Process-based Restoration of Depositional Stream Reaches—A Paradigm Shift to Stage 0

Johan Hogervorst
Forest Hydrologist
Willamette National Forest

Deer Creek, McKenzie Watershed, Willamette National Forest

Fivemile Creek, Coastal Lakes Watershed, Siuslaw National Forest

Johan Hogervorst
Forest Hydrologist
Willamette National Forest
• Historical Conditions

• Disturbance History

• Evolution of Restoration in the Pacific Northwest (particularly Oregon)

• Paradigm Shift to Stage 0 projects
Historic Floodplain Condition in Depositional Environments

- Vegetation diversity
- Elevational diversity
- Multiple flow paths
- Both downed wood and future wood supply
- High water table
- Beaver dams
- Frequent floodplain wetting
- Maximum patch complexity

Cluer and Thorne, 2013 – “STAGE 0” of the Stream Evolution Model
Reach-scale processes from Roni and Beechie, 2013*

<table>
<thead>
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<th>Flow Regime</th>
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<th>Channel features</th>
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* Stream and Watershed Restoration: A Guide to Restoring Riverine Processes and Habitats
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Changed Condition in Depositional Environments
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- Road building
Changed Condition in Depositional Environments

- Road building
- Conifer harvest
Changed Condition in Depositional Environments

- Road building
- Conifer harvest
- Diking and channelization
Changed Condition in Depositional Environments

- Road building
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- Diking and channelization
- Blocking or filling side channels
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- Grazing and farming
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Leads to:

- Single incised channel
- Loss of water table/wetlands
- Altered vegetation types
- Minimal large wood
- **Altered Stream Power → change from deposition to transport**

Stream Evolution Model, Stages 2-4
Cluer and Thorne, 2013
Historic Floodplain Condition in Depositional Environments

Stream Power Per Unit Width - Low
• Flow distributed throughout a roughened surface
Changed Condition from Depositional to Transport Environments

Stream Power Per Unit Width - High
“fire hose effect”
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Channel-centric, form-based restoration (1980s to present)

Advantages:
• Easy to count # of structures, pools created and miles treated
• Focused treatment that’s relatively inexpensive per site

Disadvantages:
• Process and function minimally addressed
• Blows out in big storms
• Unnatural materials and engineering in stream
• Stream power and water table not addressed

Stream Power Per Unit Width - High
• Form-based restoration working against a “fire hose”
Stage 0 - Valley bottom, process-based restoration (2005 to present)

Advantages:
- Process and function fully addressed for entire floodplain
- Water table restored
- Template created for native vegetation recovery
- Patch complexity maximized with dynamic change anticipated over time
- Large storms welcome (stream energy addressed)

Disadvantages:
- High level of disturbance initially – turbidity during construction
- Tough to monitor with traditional surveys
- Social acceptance for a new technique

Stream Power Per Unit Width - Return to Low
Floodplains are good!