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

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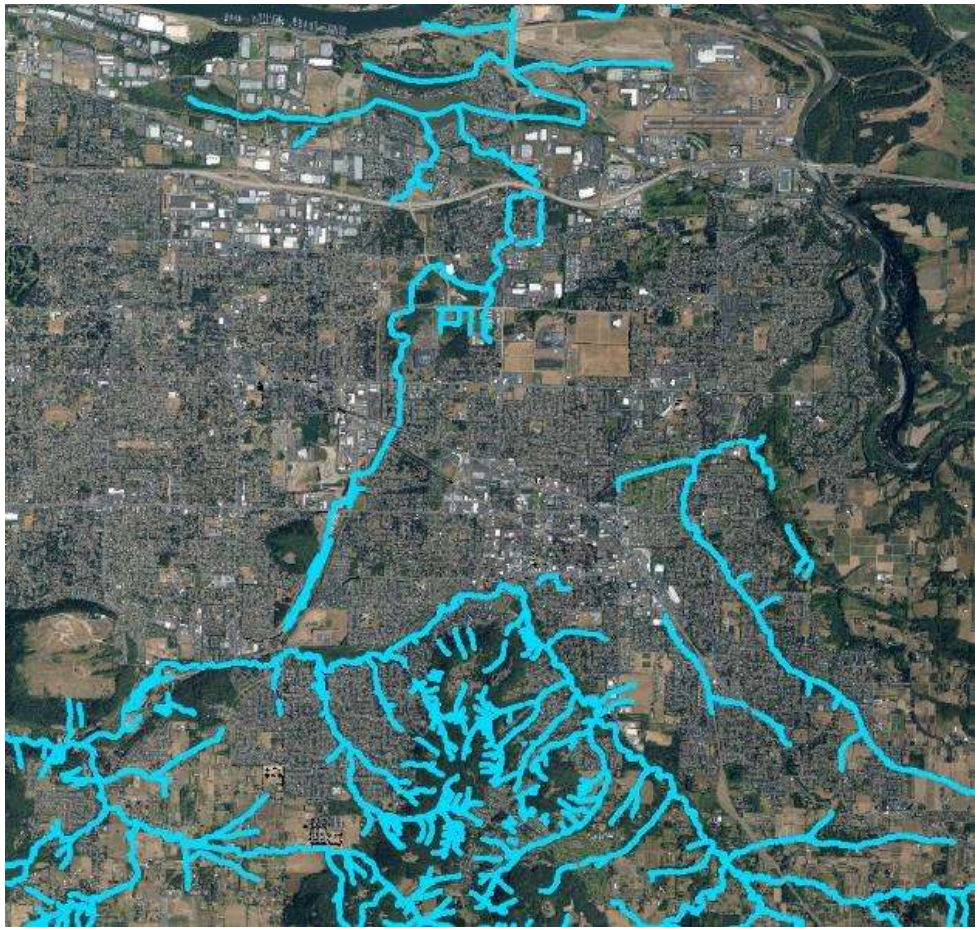
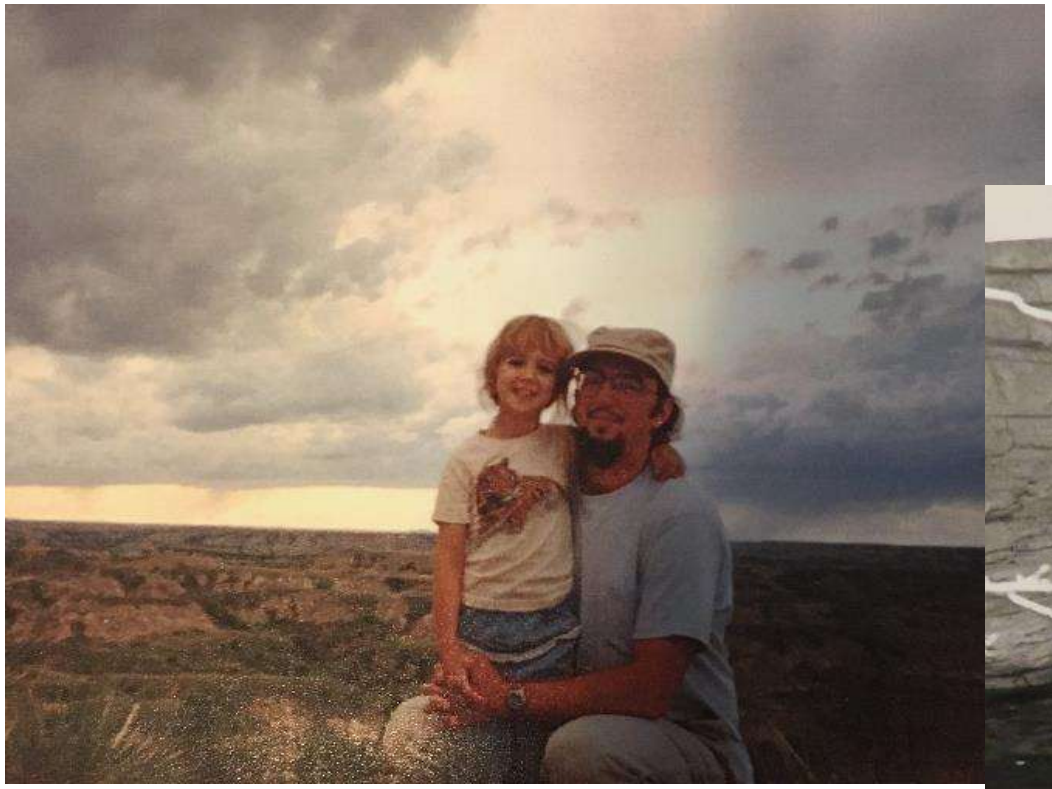
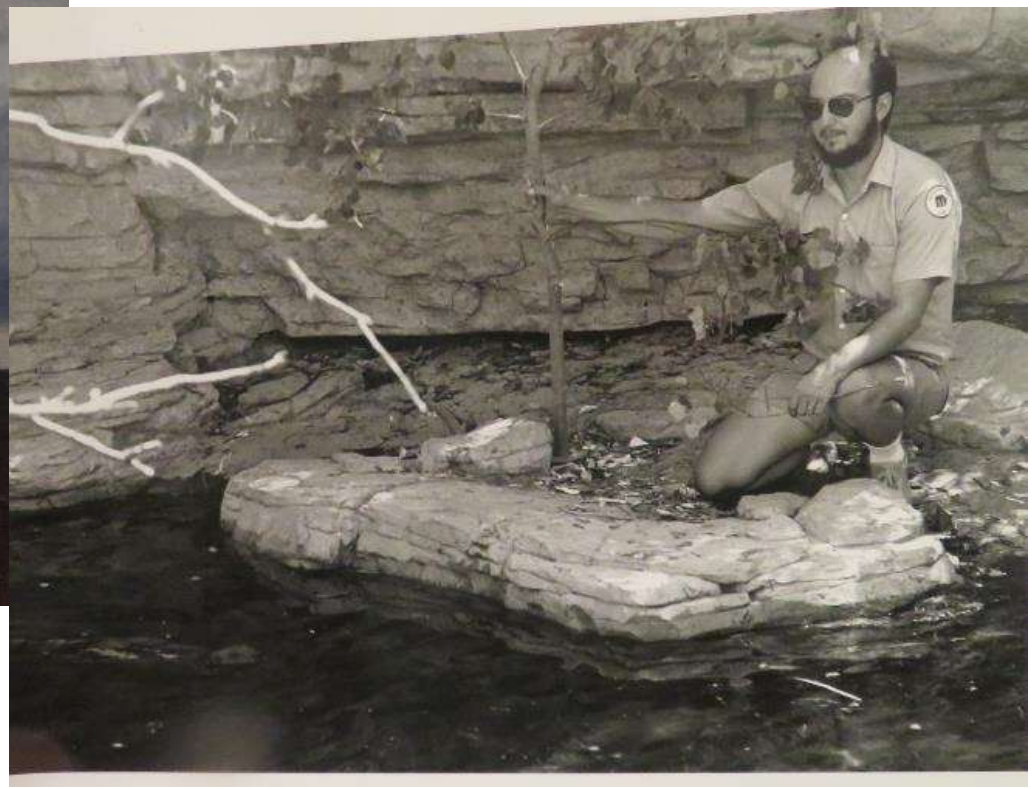
Overview

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



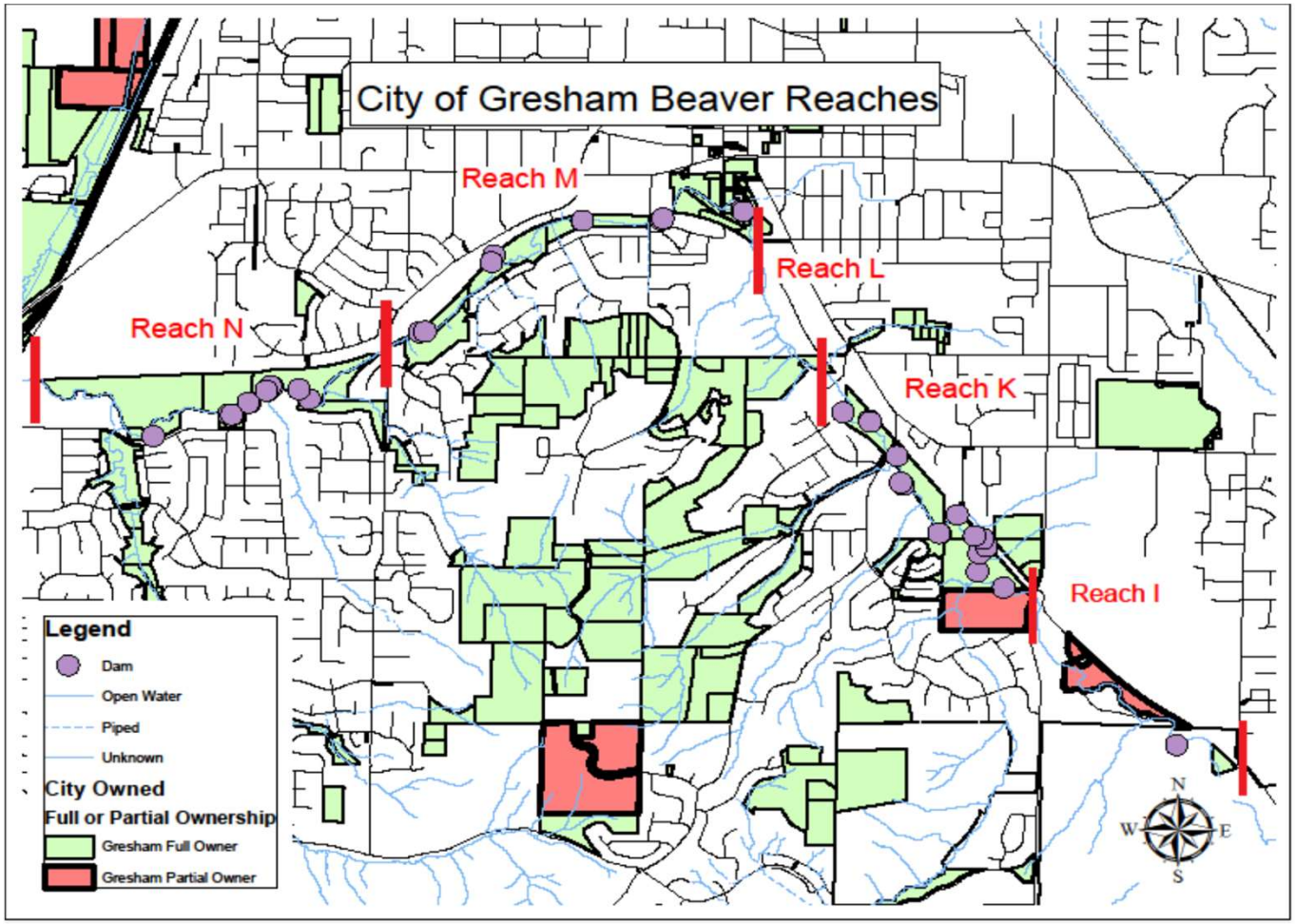
Grew up with an appreciation for beavers





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

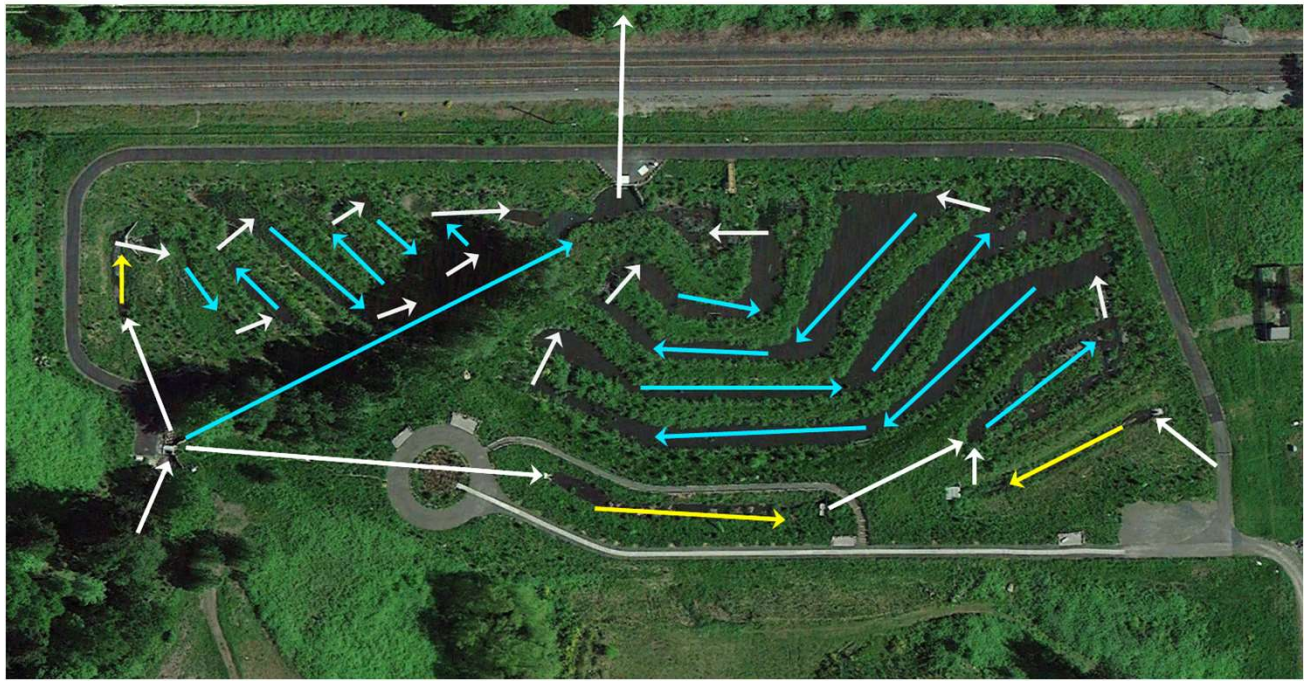
https://www.youtube.com/watch?v=czaO0pCsTq8

Life at a Beaver Dam in Gresham, Oregon

Photos by Gresham resident Caz Zyvatkauskas

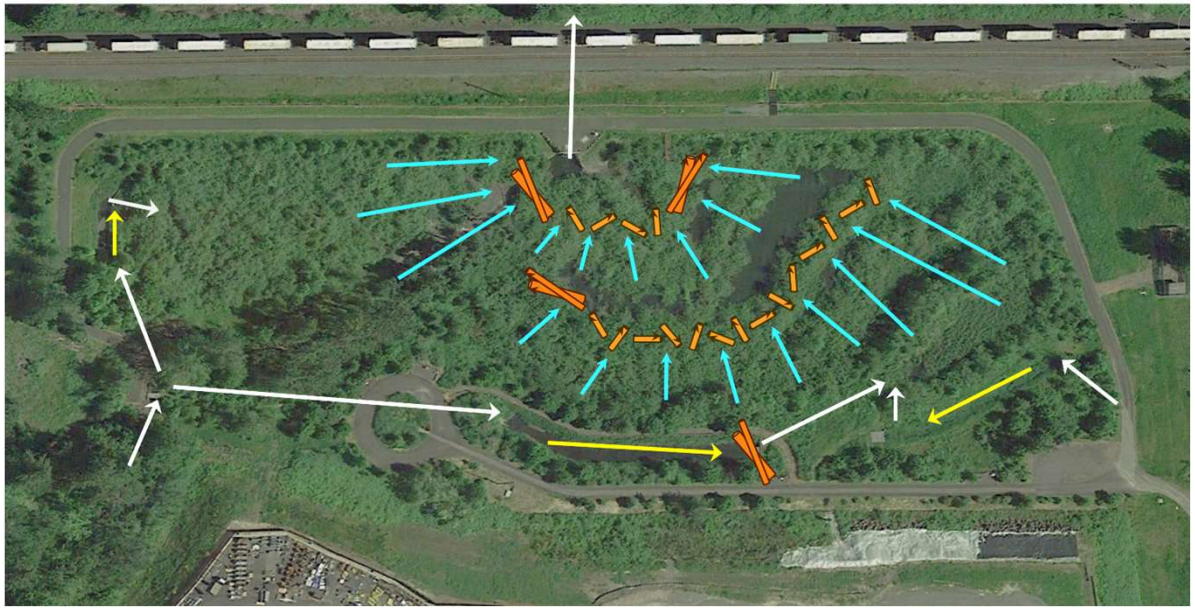
Studies – Stormwater

- Large constructed wetland
- Carefully designed flow path



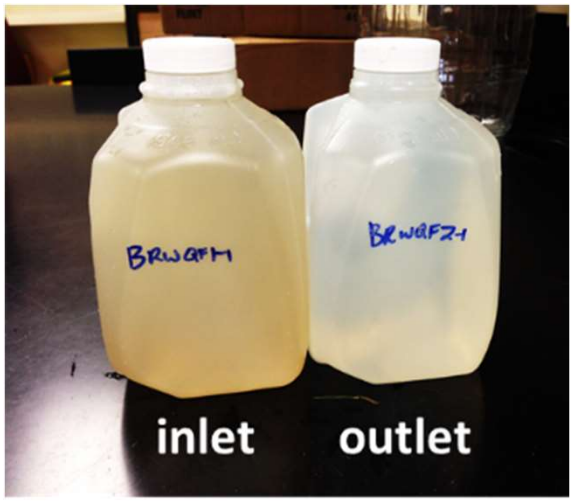
Studies – Stormwater

- Beavers changed flow path
- What to do?!



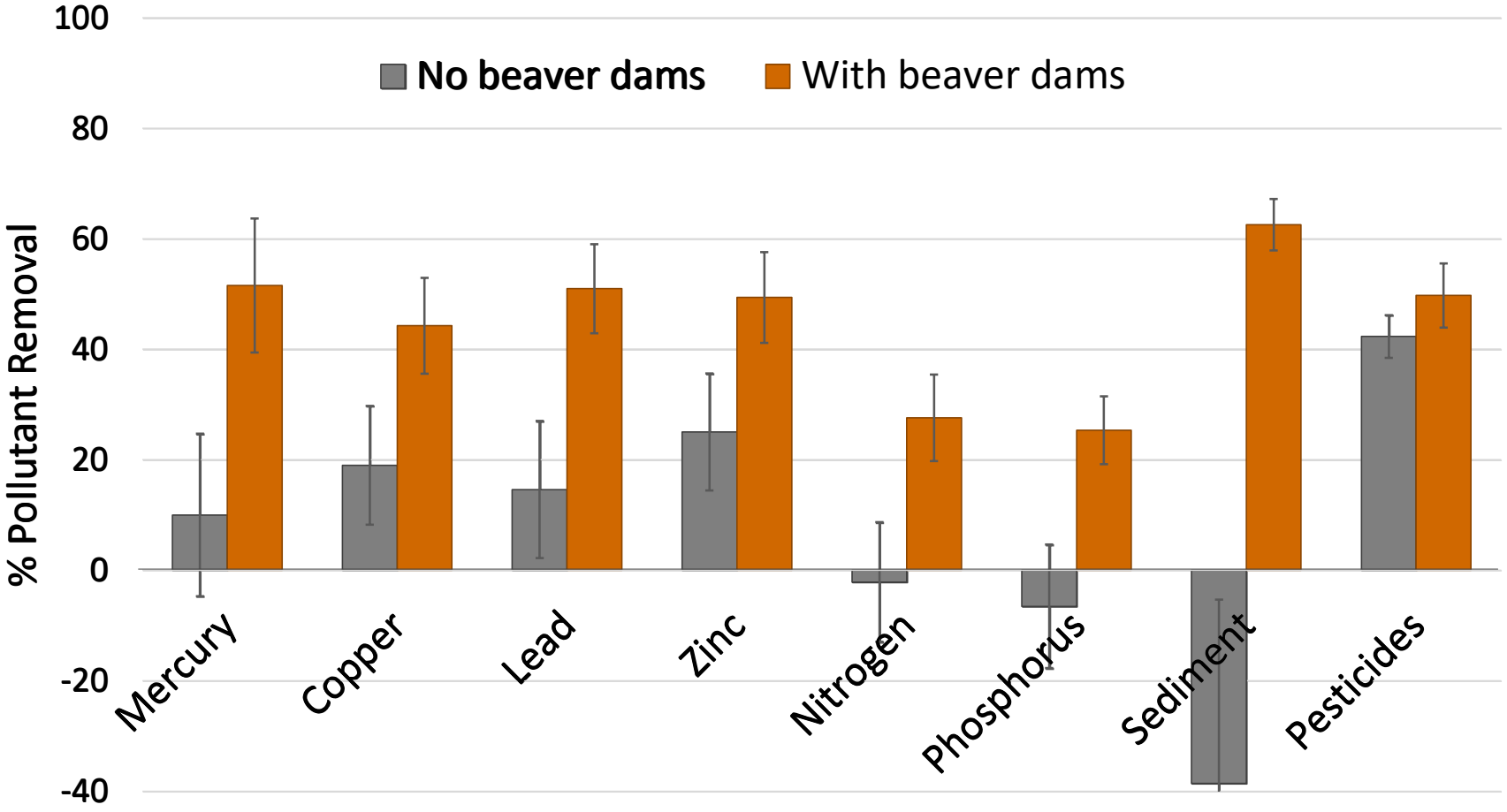
Methods

- 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


100
80
60
40
20
0
-20
-40
% Pollutant Removal
No beaver dams
With beaver dams
Mercury
Copper
Lead
Zinc
Nitrogen
Phosphorus
Sediment
Pesticides

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

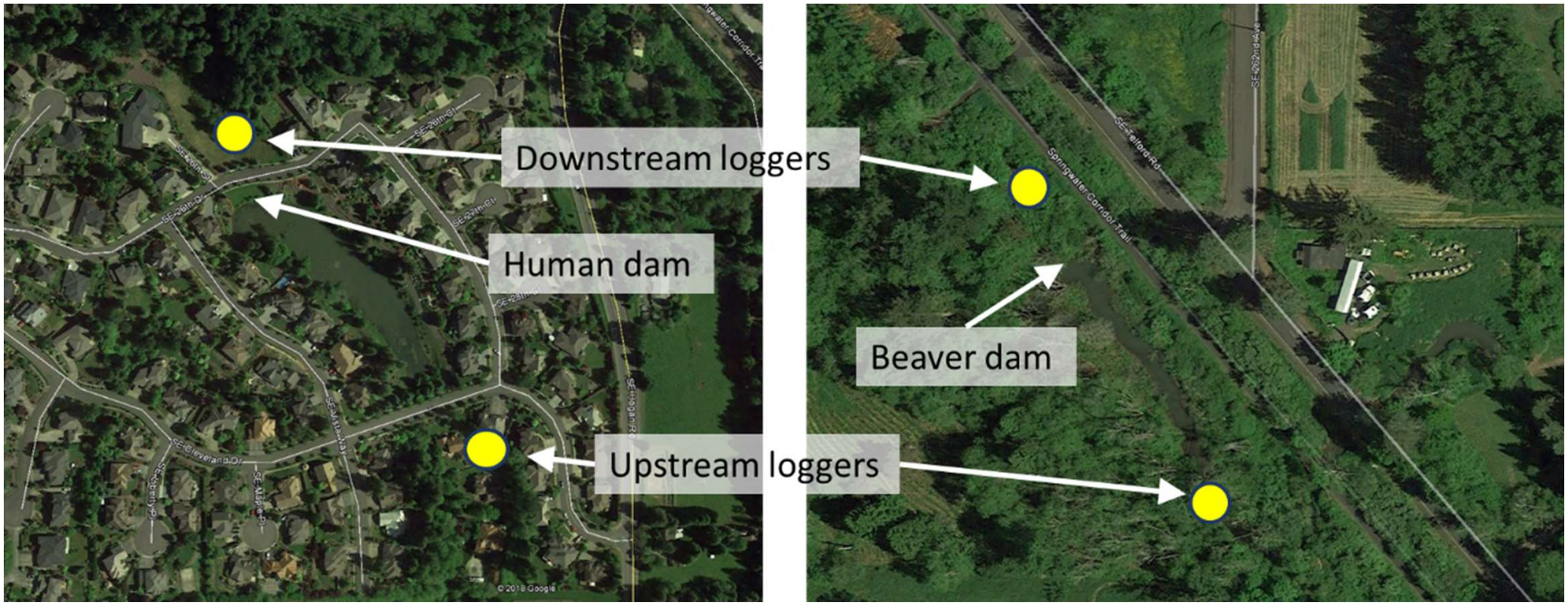
Heat as a Major Pollutant in Johnson Creek

- Major causes
  - Lack of shade
  - Dam/ponds

Studies – Stream Temperature

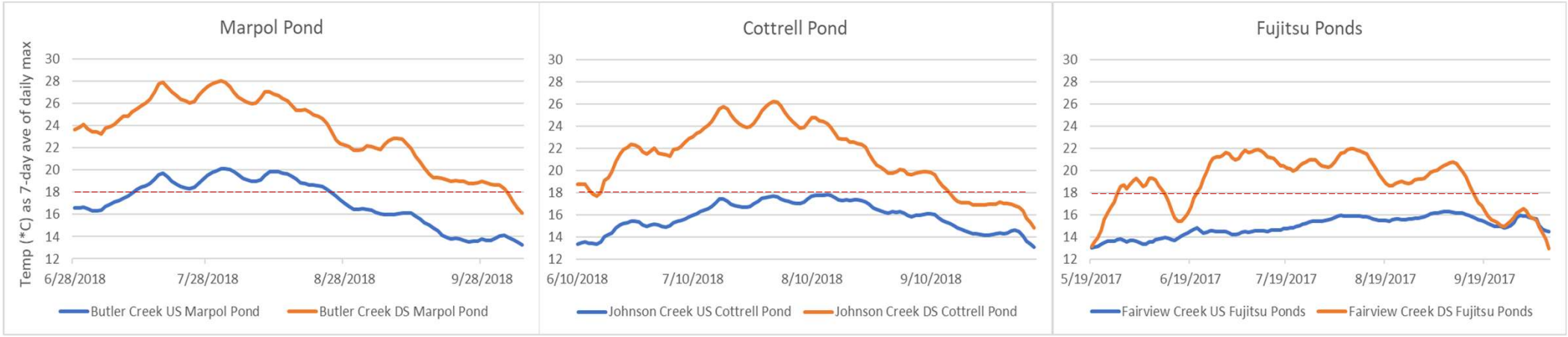
- Two summers of hourly data
  - 14 human dams
  - 8 beaver dams

Logger placement

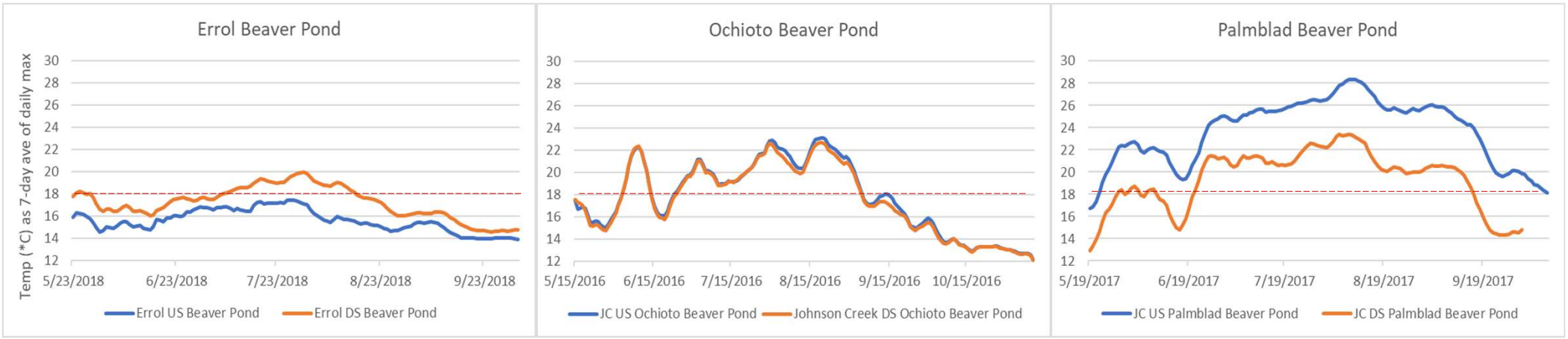


Stream Temperature Study Results – Representative Ponds

Human ponds

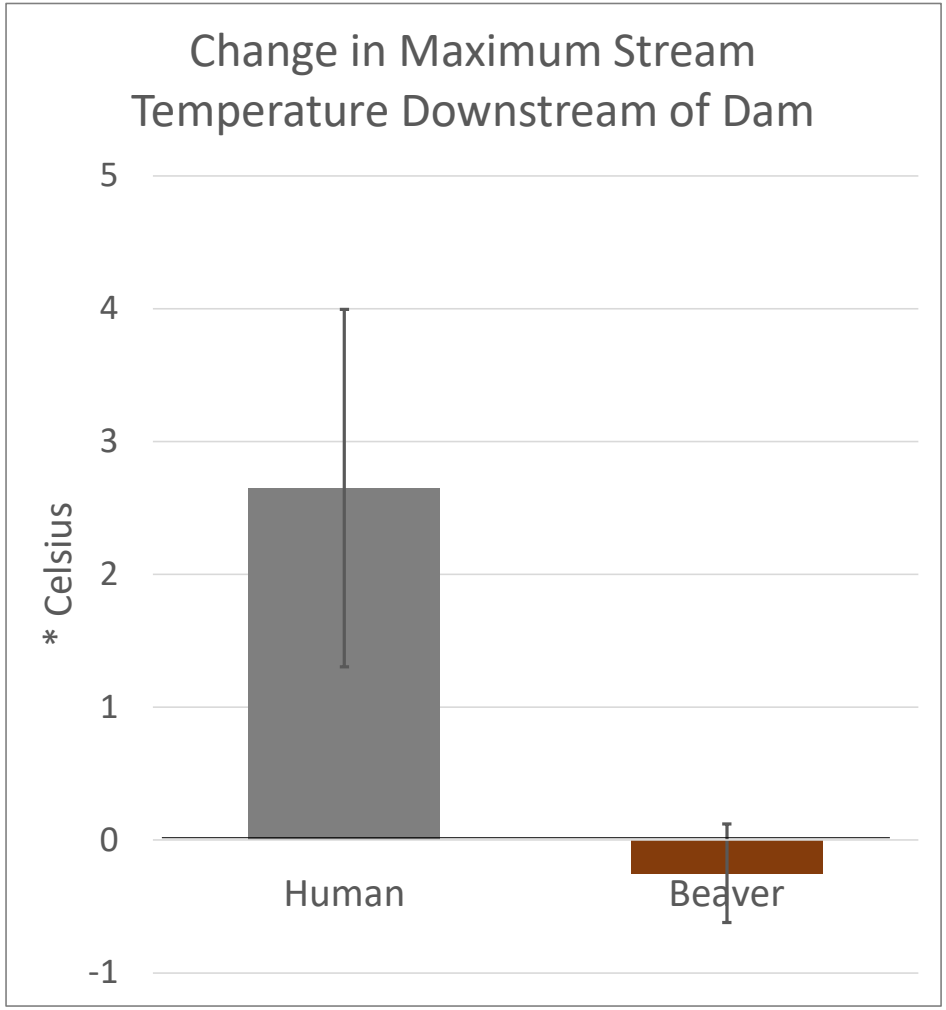


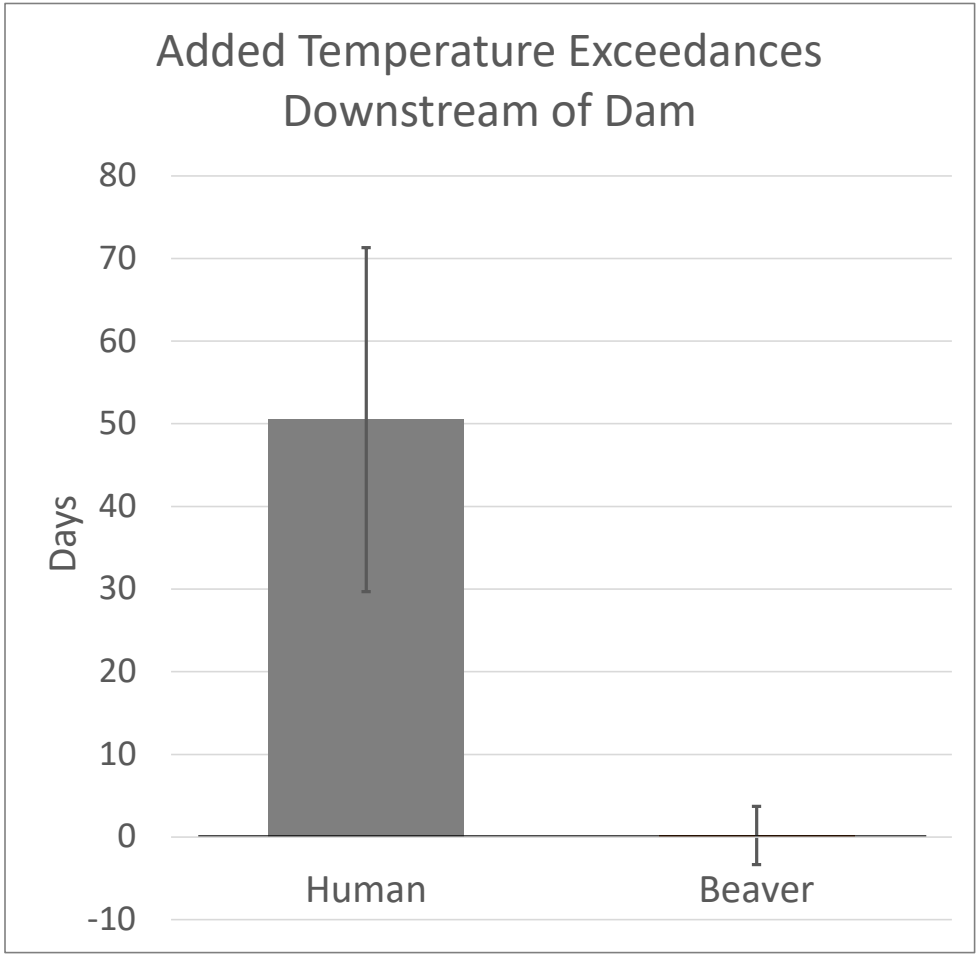
Beaver ponds



Instream water quality standard for salmonid rearing and migration

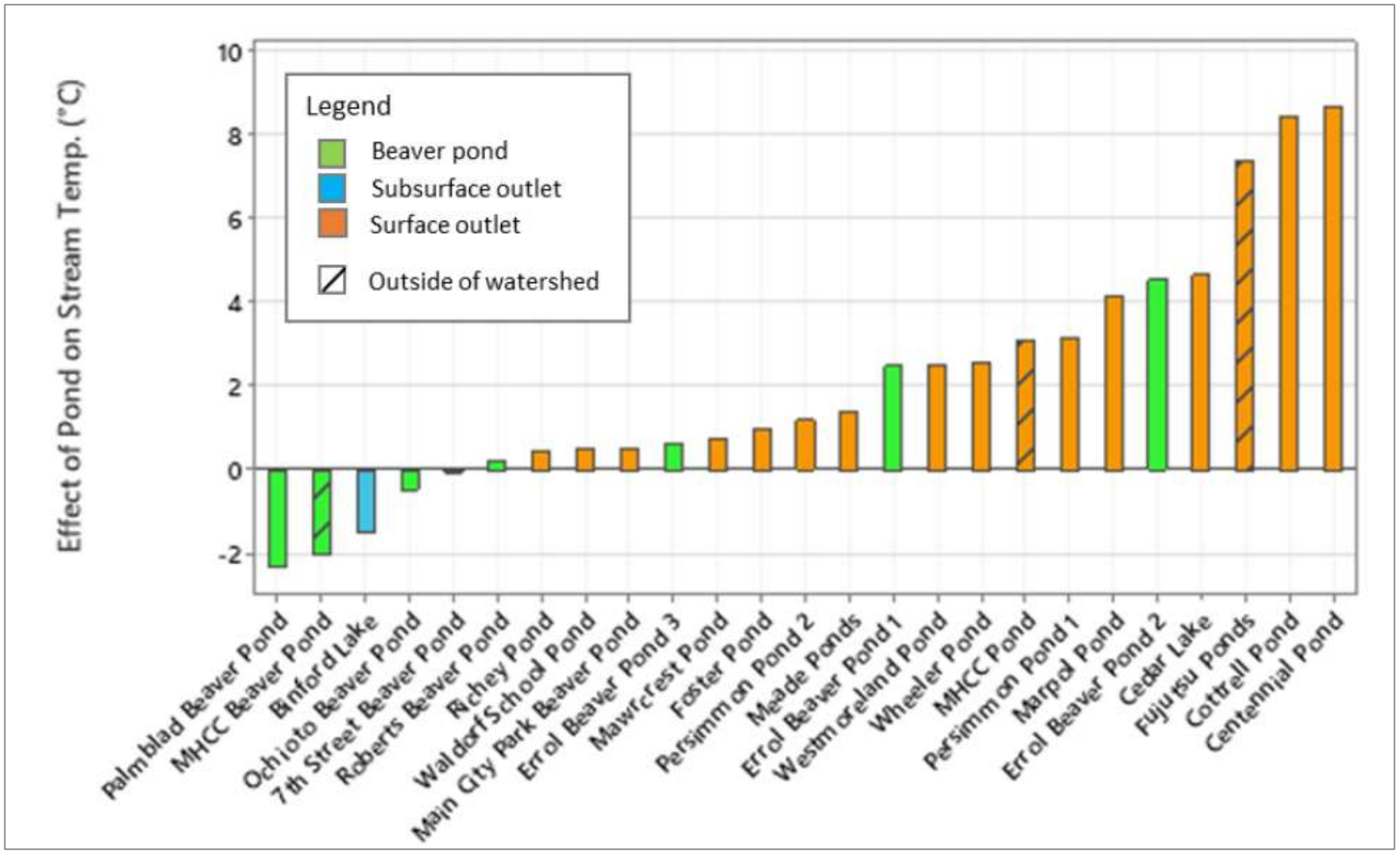
Stream Temperature Study Results – All ponds





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

Stream Temperature Study results – All ponds



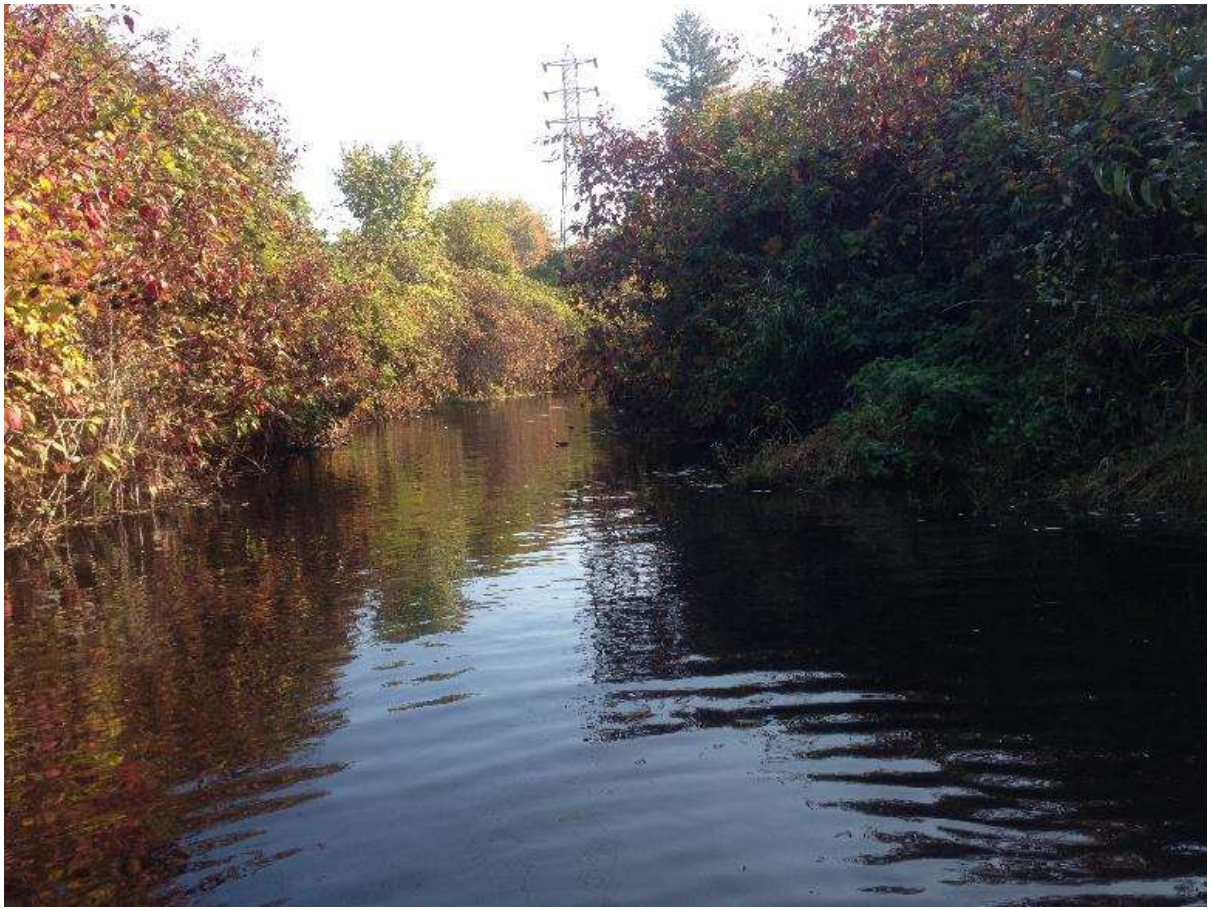
Factors

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

Tech memo: https://www.jcwc.org/wp-content/uploads/2020/08/Effects-of-Inline-Ponds-on-Stream-Temperatures-in-the-Johnson-Creek-Watershed.pdf

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

Fish were concentrated in these pools and the beaver ponds

New deep pool

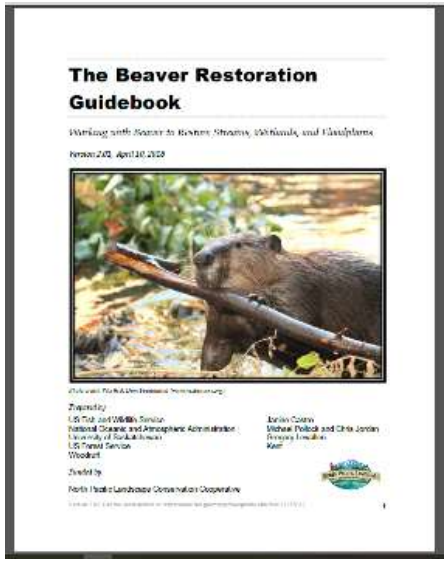
More Diverse Macroinvertebrate Communities?

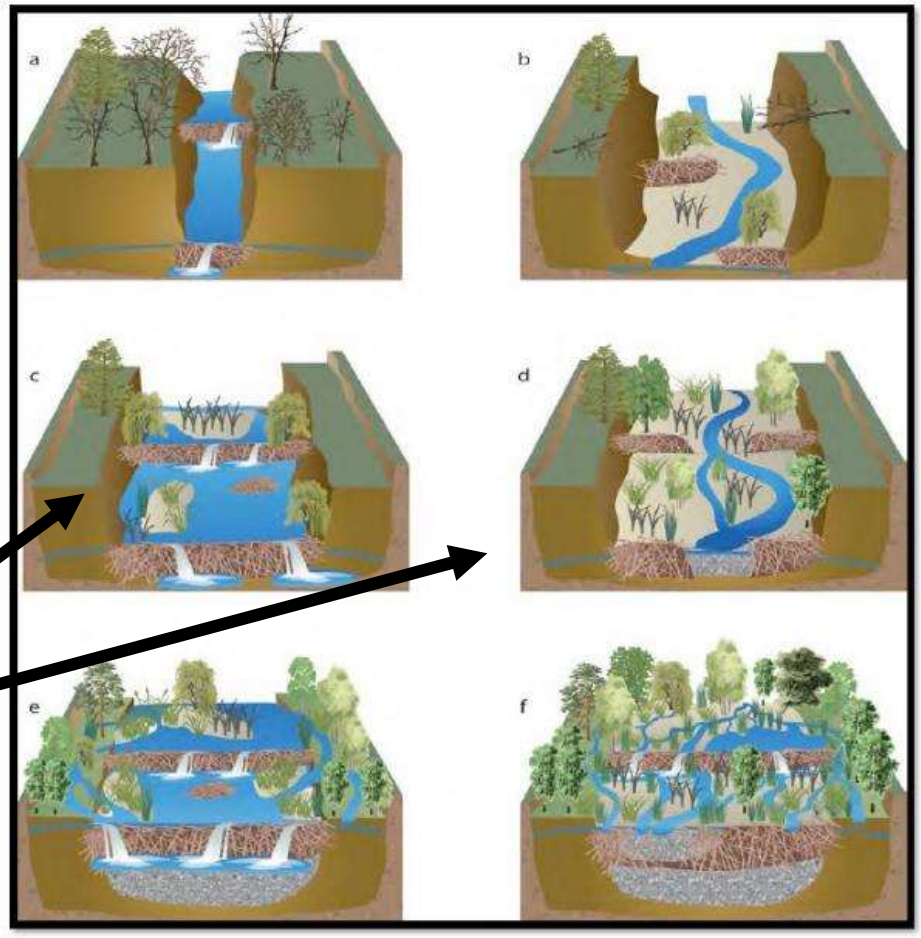
Field duplicate immediately downstream of beaver dams (B-IBI = 30) had more diversity, fewer snails, and more mayflies and caddisflies than duplicate further away from dams (B-IBI = 28)

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!

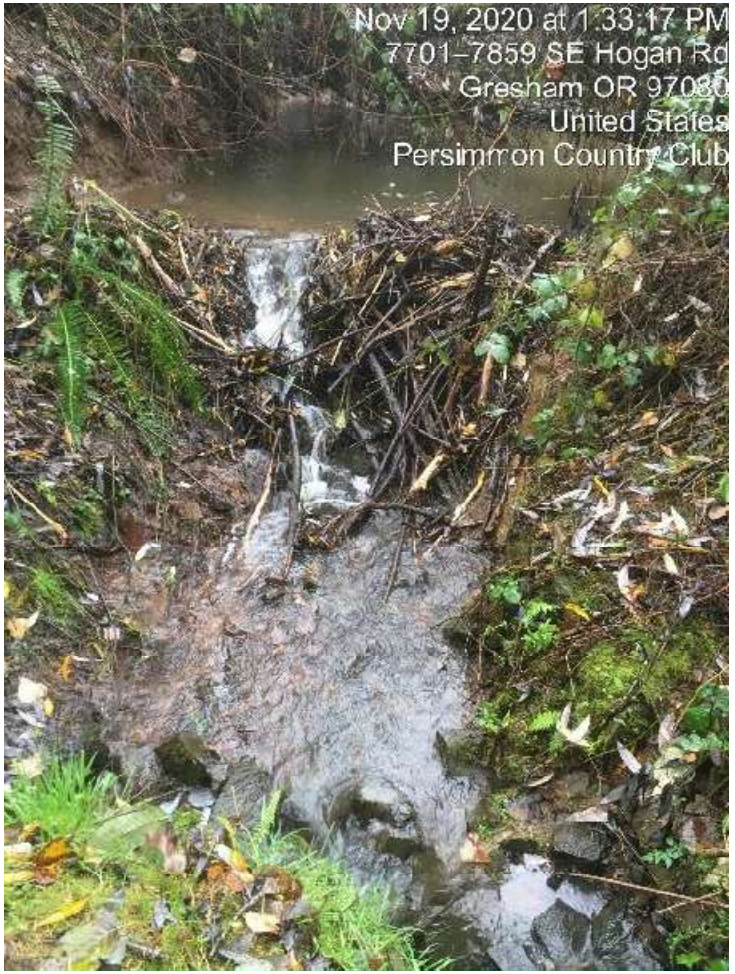
Conflicts – City was built when beavers were absent

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

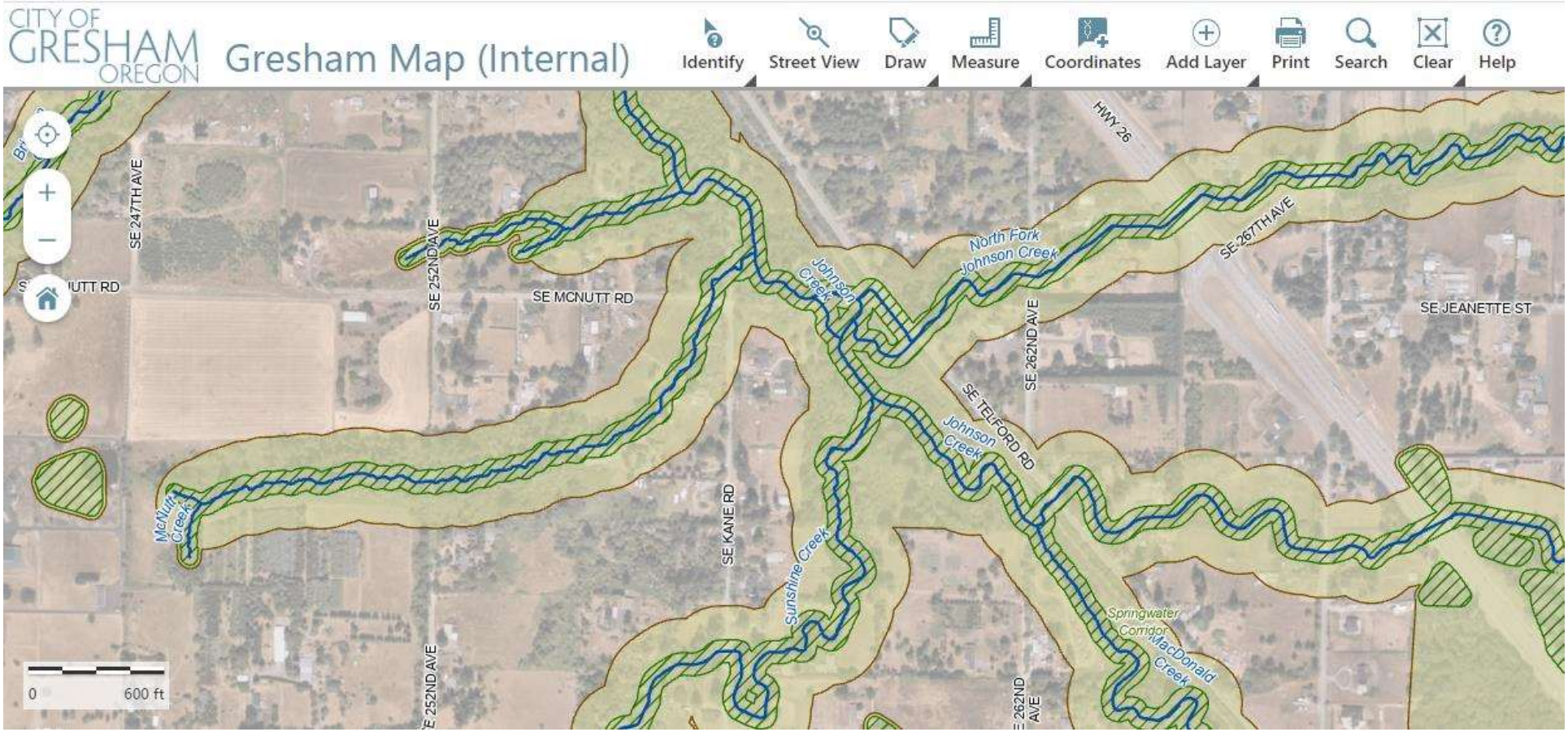
Photo from BeaverStateWildlife.com

Coexistence – Culvert protectors and pond levelers

"These things are worth their weight in gold."

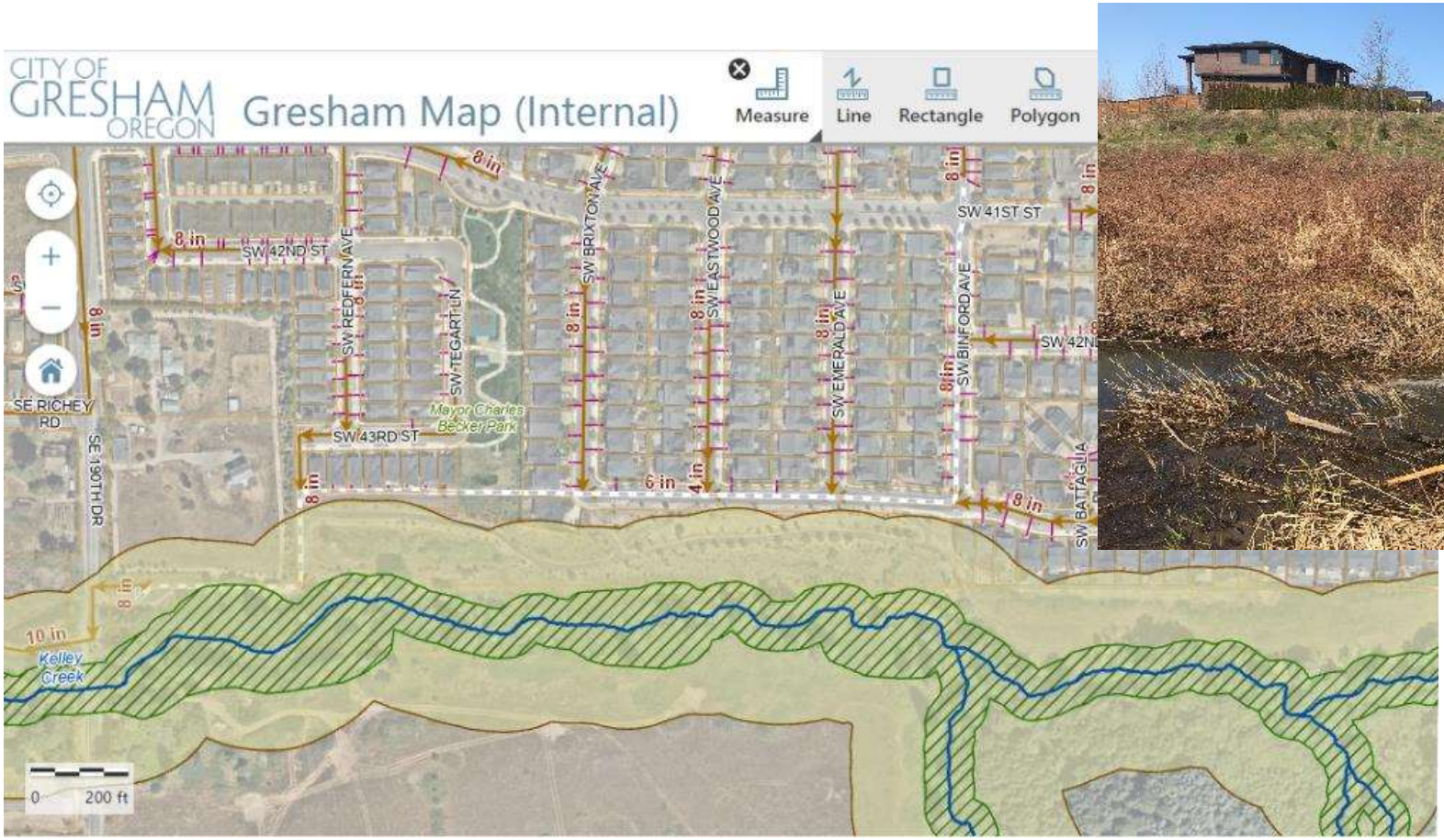
-Brian Raney
Senior Public Utility Worker
Gresham Stormwater Operations

Coexistence - Buffers



New buffers generally 200’ from stream centerline

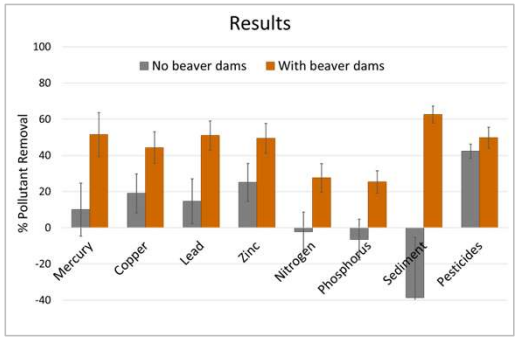
Coexistence – Buffers



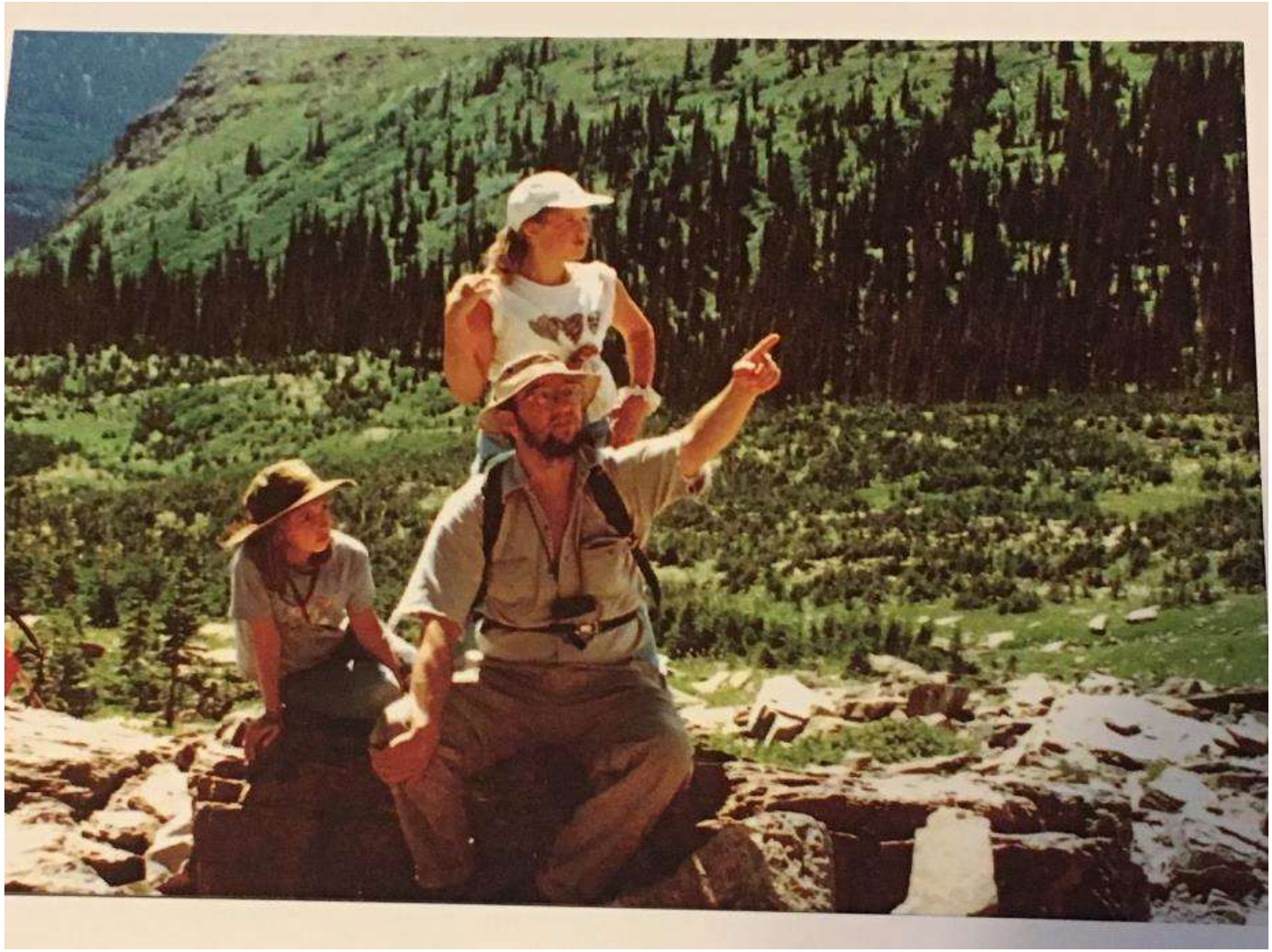
New development has room for beaver wetlands to form in streams

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