Effects of Beaver Dams on Surface Water Flow During Storm Events in an Urban Landscape

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Project Background

USGS and Clean Water Services – local wastewater and stormwater utility

Urban Growth Boundary: minimize urban encroachment onto farm and forest land

Vast majority of the population of the Tualatin Basin lives within the urban growth boundary

Streams flow through a dense urban landscape, thus inheriting issues typical of urban streams
Common issues in urban streams:

- High velocity pulse of water during storm events
- Stream bank erosion and incision
- Disconnection from floodplain
- Straightening of the stream channel
- Changes in stream temperature, dissolved oxygen and other water quality parameters
- Degradation of riparian habitat
Management Techniques

Out of stream tools:
- Upland detention facilities
- On-site stormwater management
- Proper land-use planning
- Low impact development

In-stream tools:
- Floodplain reconnection
- Channel modification
- BEAVERS?
Beavers Have Superpowers!

- Impede surface water flow
- Decrease velocity
- Increase water storage
- Disperse water across the landscape
- Trap and store sediment

No published research on beavers in urban ecosystems
The big picture

Habitat Availability

Water Quality

Channel Morphology

Stream Hydraulics

Areas of Potential Conflict

Dissolved Oxygen

Conductivity

pH

Temperature

Turbidity

Surface Water Flow

Water Storage

Ground & Surface Water Interactions

Sediment Storage

Transport of Suspended Sediment

Potential Dam Capacity Model

Beaver Dam Inventory

Biodiversity Survey
Objective

Determine if the presence of beaver dams and ponds in urban stream reaches in the Tualatin River basin, attenuates surface water flow during storm events.
Site 1 – Fanno Creek

Approximately 0.55 river miles from upstream well to downstream well

Source: Google Earth, 23 July 2016, Greenway Park
Site 2 - Stoller Creek

Approximately 0.56 river miles from upstream well to downstream well

Source: Google Earth, 23 July 2016, Greenway Park
Collect Stream Channel Data

Surface Water Level

Continuous Cross Sectional Area

Stream Channel Profile

Elevation vs Distance

Continuous Cross Sectional Area
Storm Events at Fanno Creek

- Change in Surface Water Level (ft)
  - 12/9/16 to 12/14/16
  - Upstream (light blue)
  - Downstream (red)

- Change in Surface Water Level (ft)
  - 10/31/2016 to 11/2/2016
  - Upstream (light blue)
  - Downstream (red)
Storm Events at Stoller Creek

Change in Surface Water Level (ft)

- Upstream
- Downstream

Height of Water Above Sensor (ft)

Dates: 2/19/17 to 2/28/17
Data collection
  o Continue collecting data through Fall 2017

Work up data
  o Continuous area variable as surrogate for discharge

Data analysis
  o Magnitude/duration of storm events
  o Changes in surface water storage
  o Stream flashiness throughout the water year
Data from the urban beaver study will...

- Provide a better understanding of how beavers influence urban landscape
- Support strategic management and planning decisions
- Inform where to support or discourage beaver activity
Pregnant Beaver at Stoller Creek

https://youtu.be/akpn9ps6bFM
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