Restoring Natural Processes in an Urban Watershed: Lessons from the Rainbow Bend Levee Removal Project
Rainbow Bend Neighborhood

- Residents at risk from flooding
- Significant property damage
- Public cost for emergency response and facility repair
Rainbow Bend Project Goals

1: Reduce flood risks to people and infrastructure.

2: Reduce the need for future facility maintenance and emergency response.

3: Restore floodplain functions and processes that provide for natural development of riverine habitat and aid salmon recovery.

4: Address impacts of the project on recreational safety.
And it might have been, had our project been in a remote wilderness.
But the Cedar River traverses somewhat more urban landscape
Predictive Tools

2 (or 3) D Flow Modeling
Sediment Transport Modeling
Meander Migration Modeling
Bank Retreat Modeling
"I think you should be more explicit here in step two."
Potential Adverse Consequences from Rainbow Levee Removal/Floodplain Reconnection

- Scour of Cedar Grove Road Bridge Footings,
- Channel impingement on Cedar Grove Road south of Bridge,
- Damage to Trail Site Six revetment due to changed angle of channel impingement,
- Damage to WPA levee/revetment due to changed angle of channel impingement,
- Channel migration into adjoining property to north,
- Sediment discharge exacerbates sediment accumulation through the City of Renton,
- Destabilization of right-bank bluffs downstream of site due to increased channel meandering,
- Increase channel complexity for recreational users
Cedar Grove Rd. Bridge Location

3.6021

Slope after avulsion = 0.07%

Existing average water surface slope = 0.33%

2011 Ground surface along avulsion path

2011 Water surface

Thawed under C. G. Rd. Bridge per 2012 bridge inspection, elev. 213.9

Bottom of structural footing, elev. 211.4

Break represents 1500 ft. of shortening due to avulsion

River Miles
Left Bank, Trail Site 6 Revetment Reconstruction Design
Some Other KC Projects Intended to Restore Process

• Carlin (Raging)
• Pautzke (Green)
• Chinook Bend (Lower Snoqualmie)
• Carlson (Lower Snoqualmie)
• Porter (Green)
Summary Thoughts:

• Precise, reliable tools for predicting the channel response to removal of constraints are not available. Assessing the “plausible universe” of channel responses and identifying “plausible” adverse consequences is a more feasible approach.

• High Risk (probability x consequence) outcomes may need to be addressed as a part of initial implementation. Other lower risk outcomes may reasonably addressed by monitoring and adaptive management.

• Stakeholders must be clearly (and repeatedly) apprised of the uncertainties inherent in such projects and the importance of monitoring and adaptive management.
Rainbow Bend Project Partners

• King County DNRP
• King County Flood Control District
• Seattle Public Utilities
Funding
FEMA Pre-Disaster Mitigation & Hazard Mitigation Program
Washington State Salmon Recovery Funding Board
USFWS Habitat Conservation Program
Cedar River Legacy
River Improvement Fund/Flood Control District
King Conservation District
King County Real Estate Excise Tax
King County Conservation Futures Tax
Seattle Public Utilities
Rainbow Bend, Core Design Team Members

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