

Beavers are Cleaning Stormwater, Cooling Streams, and Increasing Complexity in Gresham



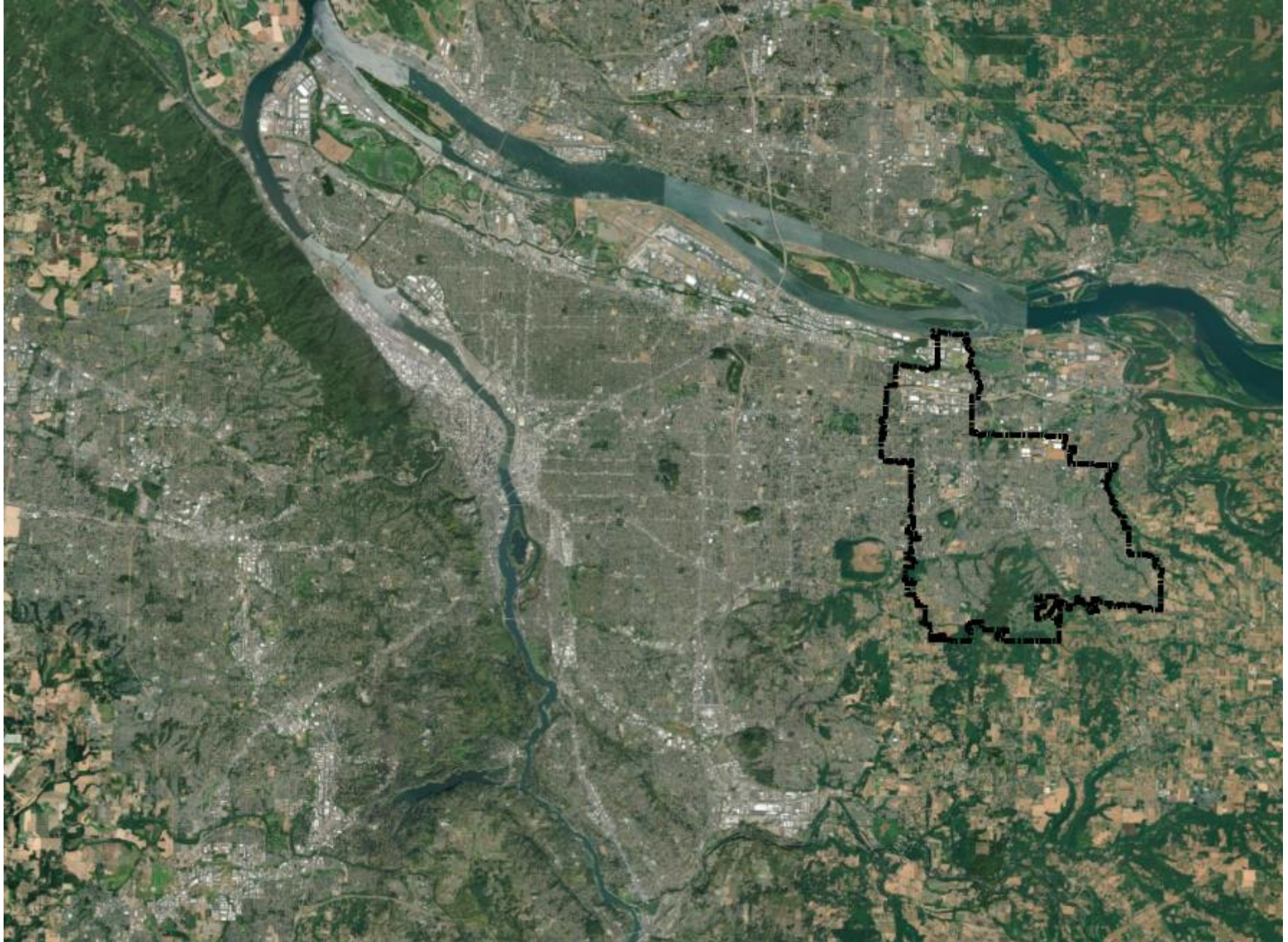
Katie Holzer
Watershed Scientist
City of Gresham, Oregon

Overview

- 1) Stormwater facility study
- 2) Stream temperature study
- 3) Stream complexity observations

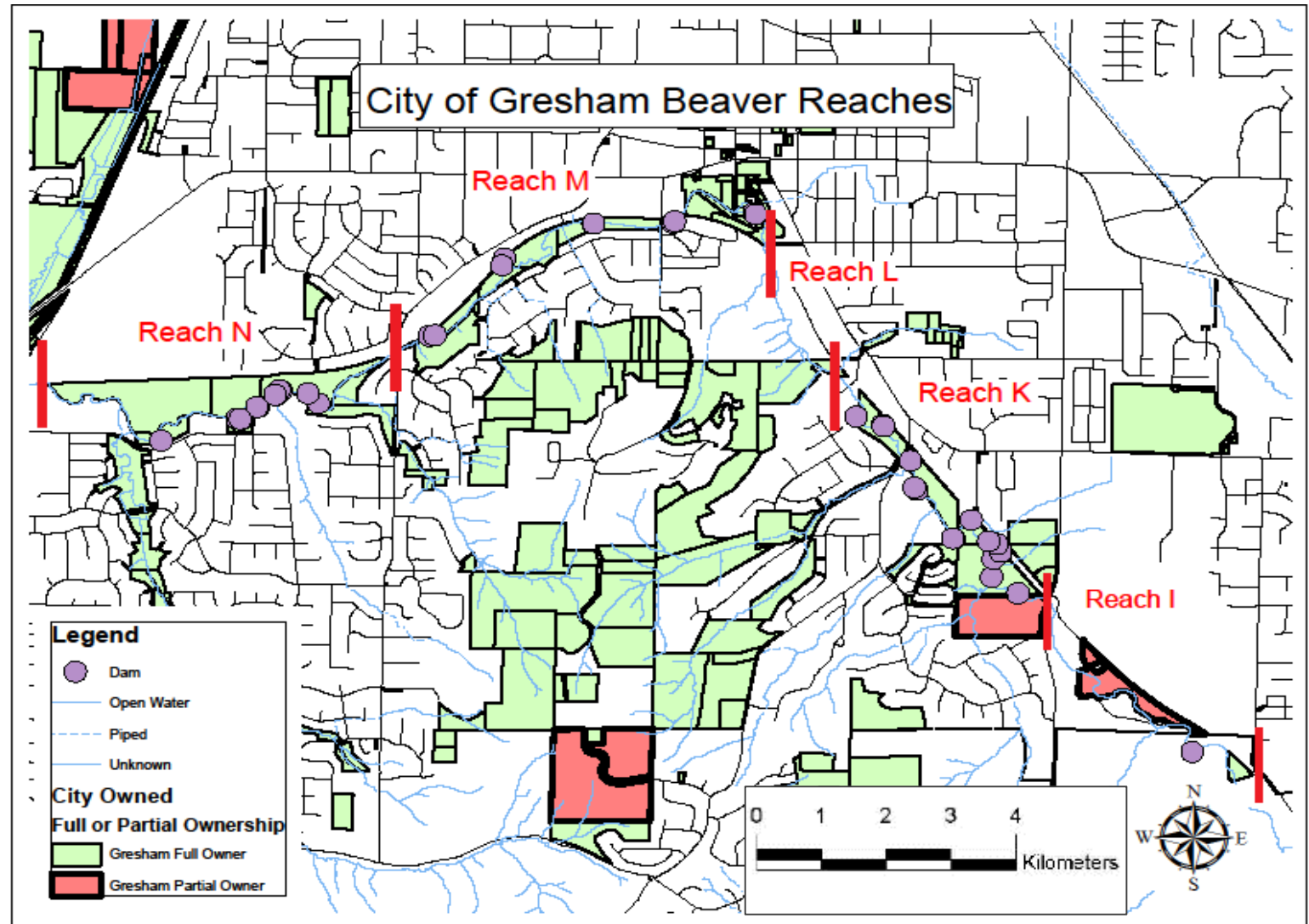


Gresham



Dozens of Beaver Dams in Gresham Streams

- Seem to be increasing drastically in past 10 years
- Most strongly associated with public land



Variety of Dams



1) Stormwater Facility Study

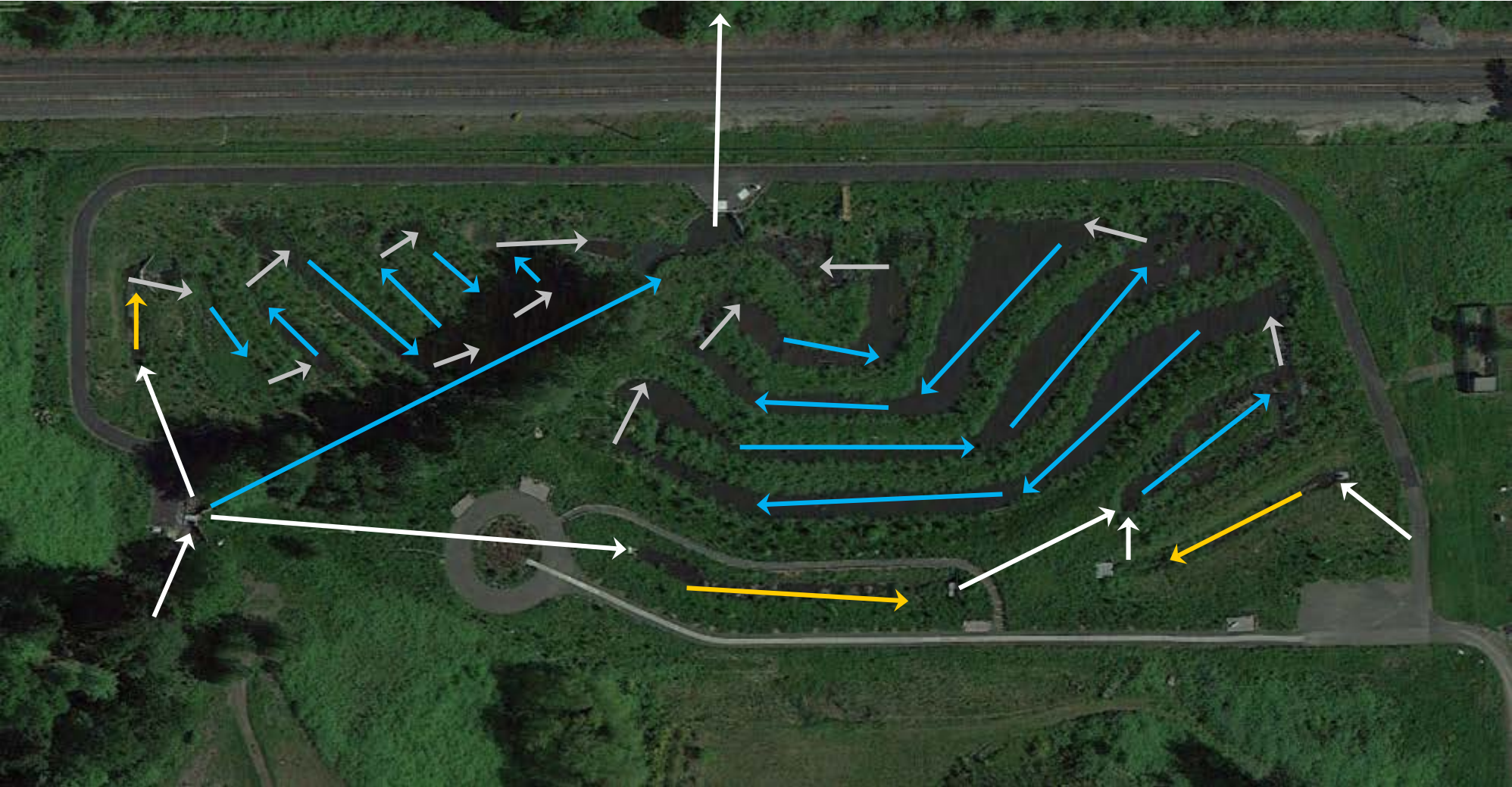


Columbia Slough Regional Water Quality Facility

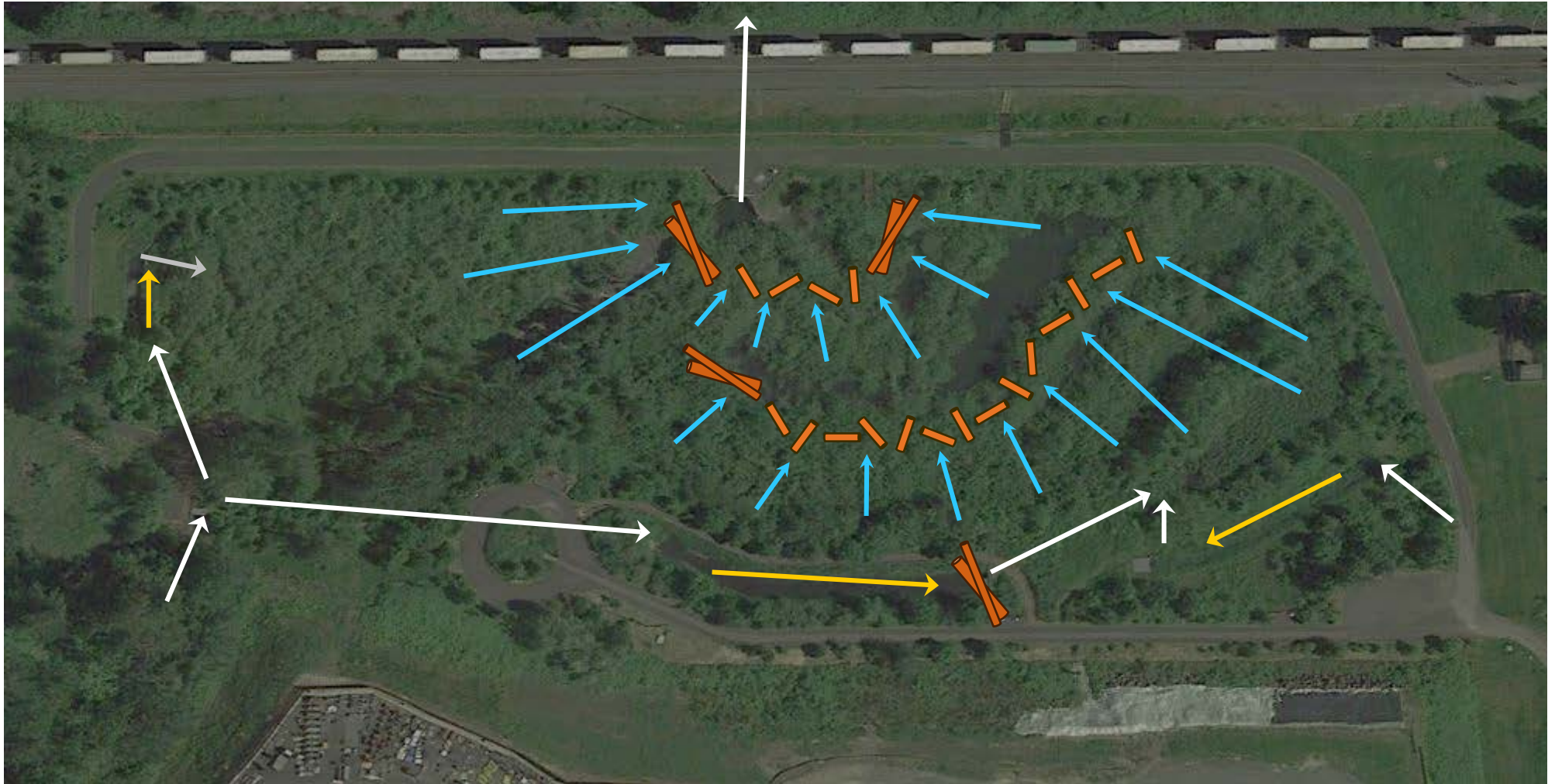
- Constructed in 2007-08
- 13-acre site
- Treats 965 acres of industrial and commercial land
- Cost = \$2.4M
- Goals: clean stormwater, provide habitat, foster education



Columbia Slough Regional Water Quality Facility



Columbia Slough Regional Water Quality Facility + Beavers



Question: Do the beaver dams help or hinder the water quality treatment in this facility?

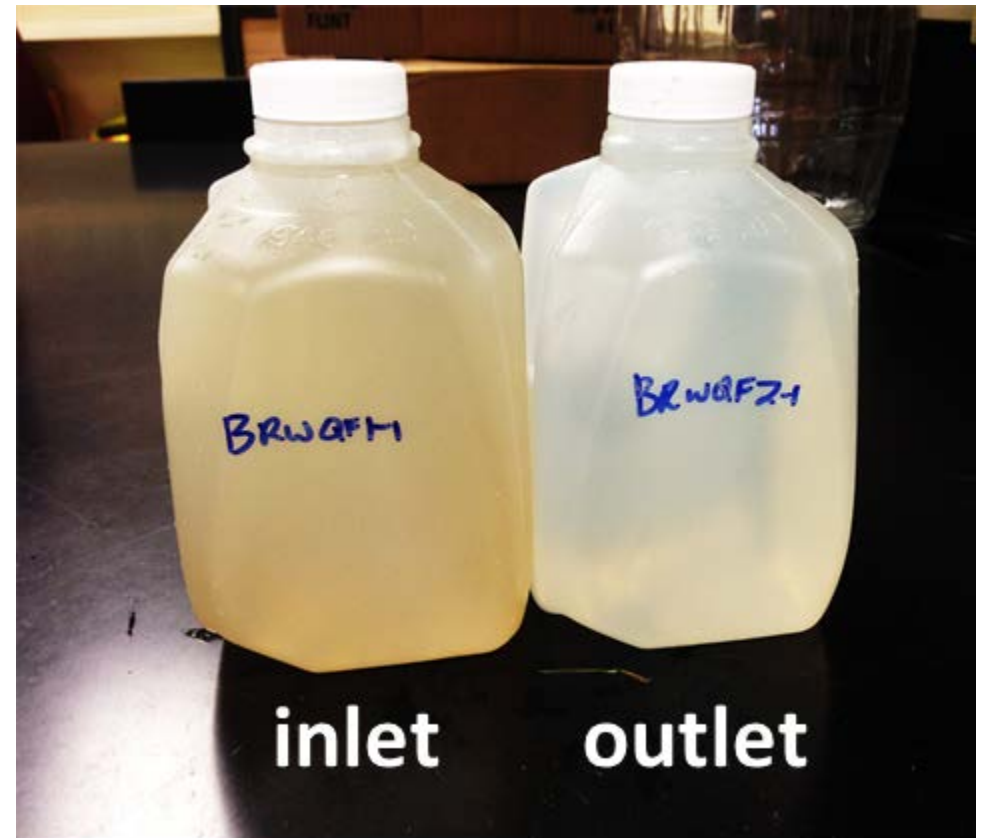


Methods – Dam Removal

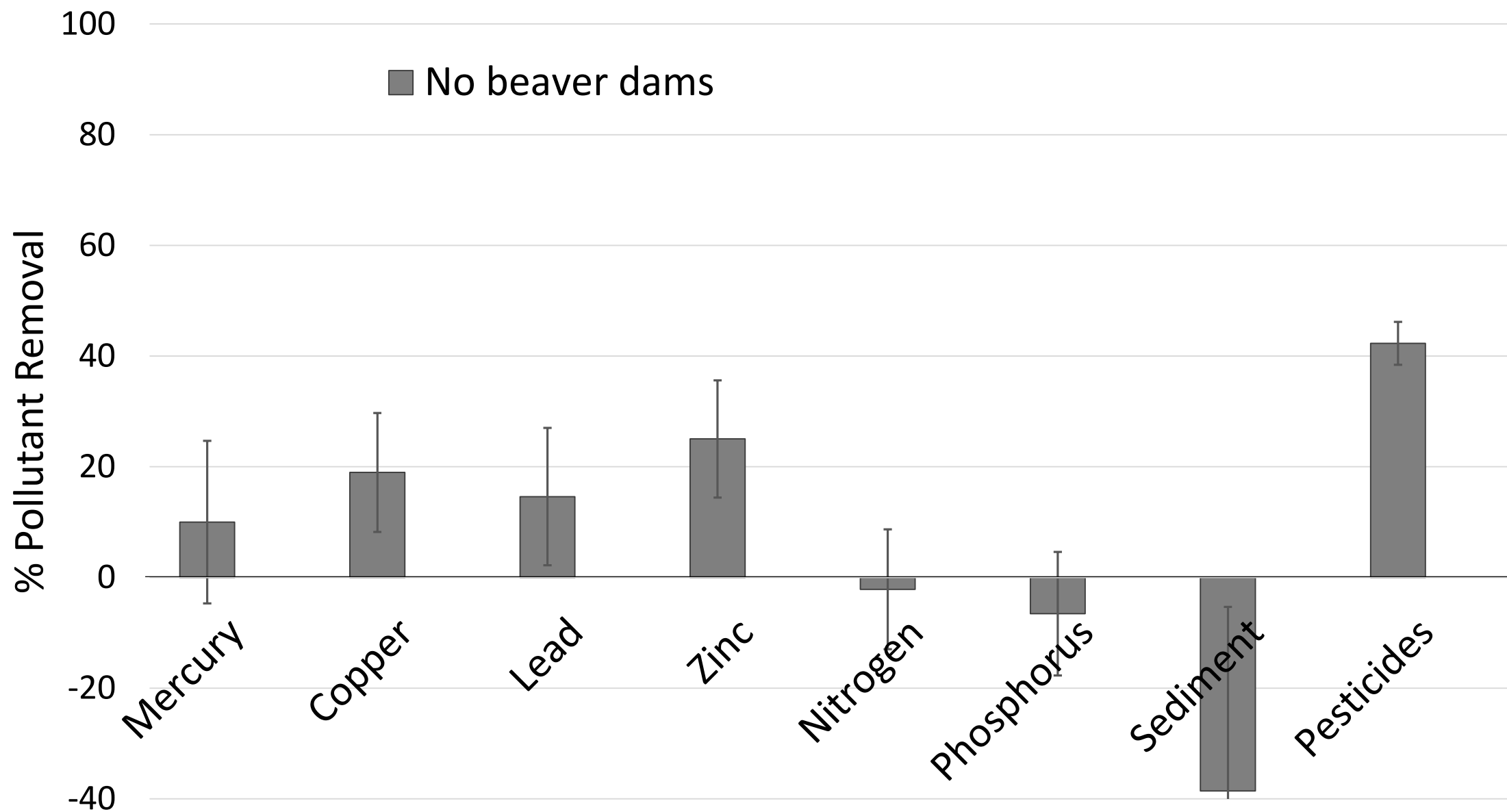


Methods – Water Quality Sampling

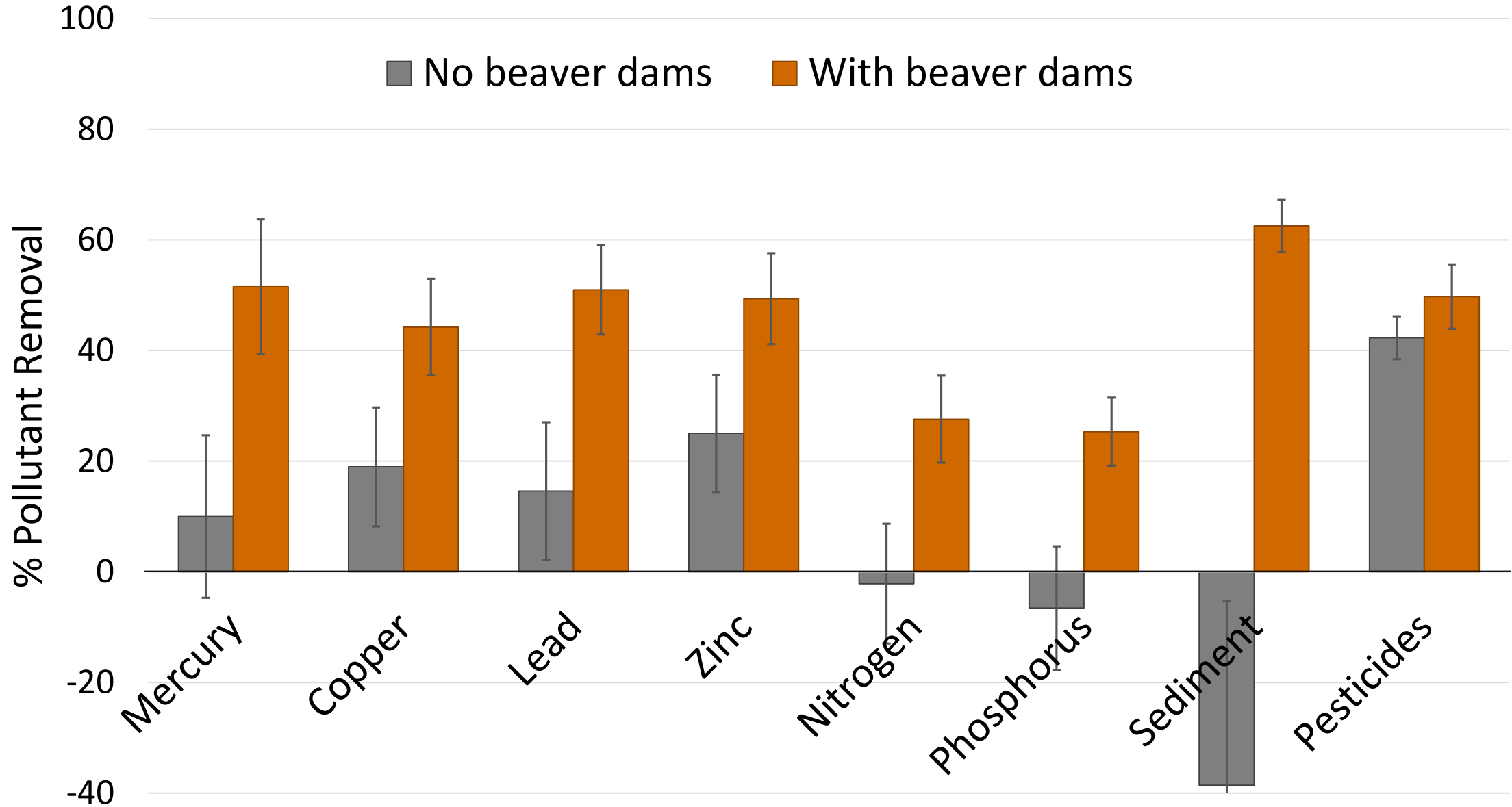
- Collected water quality samples during storms
 - Inlets and outlets of facility
 - Before and after dam removal and rebuilding
 - 7 storms without dams, 7 storms with dams
 - Metals, nutrients, sediment, pesticides



Results



Results



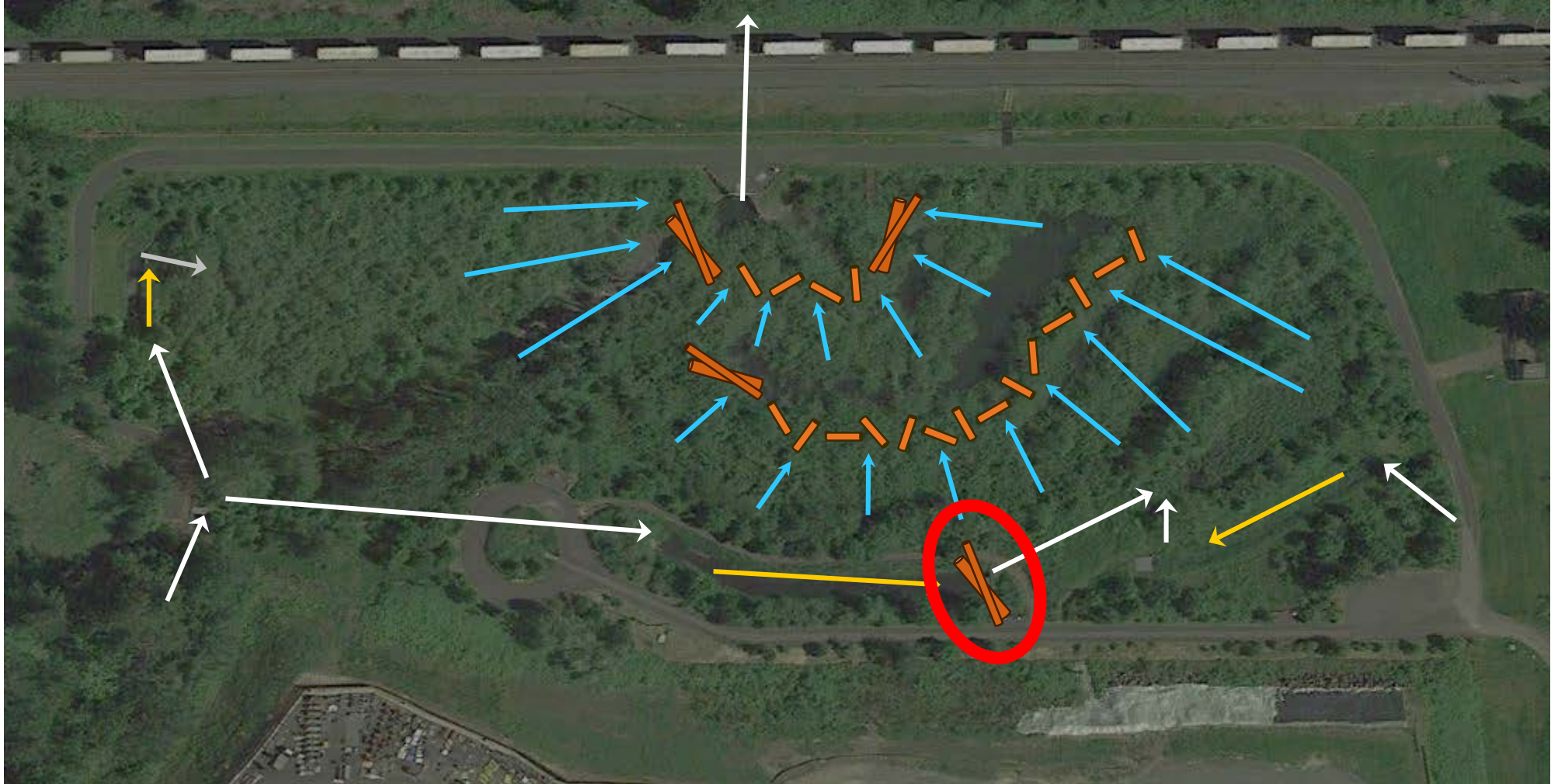
Beaver dams slow and filter stormwater



New Question: What if the beavers leave?!



Continually Remove One Dam



Suggestions for Designing Stormwater Facilities with Beaver in Mind

- 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
 - Provide food
 - Be open to change



2) Stream Temperature Study



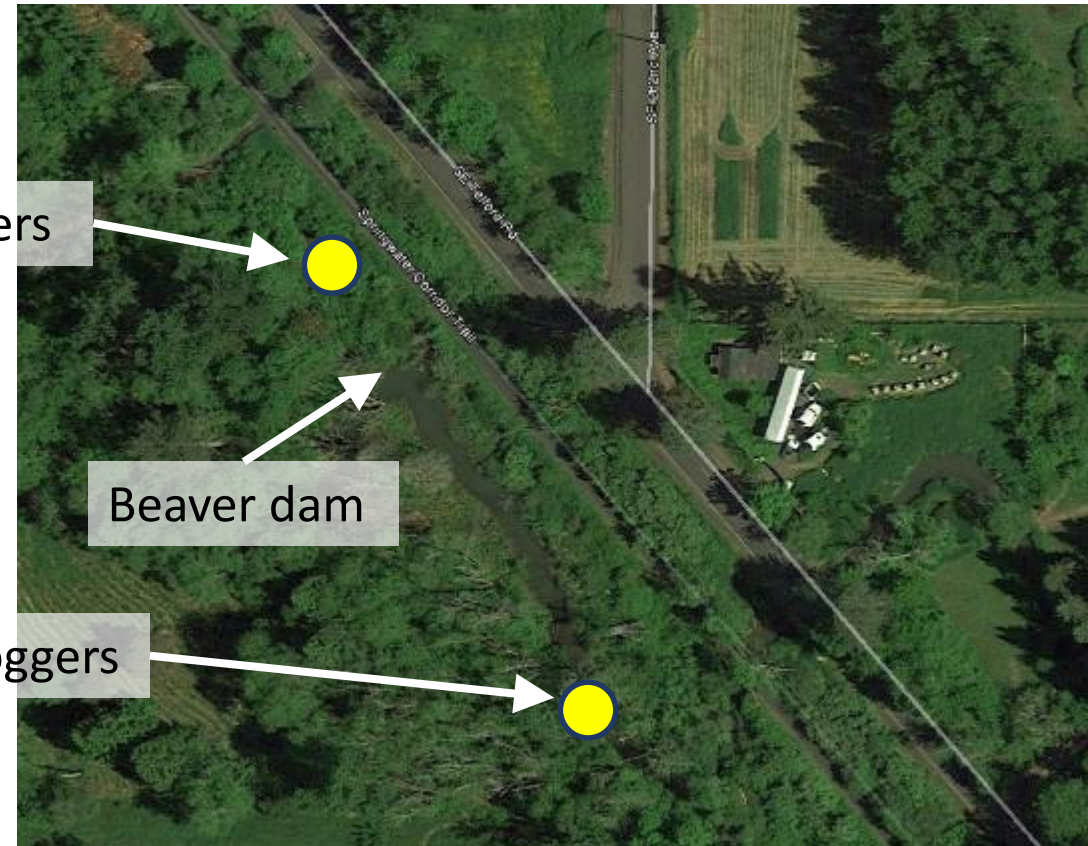
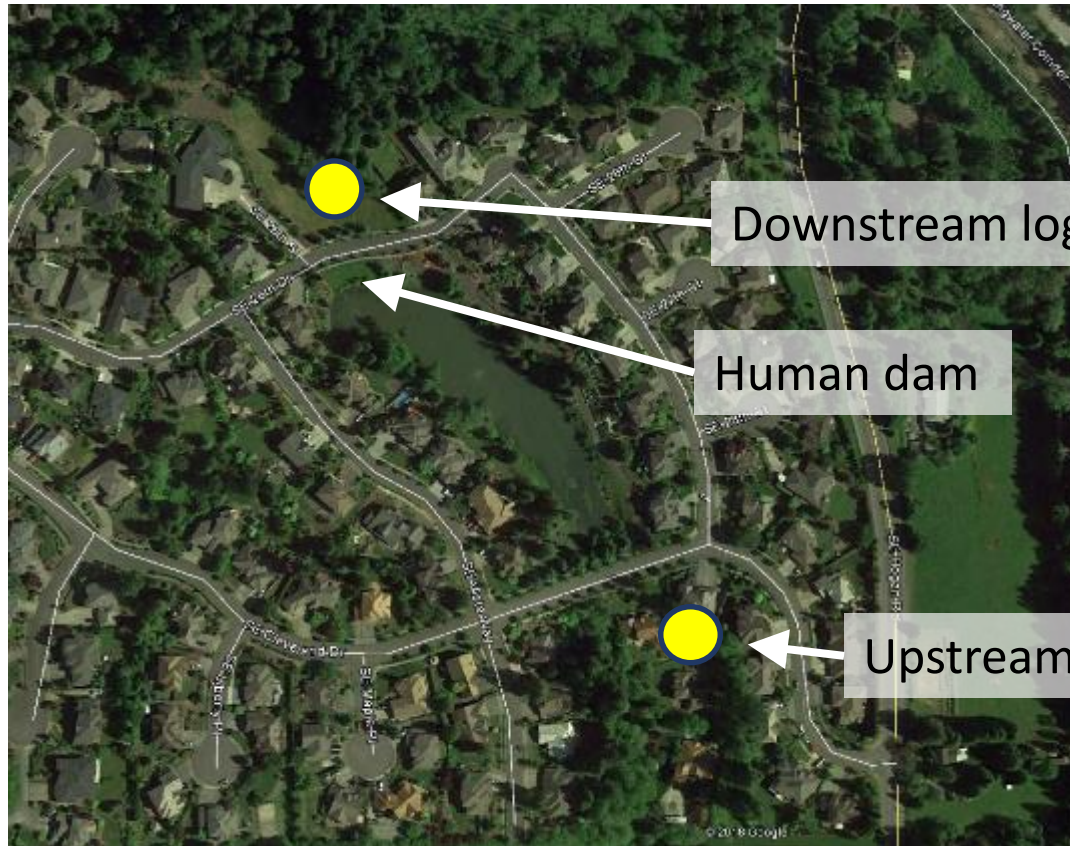
Heat as a Major Pollutant in Johnson Creek

- Major causes
 - Lack of shade
 - Dam/ponds

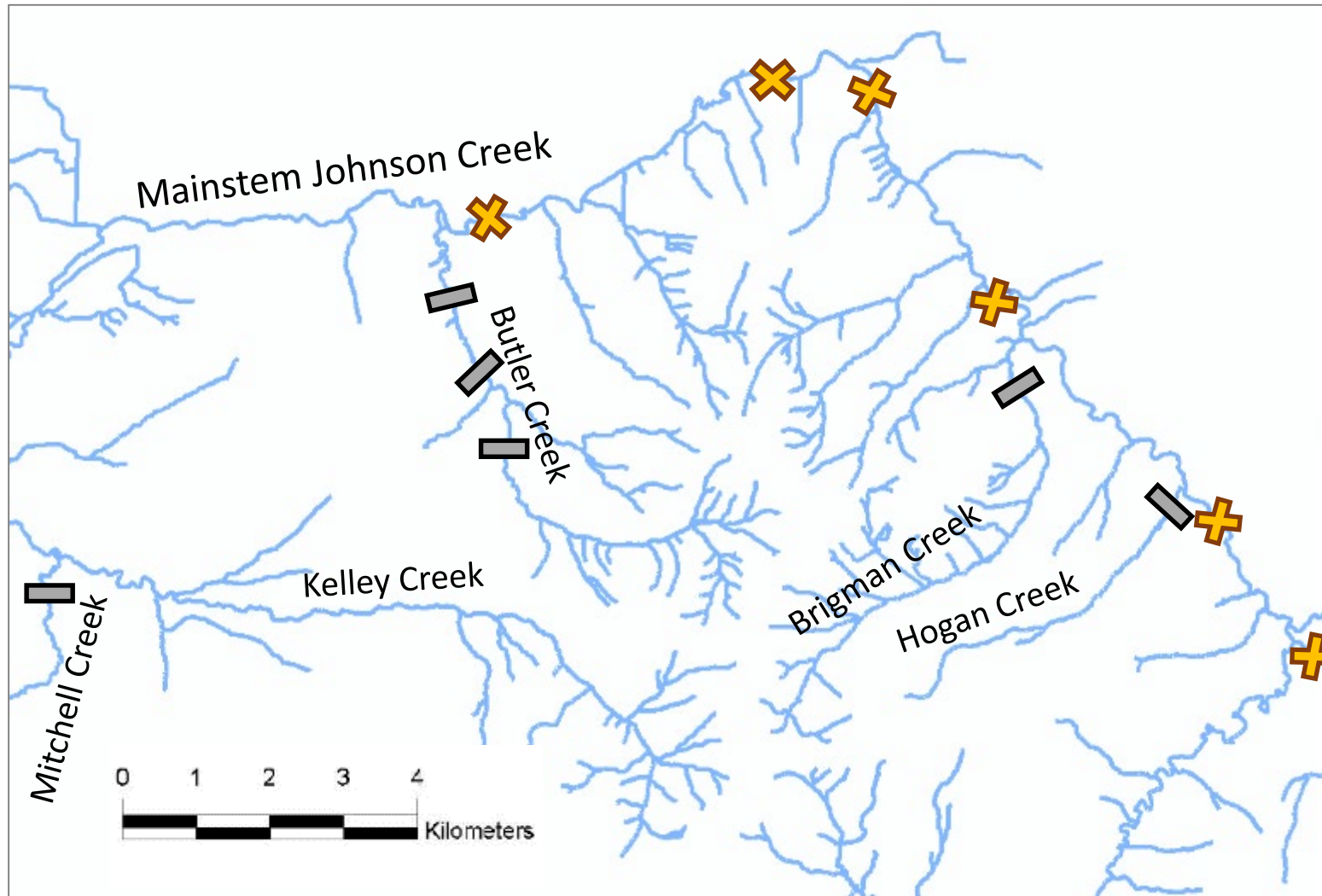


Temperature Study - Methods

- Human and beaver dams throughout Gresham
 - >2' deep
 - Maintained throughout the year
 - 6 of each type



Study Sites

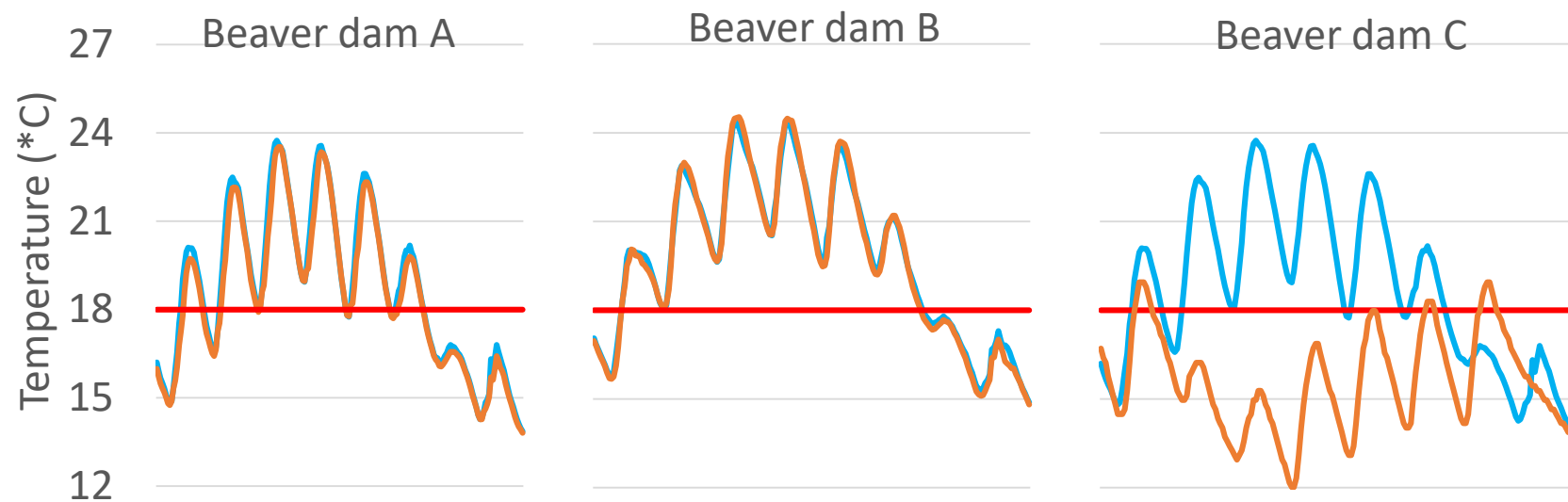
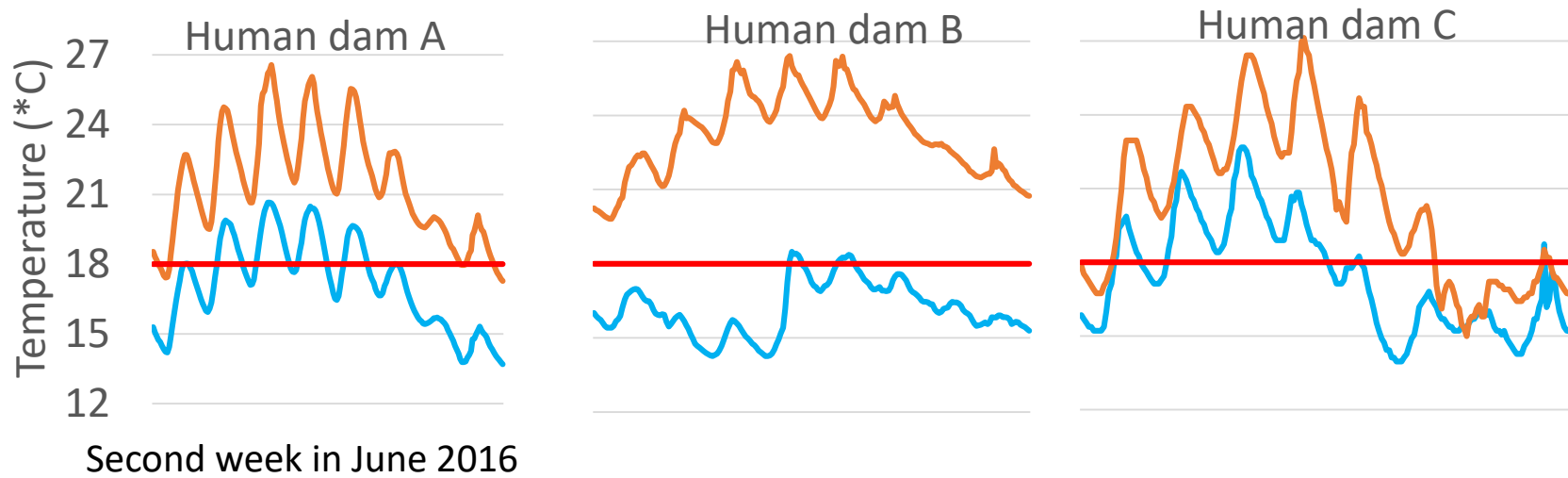


Dam Type

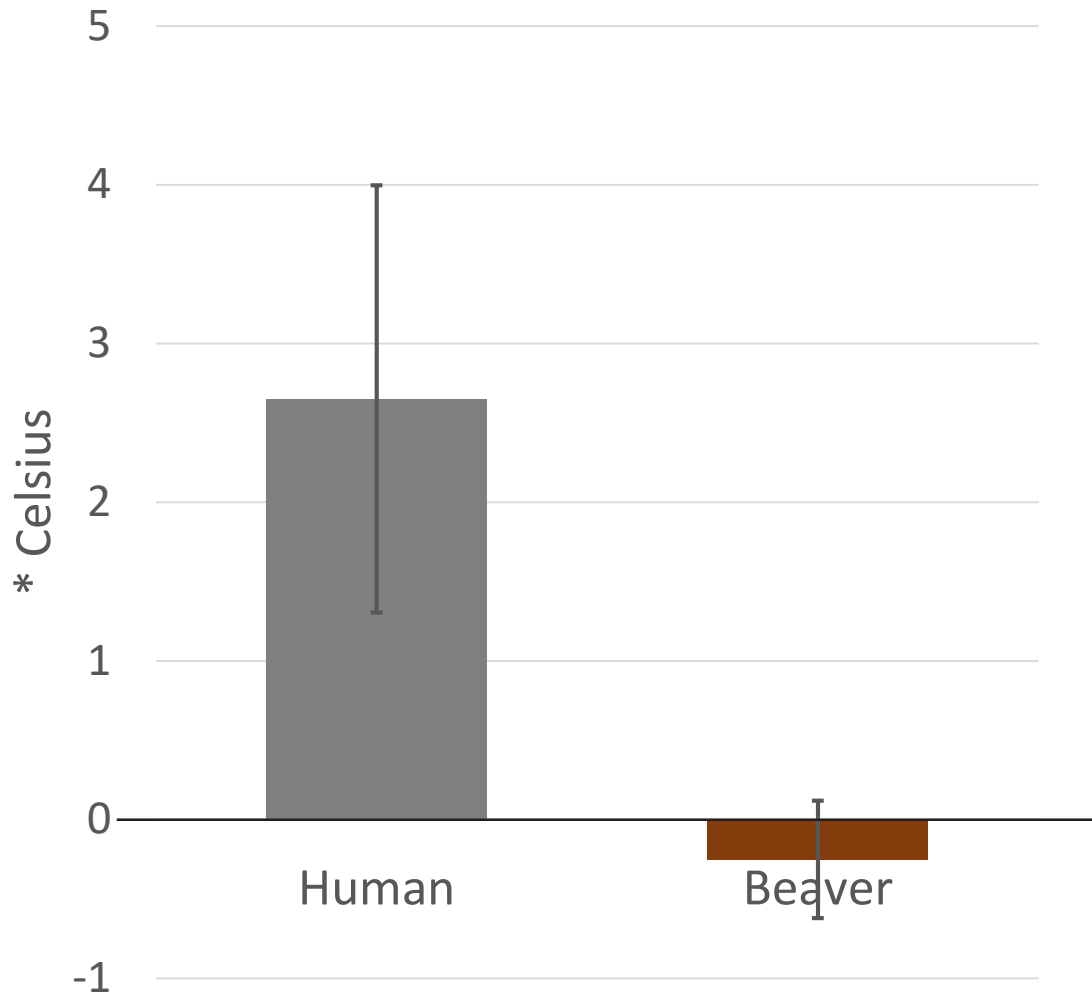
Human

Beaver

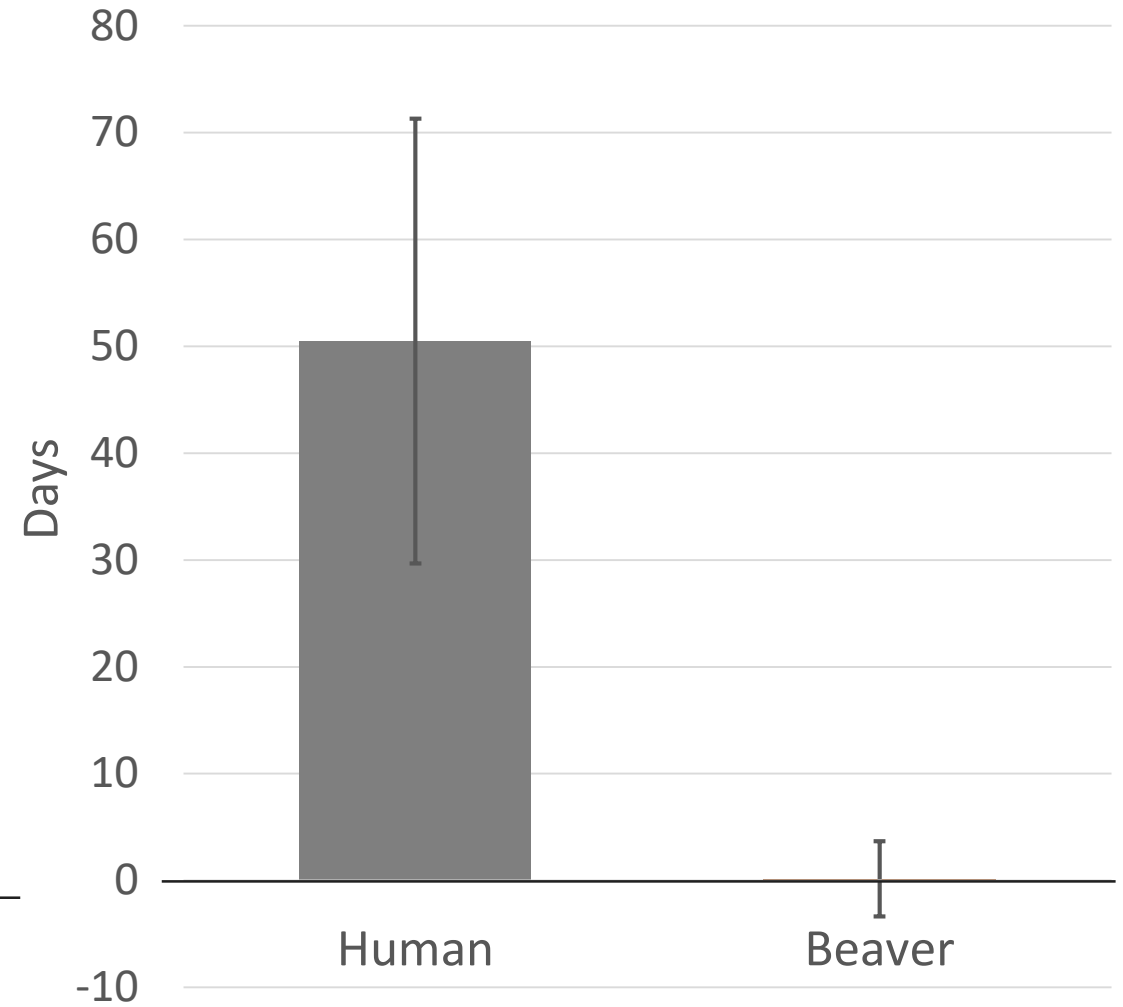
Temperature Study - Results



Change in Maximum Stream
Temperature Downstream of
Dam



Added Temperature Exceedances
Downstream of Dam



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



How has this Affected our Management?

- Worry less about added heat in Gresham
- Allow dams to persist when not threatening infrastructure



Logger Deployment



Factors that likely affect temperature changes from beaver dams

- Upstream temperature
- Shade
- Surface area
- Depth
- Connection to groundwater



3) Stream Complexity Observations



Many of Gresham's Urban Stream Channels Have Low Complexity



Finding Sediment-Free Rocks Immediately Downstream of Dams



Starting to Find Gravel Bars Downstream of Dams



New Grassy Bar Below 3-Year Old Beaver Dam



4' pool Downstream of Dam in Otherwise 1' Creek



Dam Causing Water to Find New Course Through Gopher Holes



New Side Channel in Beaver Creek within One Year of New Beaver Dam



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)



The Beaver Restoration Guidebook

Working with Beaver to Restore Streams, Wetlands, and Floodplains

Version 2.01, April 10, 2018



Photo credit: Mark A. Crow (markcrow.com)

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Starting to see
some of this!



Overview

- Beavers help clean stormwater in a large constructed facility
- Beaver dams retain or cool stream temperatures on mainstem Johnson and Beaver Creeks in Gresham
- Beaver activity is increasing complexity in Gresham streams
- City is attempting to allow and support beavers when infrastructure is not threatened



Questions?

