Context

- EPA/USACE/Oregon Department of State Lands (DSL) joint effort to develop a science-based framework

- Agencies have primary responsibility, but working collaboratively with partners

- New framework within existing regulations
Regulatory Atmosphere Supports Development of Function Based Stream Mitigation Framework

USEPA/USACE Compensatory Mitigation Rule - 2008
Oregon Removal-Fill Program Rule – 2009

- For all types of aquatic resources, including streams
- Focus on ecological significance and watershed approach
- Requires offsetting losses of functions and services
Desired Outcomes

- Integrate best available science and consider *ecological function/processes* and *watershed approach*

- Satisfy needs of partner agencies with overlapping regulatory authorities

- Enhance transparency, consistency, timeliness, and effectiveness of regulatory programs

- Promote effective restoration
Elements of Compensatory Mitigation

- Stream function assessment – assess credits (restoration outcomes) and debits (impact)
- Site selection criteria (watershed approach)
- Performance Standards (credit release)
- Credit/debit accounting (track credits)
Existing Frameworks Limited

Reliance on condition (structure) for assessment and accounting

Lacking:

• Stream function assessment tool for credit (mitigation)/debit (impact) assessment

• Defined watershed approach

• Function-based accounting
Addressing Limitations

Transition from available science to implementable, function-based framework

1) Stream classification system
   - Stream types that reflect characteristic expected functions for each type
   - Basis of *rapid* function assessment protocol

2) Function assessment method
   - Site specific assessment
Challenges

- Assessment must be rapid, consistent, and repeatable
- ‘Watershed approach’ dependent on existing information
- Limited by the current state-of-the-science
# Stream Functions

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>Hydrologic</th>
<th>Geomorphic</th>
<th>Biologic</th>
<th>Chemical/Nutrient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surface Water Storage</td>
<td>Sediment Continuity</td>
<td>Maintain Biodiversity</td>
<td>Nutrient Cycling</td>
</tr>
<tr>
<td></td>
<td>Sub/surface Transfer</td>
<td>Substrate Mobility</td>
<td>Create Habit Aquatic/Riparian</td>
<td>Chemical Regulation</td>
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<tr>
<td></td>
<td>Flow Variation</td>
<td></td>
<td>Sustain Tropic Structure</td>
<td></td>
</tr>
</tbody>
</table>

Relevance; utility; multi-functionality
# Stream Classification System Development

<table>
<thead>
<tr>
<th>INITIAL</th>
<th>REVISED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyzed Existing Classifications</td>
<td>Considered Spatial Hierarchy</td>
</tr>
<tr>
<td>Parameter Selection Criteria</td>
<td>Refined Selection Criteria</td>
</tr>
<tr>
<td>• Statewide</td>
<td>• Transparent</td>
</tr>
<tr>
<td>• Consistent across watersheds</td>
<td>• Consistent w/policy intent</td>
</tr>
<tr>
<td>• Available, mappable data layers</td>
<td>• Appropriate data resolution</td>
</tr>
<tr>
<td>• Rapid and automated</td>
<td></td>
</tr>
</tbody>
</table>

- Available, mappable data layers
- Rapid and automated
Classification Framework

*In Progress*

- Hierarchical – stream order organizational principle
- Dualistic – local (reach) and watershed (integrative)
- Hydrologic, geologic drivers of stream functions
- Expandable
Wigington et al. 2012, Oregon Hydrologic Landscapes, in review
Classification System
• Spring 2012 - theory
• Summer/Fall 2012 - practice

Function Assessment Method*
• Spring 2013 – field test

Stream Mitigation Framework
• Policy development – parallel
• Winter 2014 - ‘80% commonly permitted’
In Summary

- Compensatory mitigation is a driver for restoration actions.
- Existing stream mitigation approaches not providing consistent success.
- To meet CWA/R-F goals, Framework must promote effective restoration considering functional replacement.
Acknowledgments