

Columbia Slope Water Quality Monitoring Project

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Agenda

- Introduction
- Background
- Project Scope
- Next Steps
- Questions?



Introduction

Vancouver, Washington

- Situated across the Columbia River from Portland, Oregon
- 51.84 square miles
- 190,000 residents
- Land use is predominately residential (~80%)



Background

Watershed Health Assessment (2018)



Focused on the two largest watersheds

- Burnt Bridge Creek (28 sq miles)
 - Entire stream in city limits
 - Decades of monitoring data
 - 303d listed for temperature, bacteria, dissolved oxygen
- Columbia Slope (25 sq miles)
 - Springs/seeps that drain to Columbia River
 - Upland areas infiltrate into gravelly soils
 - USGS Study identified contaminants in stormwater from city outfalls to the river

Background

Watershed Map



Two watersheds encompass 80% of city area

Background

Watershed Health Assessment (2018)



Recommendations

- Watershed management strategies
 - Planting & restoration
 - Stormwater retrofits
 - Septic system elimination/repair
 - Operations and maintenance
- Data collection and analysis
 - Add flow monitoring for BBC
 - Characterize basin contribution areas and stormwater BMPs
 - Collect data for Columbia Slope

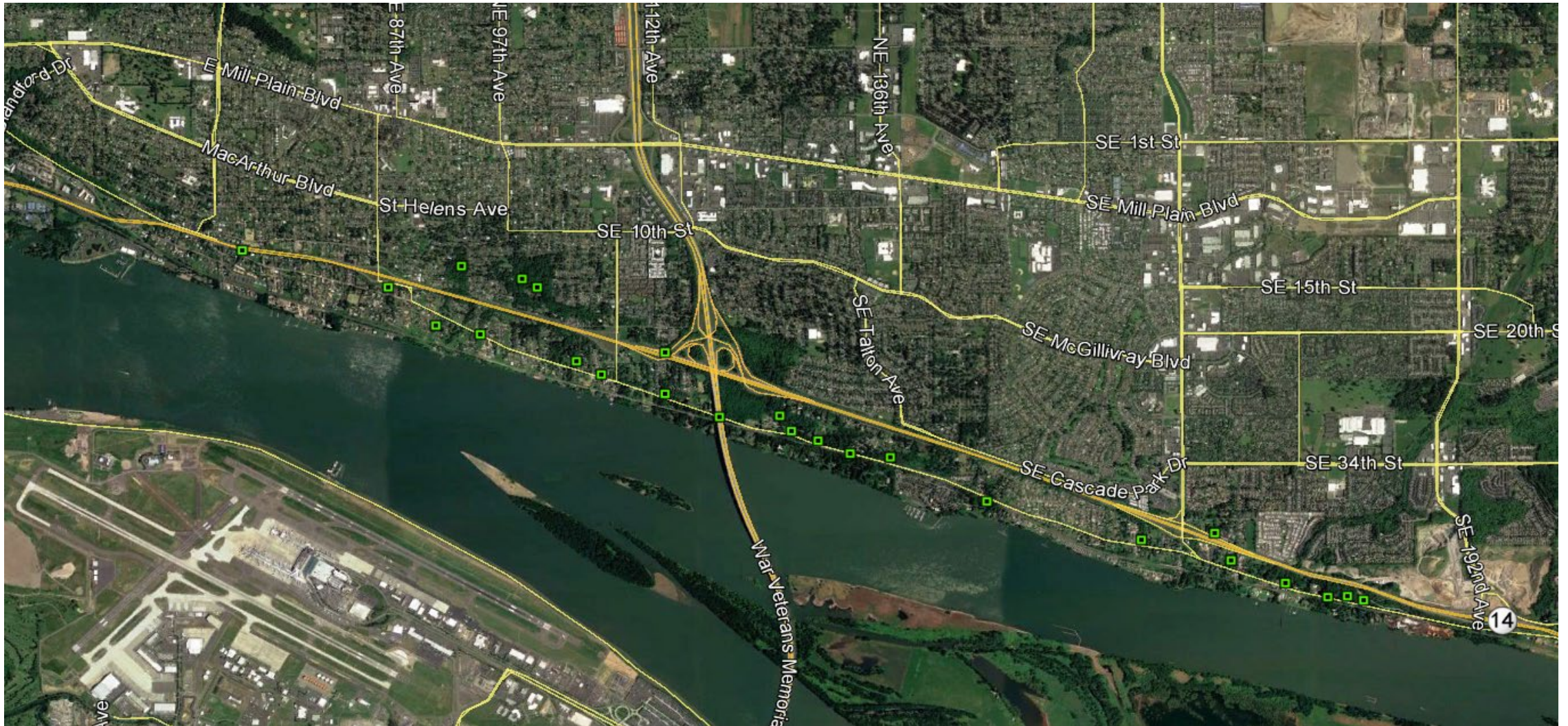
Columbia Slope Project Overview

Initial Phase (2020-2022)

- Delineate basins using existing data
- Select monitoring sites
- Determine sampling parameters
- Conduct sampling
- Final report with results and recommendations







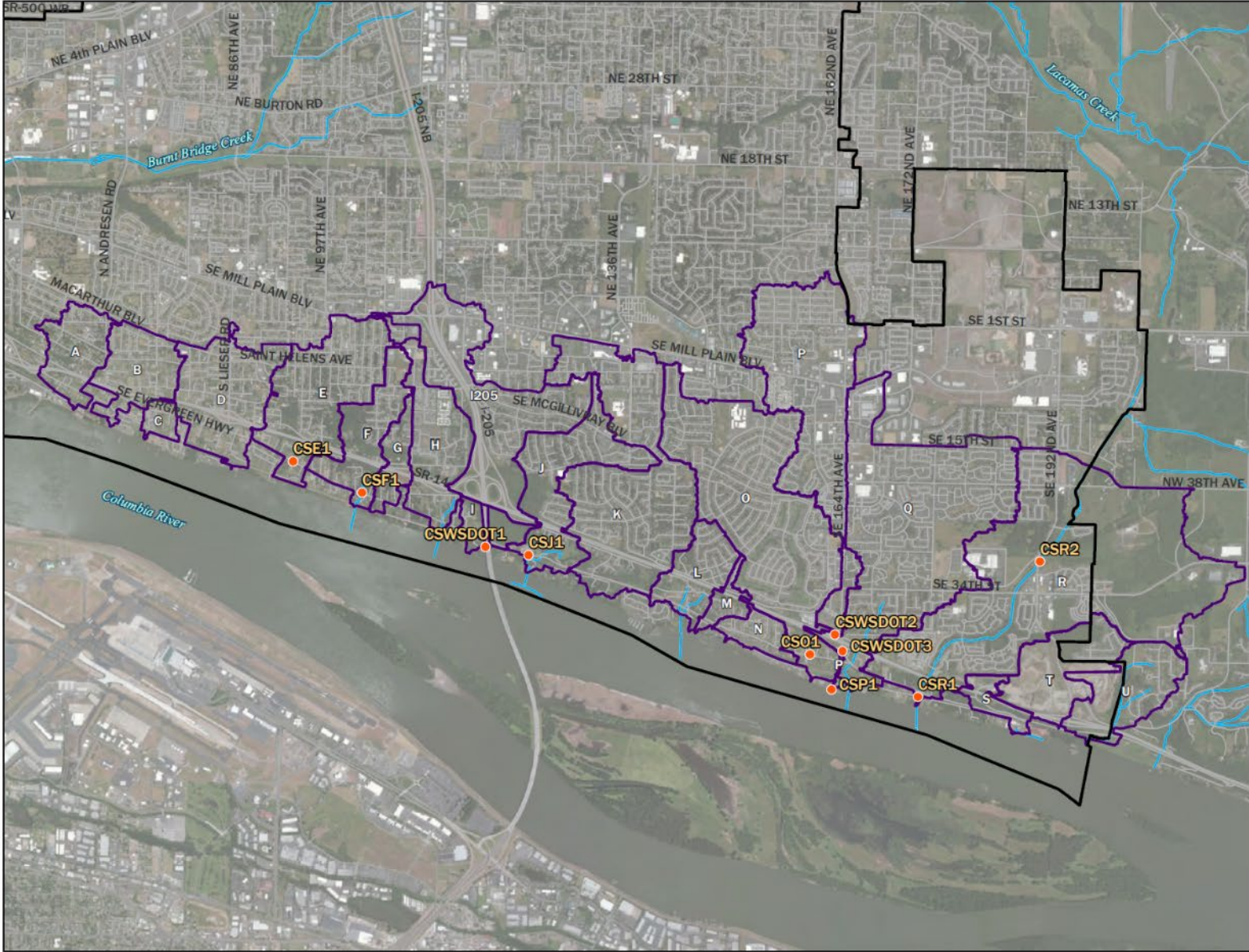
Columbia Slope Springs



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Legend

-  Monitoring Station
 Streams
 Roads
 Columbia Slope Basin
 Vancouver City Limits



ESRI Clarity (2020)

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Columbia Slope Monitoring SubBasins

Basin characteristics considered

- Size (range 144 – 1152 acres)
- Impervious area (range 25% – 66%)
 - (highway sites 60% - 89%)
- Septic density
- Stormwater swale / pond density
- Land use
 - Residential
 - Commercial/Industrial
 - Ag / Forest / Field
- Site accessibility

Basin Characteristics

Columbia Slope Basin Characteristics									
Monitoring Station	Drainage Area (acres)	Impervious Area (%)	Residential (%)	Commercial and Industrial (%)	Agriculture (%)	Forest, Field, and Other (%)	Septic Density (count/acre)	Swale Density (count/10 acres)	Storm-water Pond Density (count/100 acres)
CSE1	144.2	42.6	98.9	0.3	0.0%	0.8	0.53	0.00	0.00
CSF1	160.8	37.7	83.6	2.5	0.7%	13.2	0.19	0.06	0.62
CSJ1	246.3	45.4	80.5	6.8	1.4%	11.3	0.03	0.12	0.41
CSO1	658.0	56.4	92.2	7.8	0.0%	0.0	0.02	0.15	0.30
CSP1	522.7	65.8	79.0	21.0	0.0%	0.0	0.18	1.49	0.00
CSR1	1152.2	37.5	55.4	11.9	11.0%	21.7	0.02	0.16	1.13
CSR2	621.5	25.1	40.8	7.6	14.9%	36.7	0.01	0.11	0.32
CSWSDOT1	427.4	60.1	73.2	25.4	0.4%	1.1	0.32	0.44	0.00
CSWSDOT2	2.0	89.0	0.0	100.0	0.0%	0.0	0.00	0.00	0.00
CSWSDOT3	12.8	72.8	62.7	37.3	0.0%	0.0	0.00	0.00	7.84

Sampling Parameters

- Conventional field measurements (including discharge)
- Nutrients, bacteria, metals, chloride
- SVOCs (PAHs +)
- Pesticides
- QAPP available

Field and Laboratory Parameter Methods.		
Parameter	Method Description	Method Number ^a or Meter
Field Parameters		
Water Discharge	Circular conduit, velocity-depth transect	Swoffer Model 2100-13
Temperature	In situ field reading	YSI ProDSS
pH	In situ field reading	YSI ProDSS
Specific conductance	In situ field reading	YSI ProDSS
Dissolved oxygen	In situ field reading	YSI ProDSS
Laboratory Parameters		
Turbidity	Nephelometric	EPA 180.1
Total suspended solids	Weighed filter	SM 18 2540D
Total phosphorus	Persulfate digestion, ascorbic acid	EPA 365.3
Total nitrogen	Kjeldahl digestion, ammonia-selective electrode with known addition, adding to nitrate+nitrite	EPA 351.4; SM 4500-NH3 G LL
Nitrate+nitrite nitrogen	Automated cadmium reduction	EPA 353.2; SM 18 4500-NO3 F
Hardness as CaCO ₃	Titrimetric	SM 2340C
Chloride	Ion chromatography	EPA 300.0
Total Cu, Pb, and Zn	Inductively coupled plasma mass spectrometry	EPA 200.8
SVOCs	Gas chromatography/mass spectrometry	EPA 8270D-LL
Organochlorine pesticides	Gas chromatography	EPA 8081B
E. coli bacteria	Quanti-Tray	SM 9223B Q-tray

Results

Initial Phase

Sampling June 2021
through March 2022

Results

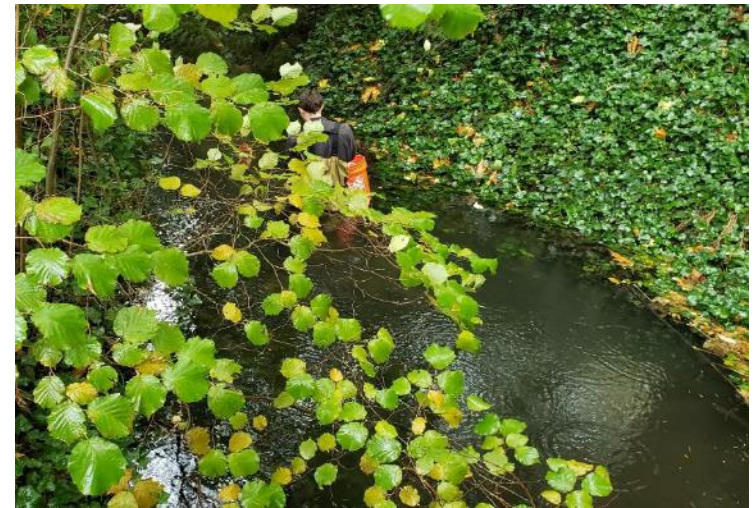
- Base flow
 - Higher nitrogen indicating inadequate treatment by septic tanks
 - Did not exceed standards for metals or bacteria
- Storm Flow
 - Higher turbidity, TSS, total metals, and bacteria
 - Hits of several SVOCs and pesticides
 - Highway runoff stations had highest water quality impairment
- Higher turbidity, TSS, total metals, phthalates, total P, and pesticides correlated to industrial/commercial areas

Recommendations

Initial Phase

Completed 2022

- Relocate some monitoring stations
- Replace stations without sufficient baseflow or low impairment level
- Add stations upstream in basin that had high pollutant concentrations
- Evaluate water quality as it enters and discharges from a stormwater facility



Project Scope Overview

Phase 2
(2022-2024)

- 18 additional sampling events
- 15 monitoring stations

Modified monitoring plan to include:

- 4 original city sites + 4 new priority sites
- 3 highway sites (2 new locations)
- 2 upstream sites in a priority basin
- Influent/effluent of a vintage stormwater facility to determine BMP effectiveness

Current Status Next Steps

Phase 2 (2022-2024)

- As of May 2023:
 - 6 storm events and
 - 1 base flow have been sampled
- 11 events upcoming through March 2024
- Final report expected August 2024



Questions?



Thank You

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