Understanding the Factors Affecting PFAS Variability in the Potomac River Watershed
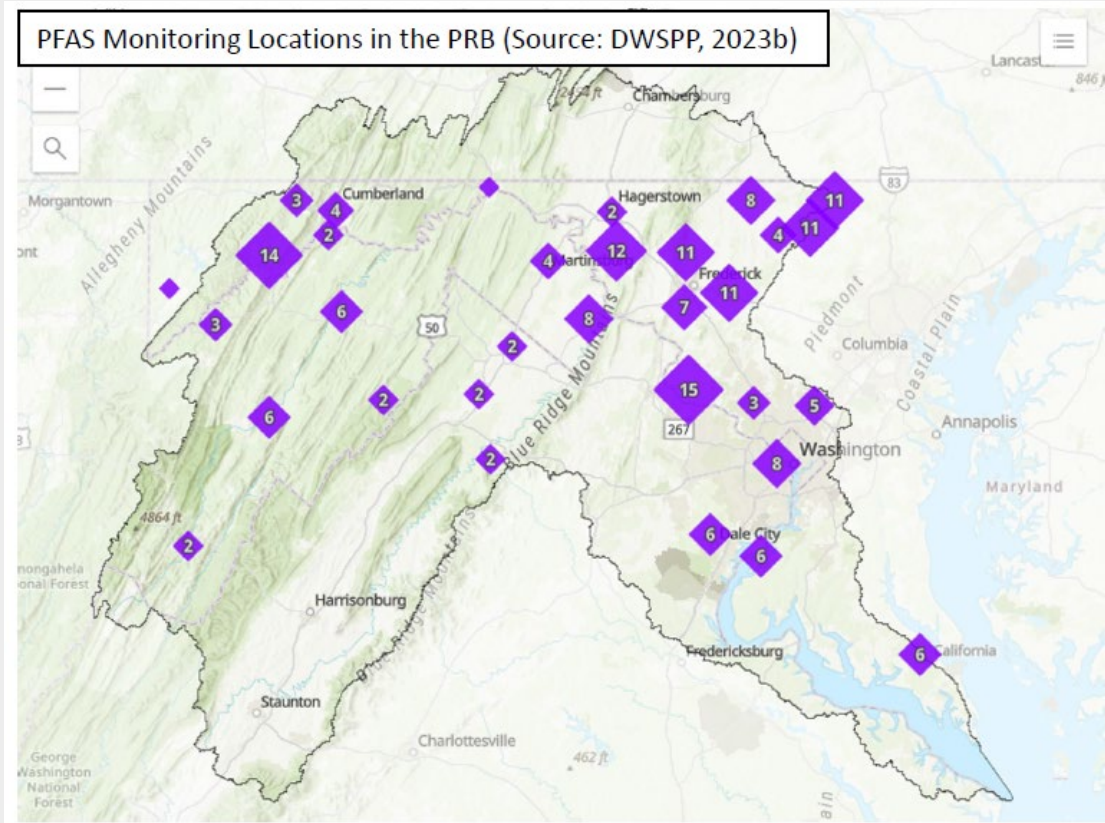
Bradley Schmitz, Ph.D. (Loudoun)

PFAS in Potomac River

PFAS Monitoring Locations in the PRB (Source: DWSPP, 2023b)

Proposed MCL Regulations

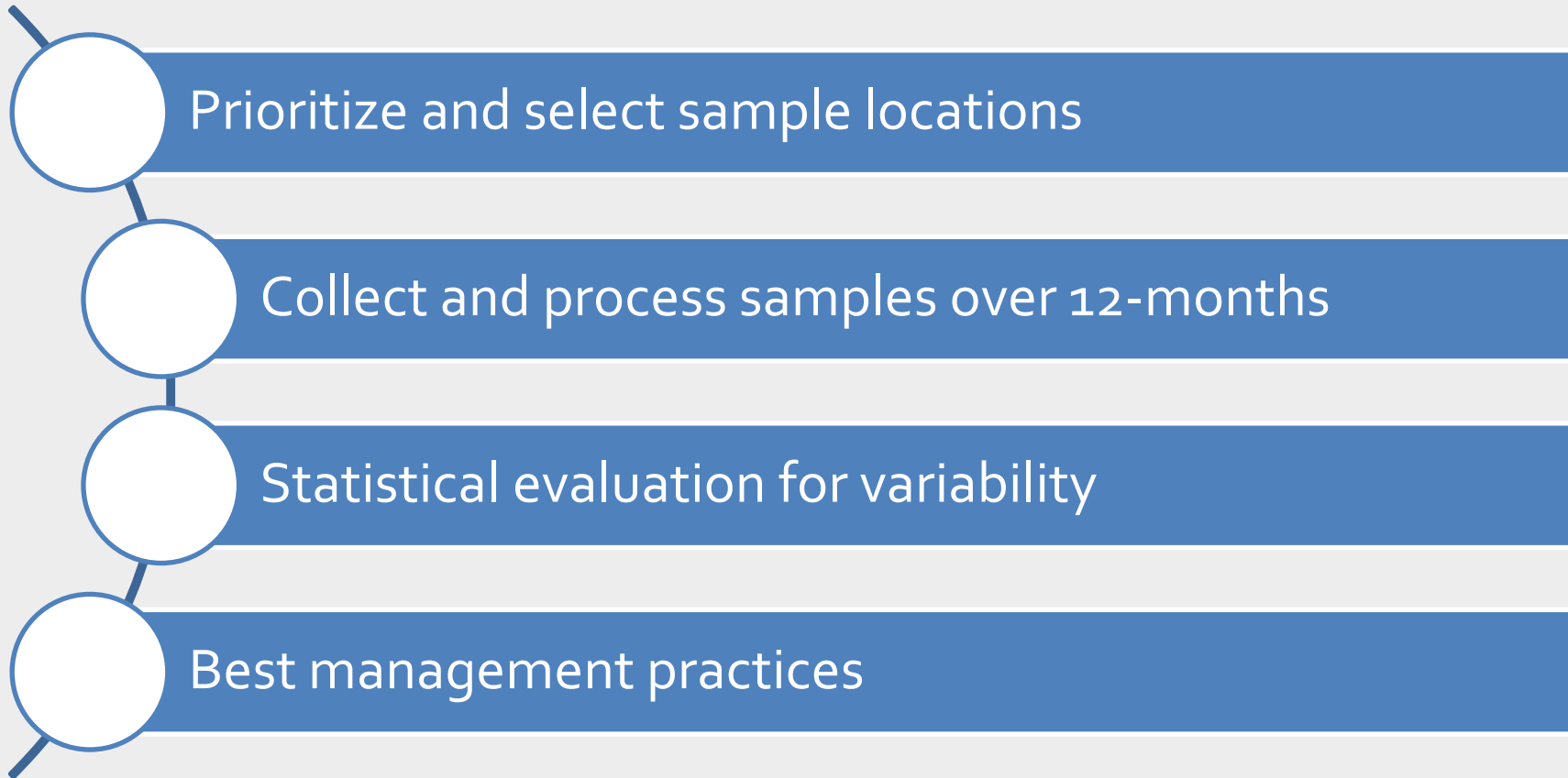| Analyte	Loudoun Water and VDH Joint Voluntary Sampling Events (parts per trillion or ppt)	EPA Proposed Regulation as of March 14, 2023
PFOS	Non-detect	4 ppt
PFOA	non-detect – 4.5 ppt[1]	4 ppt
PFBS	non-detect	1.0 Hazard Index[2]
PFHxS	non-detect	
PFNA	non-detect	
HFPO-DA (Gen X)	non-detect	

PFAS Variability

Tailored Collaboration

- WRF will provide 1:1 cash match up to $150,000

- Must be sponsored by a utility WRF subscriber

The Tailored Collaboration (TC) Program is a matching program designed to support utility-specific/regional issues. It provides an opportunity for subscribing utilities to partner with WRF on regional research projects or projects that address issues of interest to a significant subgroup of WRF subscribers. Each year, 20% of WRF's budget is allocated to this program.

PFAS Proposal Objectives

LOUDOUN WATER

- Prioritize and select sample locations
- Collect and process samples over 12-months
- Statistical evaluation for variability
- Best management practices

Task 1: Sample Design

LOUDOUN WATER

> Objective: Identify sample locations based on potential PFAS sources
>
> Deliverable: Methods to prioritize PFAS sample across a large geographical area

- WaterSuite

- EPA ECHO PFAS Tool

- Fed/State Agency Data

- PFAS Project Lab

- Facility Registry Service

- EWG PFAS Map

Task 2: Sampling & Analysis

Objective: Measure PFAS and precursor concentrations in the Potomac River

Deliverable: Dataset of FPAS and precursors compounds in the Potomac River
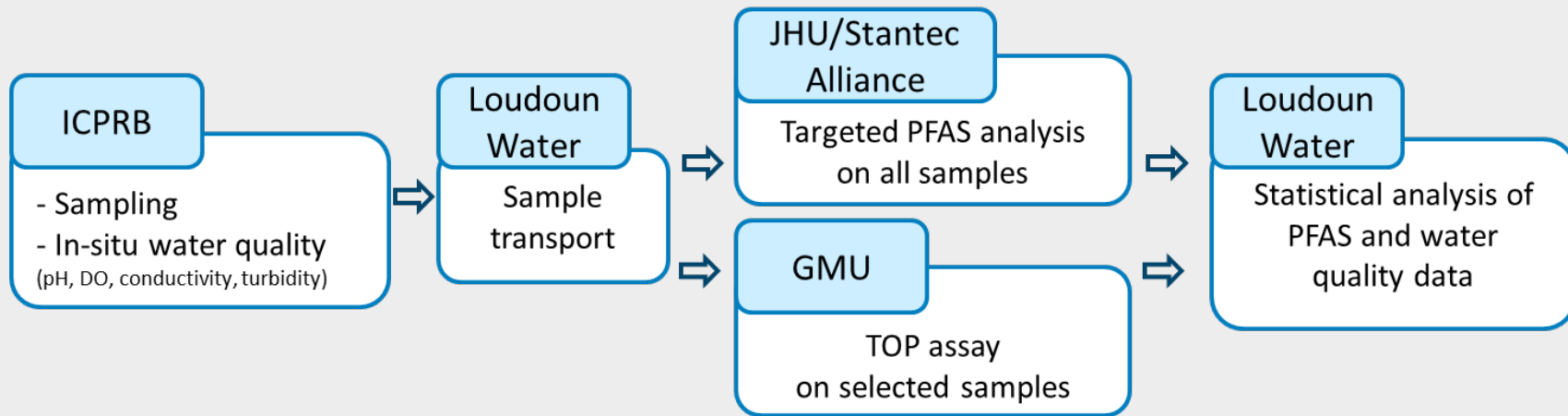
Sample Collection and Processing

Task 3: Data Evaluation

LOUDOUN WATER

> Objective: Determine factors affecting variability in PFAS/precursors levels
>
> Deliverable: Statistical relationships between PFAS and factors responsible for variability

| Data Sources	Potential Parameters
In-situ sample collection	Temperature, pH, DO, Conductivity, Turbidity
USGS	Flow, Temperature, pH, DO, Conductivity, Turbidity, Nitrogen
NOAA	Temperature, Precipitation, Wind
Source Water Intakes*	Flow, Temperature, pH, DO, Conductivity, Turbidity, TOC, TSS, PFAS
Wastewater Effluents*	Flow, Temperature, pH, Turbidity, TSS, Oxygen Demands, Nitrogen, Phosphorous, PFAS, Microplastics

* Utilities may provide data voluntarily

Task 4: Perspectives Workshop

LOUDOUN WATER

Objective: Document potential mitigation strategies and BMPs

Deliverable: Potential mitigation strategies and BMPs to limit PFAS contamination

- Hear perspectives from various stakeholders

- Brainstorm mitigation & prevention actions

- Document perspectives

- Consider next-steps
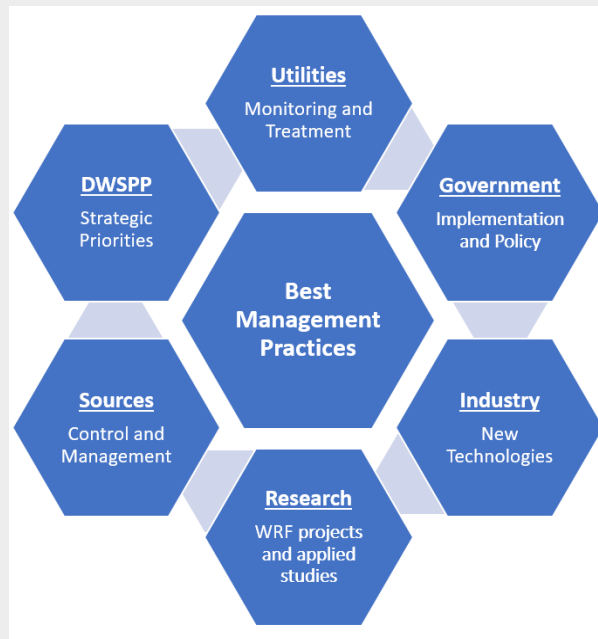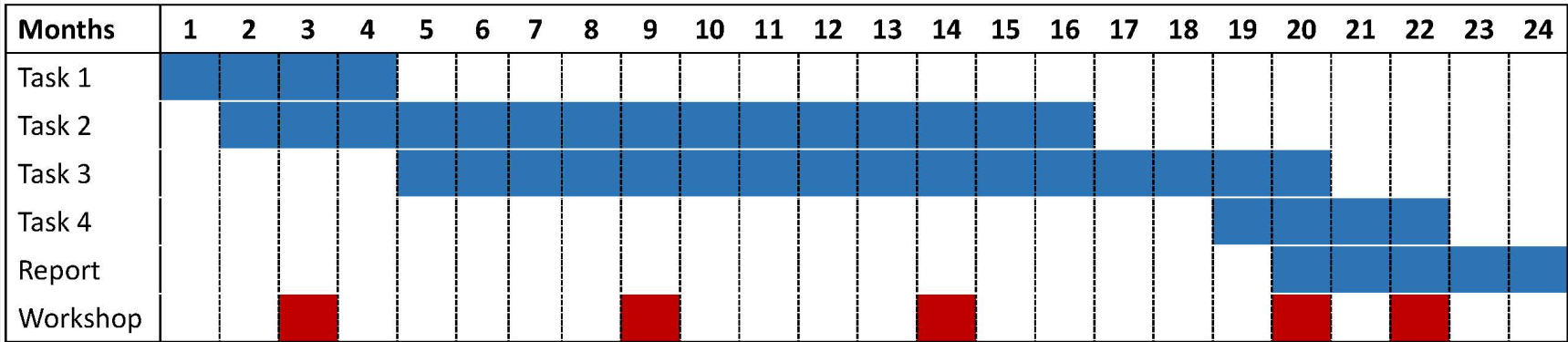
- Workshop 1: Determine sample locations
- Workshop 2: Initial results update from JHU/GMU
- Workshop 3: Intermediate results and statistics planning
- Workshop 4: Final results and statistical summary
- Workshop 5: Prioritize strategies & BMPs

Workshops will be held outside of DWSPP meetings, but DWSPP will provide updates

![Loudoun Water logo]

Principal Investigators
- Loudoun Water, VA*
- Statec*
Johns Hopkins University
- George Mason University
- WSSC Water, MD*
- Interstate Commission on the Potomac River Basin*

Non-Utility Partner
- Metropolitan Washington Council of Governments*

Collaborating Utility
- DC Water, DC*
- Fairfax Water, VA*
- Town of Leesburg, VA
- City of Hagerstown, MD

Associate Utility
- Washington Aqueduct, DC*
- Frederick County, MD
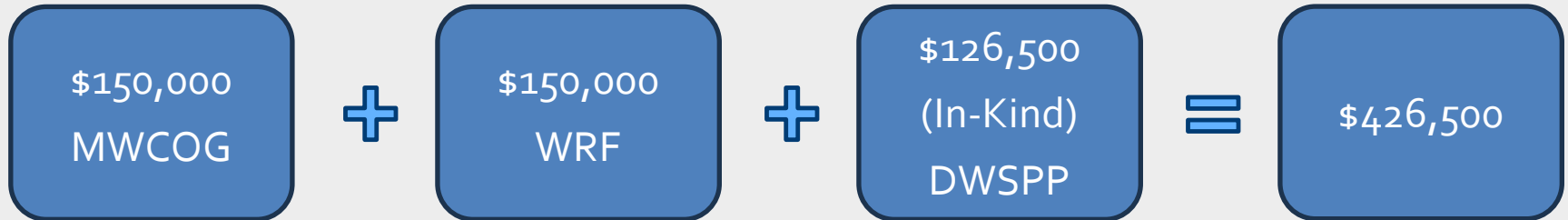- Berkeley County, WV
- City of Rockville, MD

* Denotes WRF subscriber

Leadership & Value Gained

- Region-wide collaboration
- Research 'dream team'
- 'Blueprint' for other regions to establish PFAS collaborations

$150,000 MWCOG **+** $150,000 WRF **+** $126,500 (In-Kind) DWSPP **=** $426,500

Thank you!

bschmitz@loudounwater.org

LOUDOUN WATER
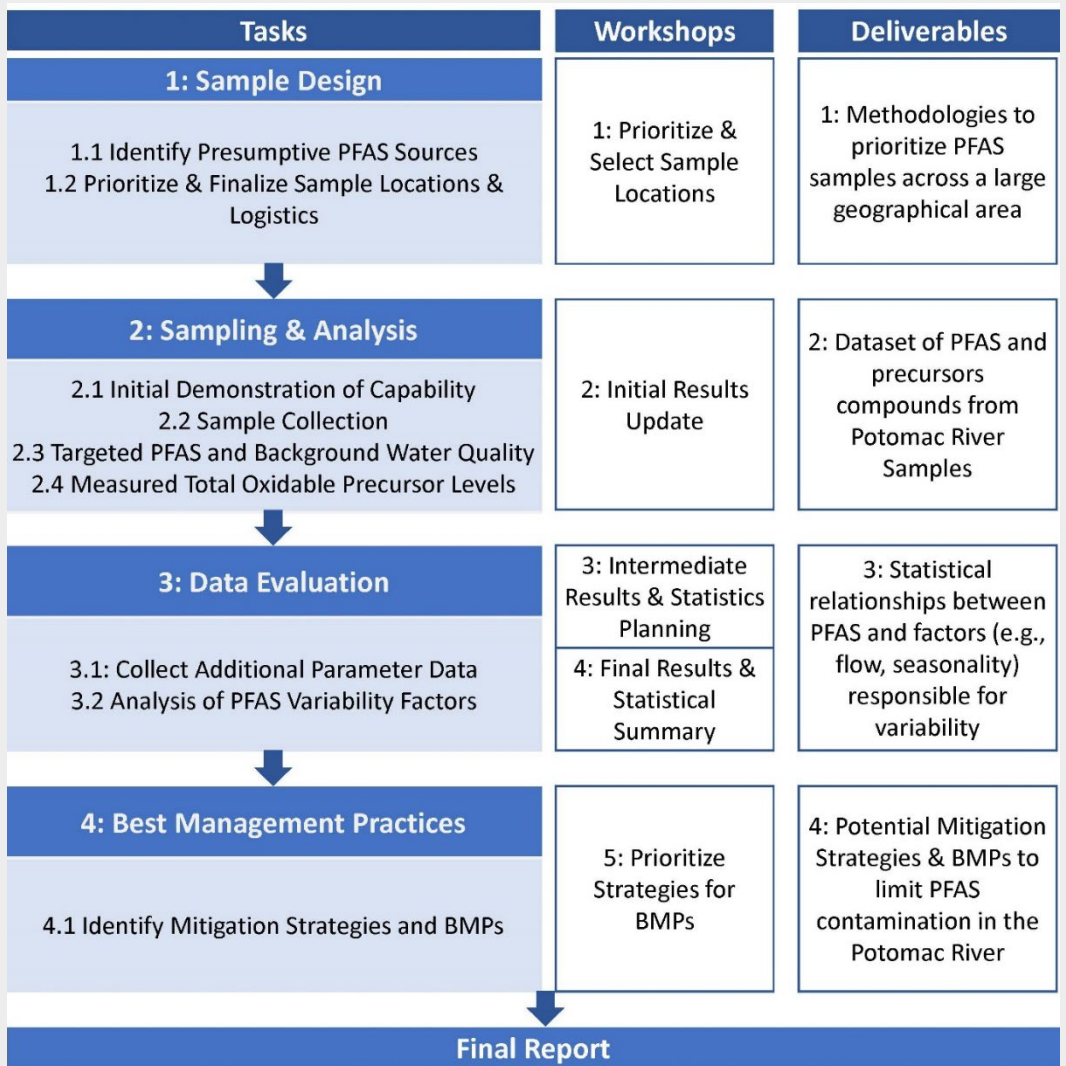
DWSPP CEC Workgroup

- Utilities, USGS, researchers, citizen groups have all collected PFAS data...inconsistent results

- A cohesive, region-wide approach is necessary

- DWSPP provides an opportunity for collaboration

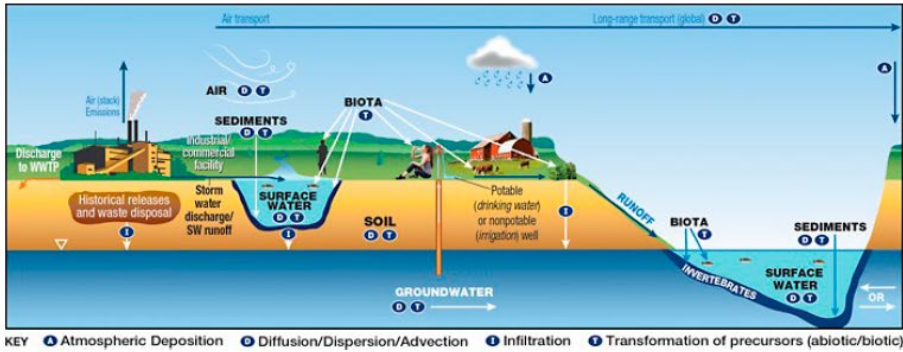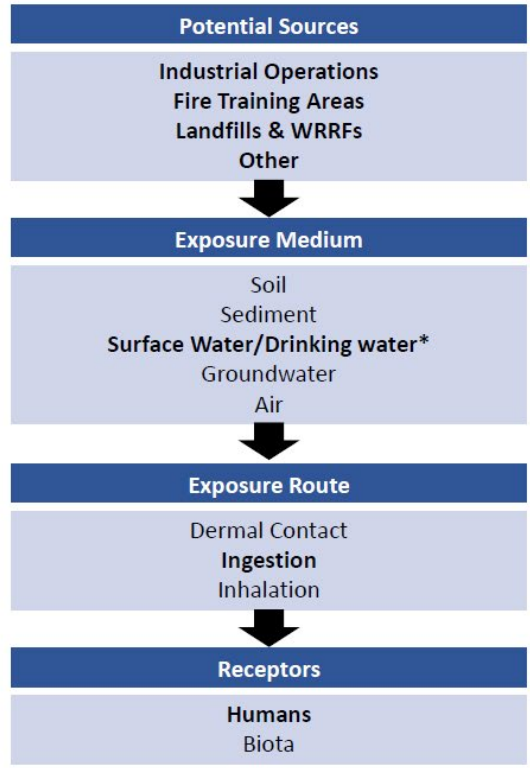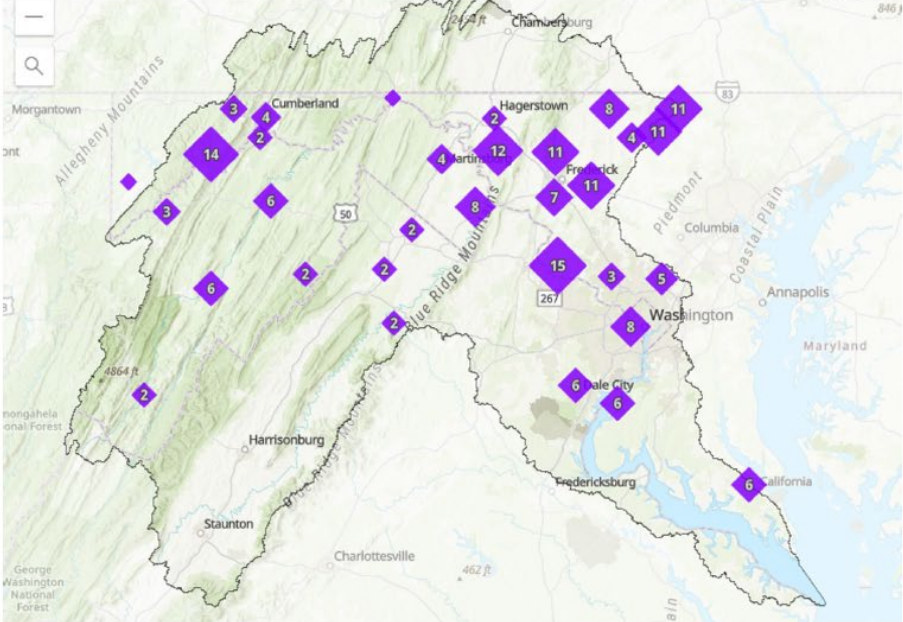A CSM shows the relationship between contaminant sources and receptors through potential or actual migration & exposure pathways.

Example Graphical CSM for industrial site
(Source: ITRC, 2022)

KEY **A** Atmospheric Deposition **D** Diffusion/Dispersion/Advection **I** Infiltration **T** Transformation of precursors (abiotic/biotic)

PFAS Monitoring Locations in the PRB (Source: DWSPP, 2023b)

Potential Sources

Industrial Operations
Fire Training Areas
Landfills & WRRFs
Other

Exposure Medium

Soil
Sediment
Surface Water/Drinking water*
Groundwater
Air

Exposure Route

Dermal Contact
Ingestion
Inhalation

Receptors

Humans
Biota

* Surface water is the source of drinking water for the major utilities in the PRB. While PFAS has several exposure pathways, the focus of this study incorporates determination of PFAS variability in surface water.

WATER

JHU Limits of Detection

Compound	MDL (ng/L)	Compound	MDL (ng/L)	Compound	MDL (ng/L)
PFPrA	0.45	PFTreA	0.44	8:2 FTS	0.27
PFBA	0.49	PFPrS	0.11	FBSA	0.54
PFPeA	0.36	PFBS	0.18	FHxSA	0.45
PFHxA	0.30	PFPeS	0.16	PFOSA	0.29
PFHpA	0.13	PFHxS	0.26	N-MeFOSAA	0.54
PFOA	0.17	PFHpS	0.24	N-EtFOSAA	0.89
PFNA	0.21	PFOS	0.41	HFPO-DA	0.11
PFDA	0.24	PFNS	0.47	ADONA	0.14
PFUdA	0.29	PFDS	0.68	9Cl-PF3ONS	0.41
PFDoA	0.43	4:2 FTS	0.20	11Cl-PF3OUdS	1.04
PFTriA	2.82	6:2 FTS	10.31		

Notes: LoDs are for drinking water, using EPA Methods 533/537.1

Organization	Cash co-funding	In-kind	Total
Loudoun Water	$0	$40,000	$40,000
Stantec	$0	$10,000	$10,000
Johns Hopkins	$0	$0	$0
George Mason	$0	$10,000	$10,000
ICPRB	$0	$7,500	$7,500
DWSPP Utilities	$0	$49,000	$49,000
MWCOG	$150,000	$10,000	$160,000
Funds from WRF	$150,000	-	$150,000
Total	$300,000	$126,500	$426,500