

Status/Update on Mission Reach Projects

Sources and Pathways of PCB-11: Initial Investigations

TTWG Meeting

August 30, 2021

Status/Update on Mission Reach Projects

Background

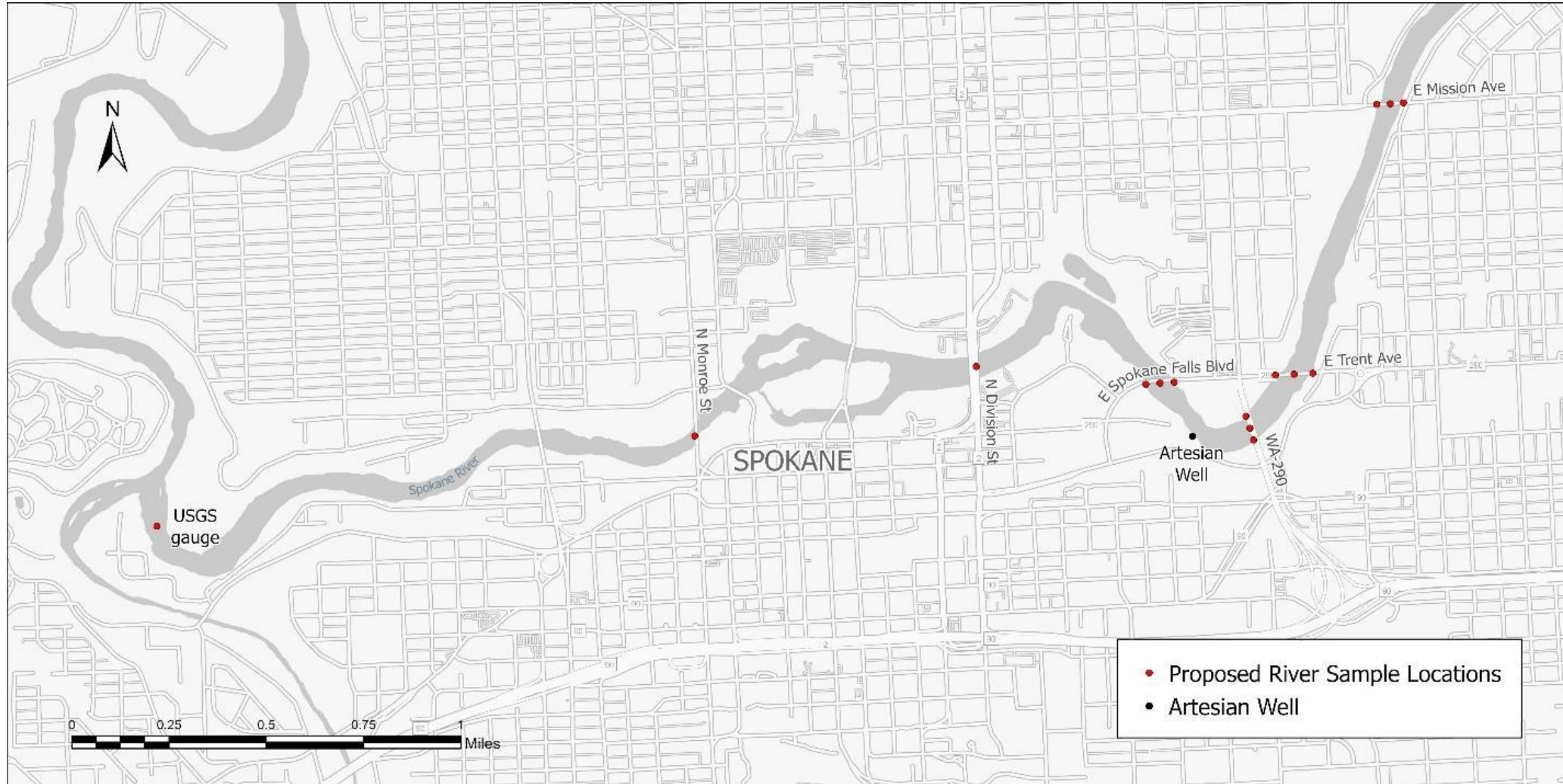
- Six tasks have received authorization from the Task Force
 - Low flow grab sampling of Mission Reach water column
 - Sampling of artesian well discharge
 - Sampling of Mission Reach bedded sediment
 - PCB-sniffing dog
 - Sub-bottom object detection survey
 - Feasibility assessment of temporary drive-point piezometers

Mission Reach Project Rationale

Low Flow Grab Sampling and Artesian Well

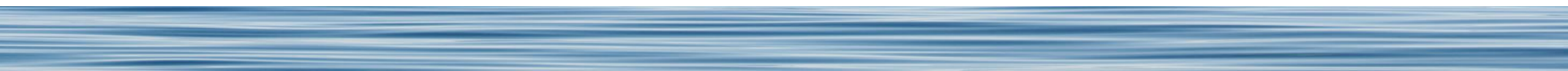
- Low flow grab sampling of Mission Reach water column
 - Pre-2020 Task Force water column sampling has been located upstream or downstream of Mission Reach
 - Biofilm monitoring and low flow SPMD sampling indicate localized contamination
 - Low flow grab sampling this summer will provide description of spatial distribution of PCBs in Mission Reach
- Sampling of artesian well discharge
 - Temperature float conducted by Ecology identified presence of flowing well in Mission Reach
 - Opportunistic sampling to determine PCB concentrations in groundwater

Water Sampling Locations



Mission Reach Project Rationale

Sampling of Mission Reach Bedded Sediment

- Conventional wisdom has been that presence of bedded sediments is too limited to be a significant source of PCB contamination in Spokane
 - Gravity Consultants noted presence of several sediment deposits in Mission Reach during SPMD deployment
 - Sediment samples will be collected at three Mission Reach locations TBD
 - Results will be assessed to determine if bedded sediments are contributing to Mission Reach contamination
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Mission Reach Project Rationale

PCB-Sniffing Dog and Sub-Bottom Object Detection

- Nature of observed Mission Reach PCB contamination (spatially-localized, no obvious sources) implies that buried objects may be the cause
- PCB-sniffing dog
 - Successfully applied elsewhere to identify PCB sources
 - Focus on bank-side areas
- Sub-bottom object detection
 - Magnetometer sensor to identify possible ferrous objects
 - Items identified by magnetometer would be further investigated by underwater imaging (i.e., side scan sonar and/or towed video camera)
 - Potential sources identified by magnetometer, but not visually identified, receive subsequent assessment with ground penetrating radar

Mission Reach Project Rationale

Feasibility Assessment of Temporary Drive-Point Piezometers

- Temporary drive-point piezometers are being used as part of DO TMDL to assess groundwater phosphorus concentrations entering river
- Goal is to determine whether this method is feasible to measure groundwater PCB concentrations entering Mission Reach in future
 - Public/regulatory access, substrate feasibility
 - Long-term feasibility also depends on results of subsequent groundwater elevation monitoring study
- Up to three wells to be installed
 - Compare groundwater conductivity and temperature to that of river

Mission Reach Projects

Status

- QAPP covering all tasks is out for signature approval
- Scopes developed/contracts issued for subs
- PCB-sniffing dog to be deployed imminently
- Low flow water column/sediment/artesian well sampling and piezometer assessment to commence next week
- Sub-bottom object detection *may* commence next week
 - Postpone to late September if river levels are too low to allow boat deployment

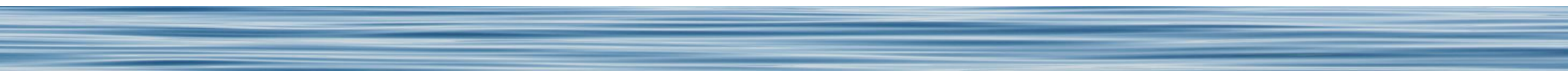
Sources and Pathways of PCB-11: Initial Investigations



Sources and Pathways of PCB-11: Initial Investigations Background

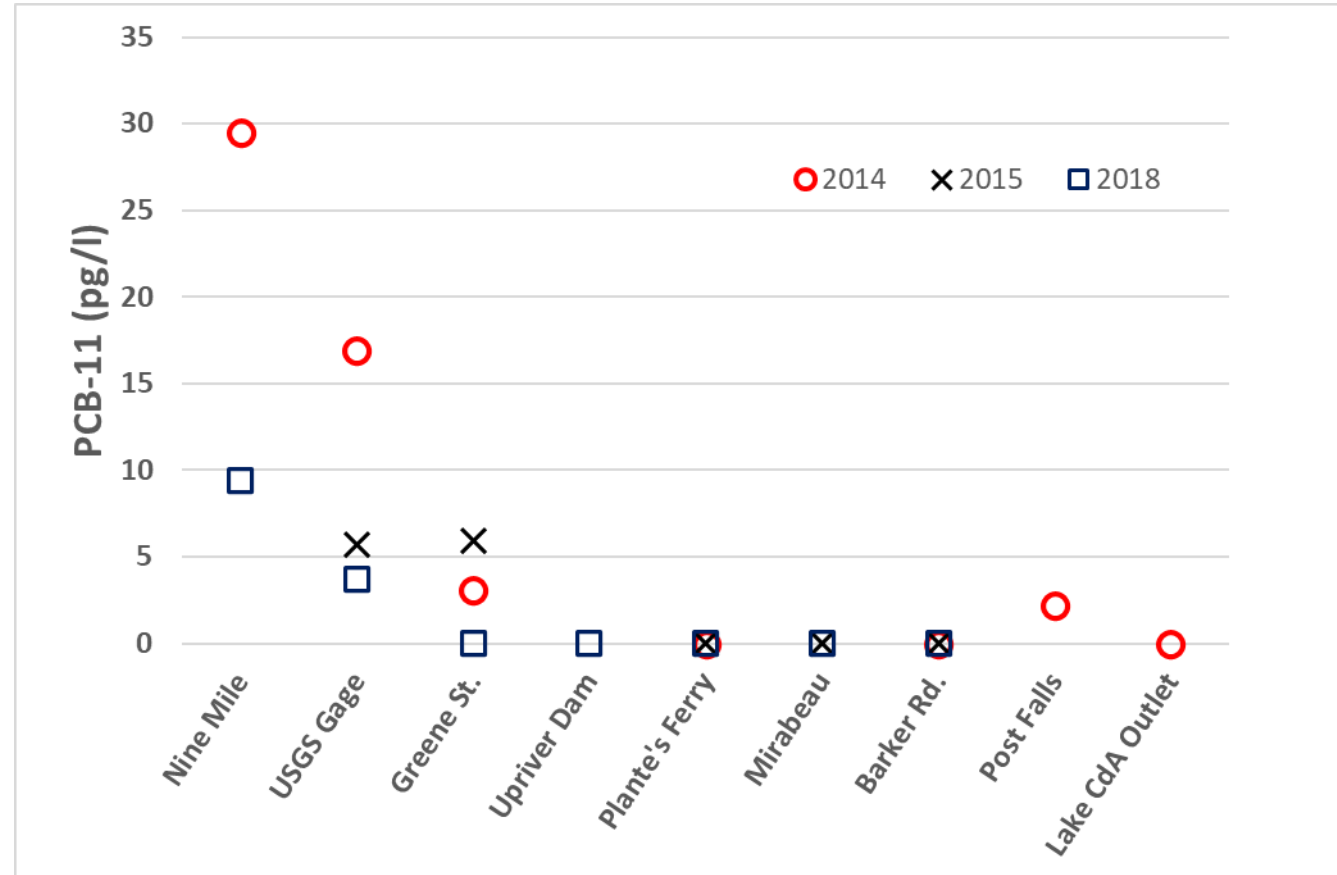
- PCB-11 is of particular interest in the Spokane River watershed because of its prevalence in the water column
 - Desire to identify the sources of PCB-11
- Objective: Conduct mass balance for PCB-11 to identify:
 - What are the predominant known sources?
 - How important are unknown sources?

Approach

- Compile blank-corrected PCB-11 data from instream and discharges
 - Conduct mass balance assessment
 - 2014, 2015, and 2018 synoptic surveys
 - Similar to what was done previously for total PCBs and individual homologs
 - Calculate magnitude of loading from known and unknown sources
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Spokane River PCB-11 Concentrations

- Consistent pattern across all three surveys
 - Concentrations essentially indistinguishable from blanks at Upriver Dam and upstream
 - Concentrations increase at Greene St. and downstream



Known External Loading Sources

- City of Spokane and Inland Empire Paper are the largest known contributors of PCB-11
 - 4 to 6 mg/day
- Spokane County at intermediate level
 - 1 to 1.5 mg/day
- All other known sources less than 0.15 mg/day

Time Period	Lake Coeur d'Alene Outlet	Post Falls WRF	Liberty Lake WRF	Kaiser Aluminum	IEP	Spokane County RWRF	Latah/ Hangman Ck.	City of Spokane RPWRF
2014	0	0.13	0.10	0	4.35	1.27	0.12	5.72
2015	-	-	-	0	4.05	1.45	-	-
2018	-	-	-	0	4.22	1.17	0	4.05

Mass Balance Results

- Discounting 2014 “USGS Gage to Nine Mile” Results

Time Period	River Reach								Total
	Lake CdA to Post Falls	Post Falls to Barker	Barker to Mirabeau	Mirabeau to Plante’s Ferry	Plante’s Ferry to Upriver	Upriver to Greene	Greene to USGS Gage	USGS Gage to Nine Mile	
2014	2.8	-3.3	-0.94		40.7			-	40.4
2015	-	-	0	0	6.2		-1.9	-	4.3
2018	-	-	0	0	-4.2	-1.2	10.7	19.4	24.7

Mass Balance Results

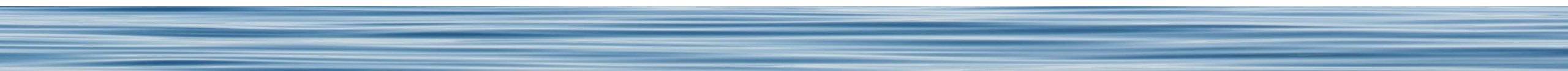
- Including 2014 “USGS Gage to Nine Mile” Results

Time Period	River Reach								Total
	Lake CdA to Post Falls	Post Falls to Barker	Barker to Mirabeau	Mirabeau to Plante’s Ferry	Plante’s Ferry to Upriver	Upriver to Greene	Greene to USGS Gage	USGS Gage to Nine Mile	
2014	2.8	-3.3	-0.94		40.7			31.8	72.2
2015	-	-	0	0	6.2		-1.9	-	4.3
2018	-	-	0	0	-4.2	-1.2	10.7	19.4	24.7

Summary

- PCB-11 concentrations are essentially indistinguishable from blanks in upper portion of study area (i.e., Upriver Dam and upstream)
- PCB-11 concentrations in lower portion of study area are at levels greater than can be explained by known loading sources
- The magnitude of the unexplained load appears large relative to known sources
 - Largest individual known load is 5.7 mg/day
 - Unexplained load ranges from 4 to 40 (or 72) mg/day
- Potential source(s) of unexplained load not yet identified?
 - Discussion

Other TTWG Projects Included in Biennial Workplan

- Scoped/costed
 1. Groundwater elevation monitoring
 2. Trent Avenue Bridge samples
 - Additional samples now available
 - How many, if any, do we have analyzed?
 3. Selective low flow water column synoptic sampling
 4. Long term effectiveness monitoring – water column and fish (2022-2023)
 - Not yet scoped/costed:
 1. Temporary drive point piezometers for Mission Reach
 2. Additional Biofilm sampling
 3. High flow sampling to ID non-point sources
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Historical Assessment for Mission Reach

- Review prior studies to make sure that we are taking full advantage of available data
- Studies initially identified
 - Ecology, 1995. Department of Ecology 1993-94 Investigation of PCBs in the Spokane River
 - Ecology, 1996. Spokane River PCB Source Monitoring Follow-up Study November and December 1995
 - Serdar, D., et al , 2011. Spokane River PCB Source Assessment - 2003-2007
 - Fernandez, 2012. Spokane River Urban Waters Source Investigation and Data Analysis Progress Report, (2009 – 2011).
 - Others?