habitat types and conduct fish surveys.</td>
</tr>
</tbody>
</table>
Juvenile Salmonid Habitat Use (All Seasons)

Percent of Total Caught

- Chinook: n=143
- Coho: n=157
- Steelhead: n=17

Chinook:
- Backwater
- Bank
- Bar
- Side Channel

Coho:
- Backwater
- Bank
- Bar
- Side Channel

Steelhead:
- Backwater
- Bank
- Bar
- Side Channel
Chinook Habitat Use

Percent of Total Caught

- Backwater
- Bank
- Bar
- Side Channel

Spring 2011
1530 cfs
n=73

Summer 2011
3000 cfs
n=57
White River Setting

White River Alluvial Fan

Countyline Reach

Auburn

Buckley

Source: Chris Brummer
## Channel Dynamics

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<tr>
<td>CD1: Channel meandering will increase.</td>
<td>Analyze channel movement using digital airphotos.</td>
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</tbody>
</table>
1914

Countyline Channel 1914 to Present

Historical Channels 1931-2000; 2010 Aerial
Predicted Left Bank Post-Project Channel and Floodplain Evolution
## Channel Dynamics

<table>
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<td>CD2: Stream and floodplain heterogeneity will increase.</td>
<td>Map elevation changes using LiDAR and cross section surveys.</td>
</tr>
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</table>
LiDAR Imagery, Cross Sections

Change in Gravel Bar Elevations (2007-09) by Comparison of DEMs
## Channel Dynamics

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<tr>
<td>CD3: Distribution of spawning sediments may shift but the overall extent</td>
<td></td>
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<tr>
<td>will not decline.</td>
<td>Quantify and map longitudinal changes in substrate particle size distributions.</td>
</tr>
</tbody>
</table>
Substrate Particle Size Distributions

White RM 0.0 to 10.6, including Countyline Reach. 2009 Data

Source: Czuba et al. (2010)
## Flood Risk

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<td>FR2: Flood risk outside of the project area has decreased or remained the same.</td>
<td>… Survey channel cross sections, calculate changes in sediment volume and rates of deposition, and model changes in flood surface elevations.</td>
</tr>
</tbody>
</table>
Cross Section Data: Volumes, Rates and Elevation Calculations

Example Surveyed Cross Section in Countyline Reach

Reach-Averaged Rate of Change in Riverbed Elevation (feet/year)

Change in Water Surface Elevation, 2009 to 2011, at 5000 cfs

Hydraulic Modeling In 1-D HEC-RAS
# Monitoring Schedule

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<thead>
<tr>
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<tbody>
<tr>
<td>Project Implementation (Left and Right Banks)</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>Channel Dynamics</td>
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<td></td>
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<td>Fish &amp; Amphibians</td>
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<td>Flood Risk</td>
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Acknowledgements

Monitoring Plan Authors:
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