

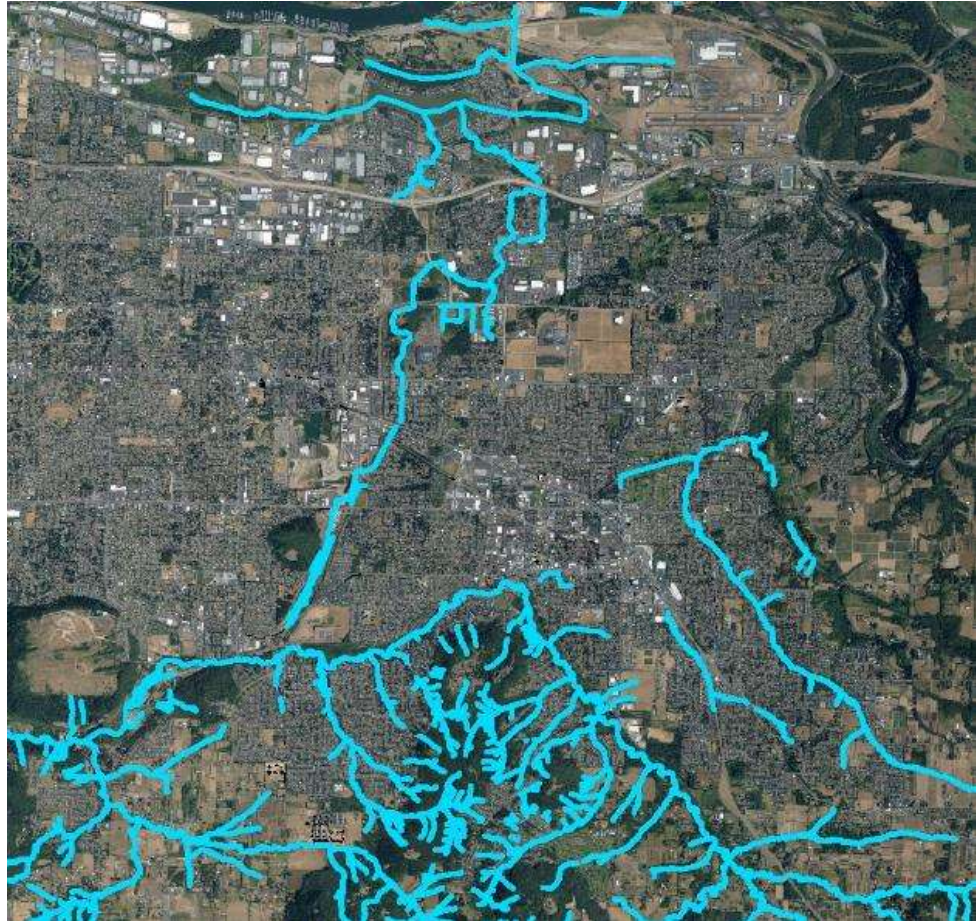
Beavers Improve Water Quality, Temperatures, and Stream Complexity in an Urban Watershed

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Watershed Scientist
City of Gresham, Oregon

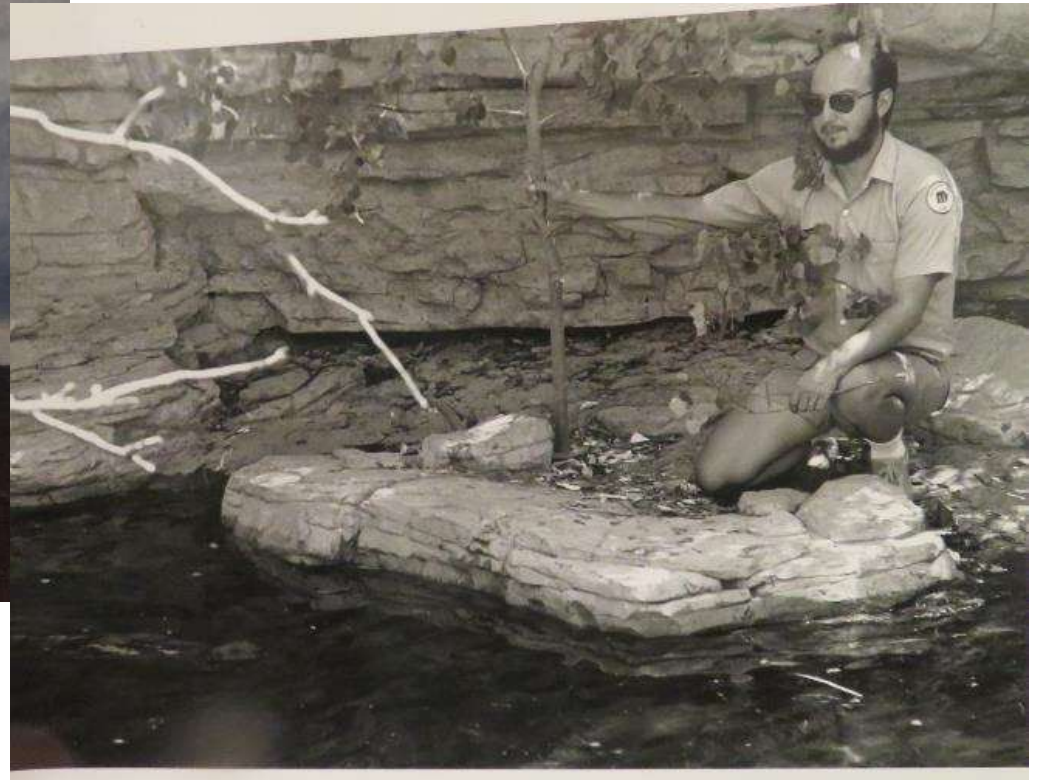
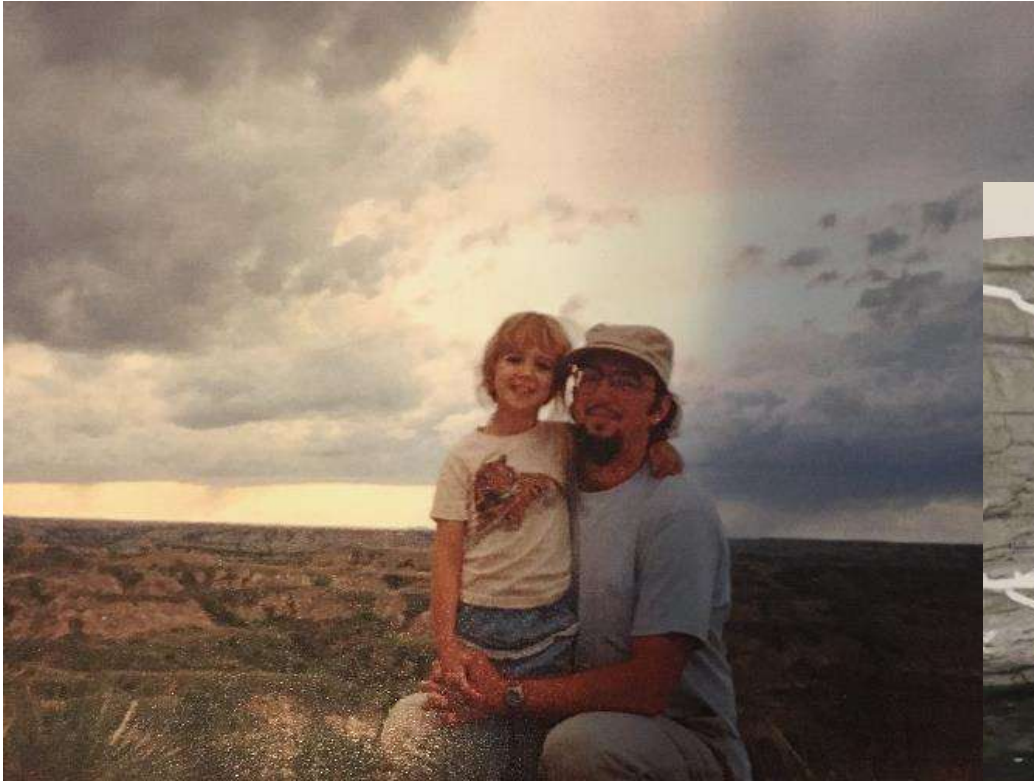


Overview

- Beavers in Gresham
- Studies of benefits
 - Stormwater
 - Stream temperature
 - Stream complexity
- Conflicts
- Coexistence

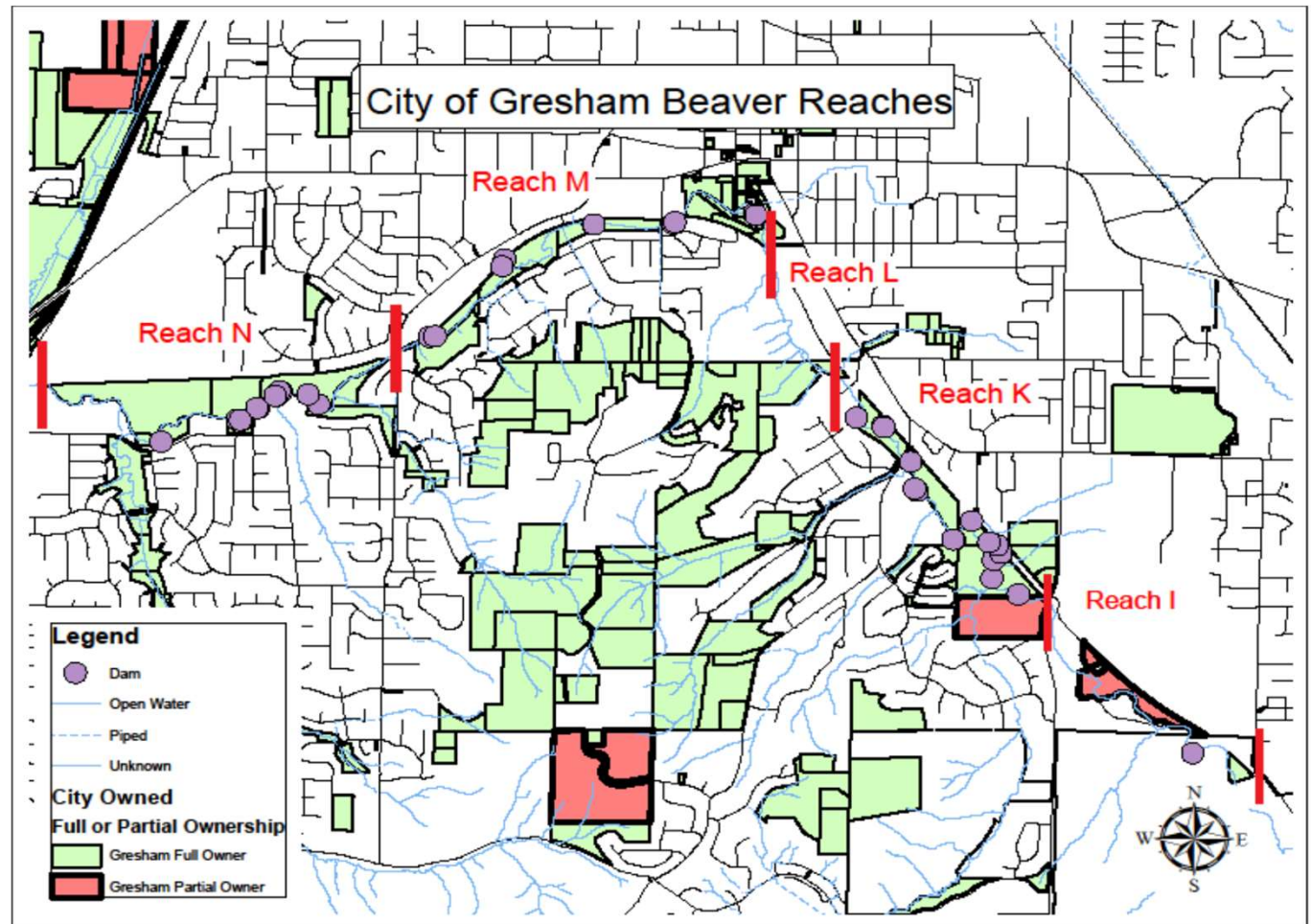


Grew up with an appreciation for beavers



Beavers in Gresham

- Increasing drastically in past few years
- Community science surveys
- Mostly on public property



Map credit: Jesse Seals, City of Gresham AmeriCorps Member

Beavers in Gresham



<https://www.youtube.com/watch?v=cza00pCsTq8>

Life at a Beaver Dam in Gresham, Oregon



Raccoons



Mallards



Great Blue Herons



Barred Owls



River Otters



Wood Ducks



Musk rats

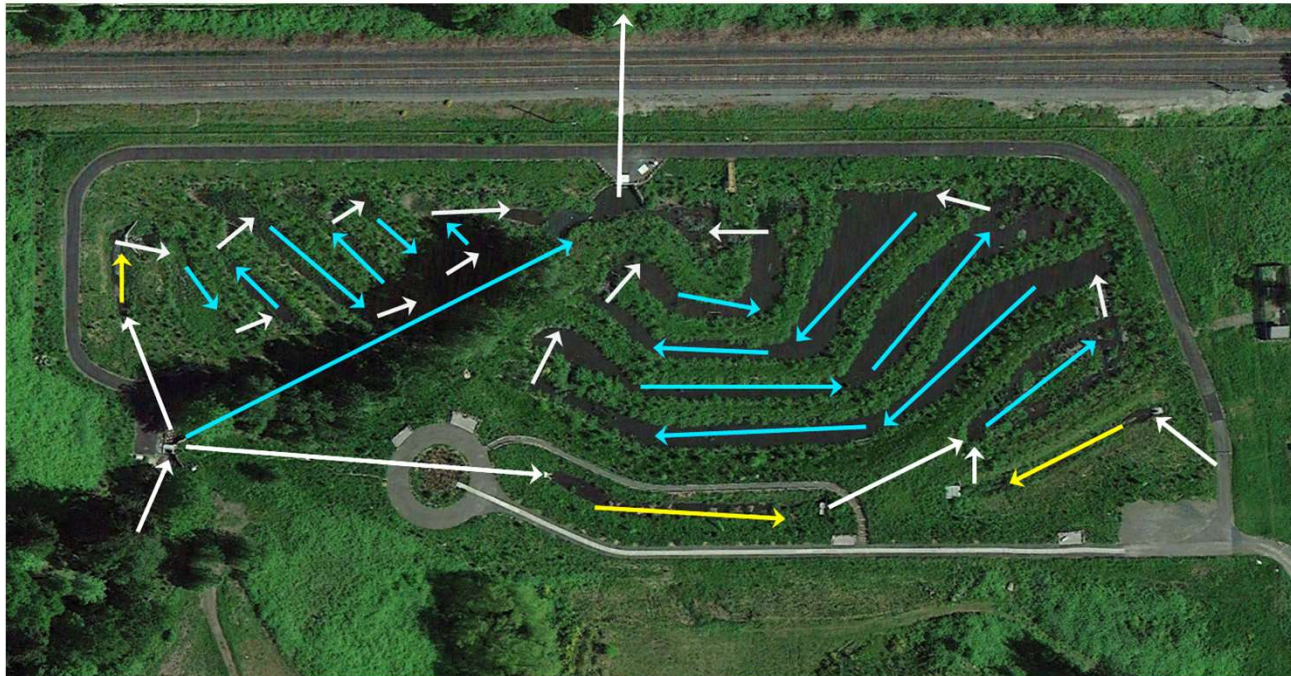


Coyotes

Photos by Gresham resident Caz Zvyatkauskas

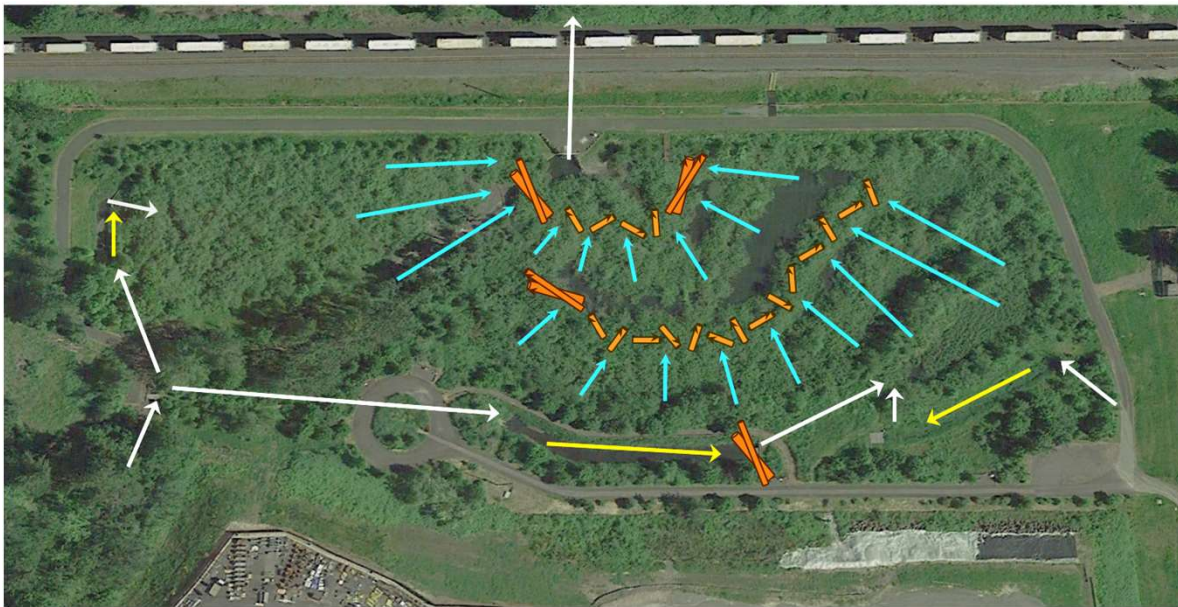
Studies – Stormwater

- Large constructed wetland
- Carefully designed flow path



Studies – Stormwater

- Beavers changed flow path
- What to do?!

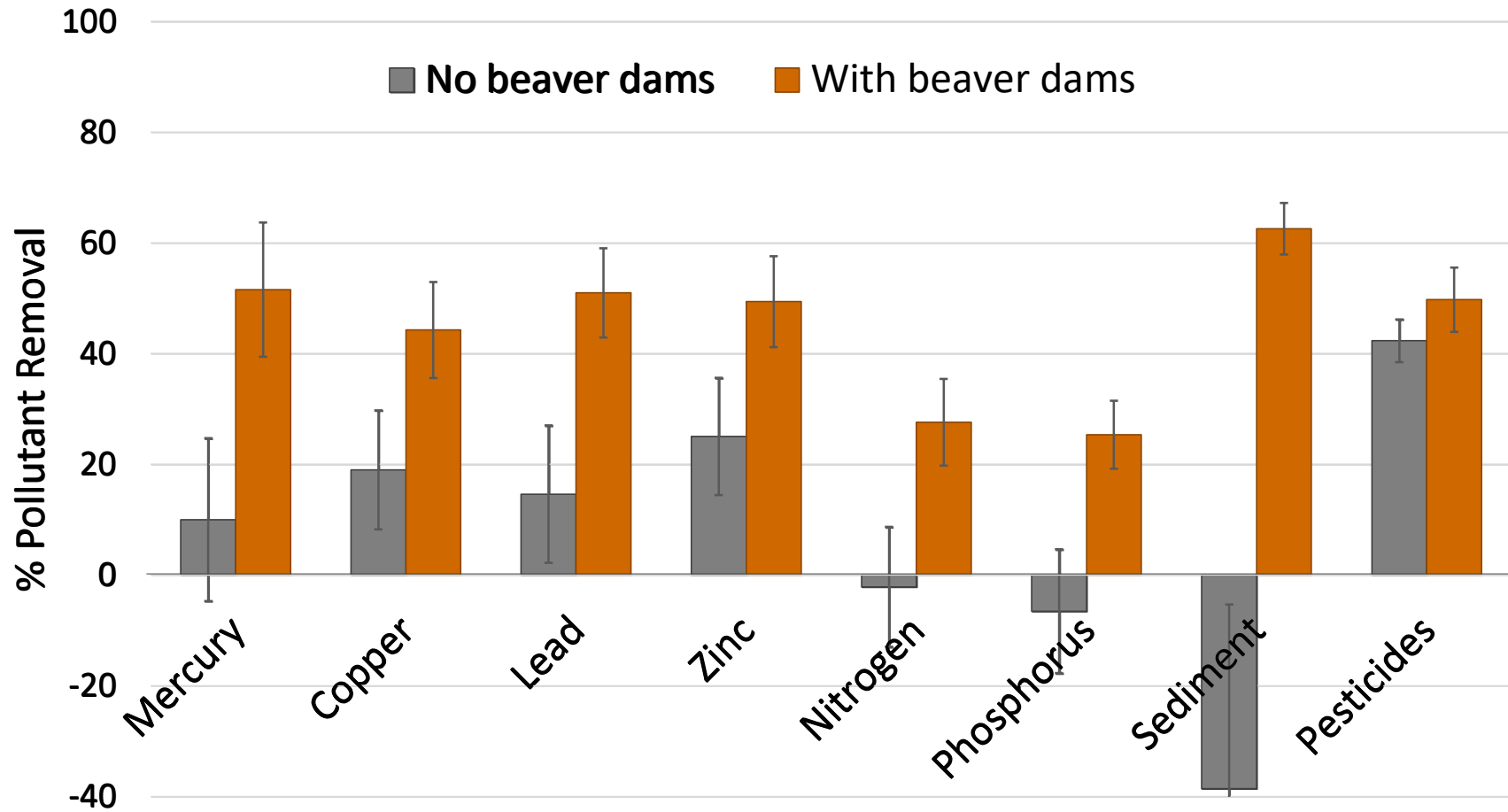


Methods

- Collected water quality samples during storms
 - Inlets and outlets of facilities
 - 7 storms without dams, 6 storms with dams
 - Metals, nutrients, sediment, pesticides
- Removed dams
 - Sampled before and after



Results



Beaver dams slow and filter stormwater



Beavers are a free night crew!

When you do (or don't) want beavers in your facility

- Always consider what it might look like if beavers show up (or not)
- If you don't want them
 - Try to minimize constrictions with running water
 - Avoid beaver food
- If you do want them
 - Allow space for extra ponding
 - Plant food
 - Be open to change



Heat as a Major Pollutant in Johnson Creek

- Major causes
 - Lack of shade
 - Dam/ponds

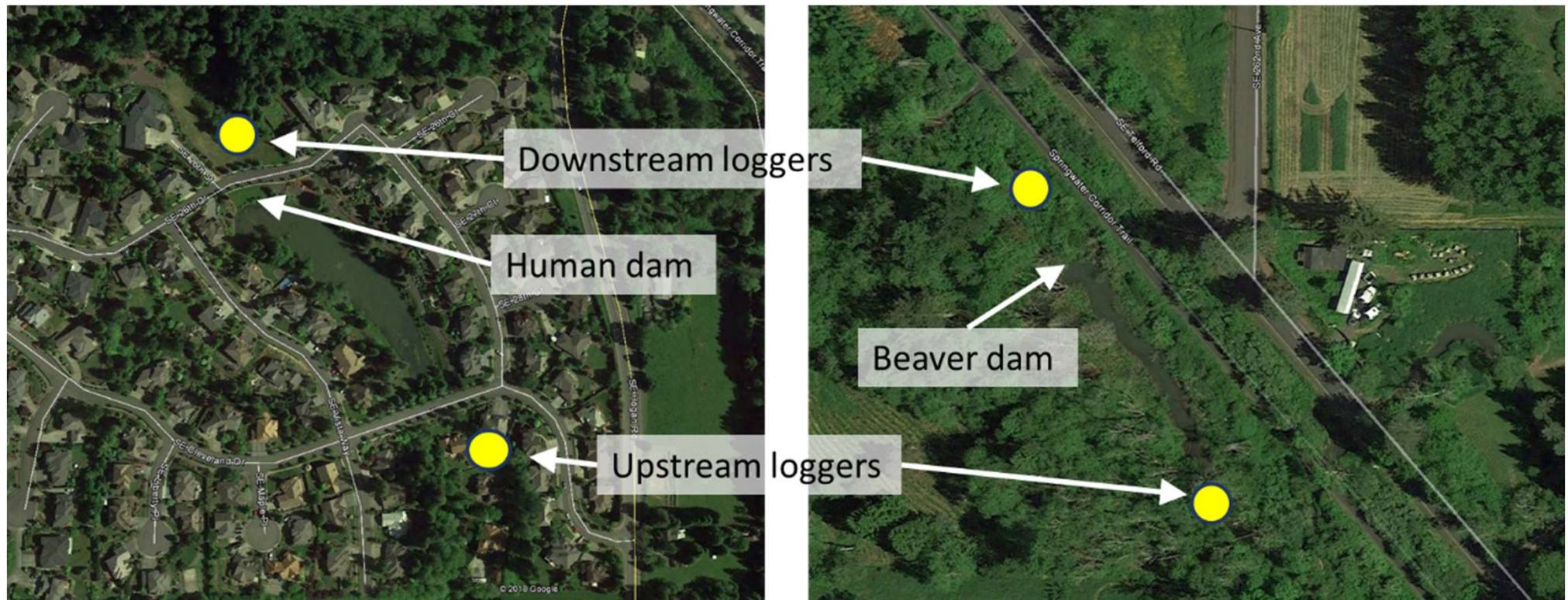


Studies – Stream Temperature

- Two summers of hourly data
 - 14 human dams
 - 8 beaver dams



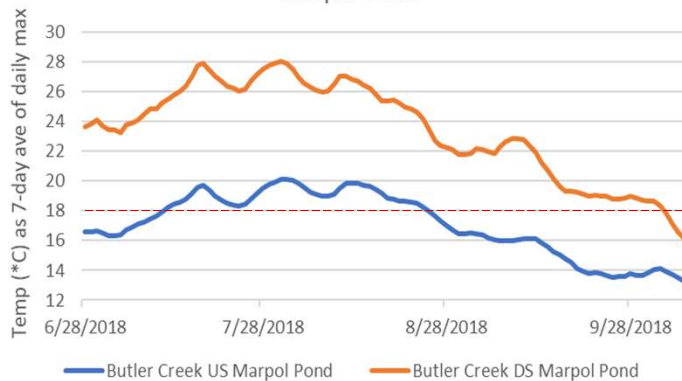
Logger placement



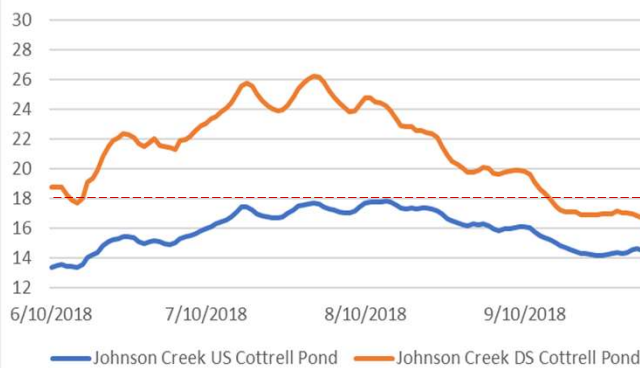
Stream Temperature Study Results – Representative Ponds

Human ponds

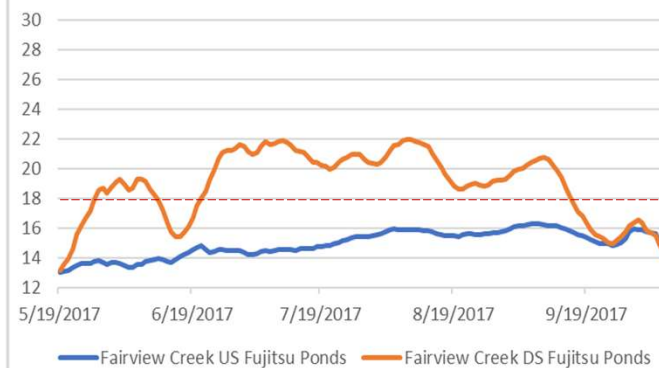
Marpol Pond



Cottrell Pond

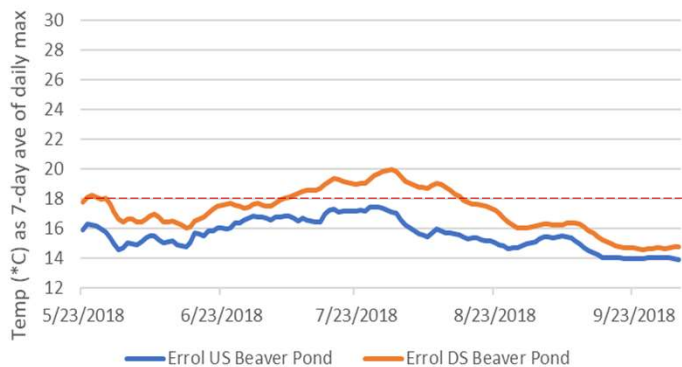


Fujitsu Ponds

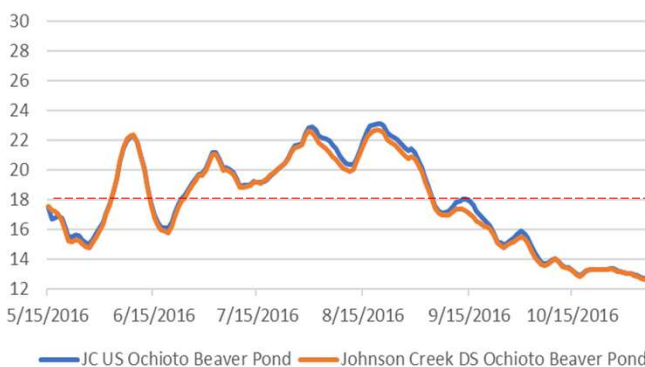


Beaver ponds

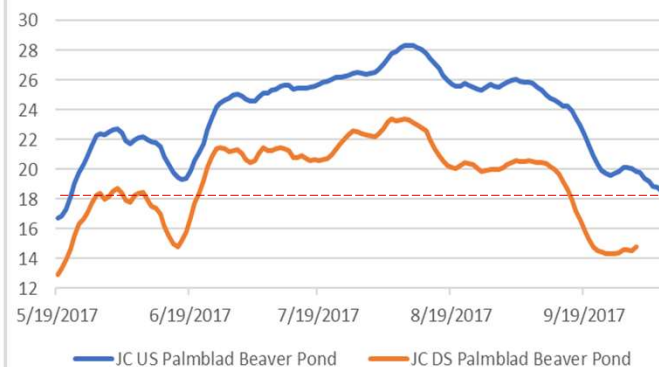
Errol Beaver Pond



Ochioto Beaver Pond

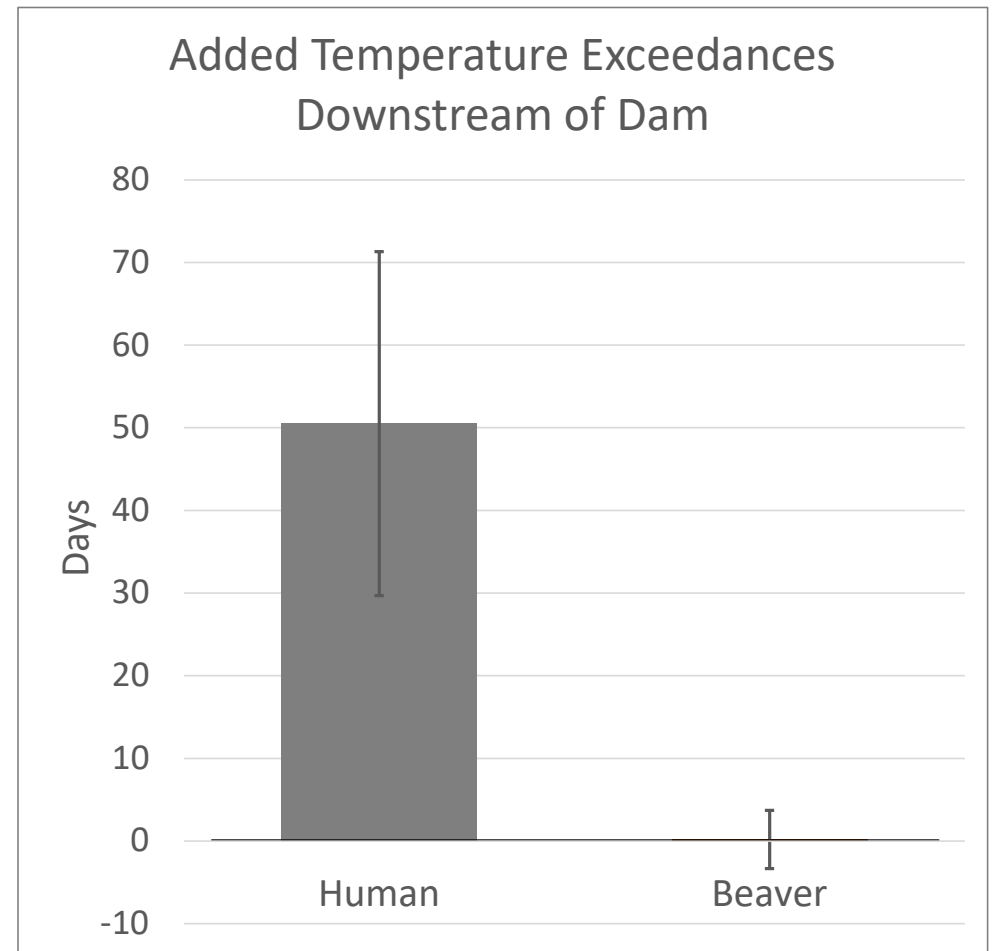
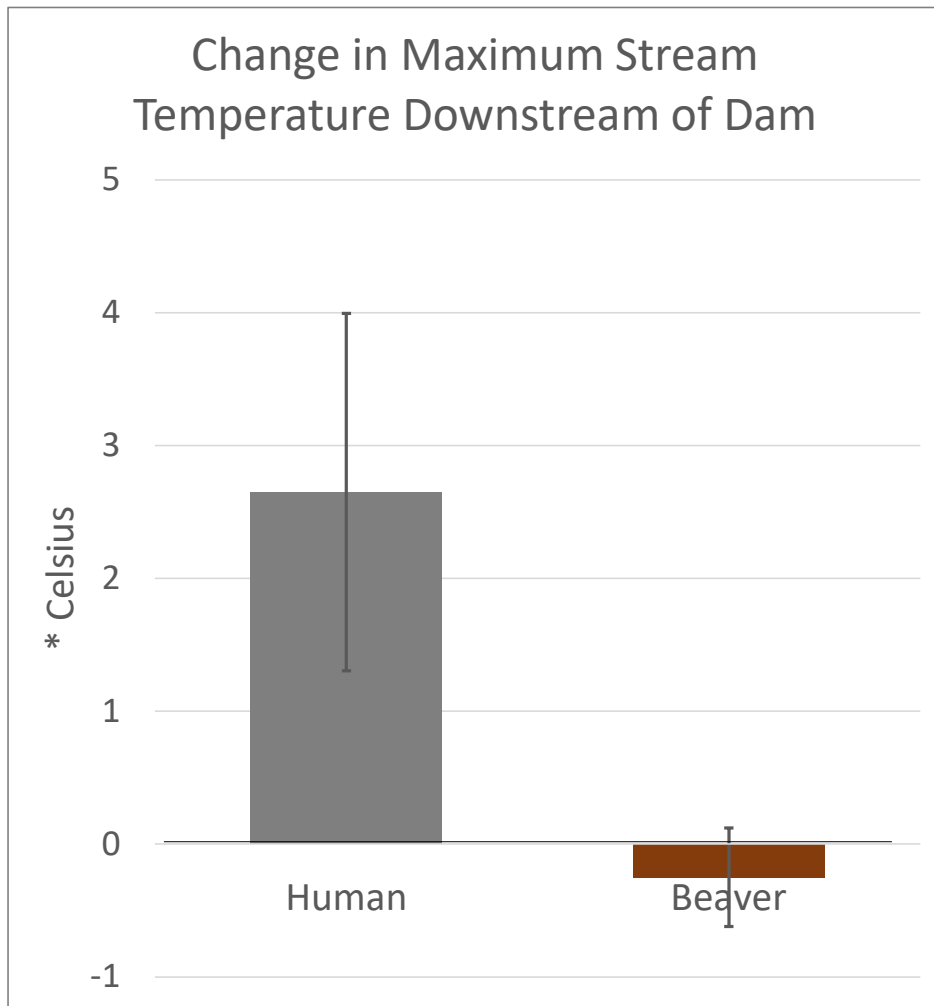


Palmblad Beaver Pond



----- Instream water quality standard for salmonid rearing and migration

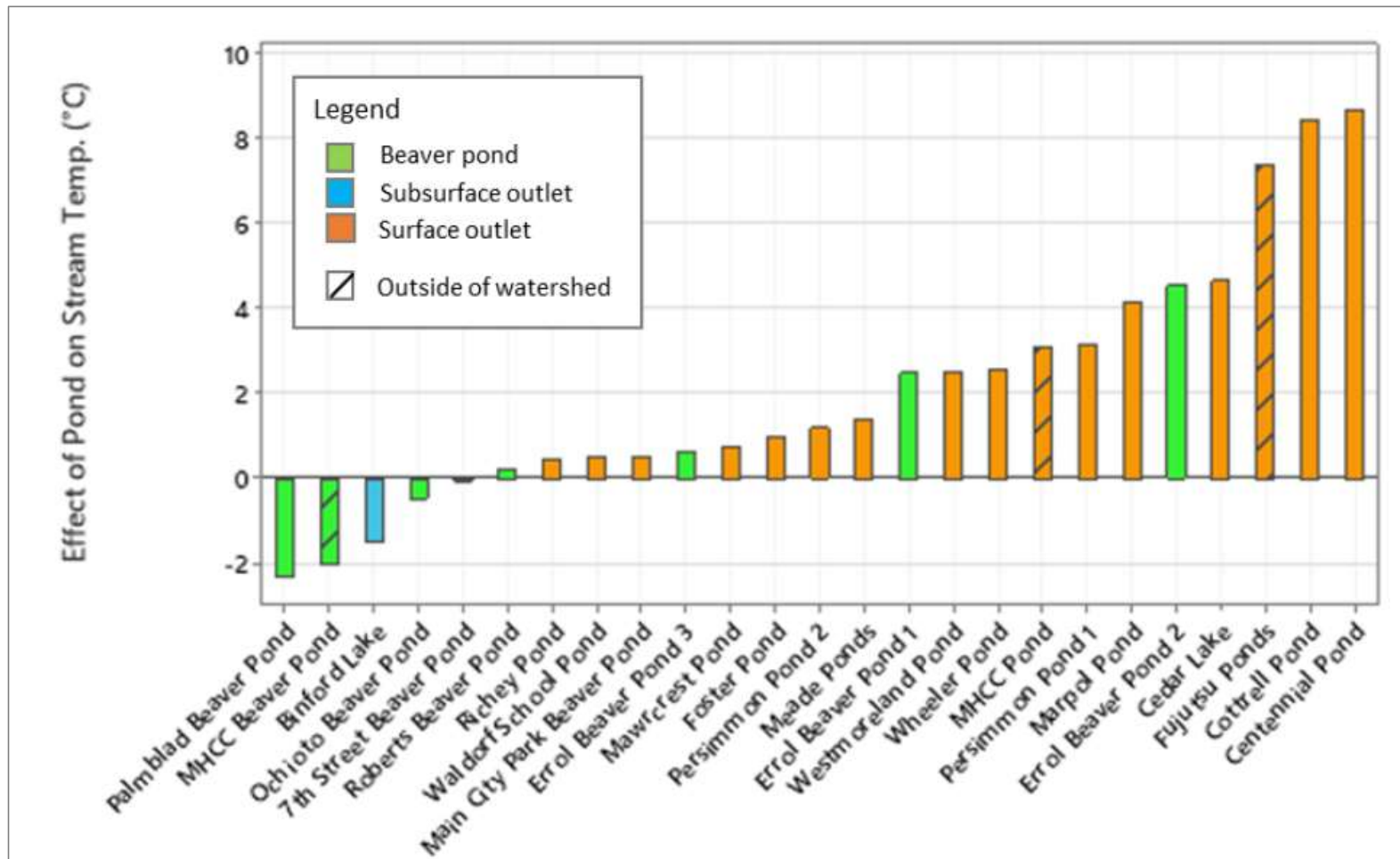
Stream Temperature Study Results – All ponds



Water seeps through the beaver dams and pulls water from the entire stratified water column



Stream Temperature Study results – All ponds

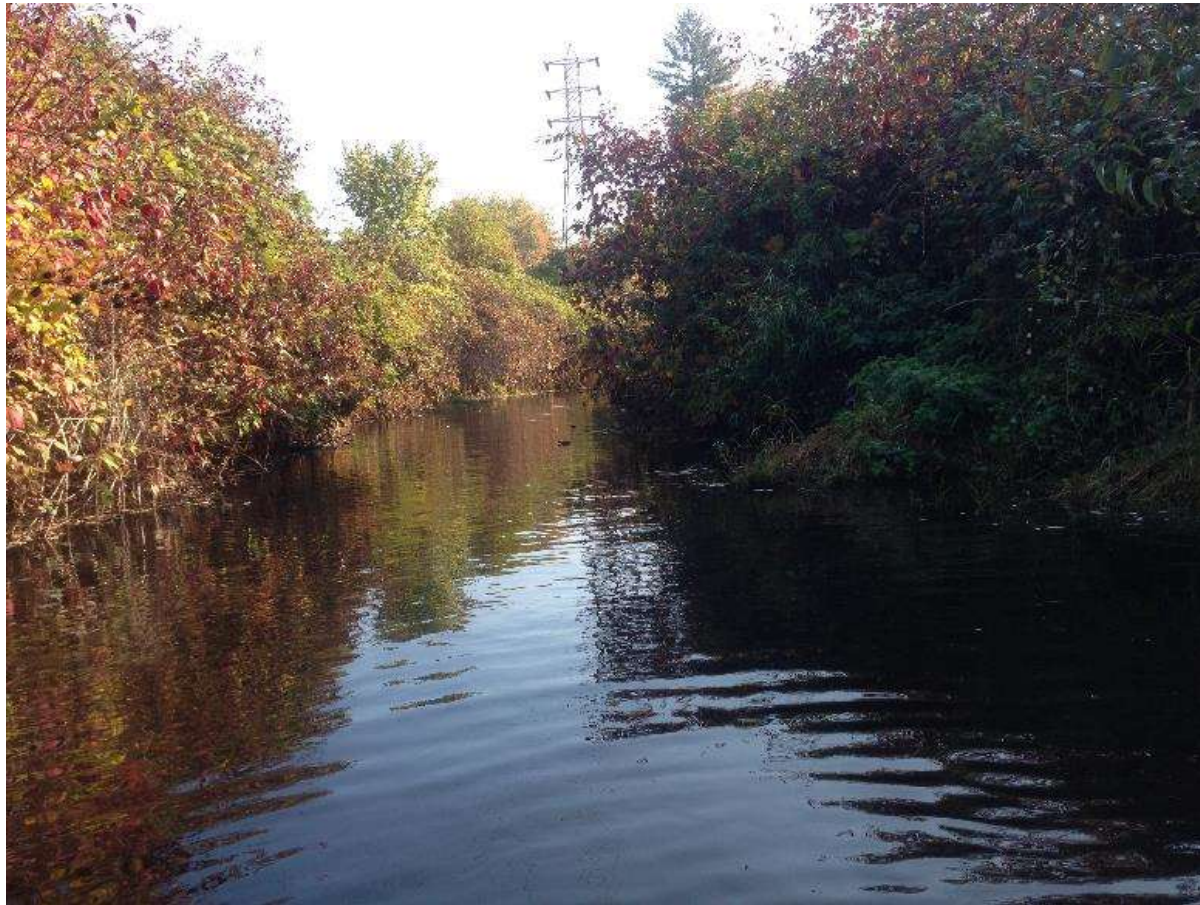


Factors

- Upstream temperature
- Shade
- Surface area
- Depth
- Connection to groundwater
- Age of pond

Studies – Stream Complexity

- Low complexity in many of Gresham's streams



Studies – Stream Complexity

New rock bar



Studies – Stream Complexity

New grass bar



Studies – Stream Complexity

Sediment-free gravel
and cobble



Studies – Stream Complexity



New side channel

Studies – Stream Complexity



New deep pool



Fish were concentrated in these pools and the beaver ponds

More Diverse Macroinvertebrate Communities?

Field duplicate immediately downstream of beaver dams (B-IBI = 30) had more diversity, fewer snails, and more mayflies and caddisflies than duplicate further away from dams (B-IBI = 28)

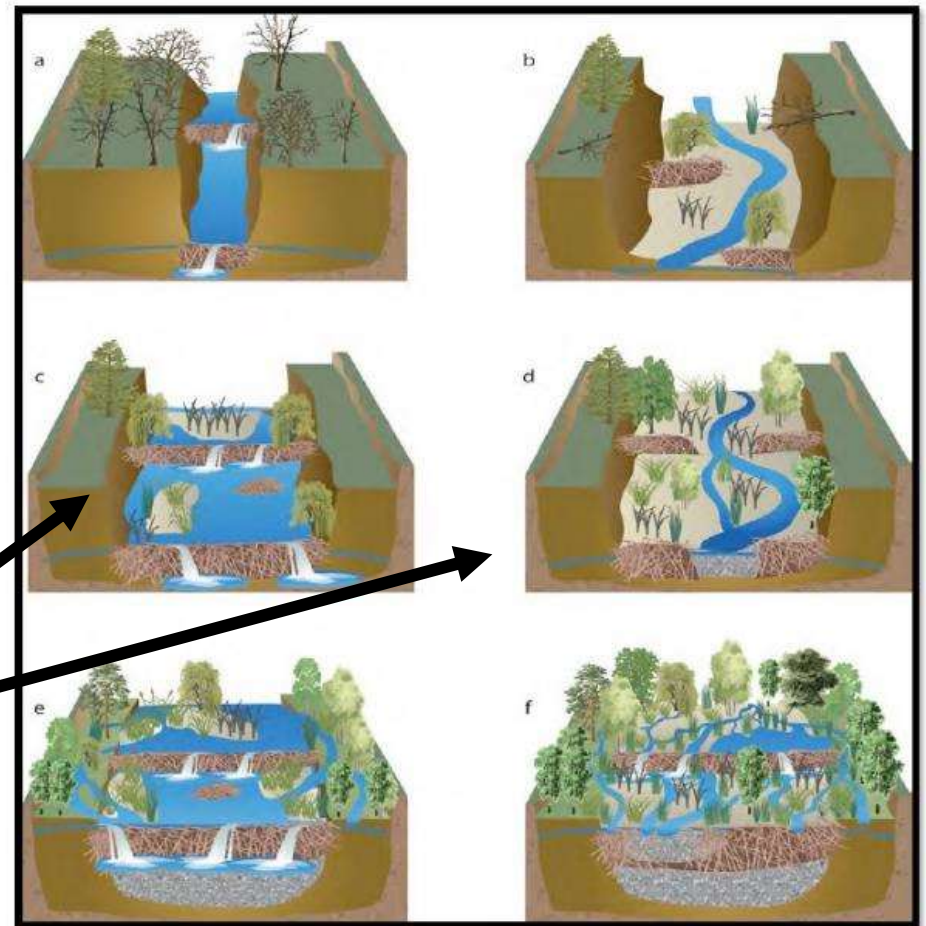
Couldn't do follow-up study because all riffles had dams!



Studies – Stream Complexity

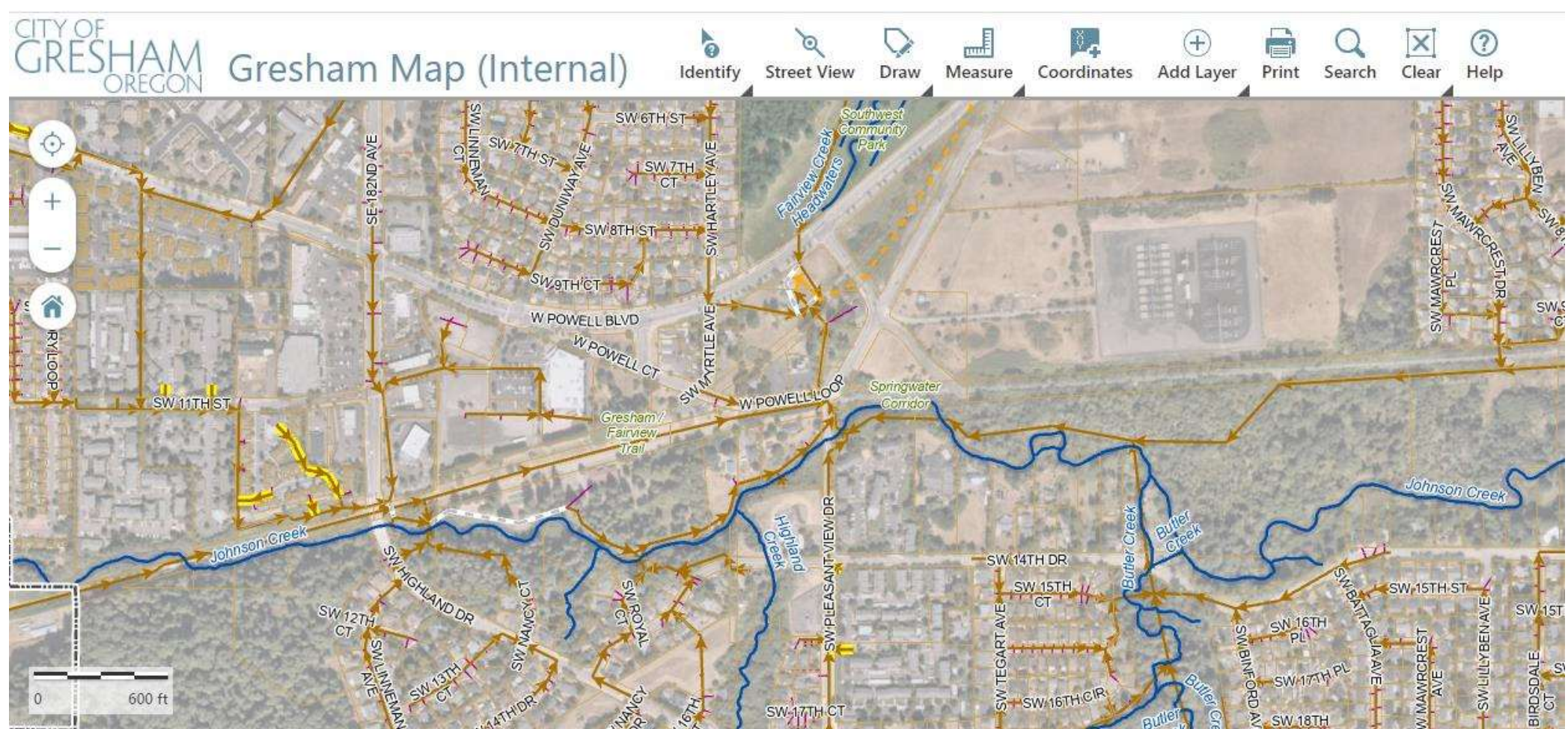
- In first few years seeing:

- pools
- unembedded substrate
- bars
- side channels



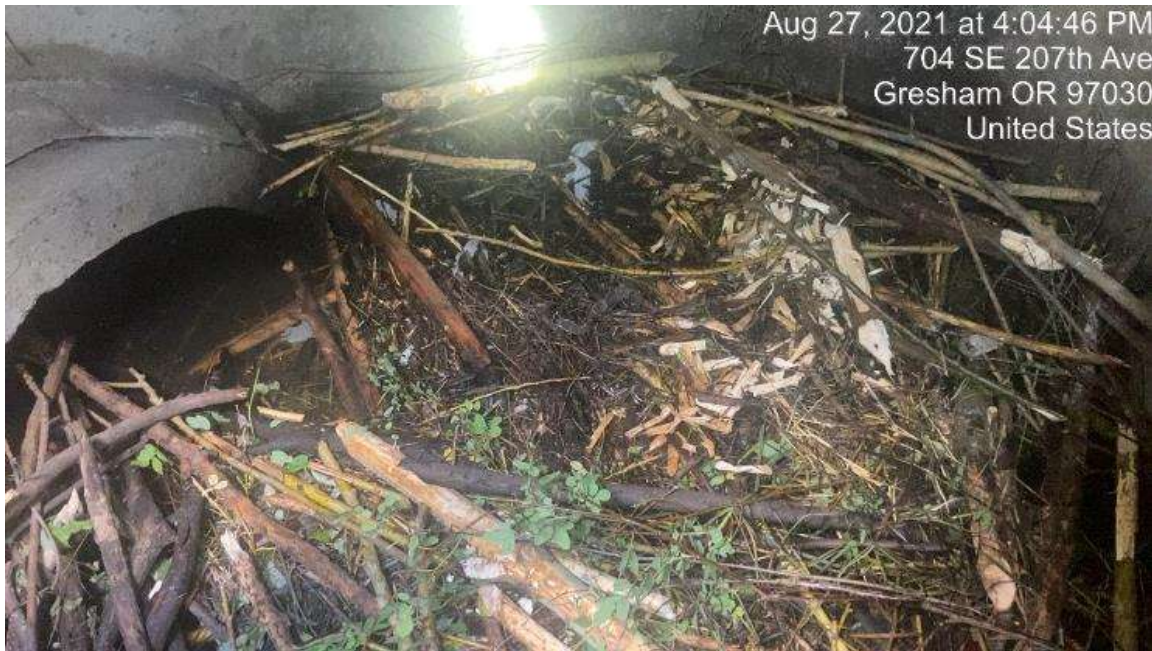
Already starting to see some of this!

Conflicts – City was built when beavers were absent



Conflicts – Living in infrastructure

Photo credits: Gresham Stormwater Operations

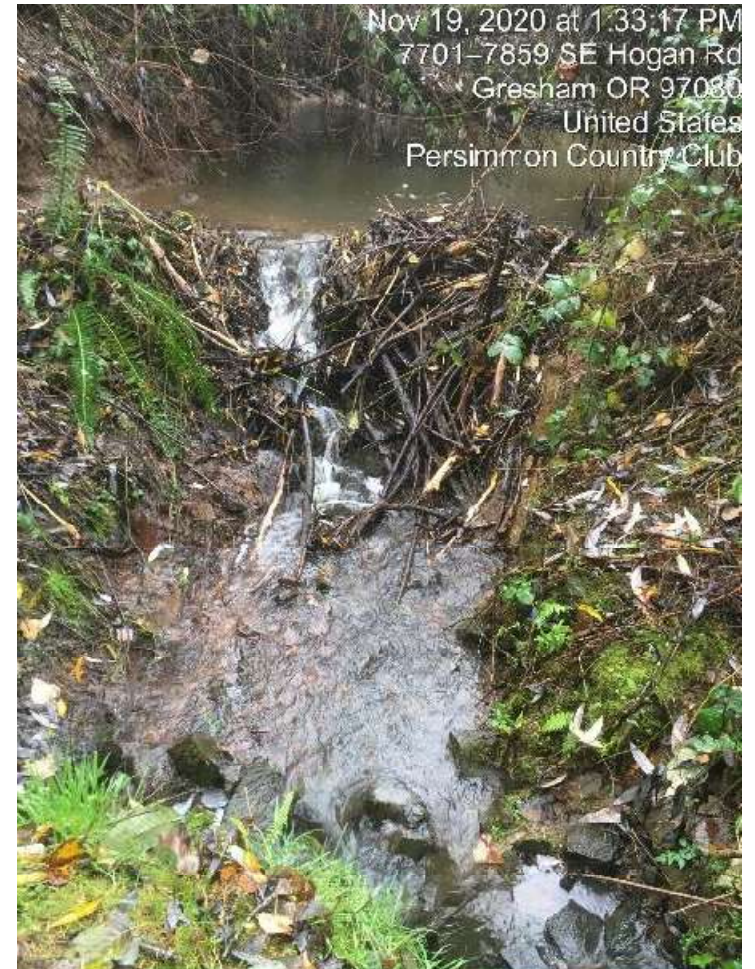


Conflicts – Change flow and block culverts

Photo credits: Gresham Stormwater Operations



What do we do now, Katie?!



Bring in the Professionals!

- Jakob Shockey from Project Beaver



Photo from BeaverStateWildlife.com

Coexistence – Culvert protectors and pond levelers

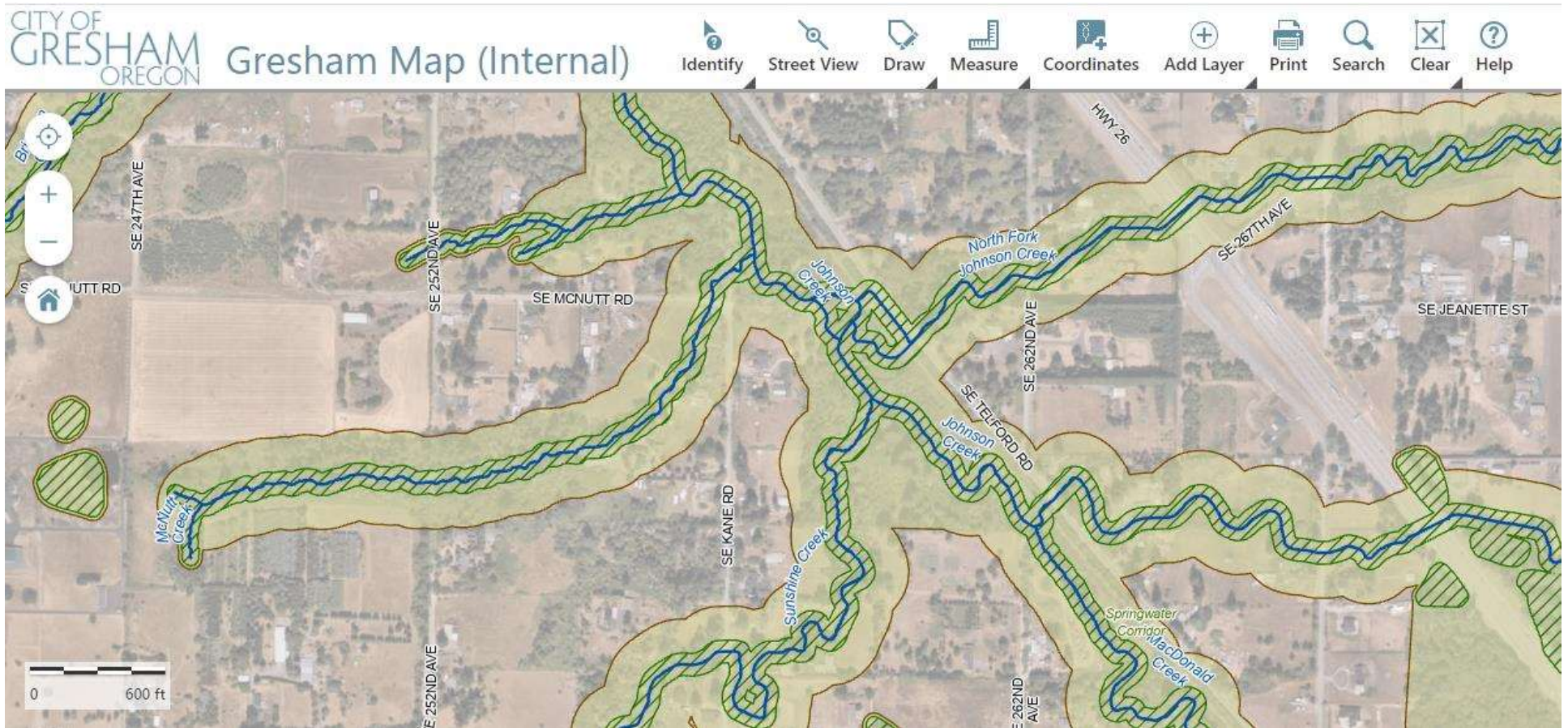


“These things are worth their weight in gold.”

*-Brian Raney
Senior Public Utility Worker
Gresham Stormwater Operations*

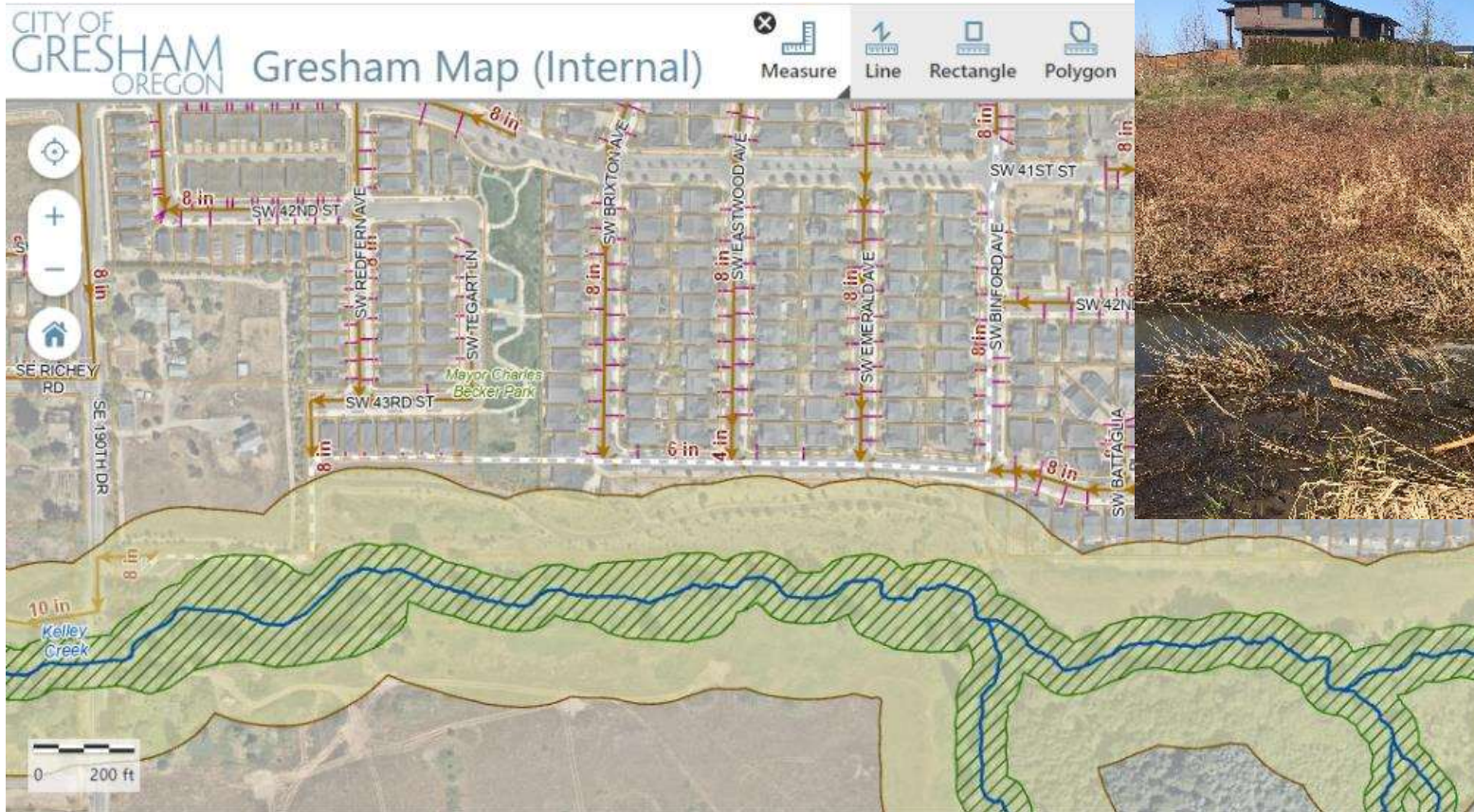


Coexistence - Buffers



New buffers generally 200' from stream centerline

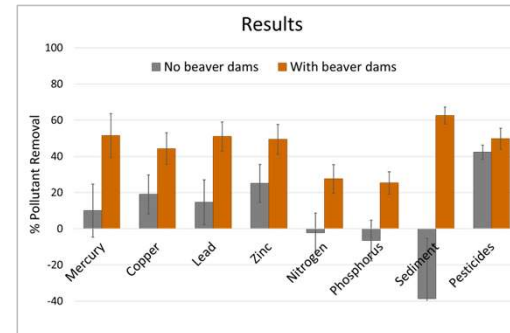
Coexistence – Buffers



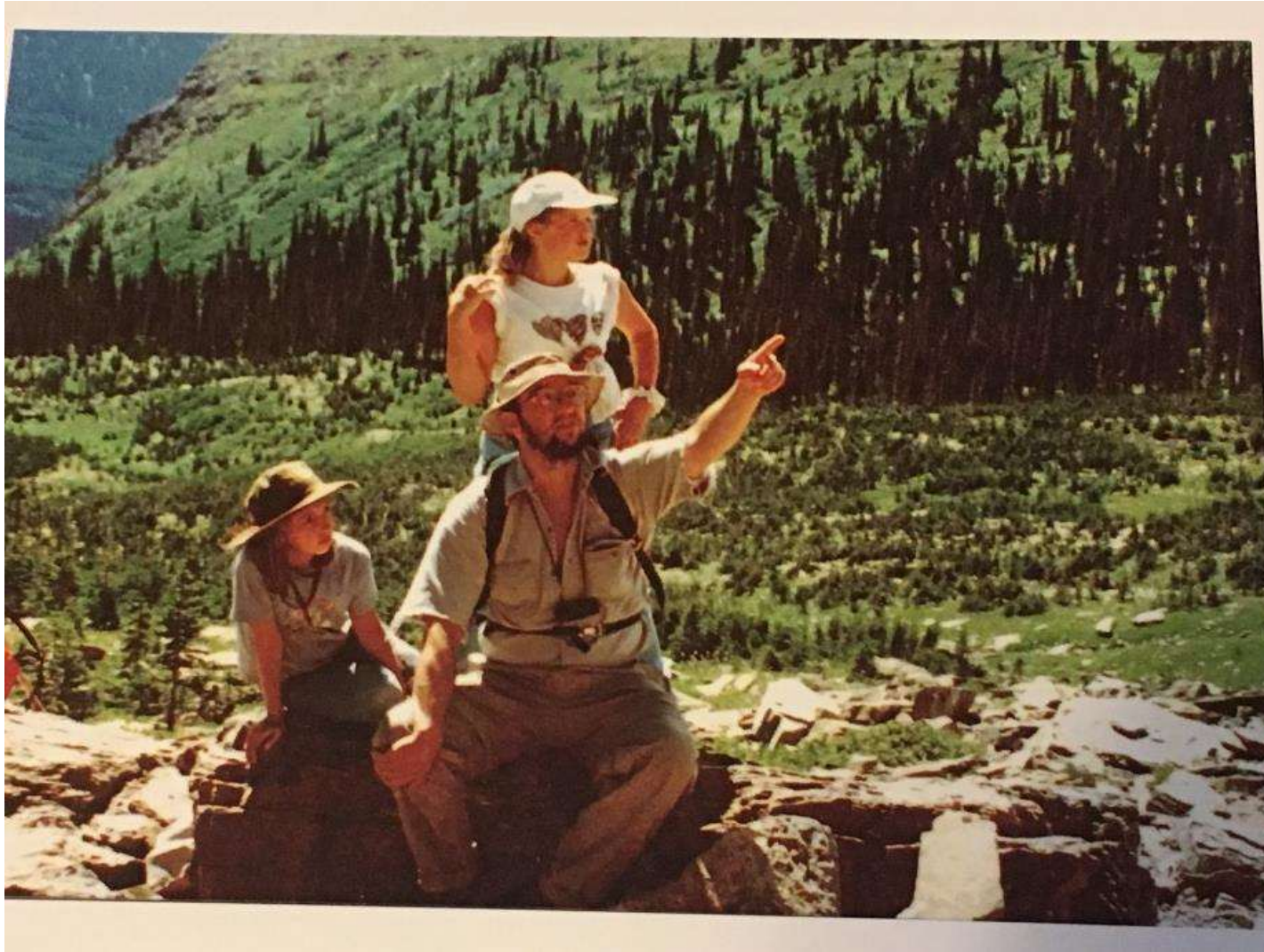
New development has room for beaver wetlands to form in streams

How to win over...

- Municipal managers
 - Local data
 - Realism
- Engineers
 - Give options
 - Understand limitations
- Operations and maintenance workers
 - Reduce their work
 - Give them control
- Urban public
 - Perspective that they are 'good'
 - Reality that they'll come back
 - Cute videos



***None of these people
read the literature...***



*Everyone benefits from
an environmental ethic,
even fashion designers*

Conclusions

- Urban beaver populations are increasing
- Beaver dams can:
 - Help clean stormwater
 - Maintain stream temperatures
 - Create complexity quickly
- Beaver activity can create conflicts with infrastructure
- Coexistence structures and buffers help a lot
- Most people are reasonable and can be won over if you understand their true motivations



Questions?

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Photo by Gresham resident Caz Zyvatkauskas