

Water research efforts

SCOTT BROSKI, SUPERINTENDENT OF ENVIRONMENTAL SERVICES

MARIE FECHIK-KIRK, MANAGER OF SUSTAINABILITY & SPECIAL PROJECTS



Why Do Research?

- Begin with the goal of answering a question
- Discover or learn something new
- Provide some benefit to society



Research: What we do at NEORSD

- Fund, Support, and Promote Research
 - Financial support
 - In-kind services
 - Contract lab services
- Participate in Research
 - Provide study site(s)
 - Staff act as project/research advisors
 - Seek funding for research
- Conduct In-house Research



Who We Fund, Support, and Promote

- Water Research Foundation
- Cleveland Water Alliance
- National Science Foundation
- Governmental Agencies
- Academic Institutions
- Other Researchers



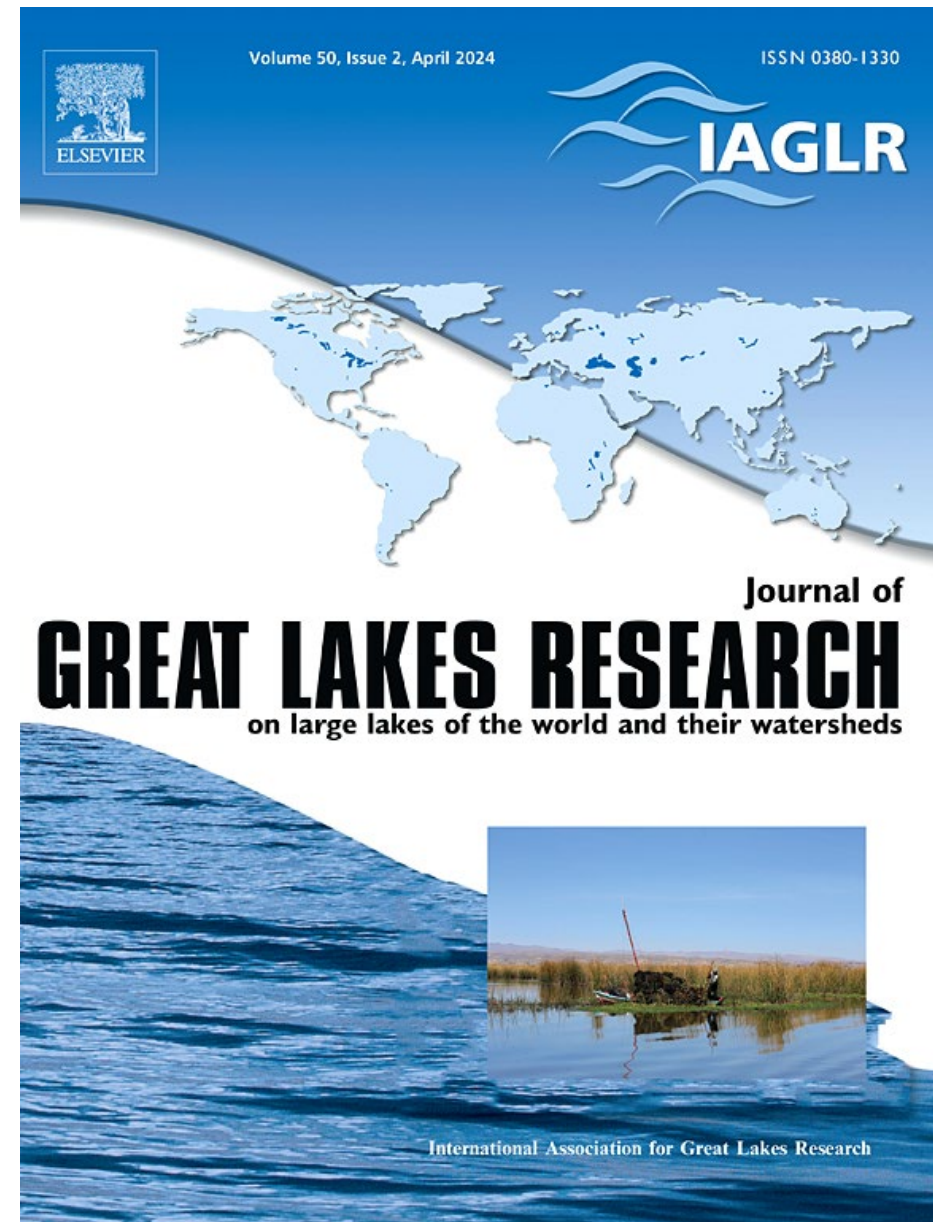
Current/Recent Research

- Occurrence of PFAS Compounds in US Wastewater Treatment Plants (WRF)
- Studying the Fate of PFAS Through Sewage Sludge Incinerators (WRF)
- Advanced Aeration and Scum Recovery for Physical Removal of PFAS from Wastewater (WRF)



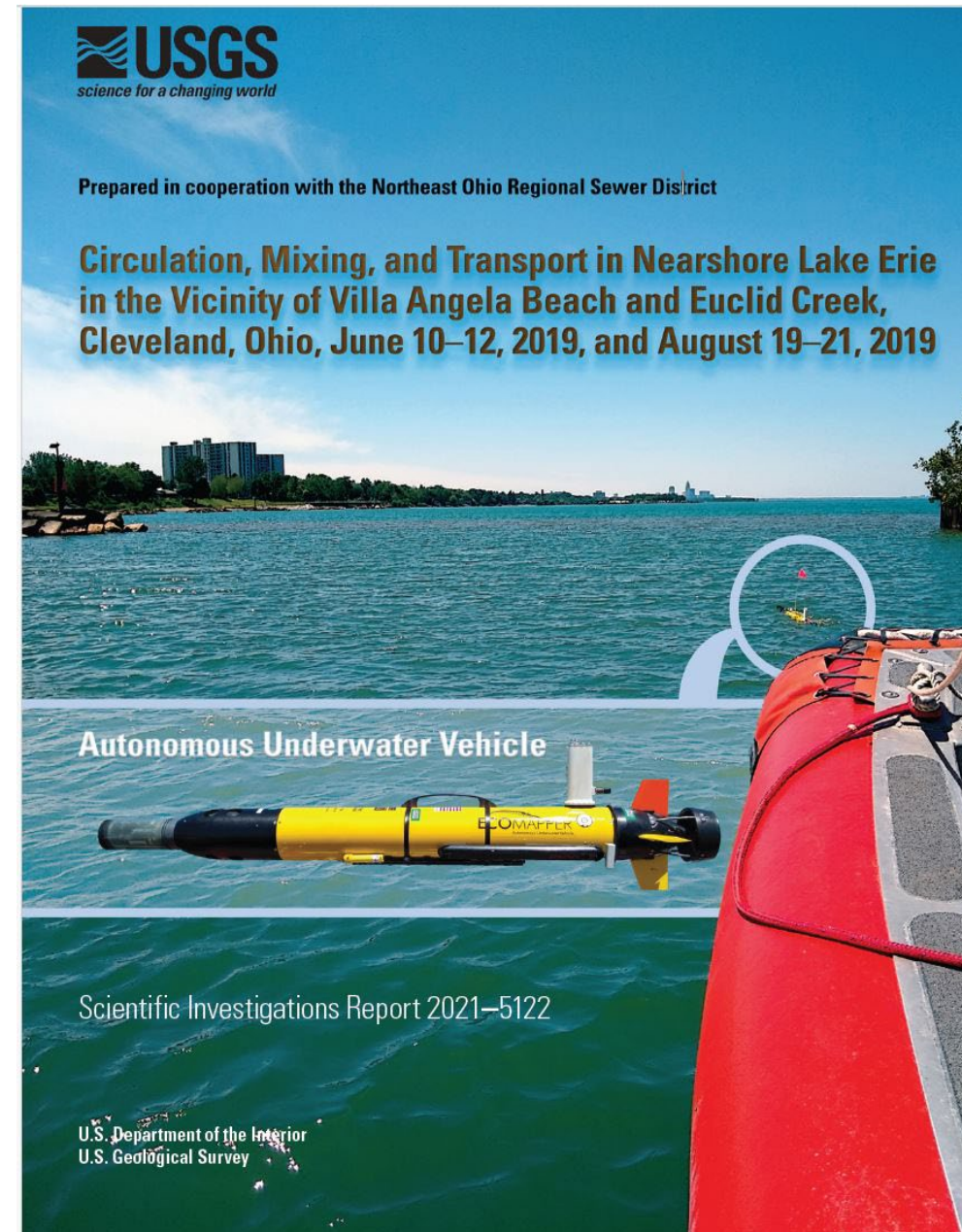
Current/Recent Research

- Using an autonomous underwater vehicle, sensors to explore under-ice CO2 dynamics across nearshore, offshore boundary in central Lake Erie (CSU)
- Anthropogenic P Storage, Bioavailability, and Cycling in the Maumee Bay and Western Lake Erie (CSU)



Recent Research

- Circulation, Mixing, and Transport in Nearshore Lake Erie in the Vicinity of Villa Angela Beach and Euclid Creek, Cleveland, Ohio (USGS)



Participate: Study Site

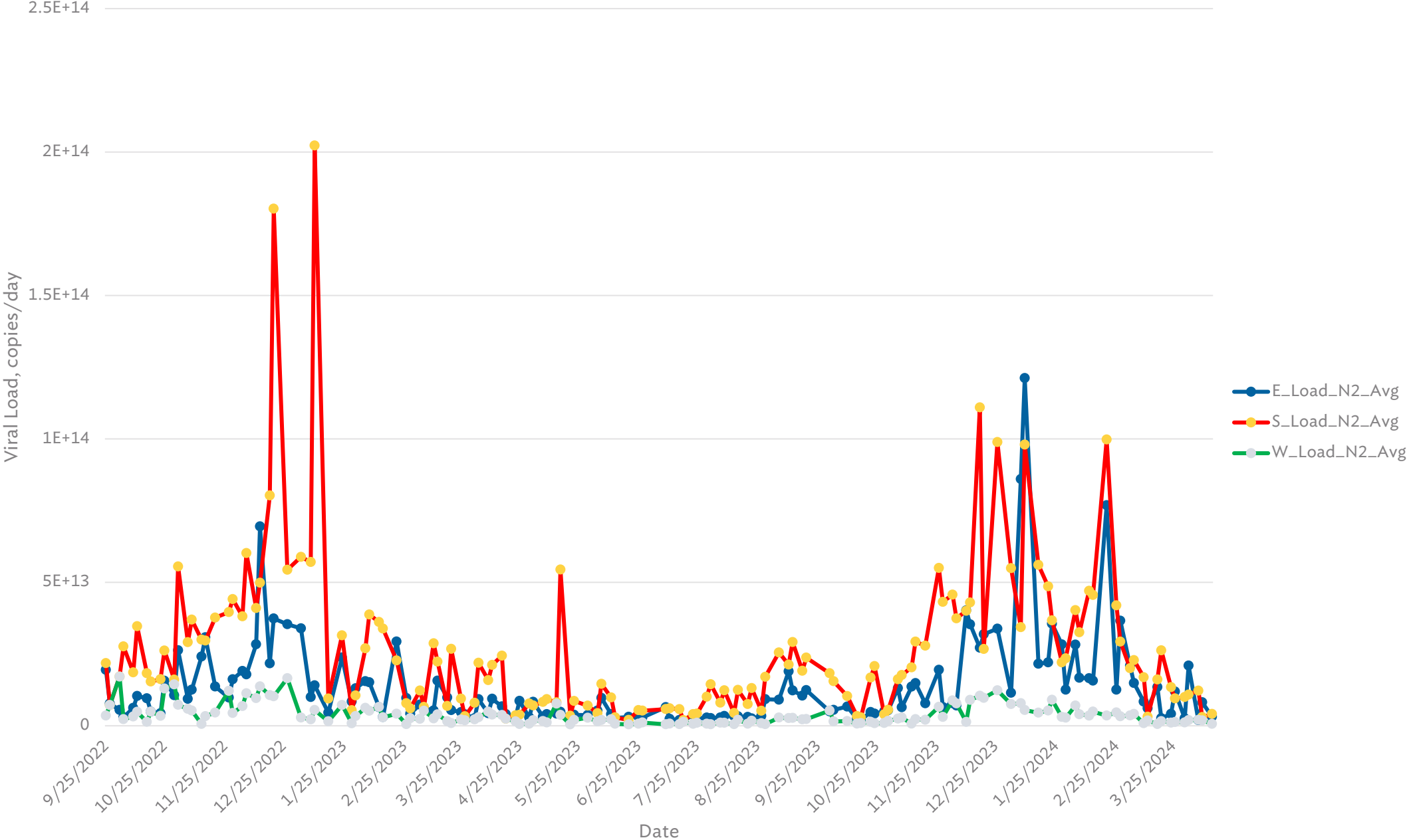
- Allow researchers access to our assets/facilities
- Provide researchers samples from our facilities
- Provide researchers data from our facilities



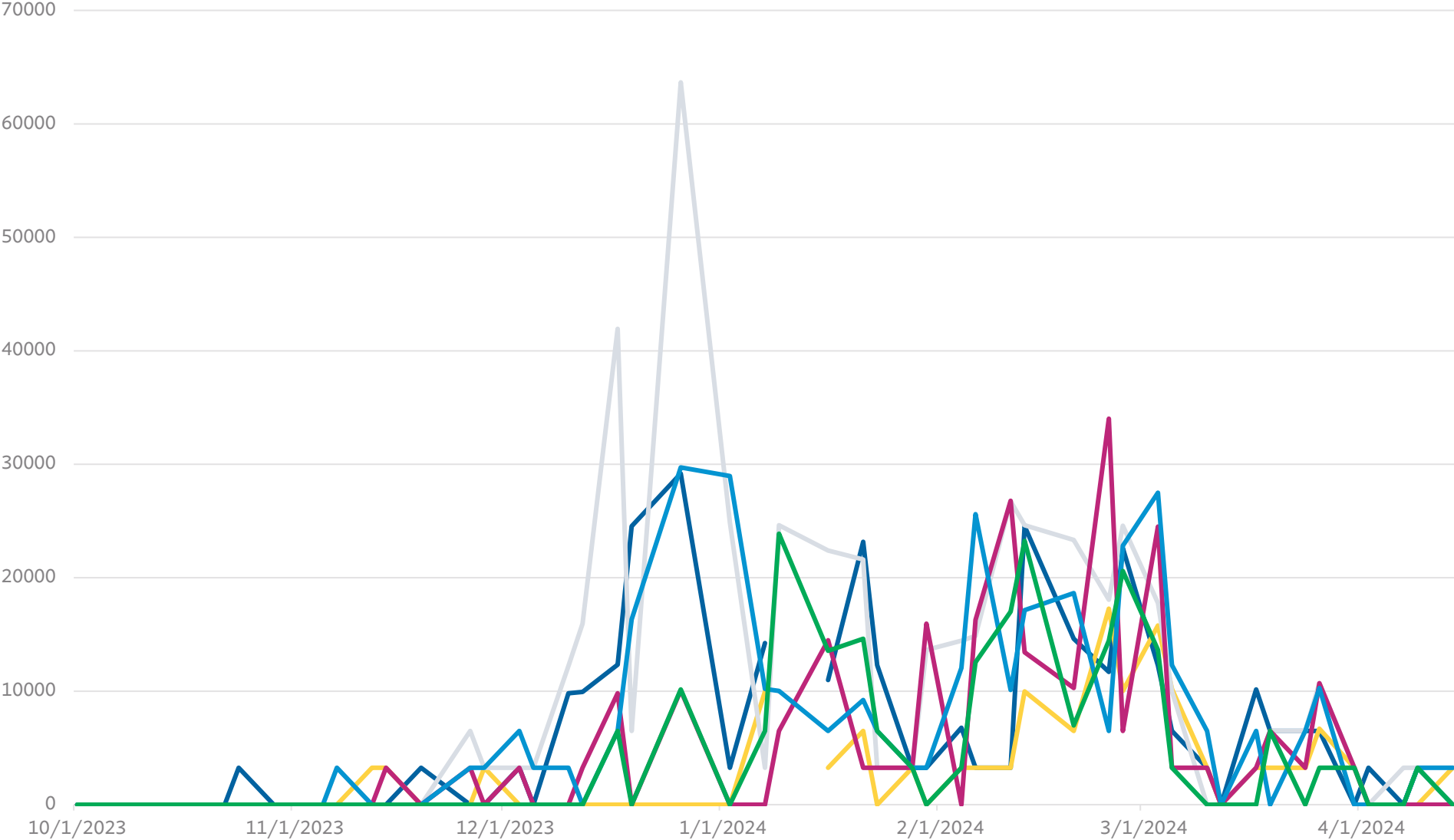
Current/Recent Research

- Wastewater Based Epidemiology
 - Prevalence and trends of Covid-19 in Wastewater at treatment plants and target areas (ODH & CWRU)
 - Prevalence and trends of Influenza A & B in wastewater (ODH)

Ohio Wastewater Monitoring Network - Trends After Method Update



Influenza A & B Gene Copies/L



— Easterly Influenza A — Easterly Influenza B — Southerly Influenza A
— Southerly Influenza B — Westerly Influenza A — Westerly Influenza B

Current/Recent Research

- Wastewater Based Epidemiology
 - Environmental, human, and animal health risks resulting from the dissemination of carbapenem-resistant Enterobacteriaceae into agricultural watersheds (OSU)
 - Narcotics in wastewater pilot study: Fentanyl & Xylazine (Ohio DPS and Ohio EPA)

Current/Recent Research

- Real-time nutrient monitoring with NuLab sensor (CWA, LimnoTech)



Participate: Advisors (Committee roles)

- Examine research proposals to determine funding
- Serve as technical experts providing input, feedback
- Ensure projects stay on scope
- Review, comment:
 - Draft products
 - All revisions along with any project deliverables



Funded Research

- Ohio Clean Water State Revolving Funds for Emerging Contaminants
 - PFAS Pretreatment Study – Centralized and Decentralized PFAS Treatment Systems for Metal Finishing Wastewater and Landfill Leachate

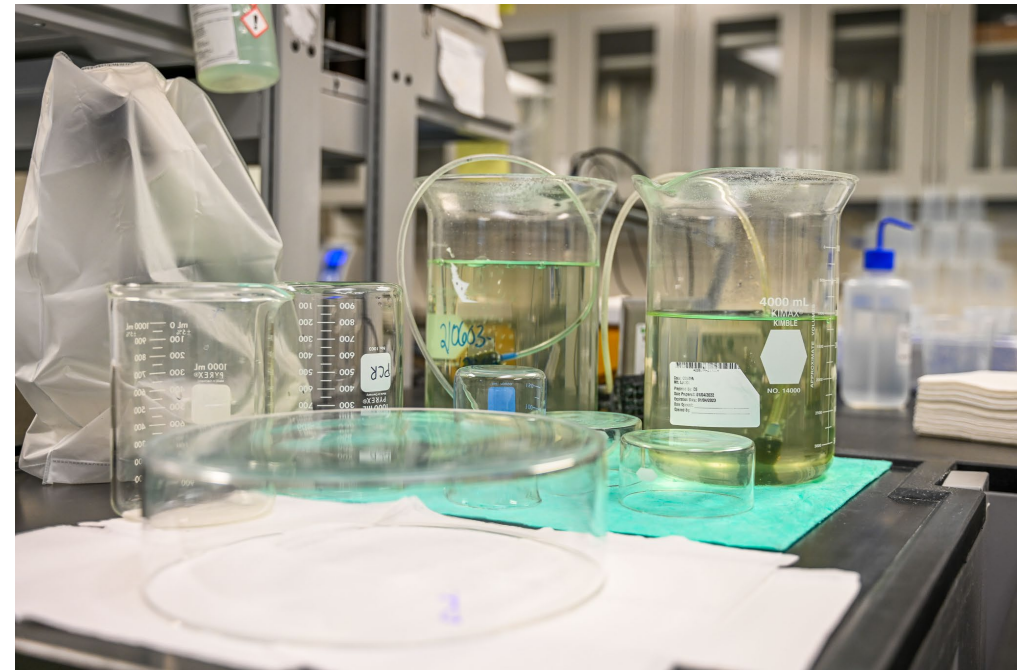
In-House Research

- Staff of scientists with varying backgrounds
 - Chemists, Biologists, Geologists, Civil, Environmental, and Chemical Engineers



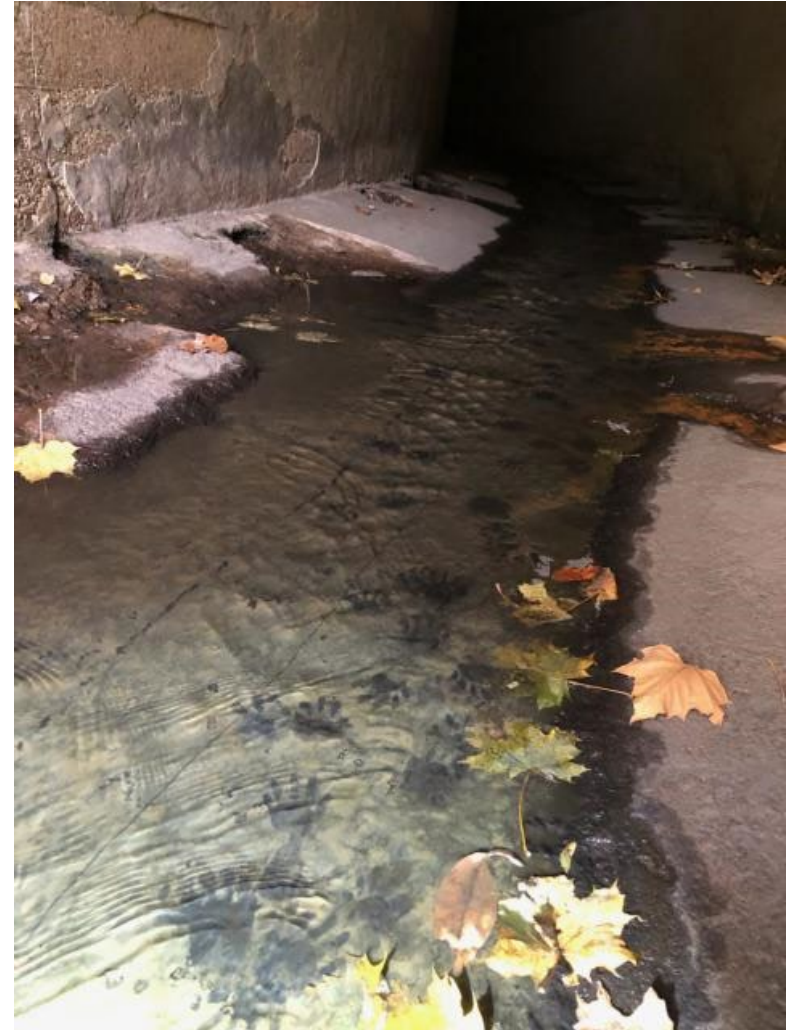
In-House Research

- One of the largest environmental labs in the region
 - TNI (NELAC) Accredited
 - Capability to implement new analytical methods and instrumentation/technologies
 - Produce legally defensible data to demonstrate project goals



Laboratory Research

- Assist with validating new instrumentation and lab methodology
 - PFAS Methods
- New uses for existing science/technology
 - qPCR and genetic markers
 - Gull, duck, racoon
 - Fish species
 - Optical Brighteners, Artificial Sweeteners



In-House Research

- Modeling capabilities
 - Predictive models for swimming beach water quality predictions
 - Other sewer/stream modeling

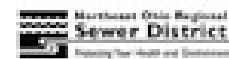
WATER QUALITY NOWCAST: GOOD

A “Nowcast” system is being tested on this beach to predict bacterial levels that may be present in the water.

GOOD WATER QUALITY IS PREDICTED TODAY

based on conditions observed this morning. This means that bacteria levels are likely to be low. Weather changes are likely to result in a rapid change in water quality.

NOWCAST DATA COLLECTED BY:



For more information, call (216) 432-7301
or visit www.ohionowcast.info.

NOWCAST SUPPORT PROVIDED BY:



Cleveland Department of Public Health
Cuyahoga County Board of Health
Ohio Department of Health
United States Geological Survey



Stormwater and Climate Research

- Developing new models to predict flooding
- Using Artificial Intelligence to analyze rainfall patterns and surface area flooding

Environmental Research

- Assessing Environmental Impacts Related to Construction
 - POTW construction/process improvements
 - Elimination or reduction of combined sewer overflow
 - Stream restoration

Environmental Research

- Water quality trend monitoring
 - Water chemistry and biological populations



Environmental Research

- Beach bacteria sources and public notification
- Biological response to the elimination of illicit discharges or stressors
- Fish translocation



Sustainability Research Efforts

How do we define sustainability?

- Use resources without compromising future needs.
- Be efficient.

Water Research Foundation Projects

- Greenhouse Gas Standard Inventory Tool
- Sewer Methane Emissions
- Greenhouse Gas Library

Standard Greenhouse Gas Inventory



**Northeast Ohio
Regional Sewer District**

https://ghgprotocol.org/sites/default/files/2022-12/us-public-sector-protocol_final_oct13.pdf

The Greenhouse Gas Protocol for the U.S. Public Sector



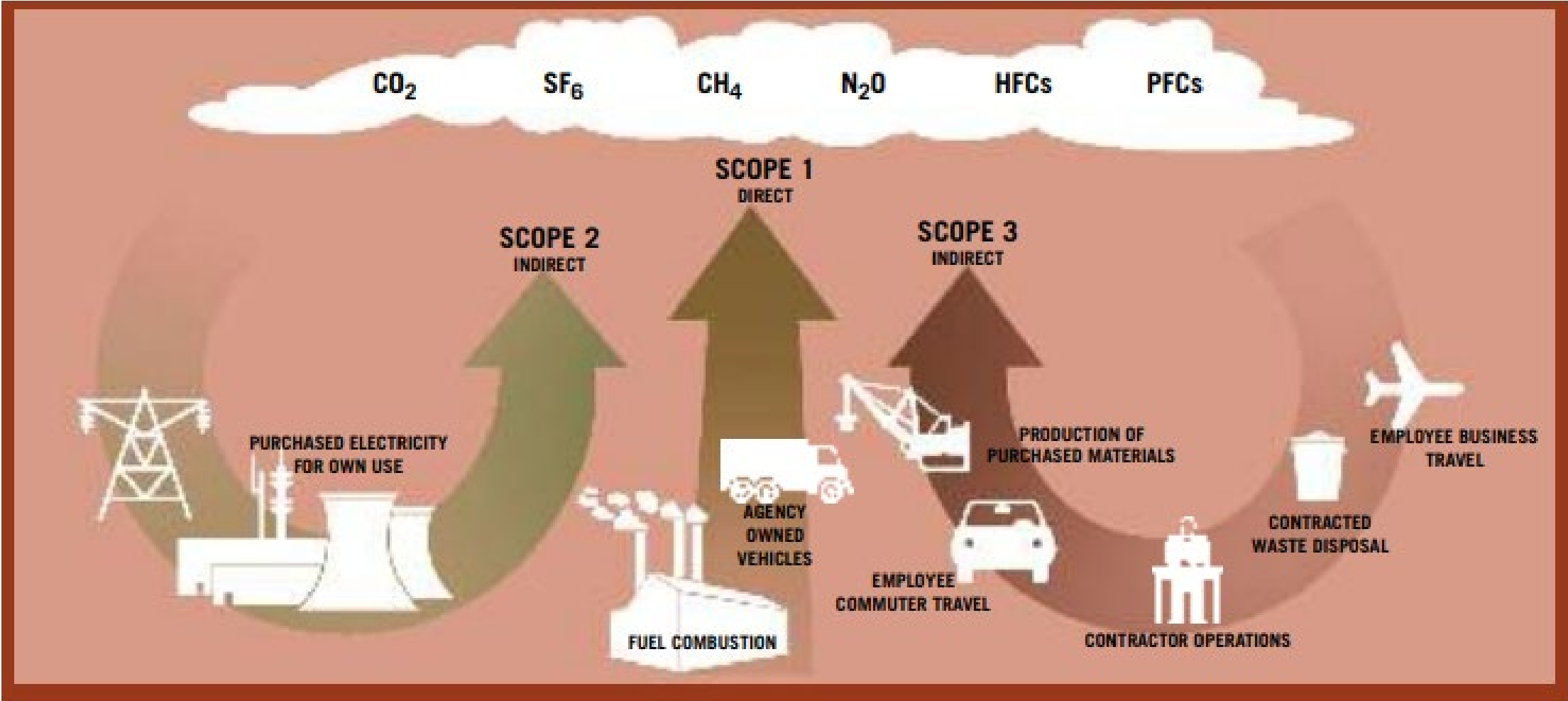
Interpreting the Corporate Standard for U.S. Public Sector Organizations



WORLD
RESOURCES
INSTITUTE

LMI

Public Sector Protocol



Adapted from NZBCSD, 2002

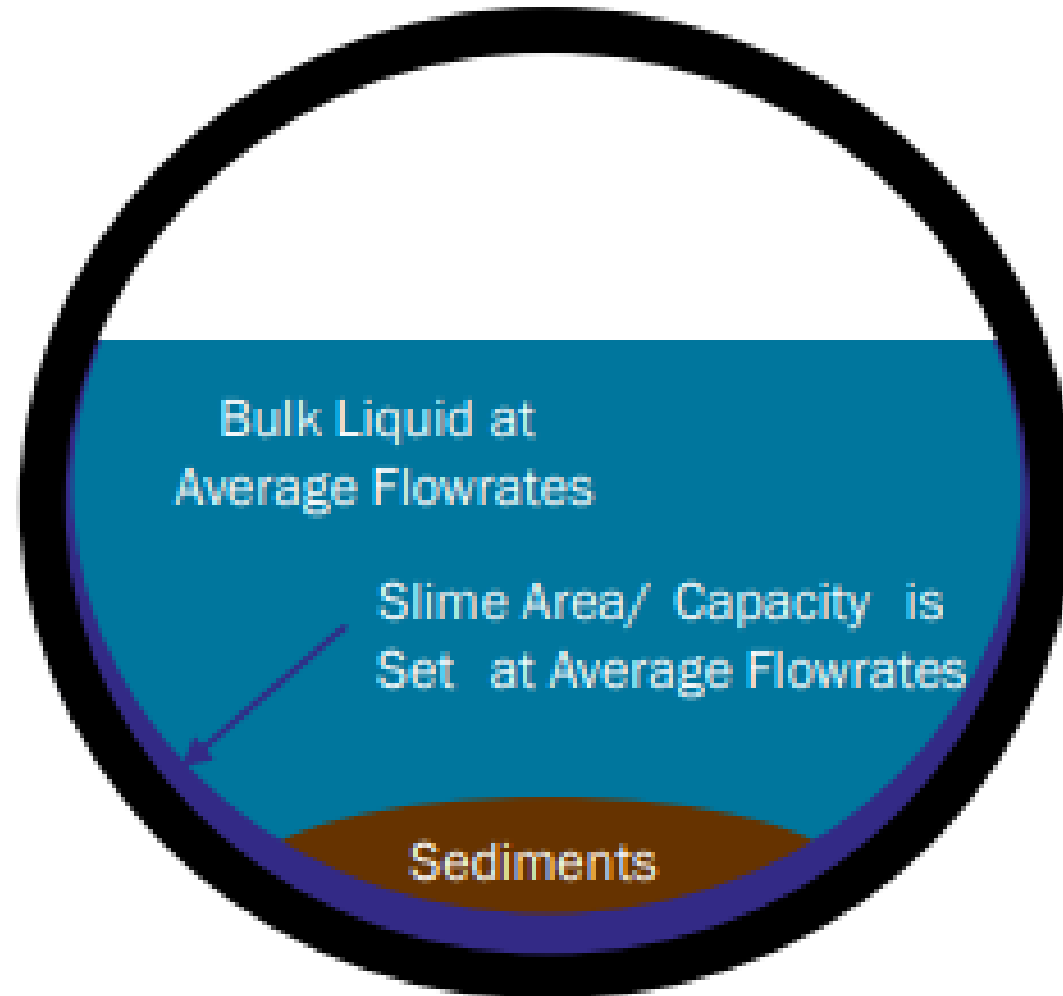
Creating Water Industry Standard

- Consensus based
- Comparable
- Relevant

Greenhouse Gas Inventory Tool

- Follows best practices
- Easier to track
- Allow comparisons

Sewer Methane Emissions



Sewer Methane Research

- Testing gaseous and dissolved methane
 - 5 utilities
 - Summer and Winter
- Develop methodology to estimate emissions

Why Sewer Methane Emissions?

- Stay ahead of regulation
- Understand emissions impact
- Set actionable greenhouse gas goals

Greenhouse Gas Library

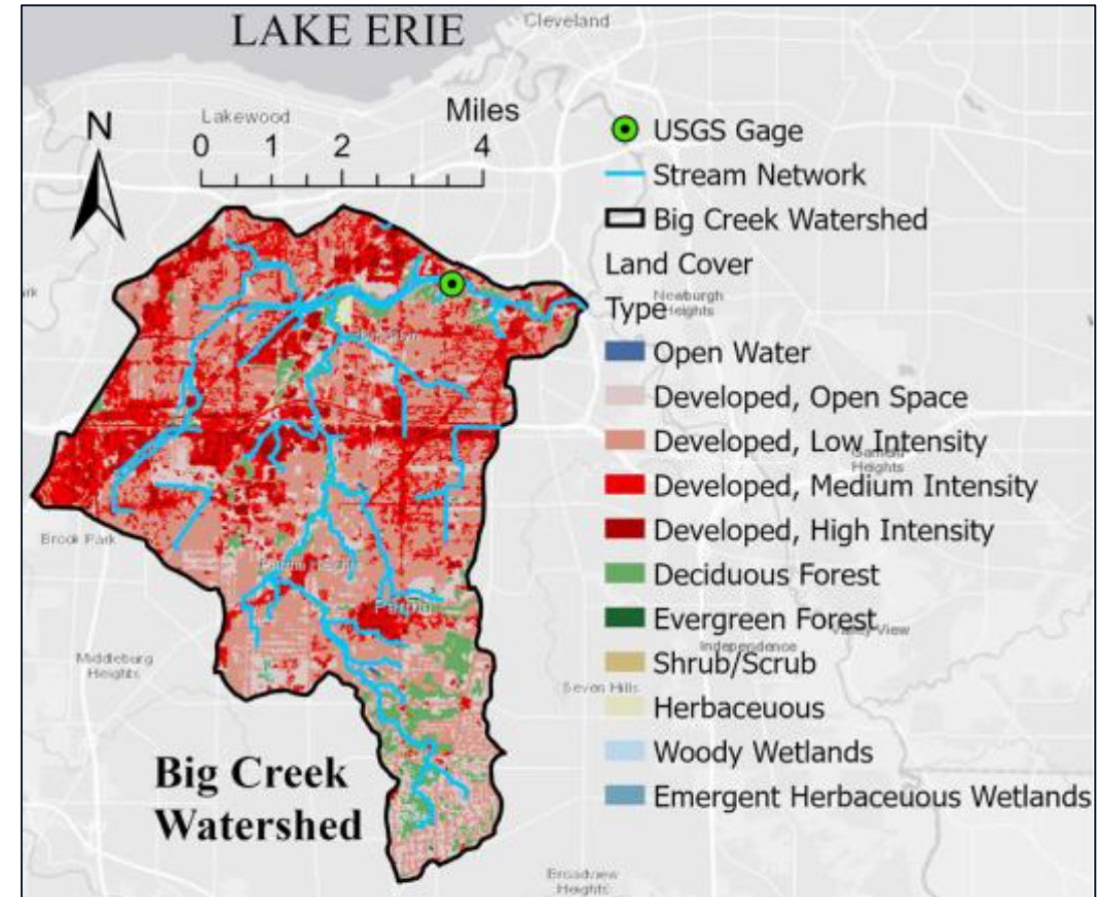
- What's missing
- What's needed

Big Creek Flood Resiliency Project

- Virginia Tech & University of Cincinnati
- Ohio Sea Grant
- Anticipate completion end of 2024

Big Creek Main Branch

- 8 communities
 - Mixed development
- Flooding
 - High impervious Surface
 - Type D soil
 - Post WWII Development



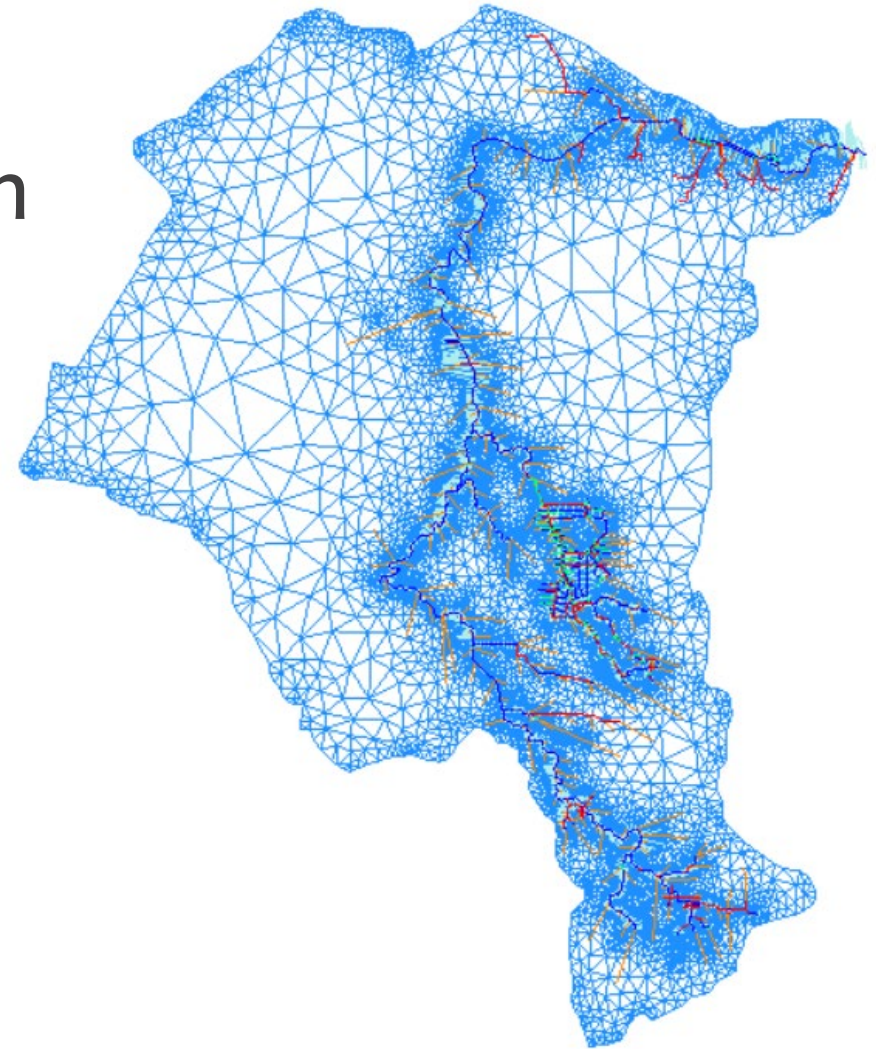
NEORSD Stormwater Master Plan

- Big Creek Main Branch
 - 12 problem areas
- Solutions
 - Stream restoration
 - Floodplain expansion/restoration
 - Storage



Developing Model

- Integrates details from master plan
- Additional local information
- Climate change scenarios



Next Horizon Sustainability Research

- Emissions factor for chemicals
- Microplastics

My Green Lab: Silver Certification



Scott Broski

Superintendent of
Environmental Services

broskis@neorsd.org

Marie Fechik-Kirk

Manager of Sustainability &
Special Projects

Fechik-kirkm@neorsd.org

