

# Finding Sources of PCBs in the Spokane River

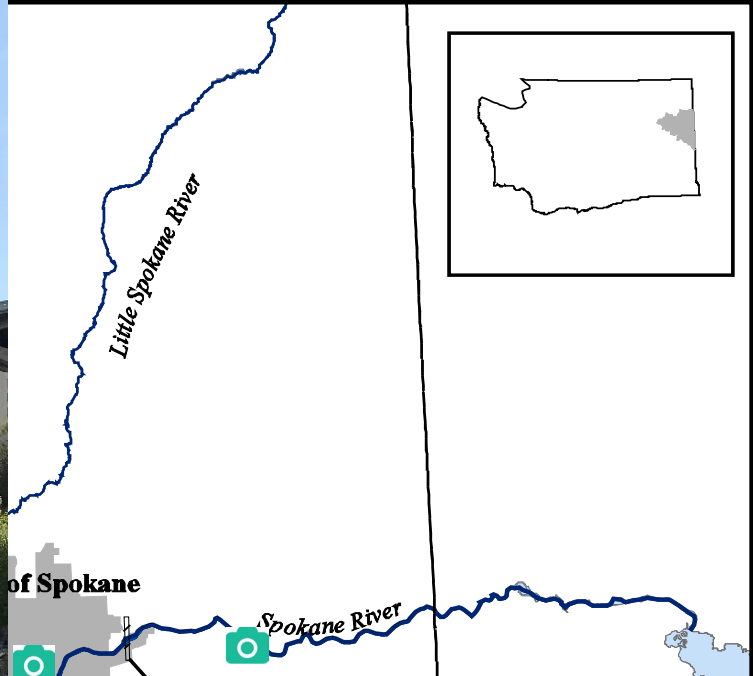
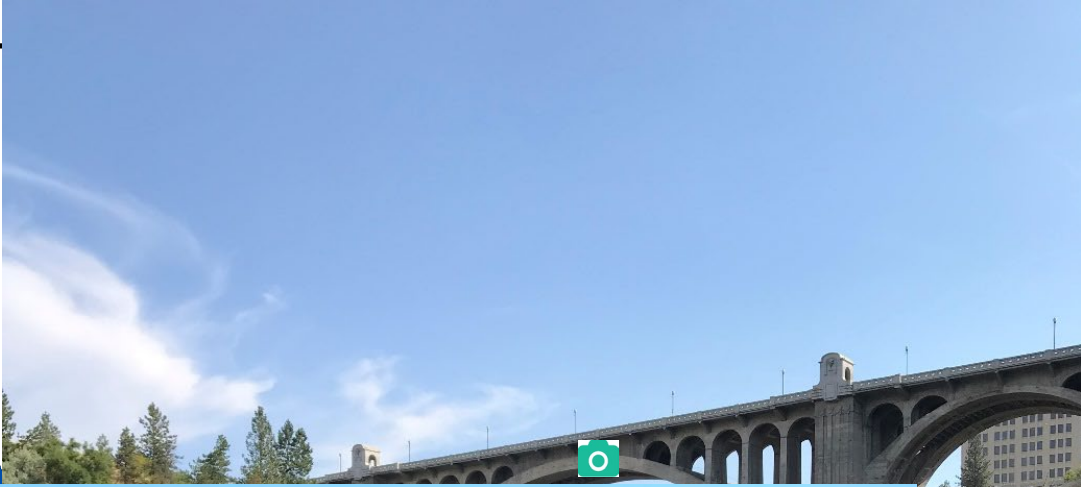
A Summary of SRRTTF Investigations

Spokane River Forum Conference  
April 26, 2023

Lisa Dally Wilson, PE, Dally Environmental

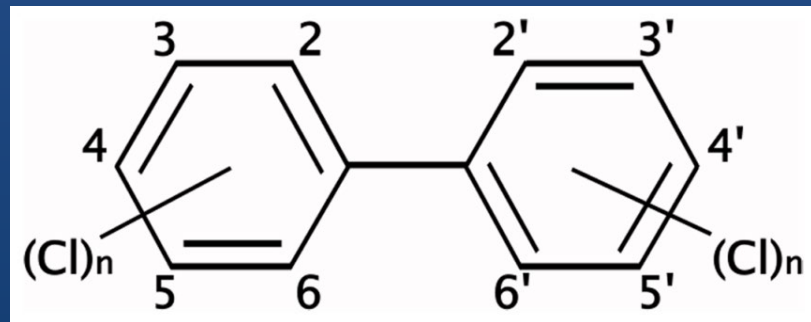
Brandee Era-Miller, Ecology, EAP

Dave Dilks, Ph.D., LimnoTech

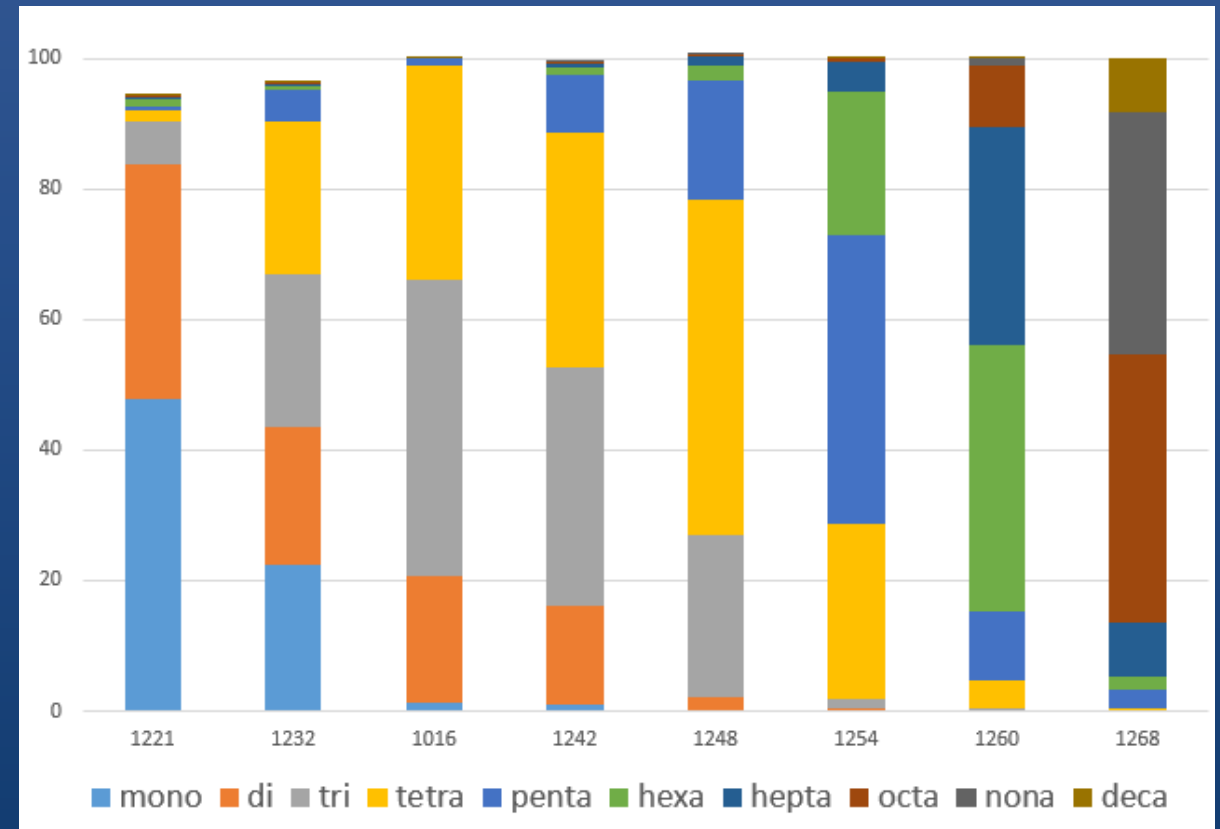


# PCBs (Polychlorinated biphenyls)

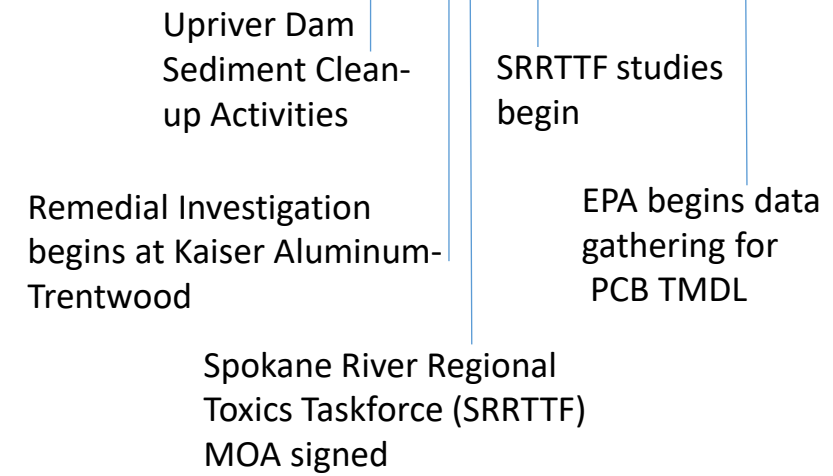
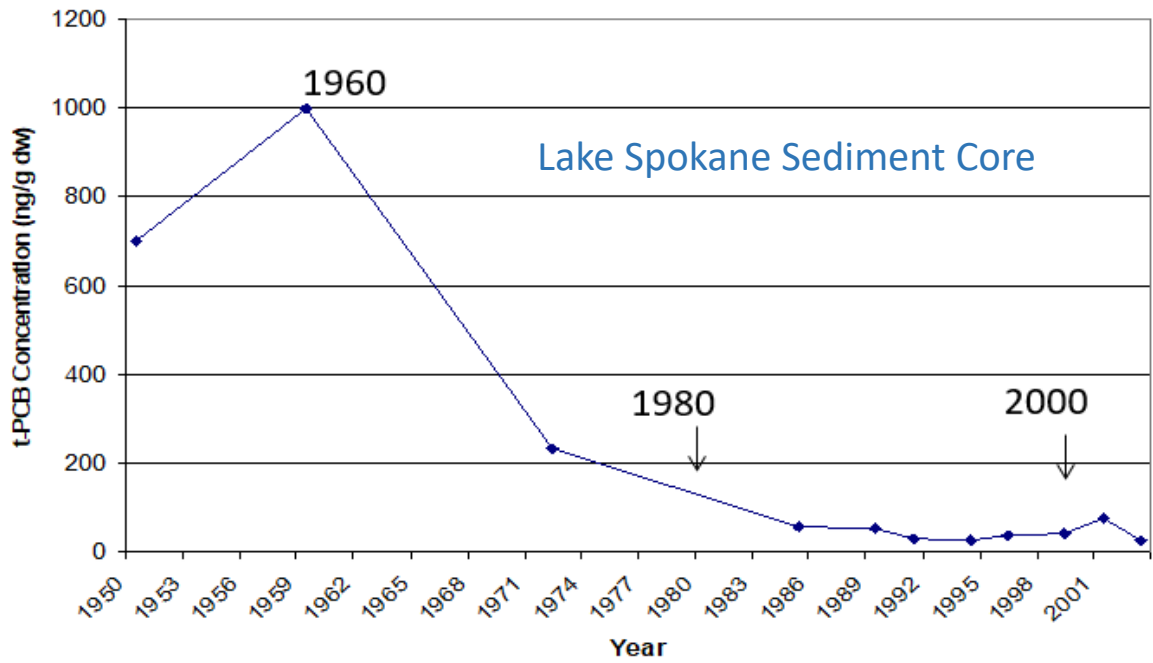
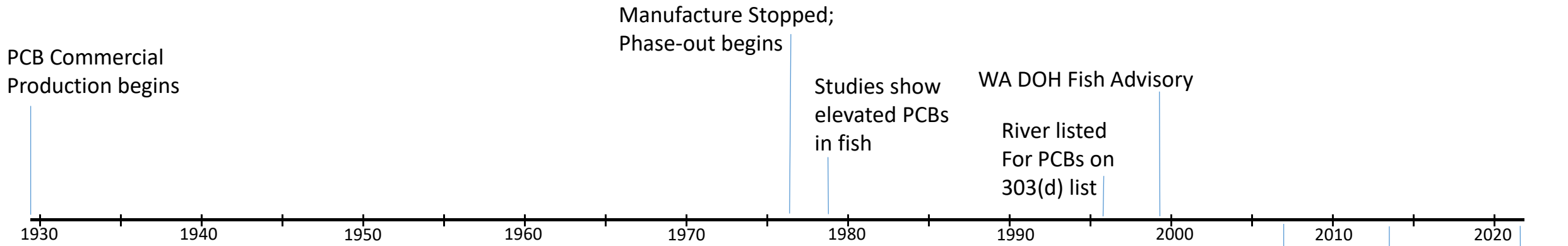
- 'Aroclor' US tradename (e.g. Aroclor 1254 = 54% chlorine)
- Electrical insulating fluid; numerous uses
- 209 congeners (compounds)
- homologs (groups of same chlorination)
- some congeners A LOT more toxic than others
- banned in the 1970s
- ubiquitous in the environment
- accumulate in organisms (fish, orcas, humans)
- WA State settled with Monsanto in 2020



Basic structure: 1 to 10 Chlorine atoms



# Timeline of PCB-Related Activities in the Spokane River



SPOKANE RIVER  
REGIONAL TOXICS TASK FORCE

*Members of the Community, Stewards of the River*



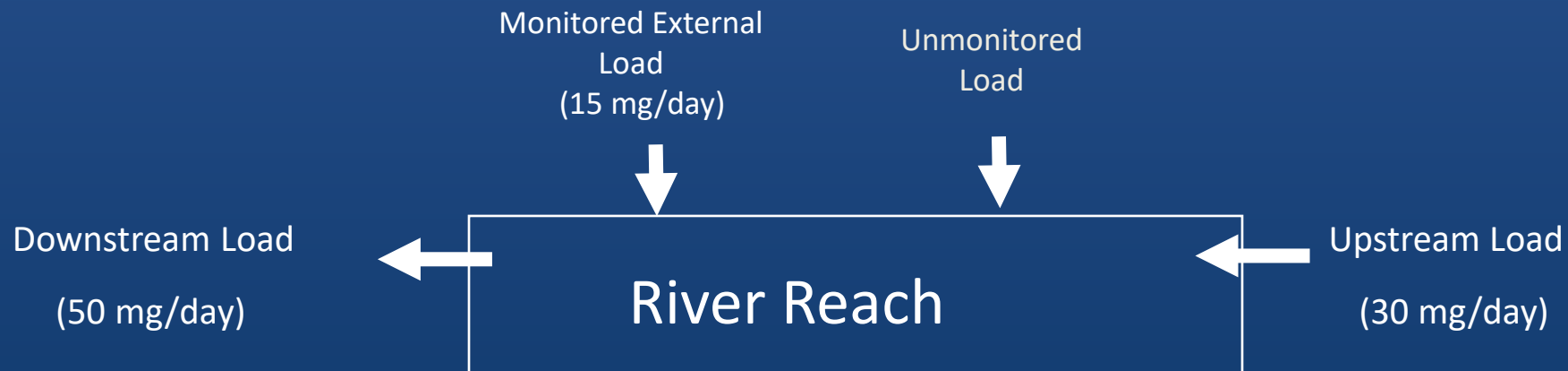
- SRRTTF MOA signed in 2012 ([srrttf.org](http://srrttf.org))
- Comprised of Stakeholders who would be involved in the TMDL process
- Developed a comprehensive plan in 2016 with the goal: “bring the Spokane River into compliance with water quality standards for PCBs”
- Must demonstrate “Measurable Progress”
- Has conducted numerous environmental studies since 2014 to characterize the sources of PCBs

# Task Force Source Identification Activities

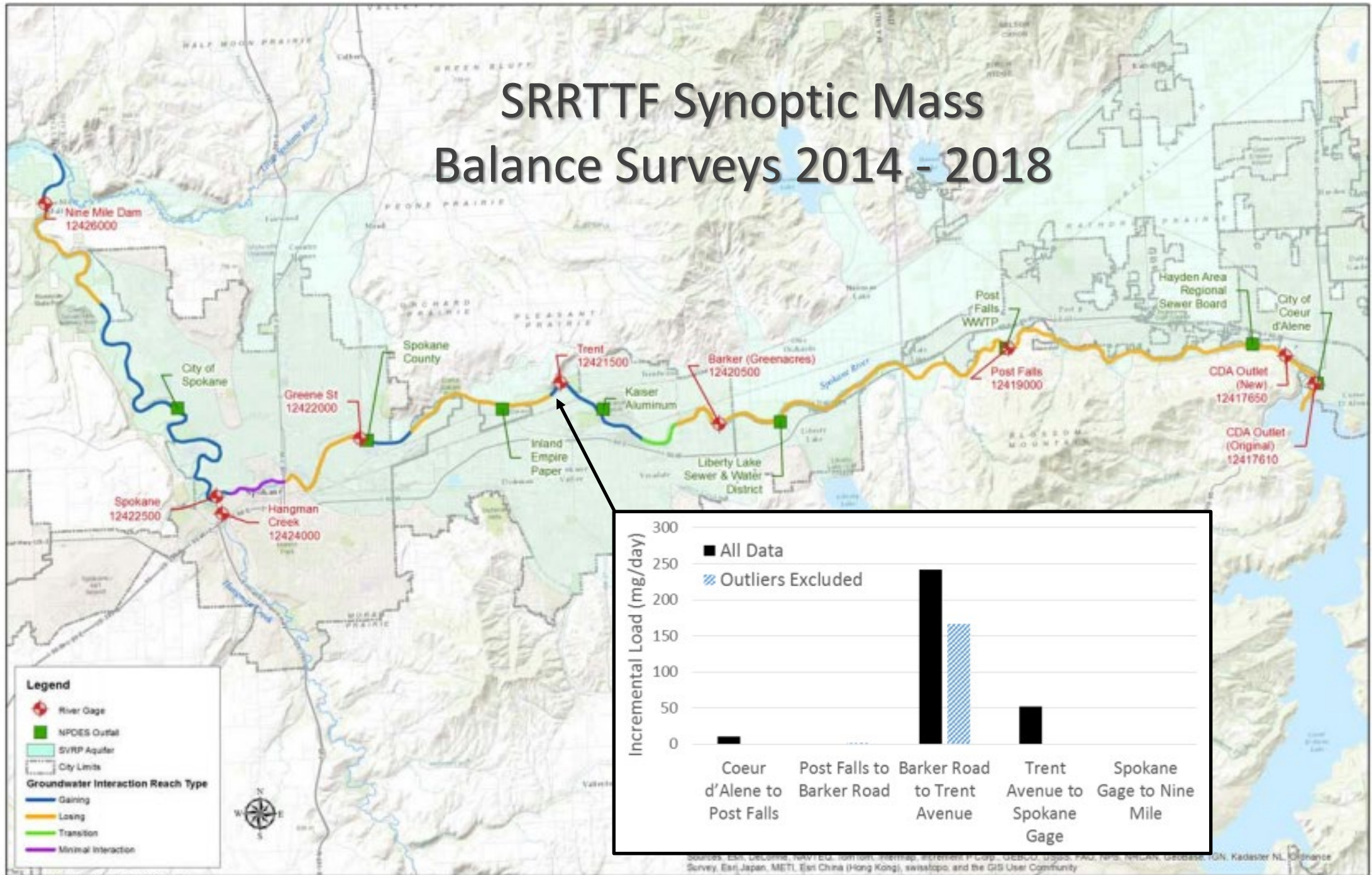
- Mass Balance - Water Column
- Biofilm
- Canine Detection Work with Jasper
- Object Detection Survey
- Trend Assessment

# Synoptic Survey - Mass Balance

- Measure flow and concentration of known loading sources
  - Point source, tributaries
- Calculate presence of unmonitored load entering the river between upstream and downstream stations
  - Measure flows and concentrations during steady state conditions
  - Unmonitored load = Downstream load – upstream load



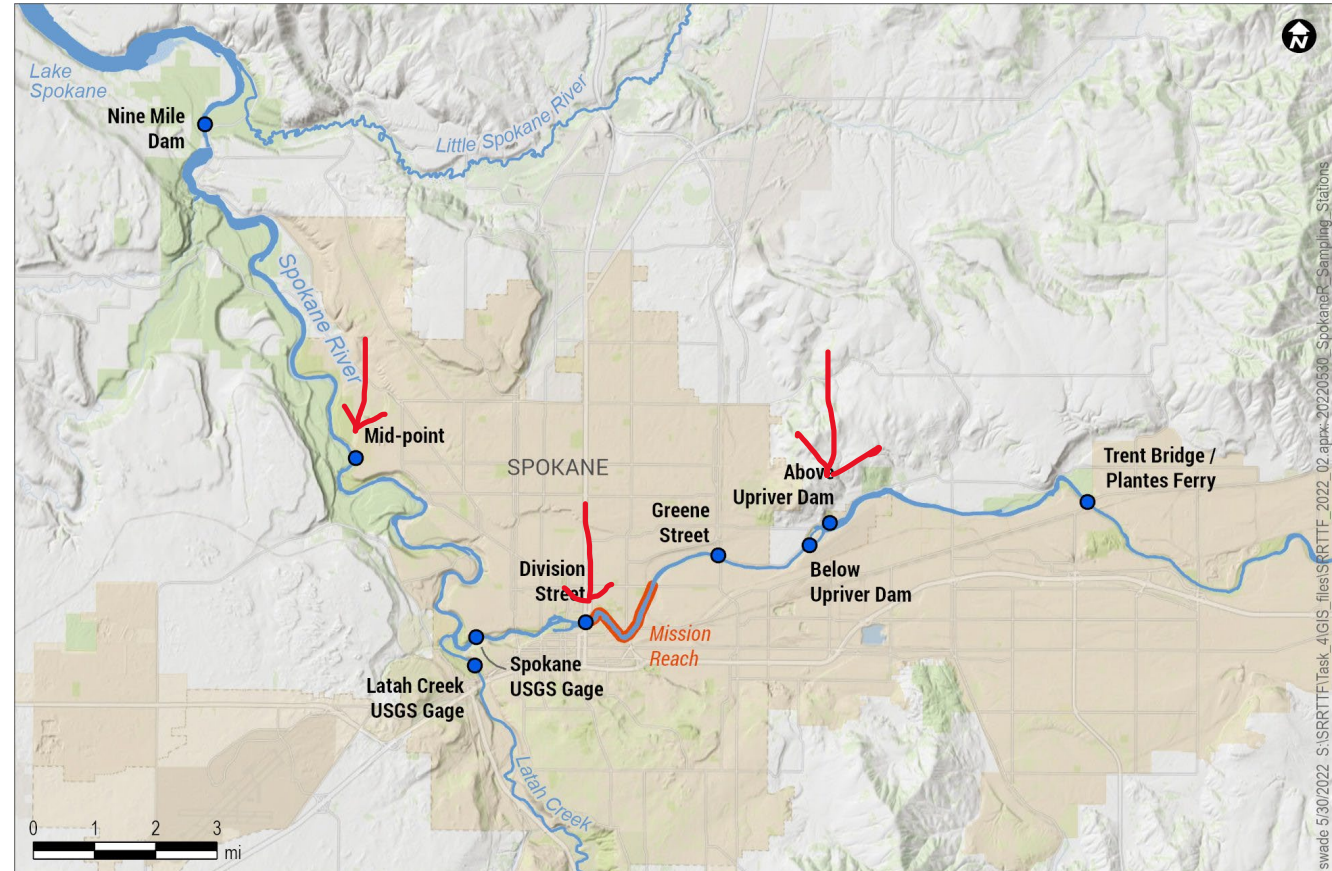
# SRRTTF Synoptic Mass Balance Surveys 2014 - 2018





# 2022 Synoptic Survey Stations

- New stations and purpose
  - Above Upriver Dam
    - Provide insight on homolog shift observed near Upriver Dam
  - Division St.
    - Mass balance specific to Mission Reach
  - Mid-point between USGS Gage and Nine Mile
    - Divided the reach between USGS Gage and Nine Mile into two parts

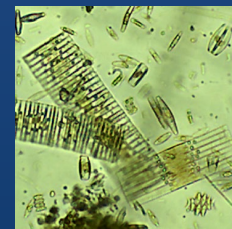
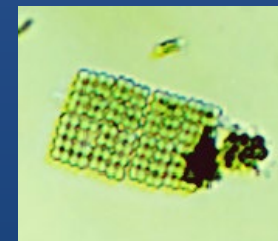
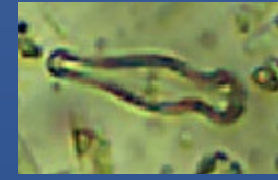




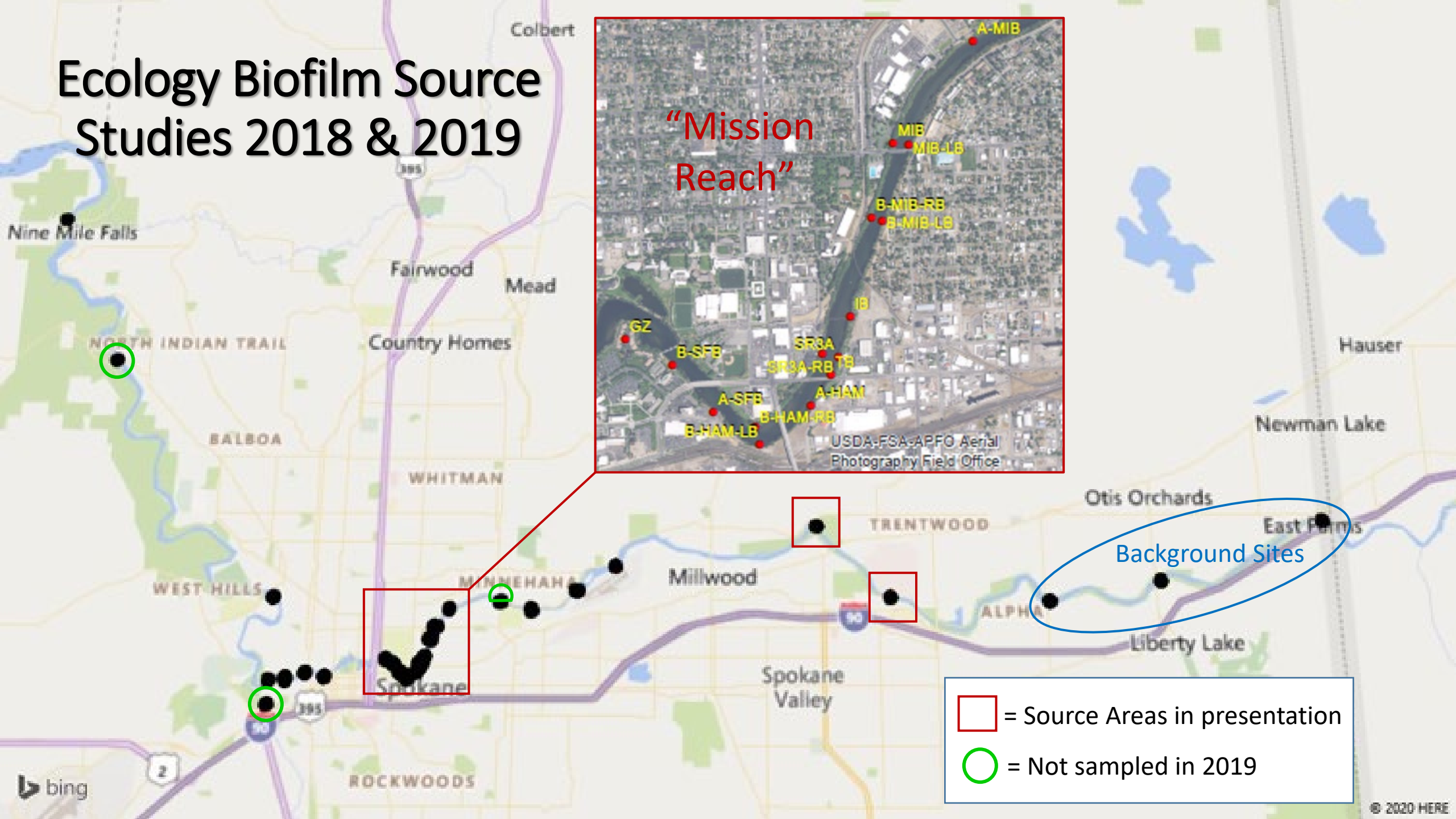
Biofilm

# What are Biofilms?

- Complex, diverse assemblages of algae, microbes, fine sediments
- Attached to each other and surfaces via secretion of mucilage
- Base of aquatic food webs
- Can act as natural passive samplers



# Ecology Biofilm Source Studies 2018 & 2019

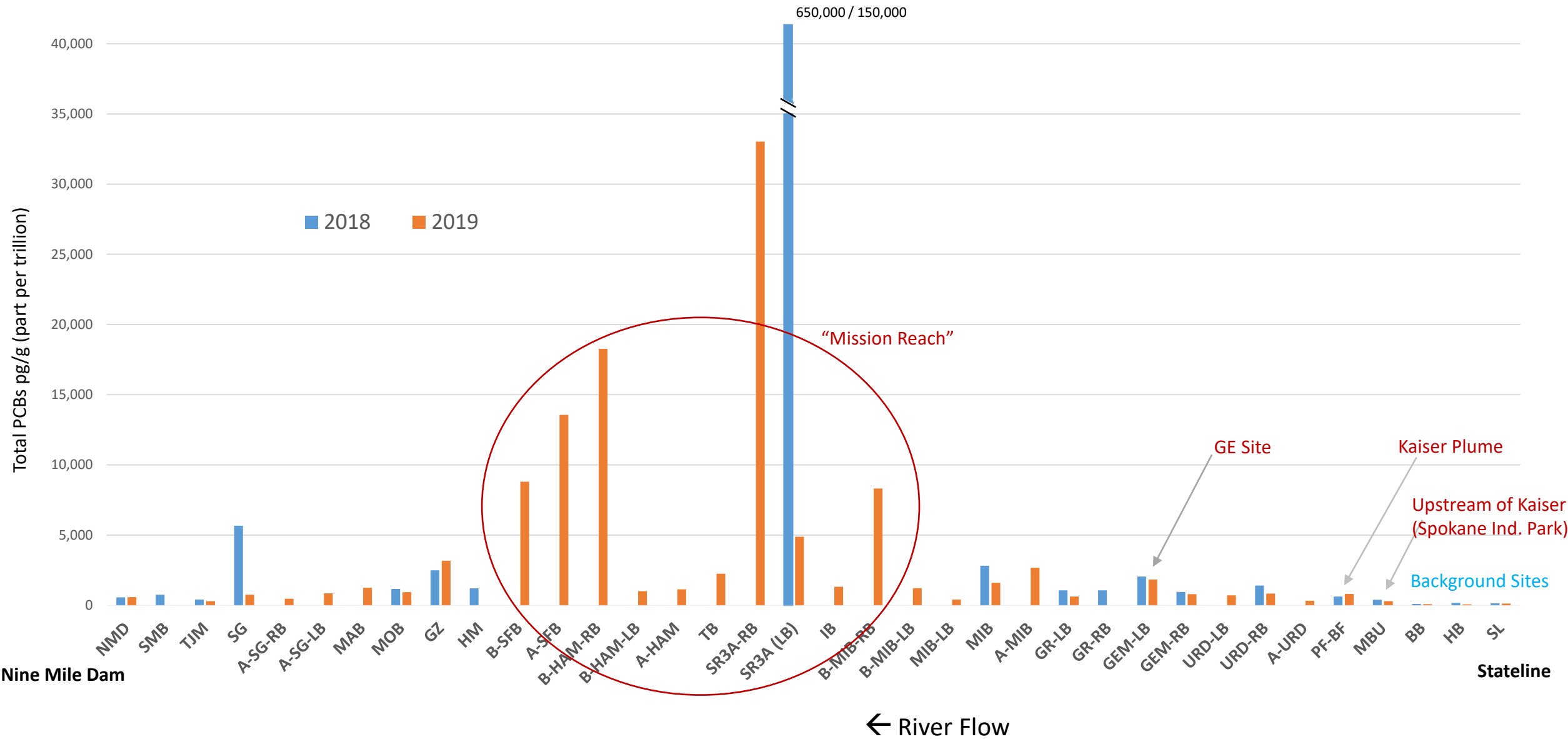


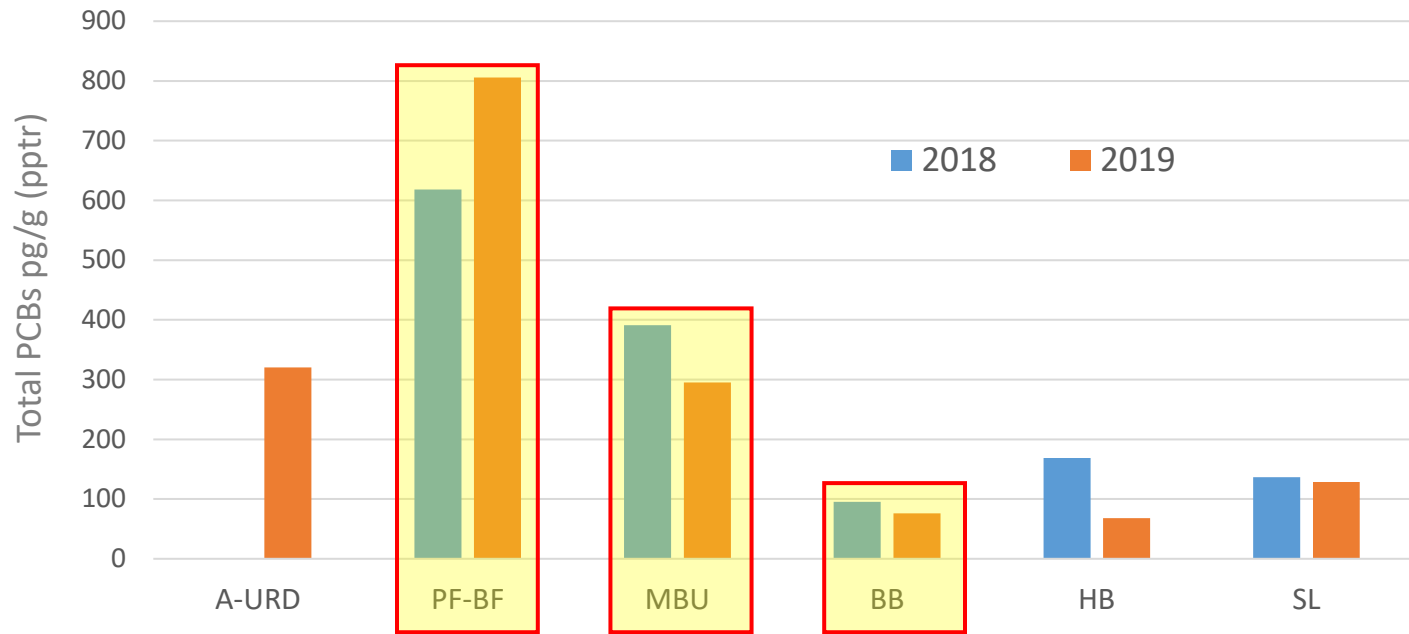
“Mission Reach”

Background Sites

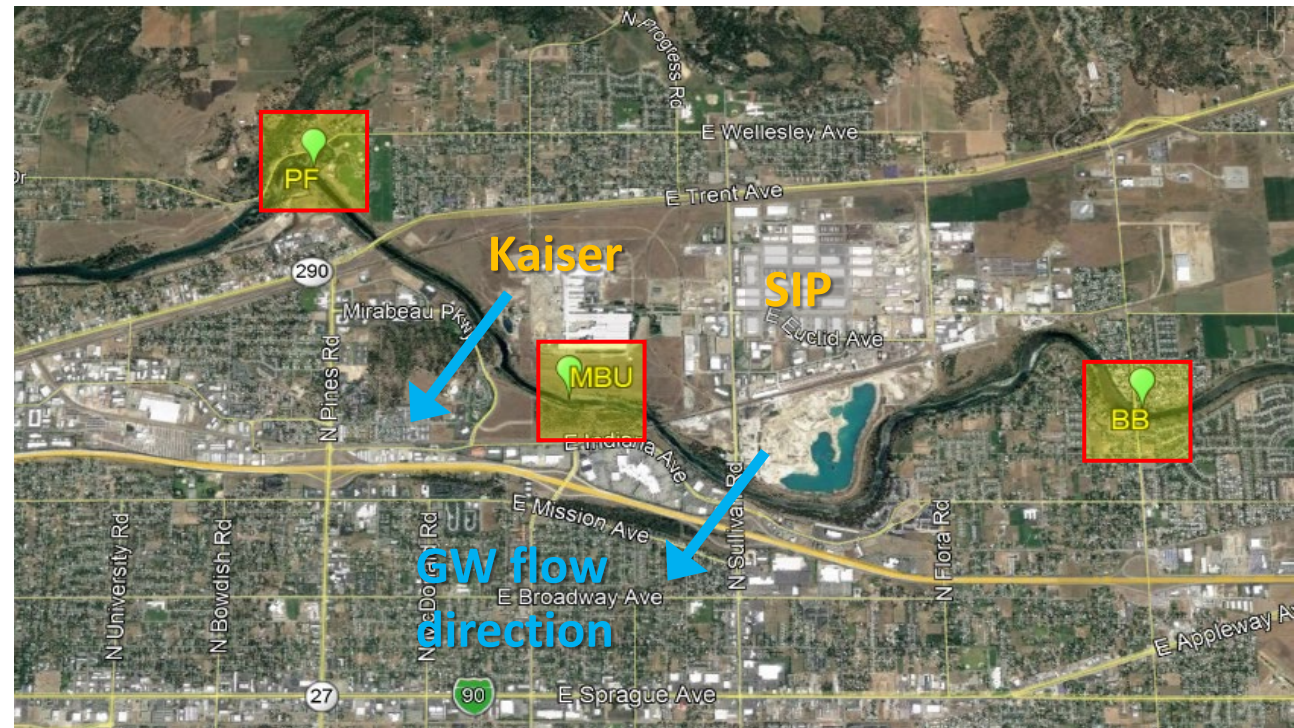
- = Source Areas in presentation
- = Not sampled in 2019

# Total PCBs in Biofilms 2018 and 2019

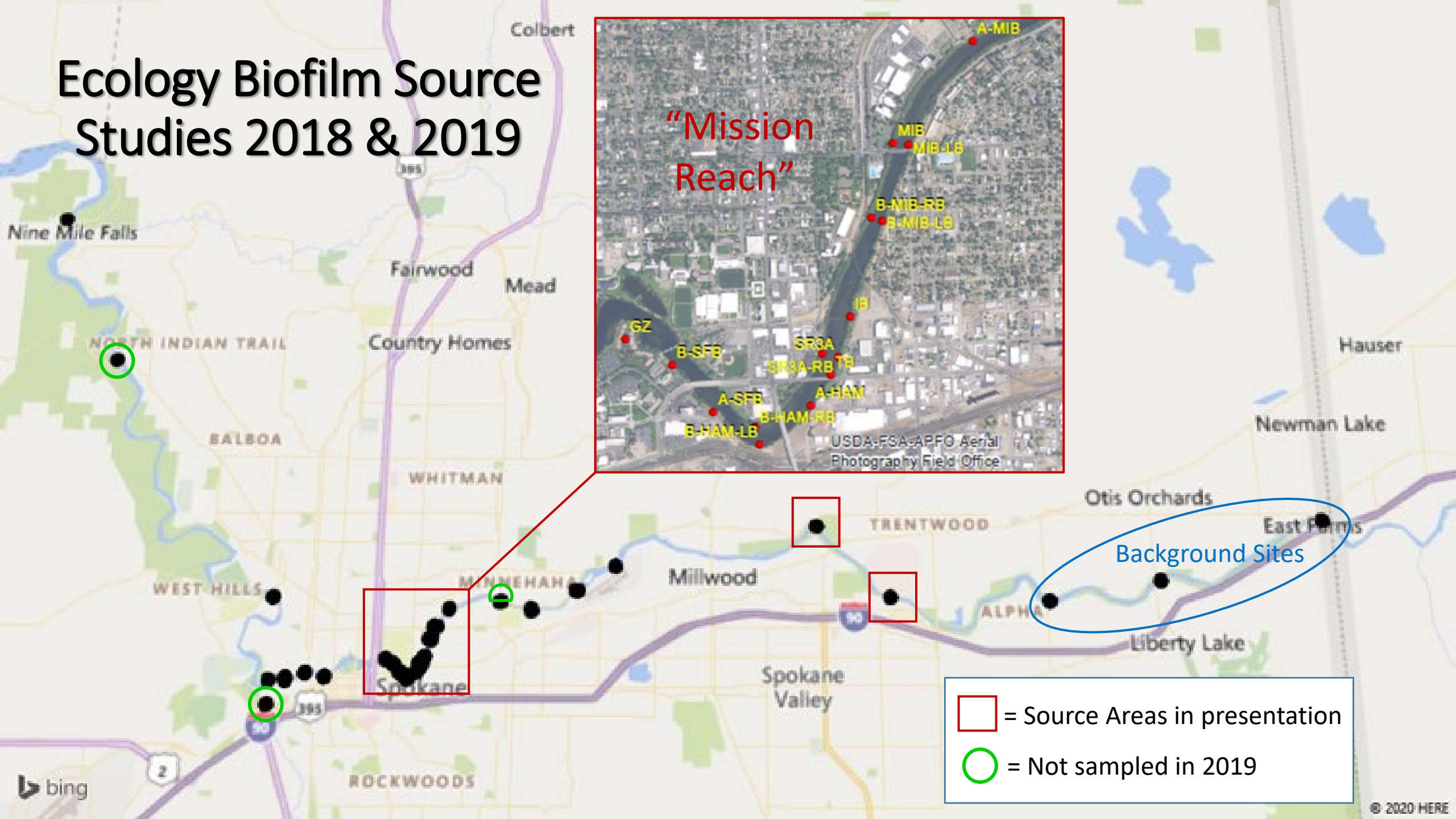




## Upriver Source Areas



# Ecology Biofilm Source Studies 2018 & 2019

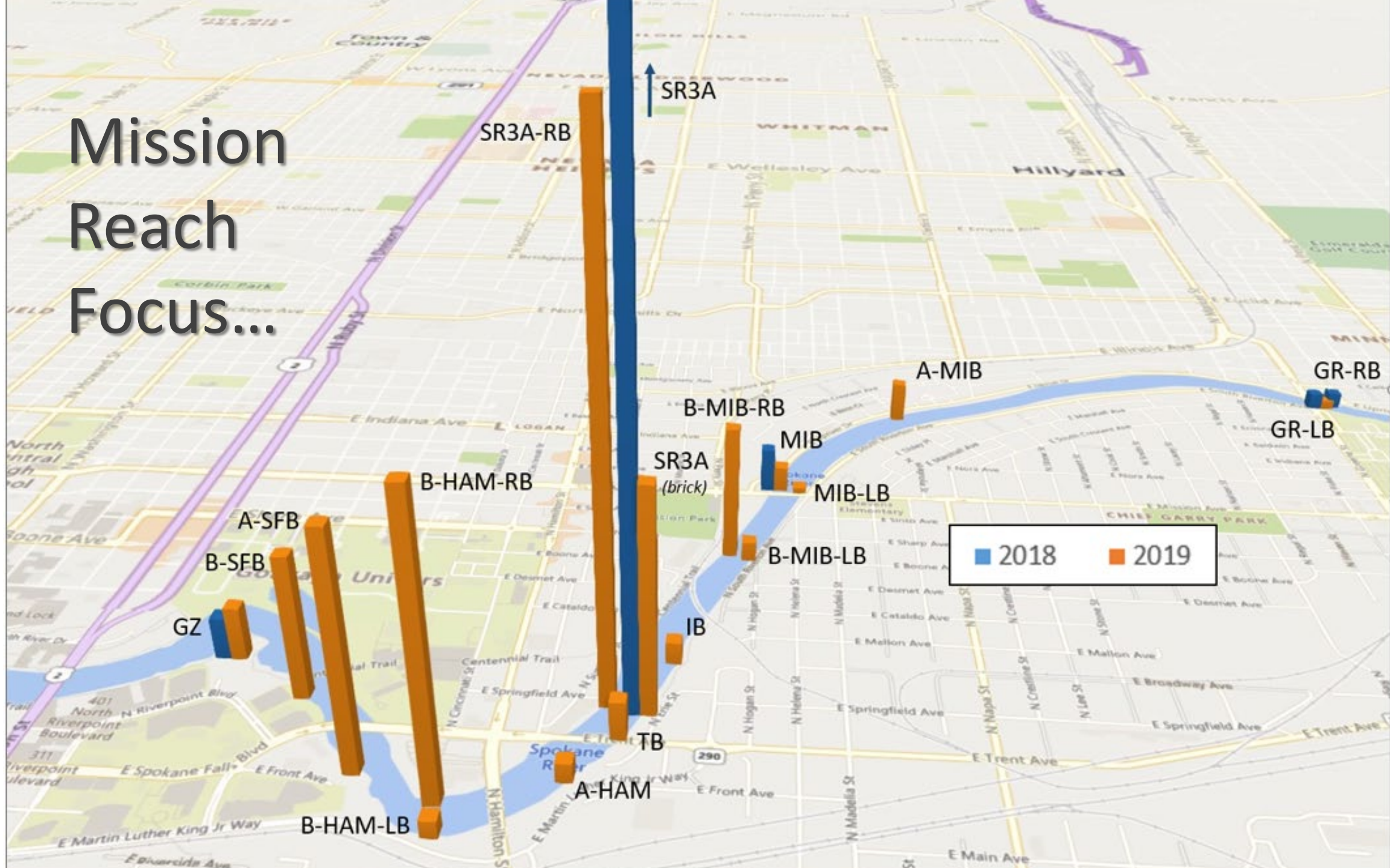


“Mission Reach”

Background Sites

- = Source Areas in presentation
- = Not sampled in 2019

# Mission Reach Focus...





# ➤ PCB Canine Survey

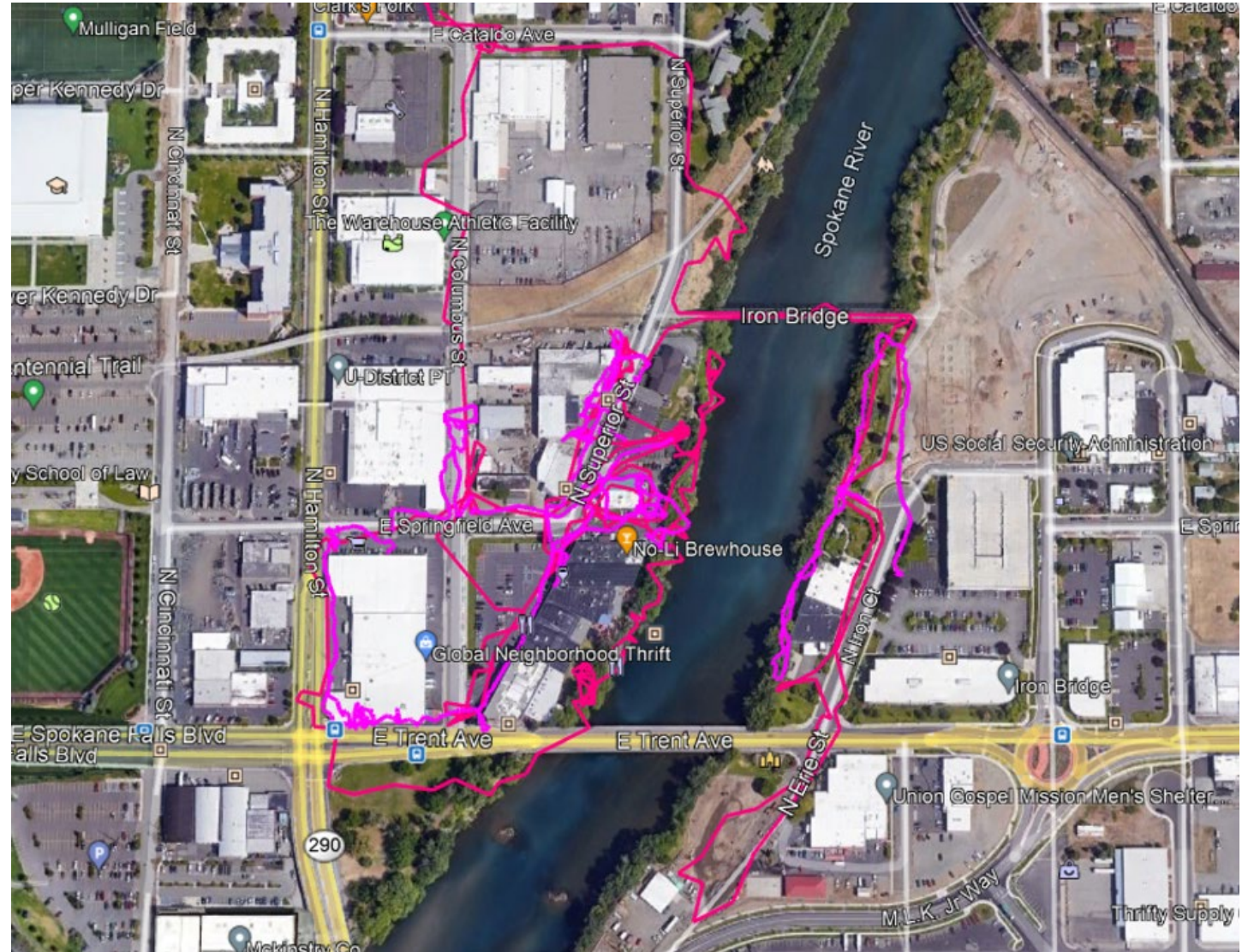
# Canine Detection Survey

(2021 Summer Low Flow)

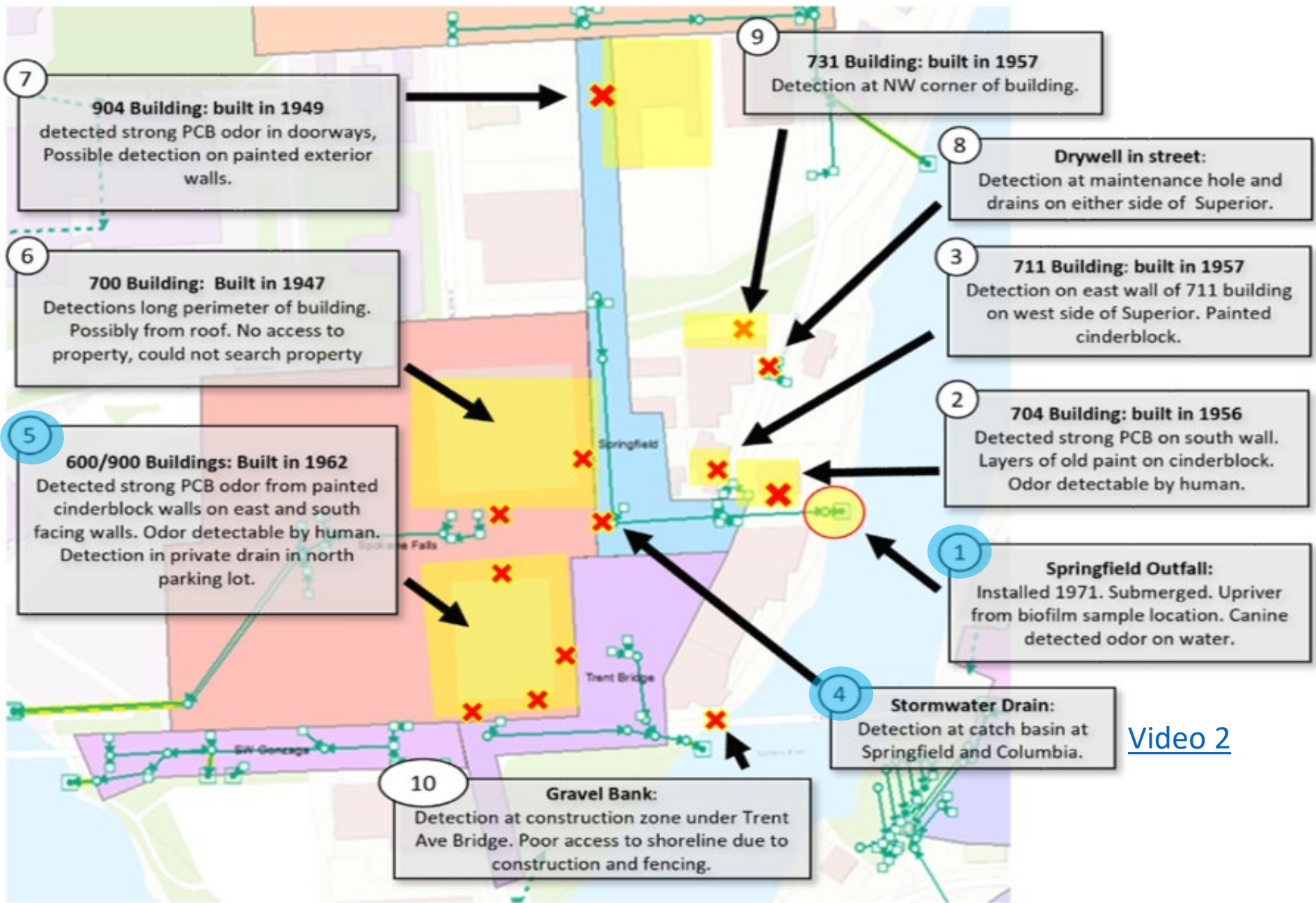
## Spokane Reach PCB Canine Surveys 2021



Julianne Ubigau & Jasper  
FieldLab Detection Services  
September 2021



# Canine PCB Detections: Overview with stormwater drainage basin layer.



[Video 1](#)

[Video 3](#)

[Video 2](#)

Canine Detection -  
600/900 Buildings  
Built in 1962



Canine Detection  
Springfield Storm Drain



Canine Detection  
Stormwater Outfall

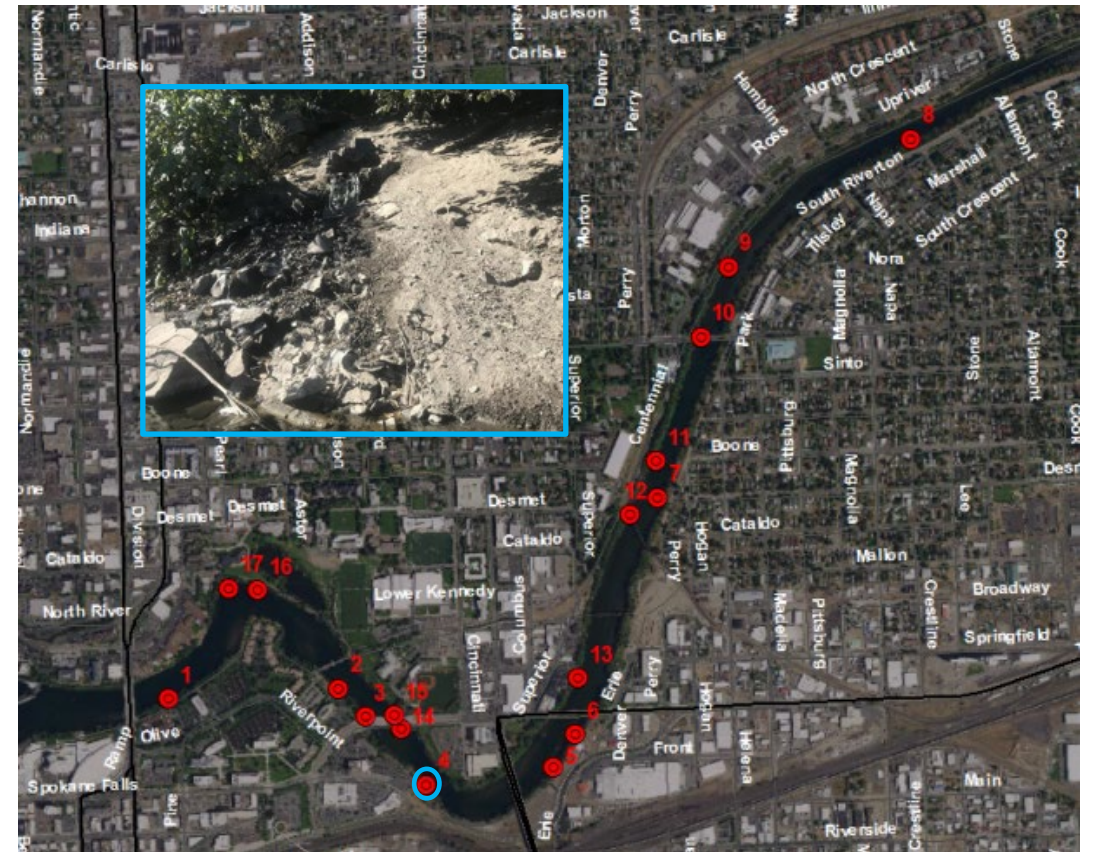
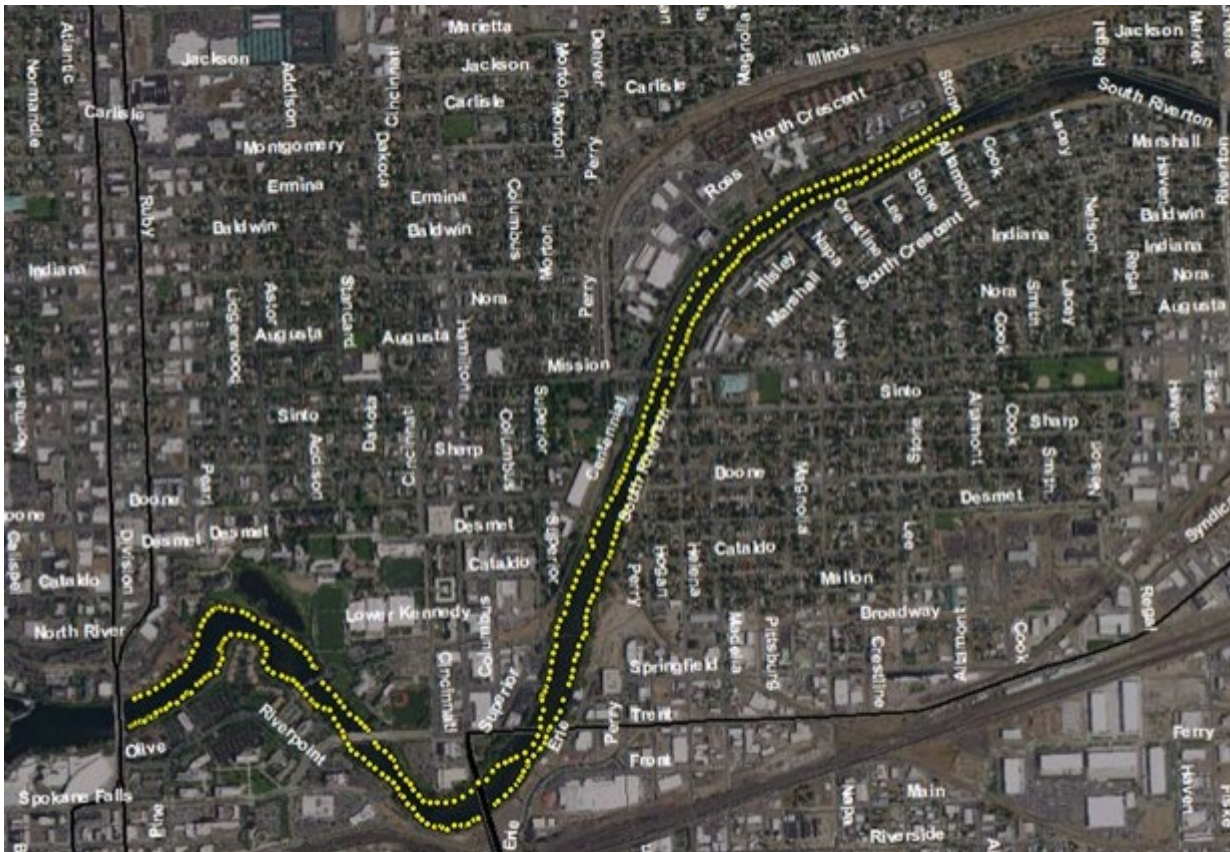


➤ Temperature Float

➤ Object Detection Survey

# Ecology Temperature Float

- 2020 Summer low flow
- No strong indicators of groundwater sources in core area
- Noted several features of interest including small artesian well

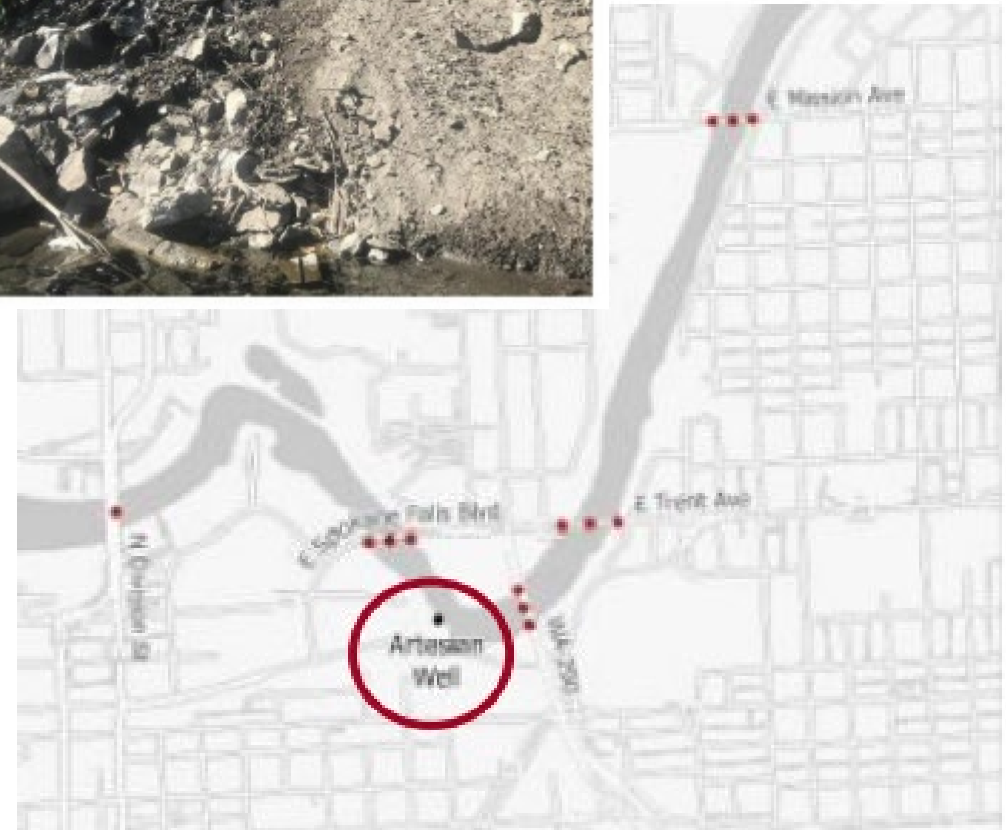




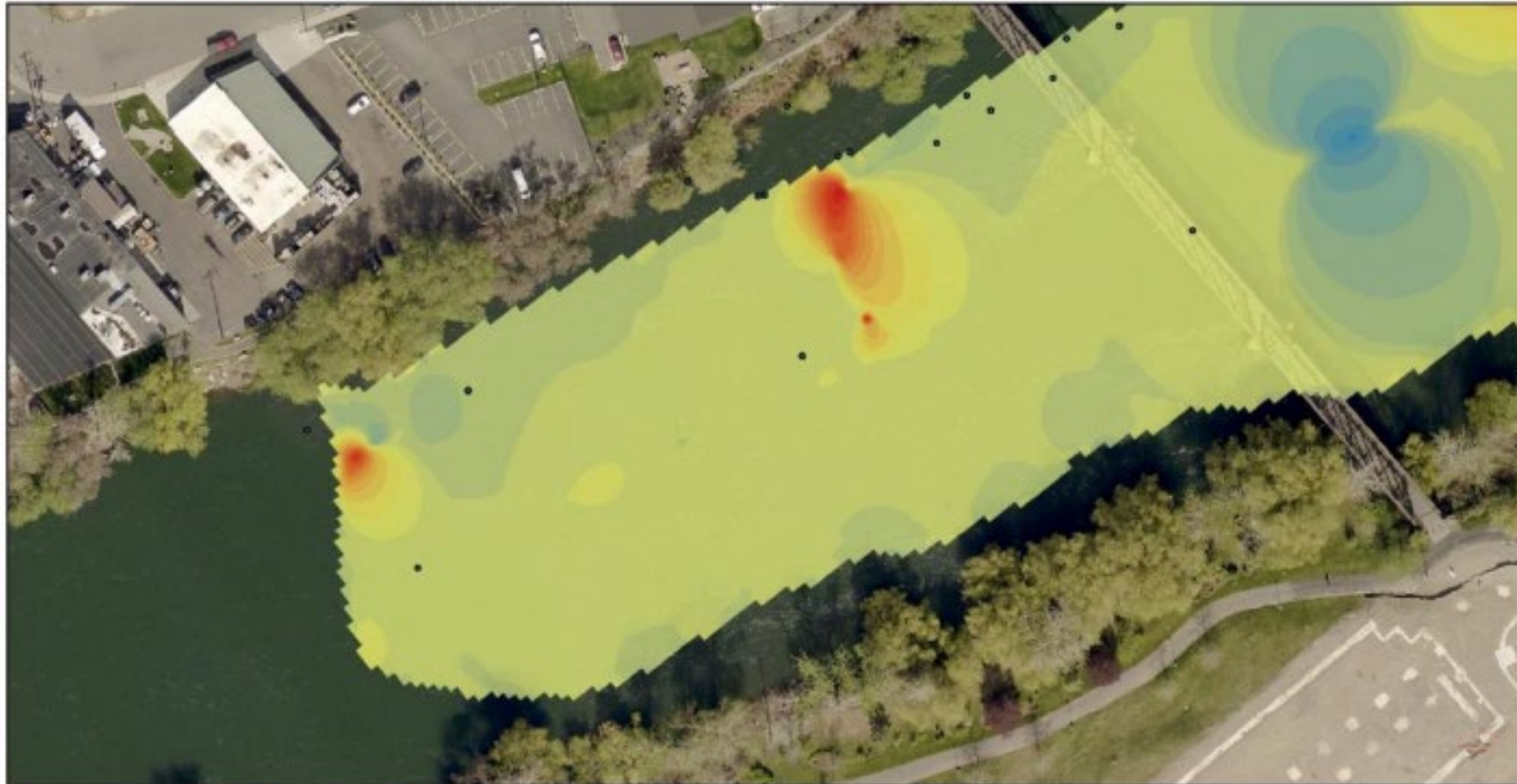
# SRRTTF Surface Water Sampling

2021 Summer Low Flow

- Ecology temperature float of river in 2020 identified presence of flowing well in Mission Reach
- 2021 water quality sampling showed elevated PCB concentrations in well
  - PCB concentration ~ 2000 pg/l measured during 2021 monitoring
  - PCB concentration measured in 2022 – preliminary results indicate similarly high concentration



# SRRTTF Sub-bottom Object Detection Survey



	Geodetic Settings		Survey Equipment				<b>Spokane River Regional Toxic Task Force</b> Mission Reach Object Detection No-Li dMidt SSS Targets October 14, 2021			
	Horizontal Datum: NAD 1983 ZONE 11 Vertical Datum: BT Geoid Model: GRS90 Horizontal Units: US Survey Feet Vertical Units: US Survey Feet Vertical Control: NA Horizontal Control: DGPS	SRS: 4326 Projection: UTM Datum: NAD 1983 Units: Meter Contour Interval: 0.5 Contour Style: Solid	Side Scan Sonar: Surfnet 550 Magnetometer: Marlin Magnetic Bowty HWA Controller: NA VIB ChirpKey CTD: VIB ChirpKey CTD Survey Date: OCT 14, 2021 Data Collection (Sampling Interval): 100PACK 360S Maximum E-Field Voltage: 8000S 10.4	7,200 - 8,028 4,626 - 3,363 3,360 - 2,046 2,038 - 1,368 1,367 - 776			175 - 377 376 - 111 110 - 22 21 - 221 222 - 620	621 - 1,152 1,153 - 1,750 1,751 - 2,348 2,349 - 2,947 2,948 - 3,545	3,546 - 4,210 4,211 - 5,074 5,075 - 5,530 5,531 - 7,458 7,459 - 8,852	Data Collector: LINTOUCH 64000 SSSP Name: LINTOUCH Operator: LINTOUCH Recorder: LINTOUCH

# Other Source Identification Activities

- Monitoring of PCBs in:
  - bottom sediments
  - stormwater catch basins
  - Water Column – 1 month composite in SPMD Samplers
- Historical land use assessment
- Groundwater flow direction study
- PCB-fingerprinting study
  - Correlated with 2018 GE Monitoring well data

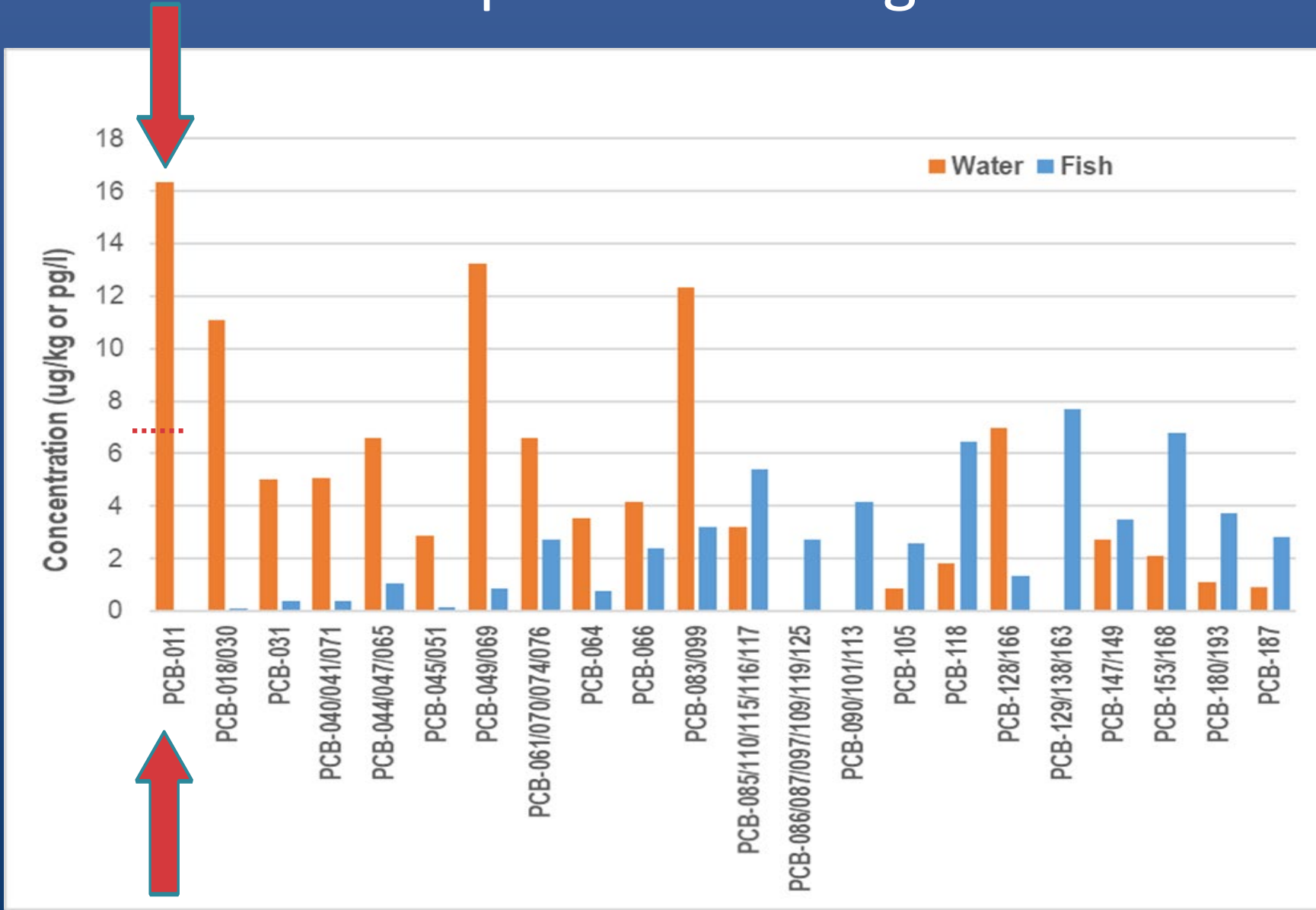
# Trends Assessment - Fish and Water Column

- Task Force has implemented consistent sampling programs to support future trend assessment
- Deployment of semi-permeable membrane devices (SPMDs) during three different seasonal flow regimes of each year
  - 2020-2021, 2022-2023
- Fish tissue sampling of juvenile redband trout
  - Fall 2020, Fall 2022

# Removal of PCBs

- WA WWTPs – 3 Municipal and 1 Industrial have all installed advanced treatment systems using membrane filtration
  - City of Spokane WWTP
  - Spokane County WWTP
  - Liberty Lake Sewer and Water District WWTP
  - Inland Empire Paper WWTP
  - IDAHO - Coeur d'Alene WWTP also has advanced treatment, City of Post Falls and HARSB, in process
- New Technology is **removing approximately 99%** of total PCBs that come into the plants
- Lighter weight congeners are more soluble – pass through membranes
- Some lighter weight congeners like PCB-11 are allowed to be produced in manufacturing processes today – under TSCA

PCB-11 is the most prevalent congener found in the river



# What's Next?

- EPA TMDL Process
- Finalize Analysis of 2022 Field Data by June 2023
  - Springfield Stormwater catchment data, sediment data
  - River Synoptic Survey and mass balance
  - GE Fingerprinting analysis
  - SPMD samples from low and medium flows for trend assessment
  - Fish tissue for Trend Assessment

