Surface Water – Groundwater Interactions in the Mosier Creek and Rowena Creek Watersheds, Mosier, OR

Master’s Thesis: Cullen Brandon Jones
Advisors: Dr. Ben Perkins (PSU) & Ken Lite (OWRD)
Study Area
- 7 mi east of Hood River, OR
- Transitional Zone
- Elevation: 30-700m (100-2300 ft)
- Cherry orchards
  - 1,440 irrigated acres
CRBG Hydrogeology

- Importance: Primary and sometimes only water source
- Homogenous sheet flows
- Interflow zones: horizontal flow > vertical flow
- Emplacement Environment
- Local Structural Geologic Controls
Sheet Flows exposed along Rowena Dell
Sheet Flow Characteristics: Interflow Zones

- Flow top: water can enter if weathered or fractured
- Massive, dense flow center: very difficult for water to enter or move through
- Flow base: water can enter if weathered or fractured
- Silt and clay: very difficult for water to enter or move through
- Massive dense center: very difficult for water to enter or move through
- Flow top: water can enter if weathered or fractured
Emplacement Environment Importance: Pillow Pillagonite: water-bearing at depth
Local Structural Geologic Controls: Yakima Fold Belt

Mosier Syncline -> Columbia Hills Anticline
Local faults can restrict groundwater flow

Lite and Grondin, 1988
Geologic Cross Section
### Stratigraphy of the Columbia River Basalt Group and associated interbeds near Mosier, Oregon

<table>
<thead>
<tr>
<th>Epoch</th>
<th>Group</th>
<th>Formation</th>
<th>Member</th>
<th>Isotopic Age</th>
<th>Magnetic Polarity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miocene</td>
<td>Columbia River Basalt Group</td>
<td>Saddle Mountains Basalt</td>
<td>Pomona Member (Tp)</td>
<td>12</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-Selah Member interbed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miocene</td>
<td></td>
<td>Columbia River Basalt Group</td>
<td>Priest Rapids Member (Tpr)</td>
<td>14.5</td>
<td>R, R</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Basalt of Lolo</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Basalt of Rosalia</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-Quincy-Squaw Creek interbed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miocene</td>
<td></td>
<td>Columbia River Basalt Group</td>
<td>Frenchman Springs Member (Tf)</td>
<td>15.3</td>
<td>N, N, E</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Basalt of Sentinel Gap</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Basalt of Sand Hollow</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Basalt of Ginkgo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miocene</td>
<td></td>
<td>Grande Ronde Basalt</td>
<td>Not yet identified as an aquifer in the Mosier area</td>
<td>15.6</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16.5</td>
<td></td>
</tr>
</tbody>
</table>

Modified from Reidel et al., 2002; Lite and Grondin, 1988; Lite, in publication; Tolan et al., 2009
Problem: Declining groundwater levels:

- Overuse (Pumping)
- Commingling
Surface water – Groundwater interaction: Newcomb (1969)
Lite and Grondin (1988)
Objectives

• Better quantify interactions between groundwater systems and Mosier Creek and Rowena Creek

• Establish extent to which stratigraphic position and geologic structures control these interactions

• Contrast Rowena Creek vs Mosier Creek flow systems
Methods

• Detailed geologic mapping
• Surface water flow measurements: seepage runs
• Compilation of well head measurements
• Chemical analysis of water samples from area wells and Mosier and Rowena Creek
Contact Info

• Cell: 361 550-0932
• E-mail: cullen.b.jones@pdx.edu