MAKING THE CASE FOR VALLEY SCALE RESTORATION

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How have we impacted fluvial systems?

Why valley scale restoration?

What are the barriers to valley scale restoration?

What are some examples of valley scale restoration?
IMPACT TO FLUVIAL SYSTEMS

Are current practices better?
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North Fork Nooksack River

South Fork Nooksack River

Shale Creek, Clearwater tributary

Skagit River
“One of the most interesting features in this basin [the Mississippi] is “the raft.” The dimensions of this mass of timber were given by Darby, in 1816, as ten miles in length, about two hundred and twenty yards wide, and eight feet deep...alluvial accumulations have been so great as to raise its channel, and cause its waters, during the flood season, to flow up the mouths of many tributaries, and to convert parts of their courses into lakes” – Lyle 1830

“Working for the U.S. government, Henry Shreve cleared 114 km of the Red River in 1833, which resulted in 3 m of channel incision and substantially increased average velocity, although more than 100 km of raft remained (Williams, 2010). Portions of the raft regrew during periods when wood was not being removed, but Shreve “finally cleared the raft in 1838.” – Wohl, 2013
IMPACT TO FLUVIAL SYSTEMS

Snagging boat Mississippi River

GLO Map Skagit River near Mt Vernon
Table 8-2. Snags removed from four north Puget Sound rivers, 1880-1910 (from Annual Reports of the Chief of Engineers).

<table>
<thead>
<tr>
<th>River</th>
<th>Drainage Area (km²)</th>
<th>1881-1890</th>
<th>1891-1900</th>
<th>1901-1910</th>
<th>Total 1881-1910</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skagit</td>
<td>7,800</td>
<td>776</td>
<td>21,553</td>
<td>14,369</td>
<td>36,698</td>
</tr>
<tr>
<td>Snohomish (including Snoqualmie and Skykomish)</td>
<td>4,645</td>
<td>920</td>
<td>2,898</td>
<td>6,527</td>
<td>10,345</td>
</tr>
<tr>
<td>Nooksack</td>
<td>2,072</td>
<td>1,462</td>
<td>758</td>
<td>1,850</td>
<td>4,070</td>
</tr>
<tr>
<td>Stillaguamish</td>
<td>1,770</td>
<td>87</td>
<td>956</td>
<td>1,021</td>
<td>2,064</td>
</tr>
</tbody>
</table>
IMPACT TO FLUVIAL SYSTEMS

Willapa River, WA

Wind River, WA

White Salmon River, WA
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Klondike River valley just upstream from its confluence with the Yukon River at Dawson YT

Trinity River near Weaverville, CA
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Photograph by Asahel Curtis of the first Denny Hill regrade, 1914. (Courtesy Special Collections, University of Washington Libraries, UW 4812)

Filling Elliott Bay tidelands with sluiced material from Beacon Hill on the South Canal project, 1901. (Courtesy Special Collections, University of Washington Libraries, A. Curtis 1769)
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Thornton Creek Wetlands
- Pre-developed Conditions
  - 890 acres, 11.5% of basin
- Post-developed Conditions
  - 75 acres, 1% of basin
  - 92% Lost
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1931 Upper Puyallup River near Orting, WA (Cardno Entrix, 2011)

1990 Upper Puyallup River near Orting, WA (Cardno Entrix, 2011)
IMPACT TO FLUVIAL SYSTEMS
IMPACT TO FLUVIAL SYSTEMS

Dams within the Columbia River watershed

Registered dams with the US
Human actions have fundamentally altered fluvial and habitat processes on the watershed to valley to channel scale throughout North America.

- Impacts have been large and pervasive.
- Restoration vs rehabilitation. Restoration needs to have similarly large scale.

Historical context:
- Resources extracted from watershed
- I.e. timber, metals, gravel, salmon, flood reduction, power, etc...
Human actions have fundamentally altered fluvial and habitat processes on the watershed to valley to channel scale throughout North America.

- Impacts have been large and pervasive

**Restoration vs rehabilitation. Restoration needs to have similarly large scale**

**Restoration context**

- Resources input into watershed
- Redevelopment of floodplain forest, removing artificial controls, corridor management
Resilient fluvial and habitat systems require a functioning corridor on the valley scale:
- Reduce flood hazards, improve water quality
- Buffer impacts of climate change

Dynamic fluvial systems need space ...i.e., channel migration

Allowing for dynamic behavior is the key to future complexity
BARRIERS TO VALLEY SCALE

- Historical misconceptions...reversing manifest destiny
  - Public outreach and education key

- Focusing on short term costs vs long term benefits

- Private property interests

- Regulatory policies
  - FEMA and NFIP regulations
  - Temporary impacts
  - Thinking out of the box. Restoration of processes

- Making assumptions that are self-limiting...ask the question of scale
RESTORATION SCALE – OPTION 1
RESTORATION SCALE – OPTION 2
RESTORATION SCALE – OPTION 3
To succeed our restoration goals the scale of the solution will need to **match the scale of the impacts**

Large scale requires partners and extensive planning

Get outside your comfort zone & engage the people needed, it’s not just sediment transport and fish, it’s people:
- Landuse Planning, Flood hazards, Politics, Economics

Dream **BIG**, go **BIG**

Even if it takes several steps, chart a course to valley scale restoration
THANK YOU
IMPACT TO FLUVIAL SYSTEMS

Historical conditions lower Skagit River

Collins and Sheikh, 2002

Dean, Ferdaña, and White, 2002