DWSPP WORKSHOP: DEVELOPING A RESEARCH STRATEGY FOR THE POTOMAC WATERSHED

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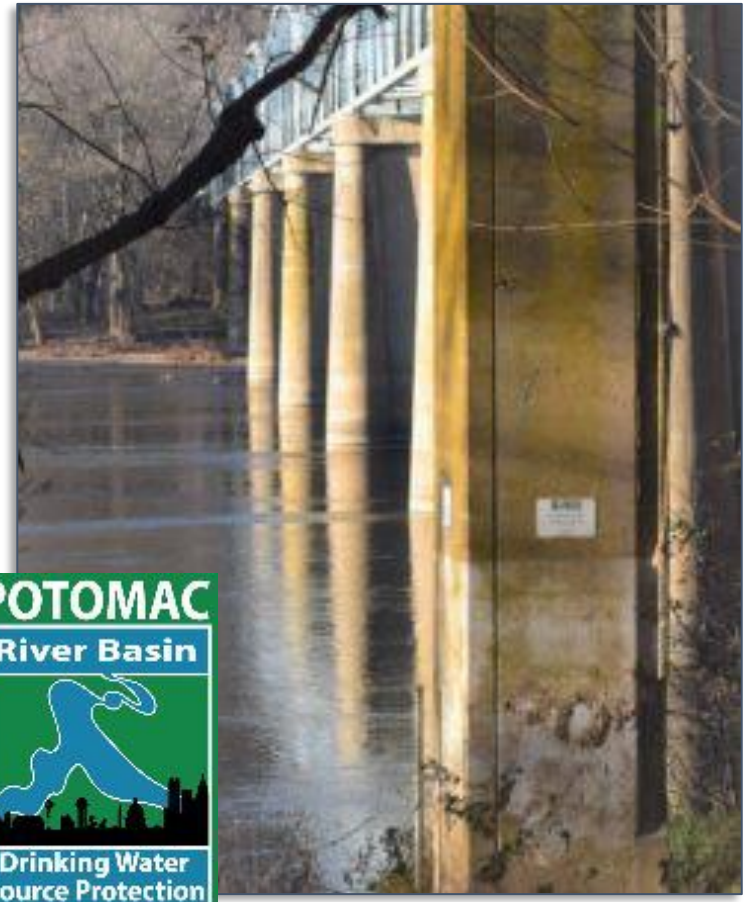
Presentation Outline

- Background on Partners and Regional Collaboration
- Past & Ongoing Research
- Research Needs & Future Collaboration Opportunities

History of Regional Collaboration

The mission of the Potomac River Basin Drinking Water Source Protection Partnership (DWSPP) since 2004:

To serve as a cooperative and voluntary partnership working towards the goal of improved source water protection of the Potomac River in recognition of the vital role of the river in supplying drinking water to millions of people within the Potomac watershed and in support of the multi-barrier approach to safeguarding the drinking water supply for public health.



DWSPP Partners

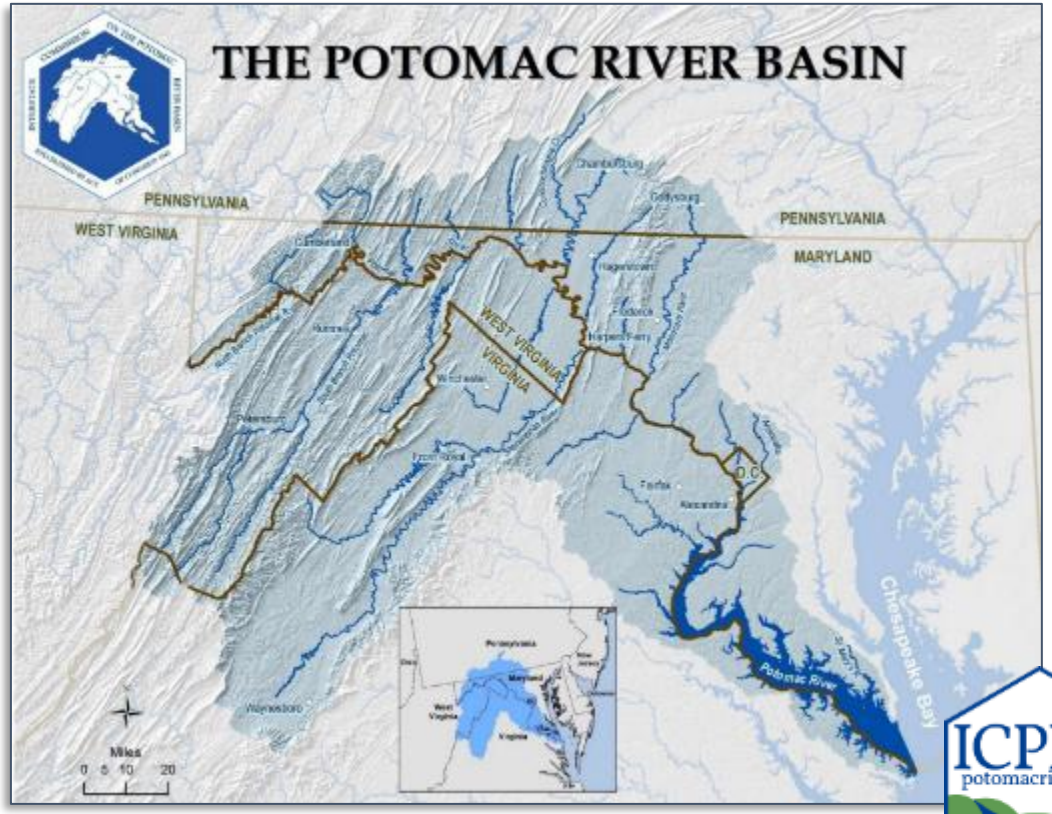
100+ Representatives

10 Government Agencies

15 Water Suppliers

DWSPP Partners

- Water suppliers
- Regulators
- Subject matter experts - treatment plant & water resources managers and engineers, water quality scientists, researchers, emergency response teams, communicators
- Interstate Commission on the Potomac River Basin's (ICPRB)
  - Created through Congress in 1940, ICPRB's mission is to enhance, protect, and conserve the water and associated land resources of the Potomac River basin and its tributaries through regional and interstate cooperation.



DWSPP Shared Priorities guide the Partnership

Priorities for the Potomac basin are drawn from the source water assessments that were done in the early 2000s. These assessments, required under the 1996 amendments to the Safe Drinking Water Act, look at potential sources of contamination upstream of a drinking water intake and assess the risk they pose to a utility's ability to provide safe drinking water. Since many utilities share the Potomac River and its tributaries as their source of raw water, they also share many of the same risks.

- PFAS in the Potomac River Basin
- De-Icing Materials
- Disinfection By-product Precursors
- Emerging Contaminants
- Hazardous Spills
- Nutrients
- Pathogens
- Sediments
- Stormwater
- Watershed Protection

DWSPP Workplan Categories

DWSPP Workgroup 2025 Accomplishments

- **Urban & Industrial Issues**
  - Reviewed NPDES permits (e.g., poultry processing, Dulles Air
  - Advocated for PFAS monitoring in permits
  - Monitored Hidden Lane Landfill PFAS contamination
  - Collaborated on Water Research Foundation project
  - Updated salt-related info on DWSPP website
- **Early Warning & Emergency Response**
  - Developed 'First Hour Checklist' for spill response
  - Conducted interactive session to refine checklist
  - Promoted PotomacSpills.io and direct communication
  - Encouraged emergency protocol customization
- **Reaching Out**
  - Created Source Water Protection Week toolkit
  - Organized Small Water Systems Roundtable (May 2025)
  - Produced outreach brochure
  - Encouraged feedback and participation
- **Water Quality**
  - Published Salt Monitoring Map
  - Planned PFAS Monitoring Map update
  - Encouraged submission of new monitoring locations
- **Emerging Contaminants**
  - Continued PFAS Sampling Study (18 months of data)
  - Secured $35,000 additional funding
  - Planned data workshop and future funding options
  - Explored long-term sustainability
- **Agricultural Issues**
  - Proposed expanded scope: forests, land use, nonpoint pollution
  - Strengthened relationships with NRCS and VA Forests & Water Partners
  - Discussed renaming workgroup to reflect broader mission
  - Emphasized partnerships and funding for watershed protection
- **PFAS Strategic Planning**
  - Surveyed members for data needs and gaps
  - Proposed research prioritization workshop (Oct 2025)
  - Supported legislative summit on PFAS and biosolids
  - Explored collaborative project structures

Partners 2025 Accomplishments

- PFAS Sampling Study: 70+ samples collected for joint sourcewater research by Loudoun Water, WSSC Water, ICPRB, and universities.
- Tailored Collaboration proposal to WRF for $300K+ to extend PFAS research.
- ERSM spill model upgraded to R/Shiny app with automated USGS data.
- 2D oil spill modeling advanced using GNOME and Delft3D with DHS/EPA funding.
- Plans to integrate models with real-time flow forecasts and automate inputs.

Background for Research Needs

- **Growing Challenges in the Potomac Watershed**: Increasing concerns over PFAS, salinity, microplastics, and other emerging contaminants prompted the need for a coordinated research response.
- **Need for a Unified Strategy**: The workshop aimed to align regional utilities, researchers, and stakeholders around a shared, science-based research strategy for source water protection
- **Support from the Water Research Foundation (WRF)**: Leveraging WRF's Facilitated Research Program to fund and guide collaborative projects addressing critical water quality issues.
- **Legacy of DWSPP Collaboration**: Building on over 20 years of DWSPP-led initiatives, the workshop sought to avoid duplication, identify knowledge gaps, and prioritize impactful research.
- **Weather and Land Use Pressures**: Recognition that weather variability and land development are altering watershed dynamics, requiring adaptive and forward-looking research.

Historical DWSPP-Inspired Research Initiatives

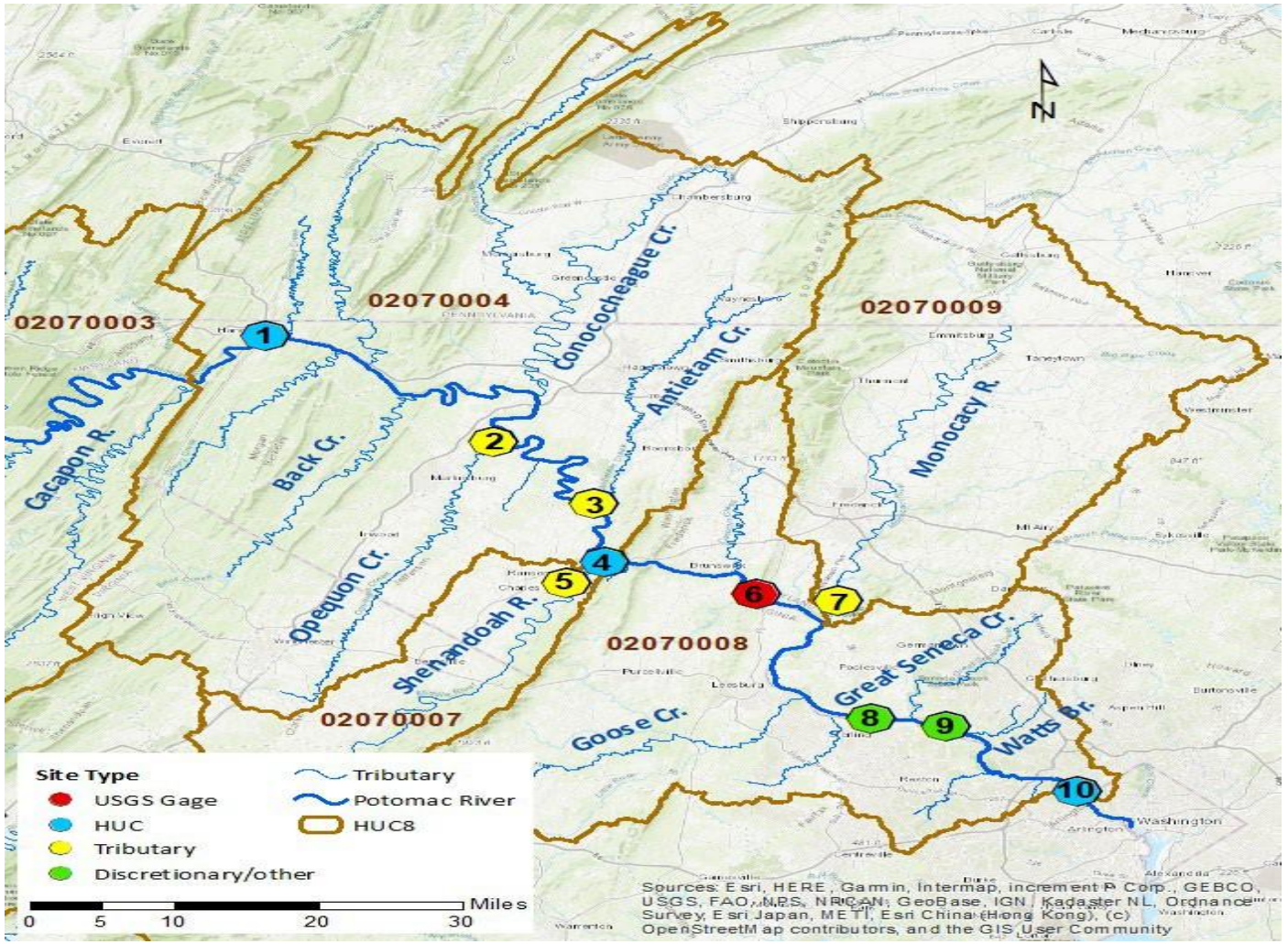
Research Topic *DWSPP Workgroup*	Key Features	Publications/ More Information
Pathogen Source Tracking *Ag Issues*	• Cryptosporidium source tracking to enhance source water protection implementation • Use of genotyping (using nested PCR) to identify specific Cryptosporidium sources in the Potomac watershed	EPA Regional Applied Research Effort (RARE) Study https://pmc.ncbi.nlm.nih.gov/articles/PMC2576682/ *Appl Environ Microbiol*. 2008 Sep 5;74(21):6495–6504
Land Use Impacts on Treatment *Reaching Out*	• Forest cover impacts on WTP chemical costs • Led to land prioritization mapping project	*Forest Cover Impacts on Drinking Water Utility Treatment Costs in a Large Watershed*. Project #4651. Water Research Foundation, Denver. https://www.potomacriver.org/publications/forest-cover-impacts-on-drinking-water-utility-treatment-costs-in-a-large-watershed/ **https://doi.org/10.1002/awwa.1223**
EDCs, Perchlorate, Chlorate *Emerging Contaminants*	• Impact of anthropogenic discharges of EDCs in the Potomac River • Temporal / spatial distribution of perchlorate in the Potomac River • Chlorate occurrence and variability in source water	Assessing the Impact of Anthropogenic Discharges of Endocrine Disruption in the Potomac River https://www.dcwater.com/sites/default/files/documents/Technical%20Memorandum%20EDC%20Impact%20in%20the%20Potomac%20River.pdf https://pubmed.ncbi.nlm.nih.gov/21713293/ *Insights on Chlorate Occurrence, Intra-system Variability, and Source Water Concentrations*, DOI: https://doi.org/10.5942/jawwa.2015.107.0152 Journal AWWA 2015 Nov (11) 613-626
Algae *Ad hoc Algae*	• Features of utility cyanotoxin response plans	*A Tale of Two Utilities: Cyanotoxin Response Plans* DOI: https://doi.org/10.1002/awwa.1592 Journal AWWA 2020 Oct (10): 24-38
Salt *Urban/Industrial Issues*	• Collaborative stakeholder engagement • Enhanced salinization monitoring network	**Numerous** regional salt research efforts were catalyzed!

Ongoing Potomac Research - WRF Projects

Project Name (#)	Total Research Investment	Duration (Status)
Understanding the Factors Affecting PFAS Variability in the Potomac River Watershed (WRF #5269)	$426,500 WRF Match from MWCOG, Cost Share + In-Kind	March 2024-September 2026 (Ongoing)
One PFAS: A One Water Approach to Managing PFAS Pollution (WRF #5345)	$679,000 WRF Match from FW, UOSA, PWW, FC + in kind	June 2025-May 2027 (Ongoing)
Assessing Changing Salinity in Water Sources (WRF #5308)	$269,562 WRF +in-kind	August 2025-March 2028 (Ongoing)

Understanding the Factors Affecting PFAS Variability in the Potomac River Watershed (WRF #5269)- $426,500

- **Objectives:** identify the factors affecting the presence and variability of PFAS and precursor compounds in the Potomac River and serve as a model for regional source water monitoring to inform mitigation strategies
- **Expected Outcomes/Deliverables:**
  - Factors affecting the presence and variability of PFAS and precursor compounds in the Potomac River
  - Model for region-wide source water monitoring to inform mitigation strategies.
- **Future Work and/or Knowledge Gaps:** PFAS source ID (eg, fingerprinting) and source tracking



Understanding the Factors Affecting PFAS Variability in the Potomac River Watershed (WRF #5269) - $426,500

Research Team

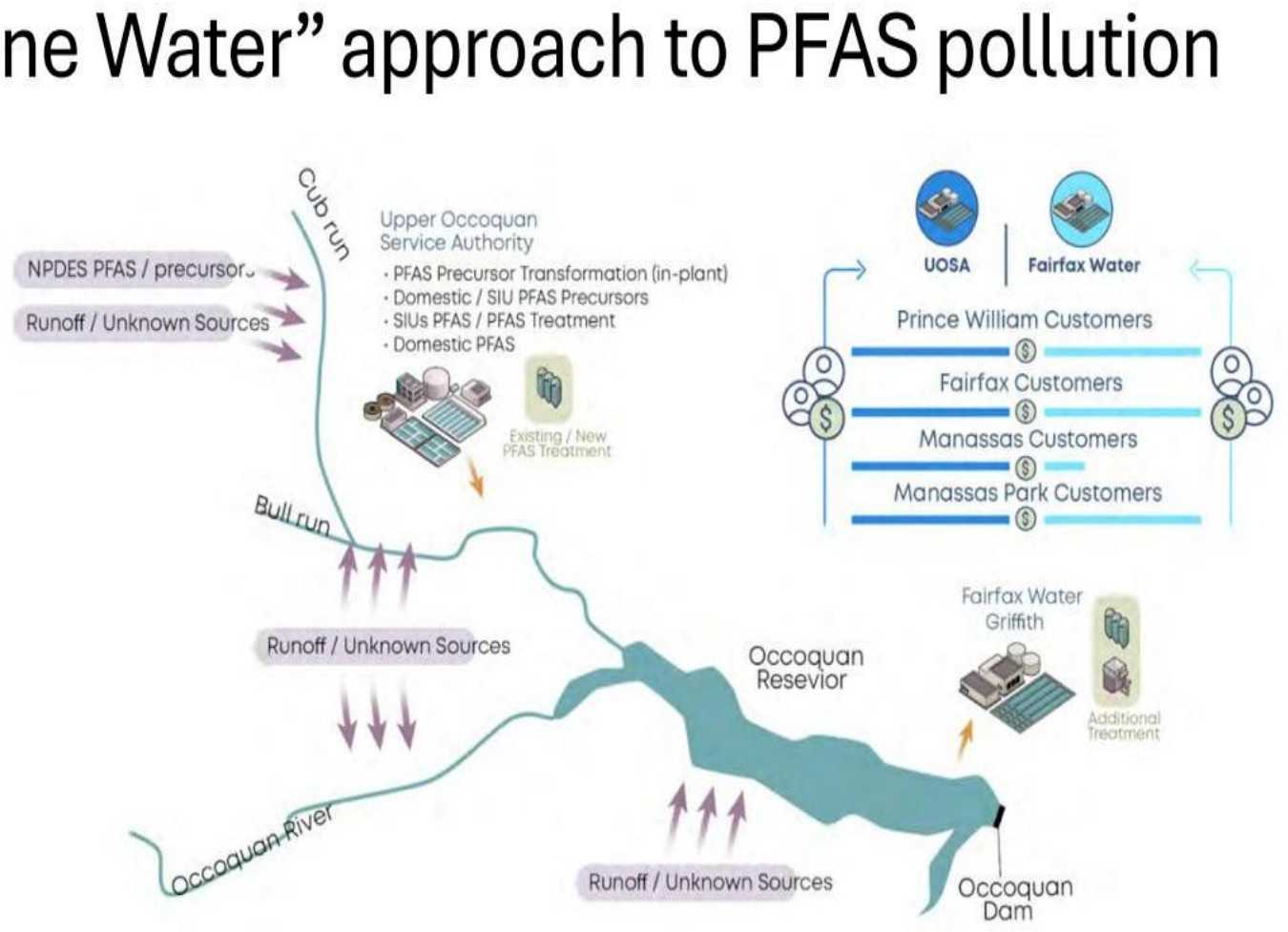
- Loudoun Water (PI: Bradley Schmitz, Christina Davis)
- Stantec (Joseph Jacangelo & Caitlin Glove)
- WSSC Water(Priscilla To & Laura O'Donnell)
- ICPRB (Renee Bourassa)
- Virginia Tech Occoquan Watershed Monitoring Lab (Kirin Furst)
- Johns Hopkins (Carsten Prasse)

Partner Organizations/Utilities:

- MWCOG
- Loudoun Water
- WSSC Water
- DC Water
- Fairfax Water
- Town of Leesburg
- City of Hagerstown
- Berkeley County Public Service Water District
- Washington Aqueduct
- Frederick County Division of Water and Sewer Utilities
- City of Rockville

One PFAS: A One Water Approach to Managing PFAS Pollution (WRF #5345)-$679,000

- **Objectives:** create an equitable, least-cost intervention portfolio for PFAS across drinking water, wastewater, stormwater in Occoquan watershed
- **Expected Outcomes/Deliverables:** framework for managing PFAS in One Water systems
- **Future Work and/or Knowledge Gaps:** TBD



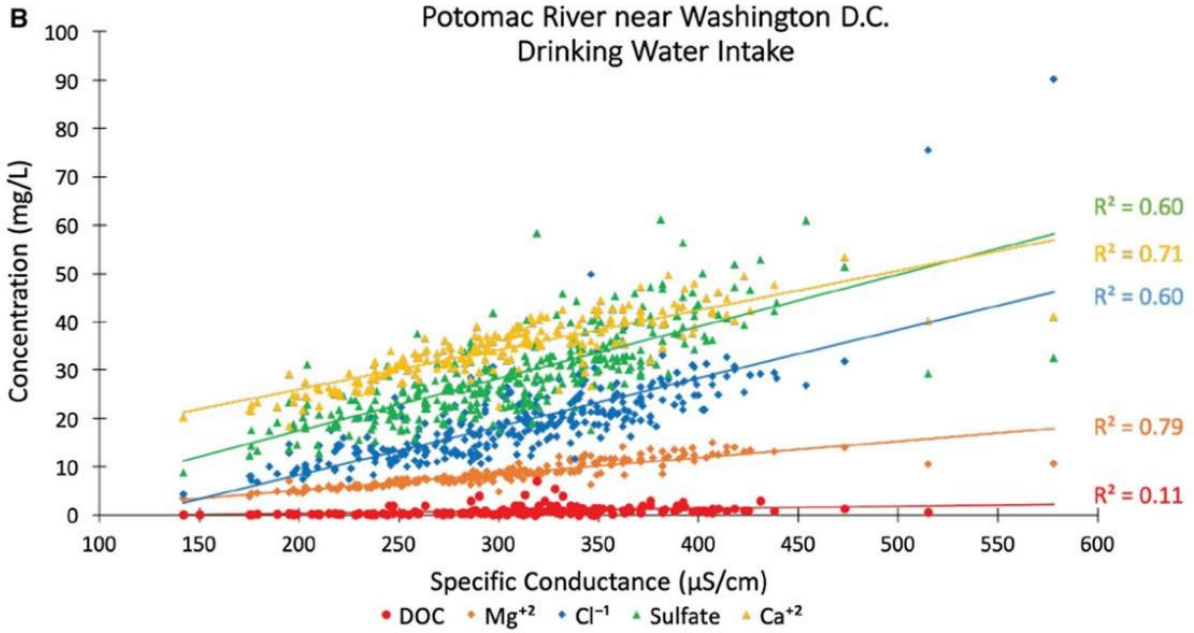
One PFAS: A One Water Approach to Managing PFAS Pollution (WRF #5345)-$679,000

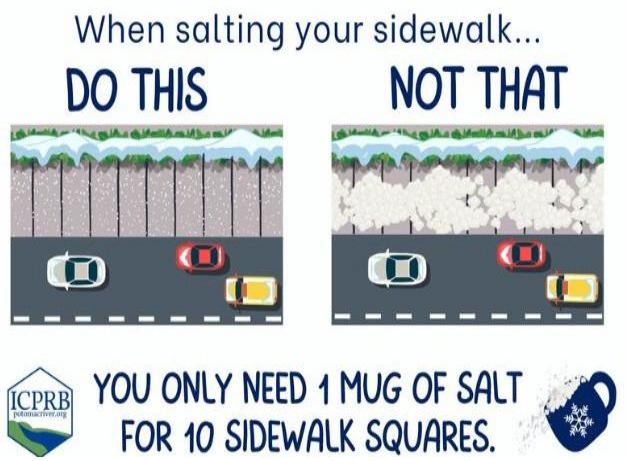
- **Research Team**
  - Virginia Tech Occoquan Watershed Monitoring Laboratory (PI: Stanley Grant)
  - Hazen & Sawyer (Erik Rosenfeldt)

- **Participating Organizations/Utilities**
  - Fairfax Water
  - Upper Occoquan Service Authority
  - Prince William Water
  - Fairfax County
  - Northern Virginia Regional Commission
  - Loudoun Water
  - Fauquier County Water and Sanitation Authority
  - Hazen & Sawyer

Assessing Changing Salinity in Water Sources (WRF #5308)-$269,562

- **Objectives:** synthesize current knowledge of salinity impacts on U.S. water systems and provide the water sector with scientific tools and educational strategies
- **Expected Outcomes/Deliverables:**
  - Implementation guidance for watershed mass balances and source ID
  - Framework for temporal-spatial salinity assessment
  - Management strategies and communication toolkit
- **Future Work and/or Knowledge Gaps:** TBD





Assessing Changing Salinity in Water Sources (WRF #5308)-$269,562

Research Team

- Loudoun Water (PI: Christina Davis, Bradley Schmitz)
- Virginia Tech Occoquan Watershed Monitoring Lab (Stanley Grant)
- University of Maryland (Sujay Kaushal)
- Hazen and Sawyer (Phoebe Aron)
- ICPRB (Renee Bourassa)

Participating Organizations/Utilities

- Loudoun Water
- WSSC Water
- Berkeley County PSWD
- City of Hagerstown
- Fairfax Water
- Town of Leesburg
- MWCOG
- Charles County Government
- Maryland Department of the Environment
- Northern Virginia Regional Commission
- ICPRB
- Hazen and Sawyer

National Participating Organizations/Utilities

- Orange County Water District
- Orange County Utilities
- Massachusetts Division of Water Supply Protection
- Aurora Water
- Great Lakes Authority

DWSPP Priorities and Survey Results – May 2025

Topic	Specific Priority
PFAS Monitoring and Management	• PFAS source tracking • Continued PFAS mainstem quarterly monitoring • Predicting likely PFAS source based on the PFAS river results • Mapping tool to assess possible or presumptive PFAS sources
Spill Response and Modeling	• Quick utility access to spill modeling and mapped predictions of spill arrival times • PAC removal effectiveness of diesel in water • Literature review of treatment alternative for spills of il or gas.
Water Quality and Environmental Data	• Salt mitigation • Mapping tool to visualize data in the watershed • Best practices in using data form USGS gages • Summary of UCMR5 data in the watershed
Algal Bloom Monitoring and Prediction	• Algal bloom predictive modeling using utility WQ as inputs • Gathering and sharing rapid results of algal bloom monitoring • Documenting algal bloom occurrence (historical locations, historical/year, species, monitoring results

DWSPP Workshop – Oct 2025 - Identify Research Priorities

Goal: Identify Project Concepts specific to the Potomac Watershed and considerations for future funding for projects.

Survey & Steering Committee Meetings

Prioritize Topics for Research Needs in the Potomac Watershed

Day 1 – Presentations

State of Science of Prioritized Topics

Research in the Potomac/Future Needs from Experts

Day 2 – Project Concept Development

Breakout Groups

Develop Project Concept from Prioritized Projects

Final Survey

Selection of Project Concept for Future Funding

Day 1 – Topical Presentations

Algae

- Focused on harmful algal blooms (HABs) and cyanotoxins in source waters.

PFAS

- Reviewed watershed studies in the Potomac and South Platte Rivers.

Salinity

- Presented long-term trends of rising chloride levels in the Potomac River.

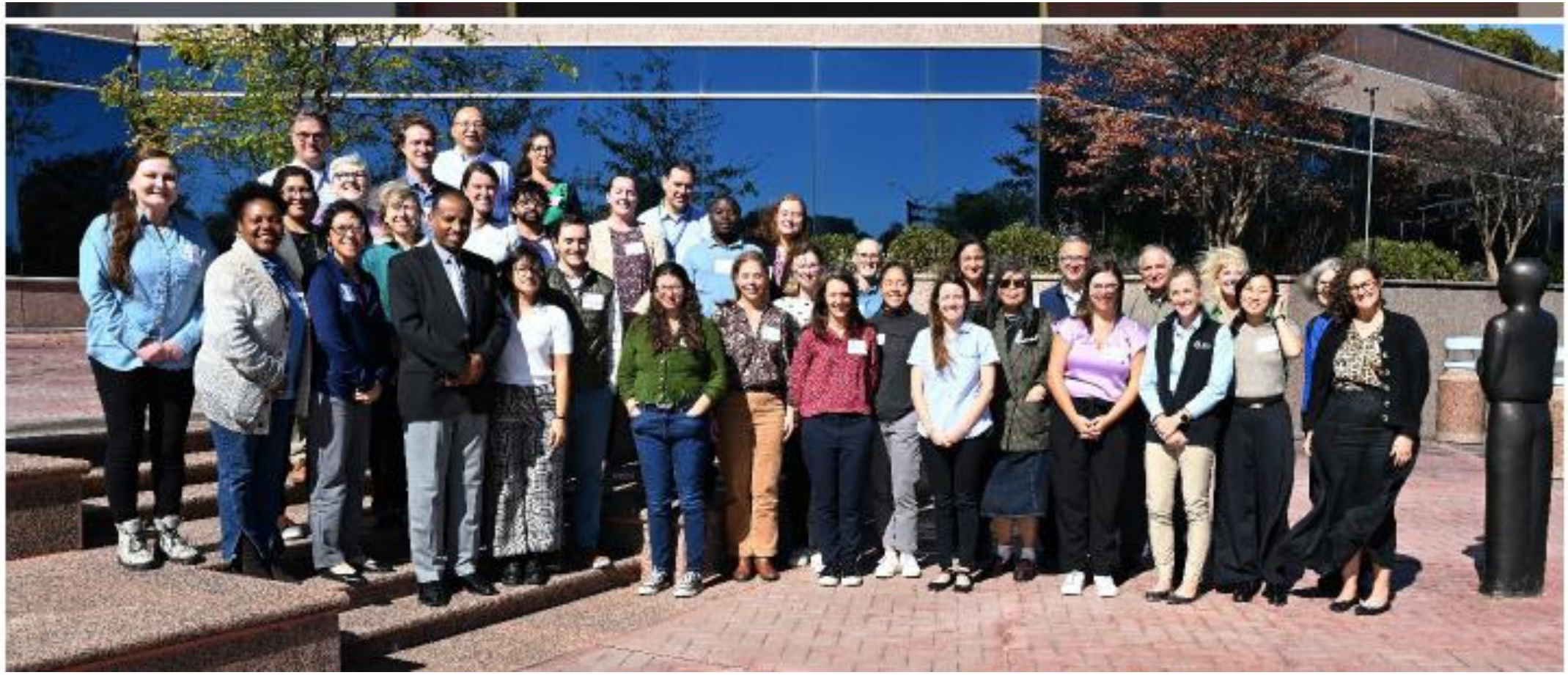
Microplastics

- Highlighted widespread occurrence in water supplies, air, and even bottled water.

On the Horizon

- Emerging contaminants beyond PFAS and microplastics (e.g., DBPs, AI/ML applications).

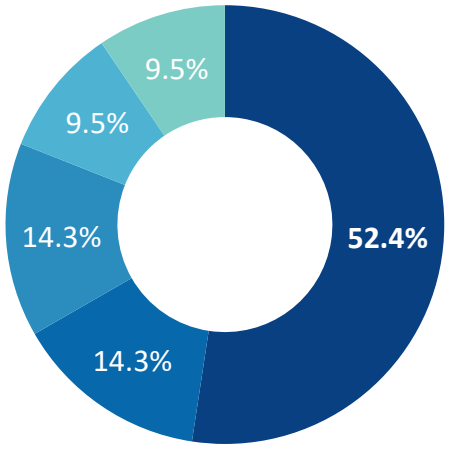
Day 2 – In-Person: DWSPP Members & Topic Experts



Day 2 - Concept Development

Category	Top Concept
Algae	Development of an Algal Predictive Modeling Tool for the Potomac Watershed
	Streamlining Algae data sharing capabilities across the Potomac Watershed
PFAS	Utilizing PFAS Forensics and Fingerprinting for Source Profiling
Microplastics	Standardized Monitoring and Treatment Evaluation for Microplastics
Salinity	Evaluation of Salt Source Identification, Modeling Approaches, and Management Strategies
Cross Topic	Leveraging Collaboration and Data Exchange for enhanced source water protection in the Potomac Watershed
On the Horizon: Data Centers	Understanding and Managing Data Center Water Demand in the Potomac Watershed
On the Horizon: Climate Impacts	Modeling Water Quality Impacts Under Extreme Climate Conditions
On the Horizon: Reservoirs	Mitigating Water Quality Impacts Using Regional Reservoirs

Research Concepts (Top Priority to DWSPP)



- Utility
- Research/Academia
- Government
- Consulting Firms
- NGO/Non-Profit

Item	Overall Rank	Rank Distribution	Score	No. of Rankings
Utilizing PFAS Forensics and Fingerprinting for Source Profiling	1		137	27
Development of an Algal Predictive Modeling Tool for the Potomac Watershed	2		129	27
Streamlining Algae Data Sharing Capabilities Across the Potomac Watershed	3		127	27
Leveraging Collaboration and Data Exchange for Enhanced Source Water Protection in the Potomac Watershed	4		107	27
Evaluation of Salt Source Identification, Modeling Approaches, and Management Strategies for the Potomac Watershed	5		94	27
Mitigating Water Quality Impacts using Regional Reservoirs	6		85	27
Understanding and Managing Data Center Water Demand in the Potomac Watershed	7		77	27

Lowest Rank — Highest Rank

Chosen Concept(s) will be submitted to [WRF's Tailored Collaboration and/or Facilitated Research Program]

Needs – Research and Funding Partners

Questions?
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