District of Columbia Water and Sewer Authority
George S. Hawkins, General Manager

PHASE I POST CONSTRUCTION MONITORING FOR DC CLEAN RIVERS PROJECT

Briefing for:
Water Resources Technical Committee Meeting

September 8, 2017

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(Director, DC Clean Rivers Project, DC Water)
John Cassidy
Program Manager, DC Clean Rivers, Greeley and Hansen

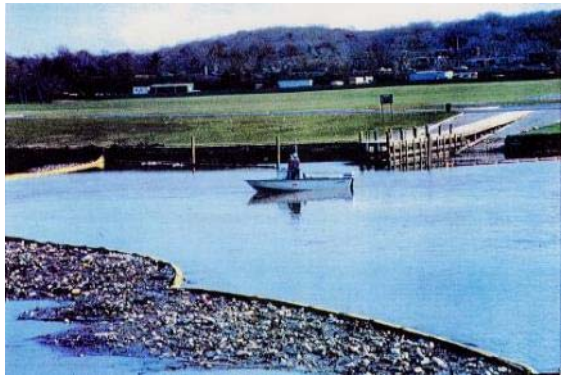
Agenda

- DC Clean Rivers Background
- Phase I Post Construction Monitoring
- Summary of *E.coli* Results
- Conclusions
- Questions

DC Clean Rivers Background
Magnitude of the Challenge

▶ Combined Sewer Overflows

CSO Discharge to Anacostia River

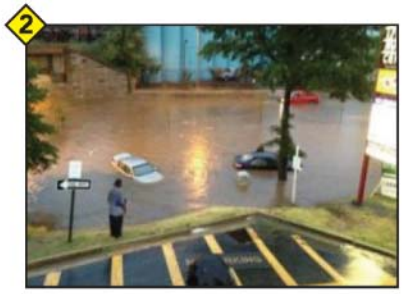


Trash in Anacostia River

On average, **2.1 billion gallons** of untreated sewage and stormwater runoff (combined sewage) are discharged to the Anacostia River per year.

▶ Chronic Sewer Flooding

▲ Flooding on Mt. Olivet Rd NE



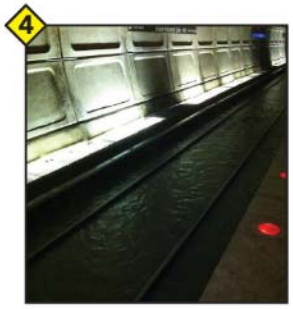
▲ Flooding on Rhode Island Ave NE

▲ Flooding on Rhode Island Ave NW

▲ Flooding on Flagler Pl NW

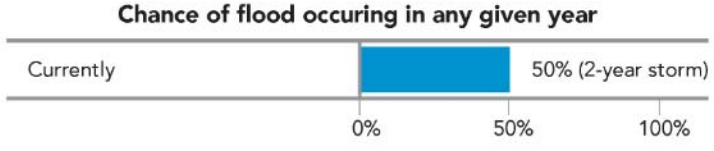
▲ Flooding at 1st and V Streets NW

▲ Flooding at 1st and Rhode Island Ave NW

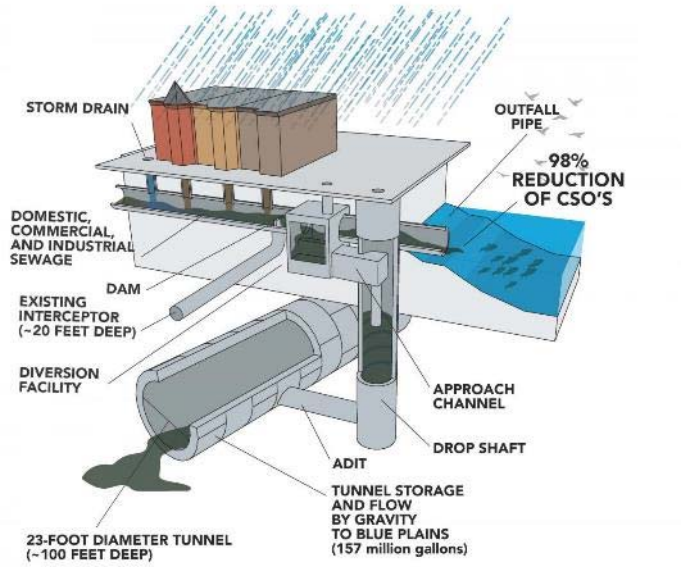


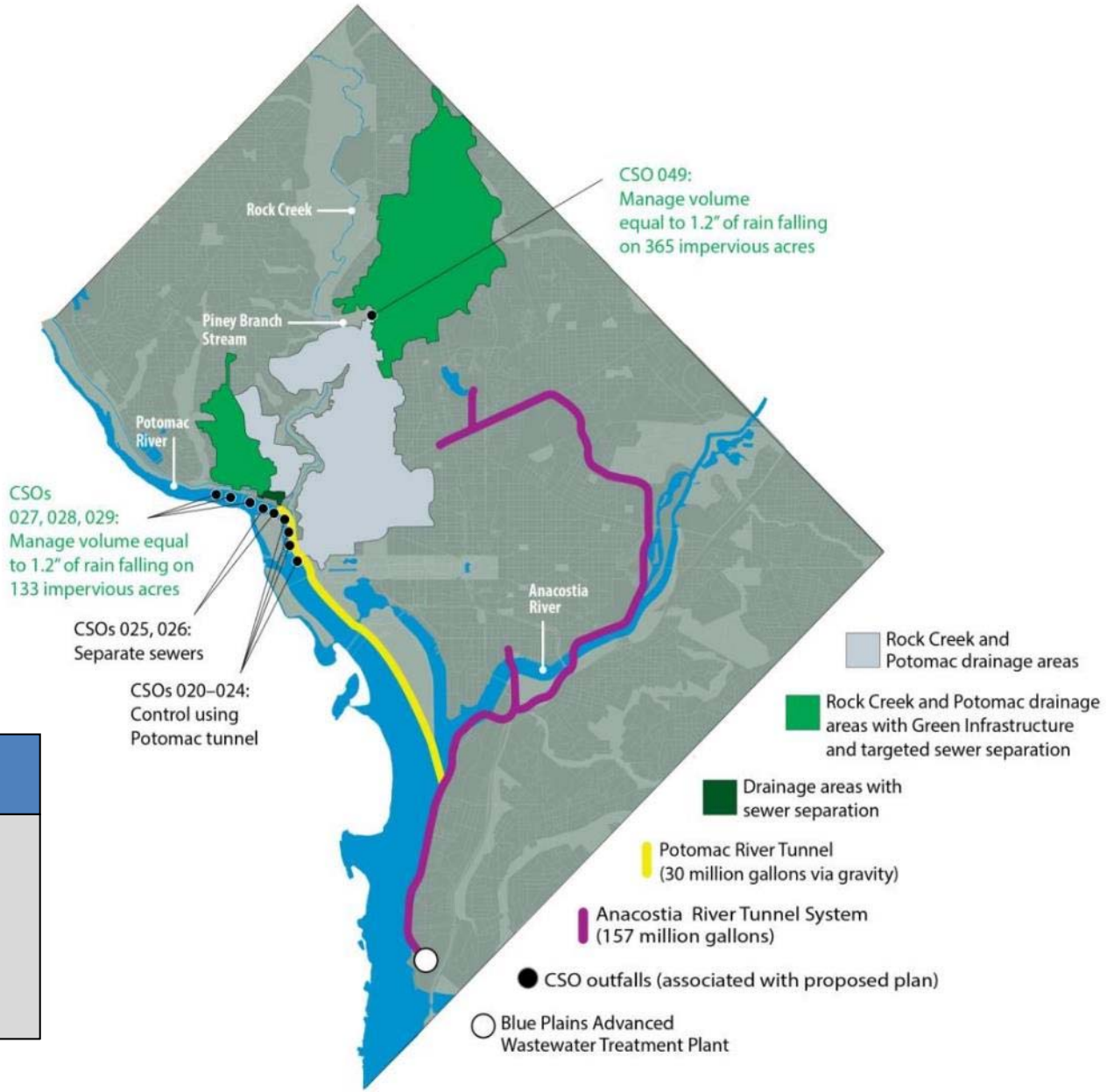
▲ Flooding at Shaw metro

▲ Flooding at 1st and P Streets NW



DC Clean Rivers Project





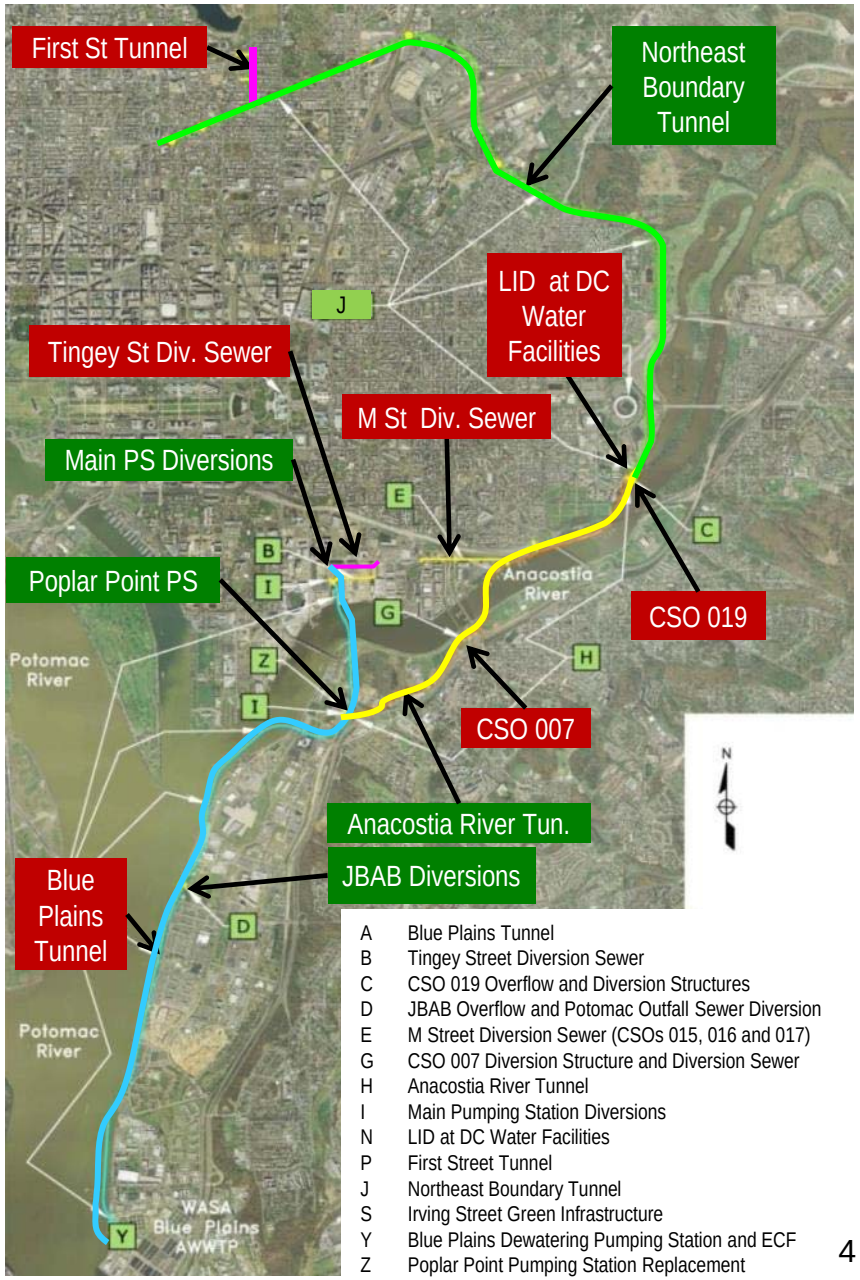
DC CLEAN RIVERS PROJECT AND NITROGEN REMOVAL PROGRAMS
• DC Clean Rivers Project: $2.6 Billion • Nitrogen Removal: $950 Million • Total > $ 3.5 Billion • 25 yr implementation (2005 – 2030) • 96% reduction in CSOs & flood relief in Northeast Boundary • Approx 1 million lbs/yr nitrogen reduction predicted

Anacostia River Tunnel System Snapshot

Project	Diameter	Length	Start	Finish
Blue Plains Tunnel ($318M)	23	24,207	5/2011	8/2015
First Street Tunnel ($158M)	20	2,700	10/2013	10/2016
Anacostia River Tunnel ($254M)	23	12,484	6/2013	12/2017
Northeast Boundary Tunnel ($580M)	23	27,000	9/2017	2023

Various other contracts to connect to tunnel system

More than $1.8 B in Contracts have been let for the Anacostia River Projects



PHASE I POST CONSTRUCTION MONITORING - SUMMARY

Overview

- NPDES Permit Requirements:

Phase	Post-construction Condition
1	Following placement in operation of the inflatable dams and pumping stations rehabilitation
2	Following placement in operation of the Anacostia, Rock Creek and Potomac Storage tunnels, respectively as each tunnel is placed in operation
3	Following placement in operation of the complete CSO Tunnels storage system

- Phase I Monitoring - Duration
  - Data Collection Period: 12/1/2014 – 2/16/2016
  - Report sent to EPA on August 12, 2016

- Phase I Monitoring – Scope

Component	Who Performed
Rainfall Monitoring	CSL & OneRain
CSO Overflow & In-system Monitoring	CSL
CSO Overflow Sampling	DC Clean Rivers
Receiving Water monitoring	
Continuous Dissolved Oxygen	MWCOG /Versar
Regular sampling	MWCOG /Versar
Wet Weather Surveys	MWCOG /Versar

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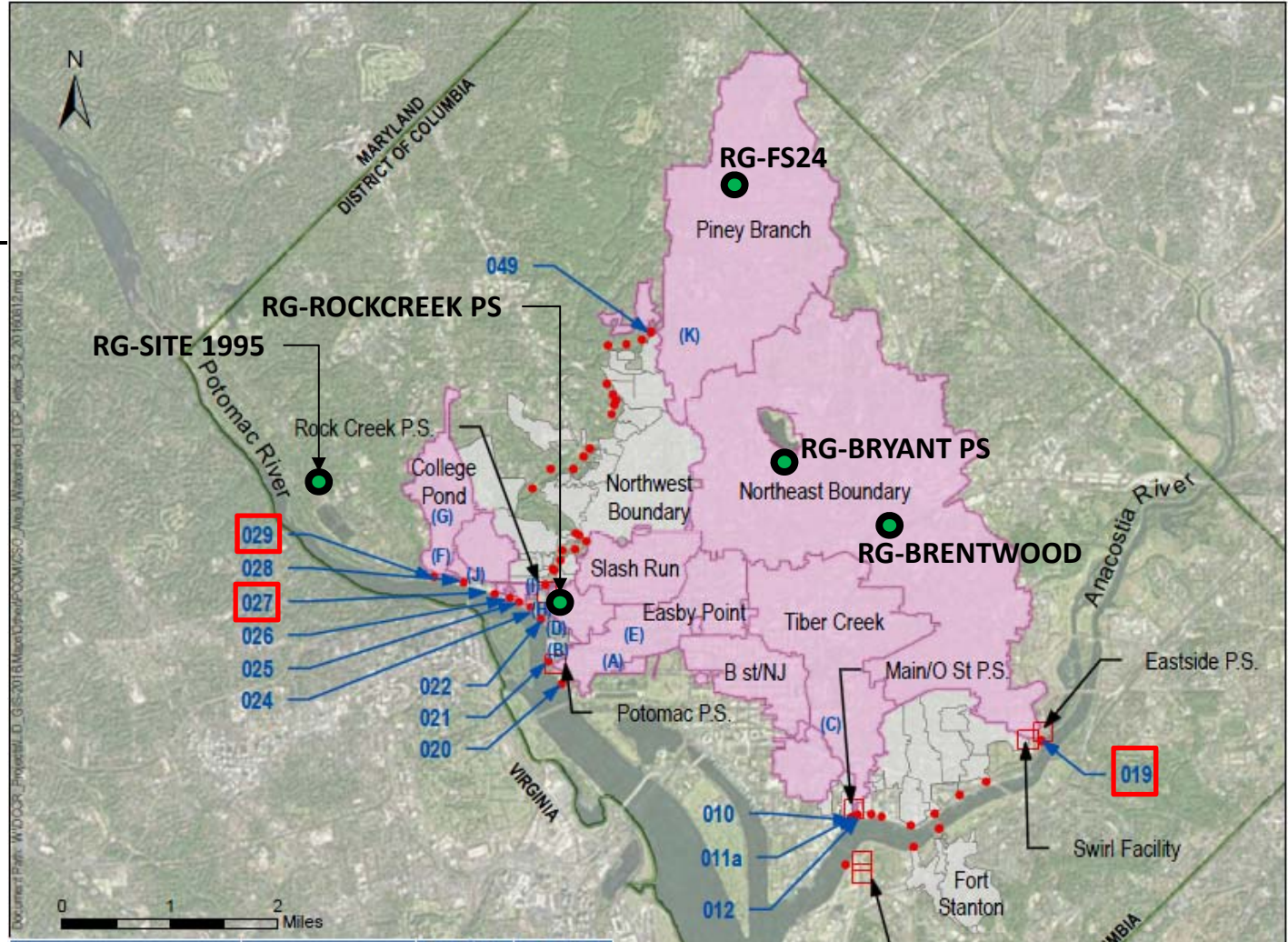
Rainfall, Flow & CSO Sampling – Locations

- Additional Rainfall Data Used:
  - National Weather Service Gage at Ronal Reagan Nat'l Airport
  - Radar data (1km x 1km grid)

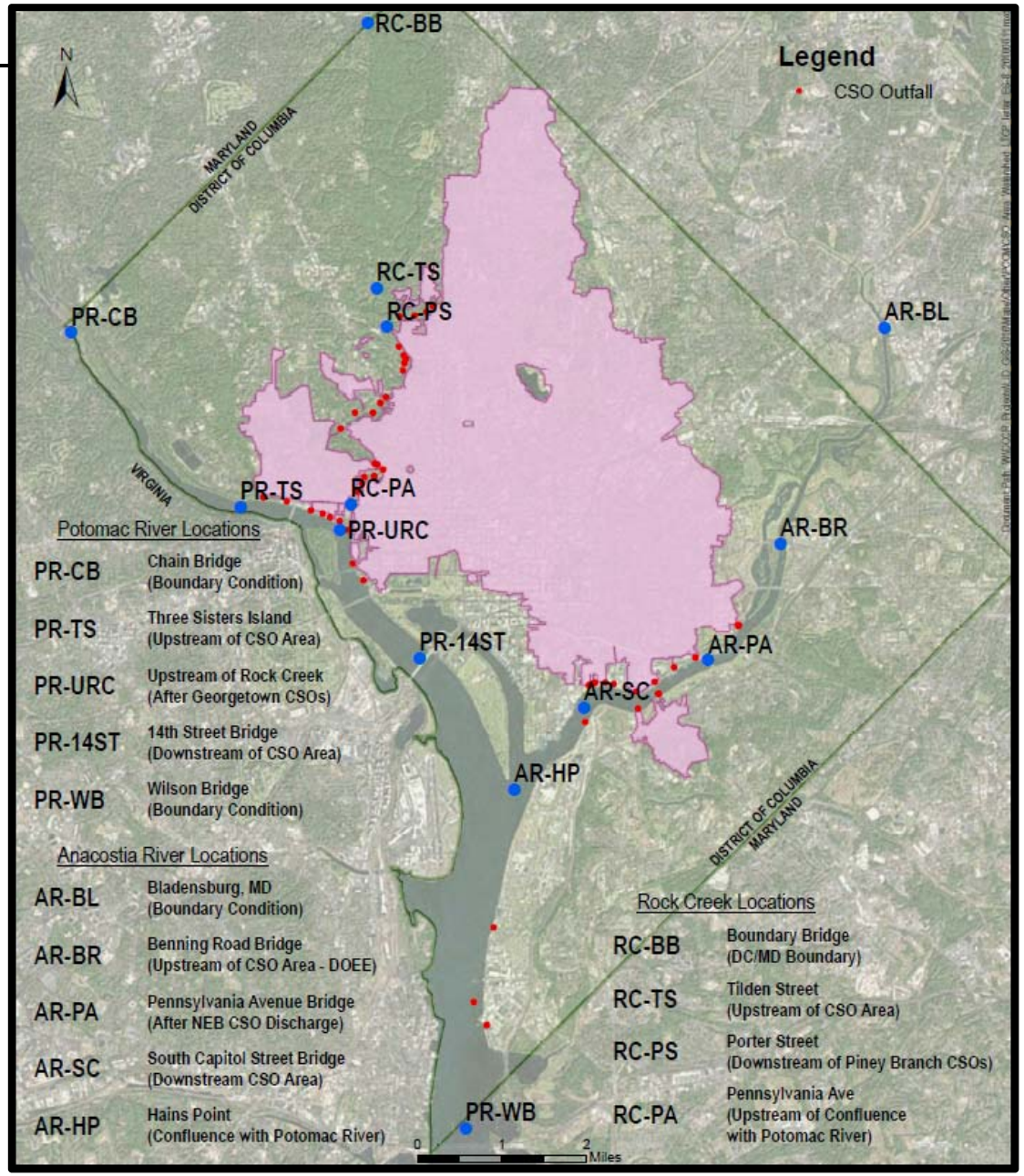


Site/ Outfall	Drainage Shed	Flow Metering		Sampling	
		Req'd by Permit	Per-formed	Req'd by Permit	Per-formed
Anacostia River					
CSO 010	B St/ NJ Ave.	✓	✓		
CSO 011a	B St/ NJ Ave.		✓		
CSO 012	Tiber Creek		✓		
CSO 019	Northeast Boundary	✓	✓	✓	✓
Potomac River			✓		
CSO 003	JBAB Overflow		✓		
CSO 020	Easby Point		✓		
CSO 021	East Rock Creek Div. Sewer	✓	✓		
CSO 022	East Rock Creek Div. Sewer		✓		
CSO 024	West Rock Creek Div. Sewer	✓	✓		
CSO 025	31st Street NW		✓		
CSO 026	Wisconsin Ave NW		✓		
CSO 027	Georgetown		✓		✓
CSO 028	Georgetown		✓		
CSO 029	College Pond	✓	✓		✓
Rock Creek			✓		
CSO 049	Piney Branch		✓		
In-System Locations			✓		
(A) - Upstream of Str. 34	Easby Point		✓		
(B) - Upstream of Str. 35	East Rock Creek Div. Sewer		✓		
(C) - Downstream Str. 15a	B St/ NJ Ave.		✓		
(D) - Upstream Str. 35b	B St/ NJ Ave.		✓		
(E) - Downstream Str 35a	B St/ NJ Ave.		✓		
(F) - Upstream Str. 46	College Pond		✓		
(G) - Upstream Str. 47	College Pond		✓		
(H) - Downstream Str. 37a	Upper Potomac Int. Relief Sewer		✓		
(I) - Downstream Str. 38a	Upper Potomac Int.		✓		
(J) - Downstream 6' connection with UPIRS	Upper Potomac Int.		✓		
(K) - Downstream of Str. 70	East Rock Creek Div. Sewer		✓		

Receiving Water Monitoring Summary

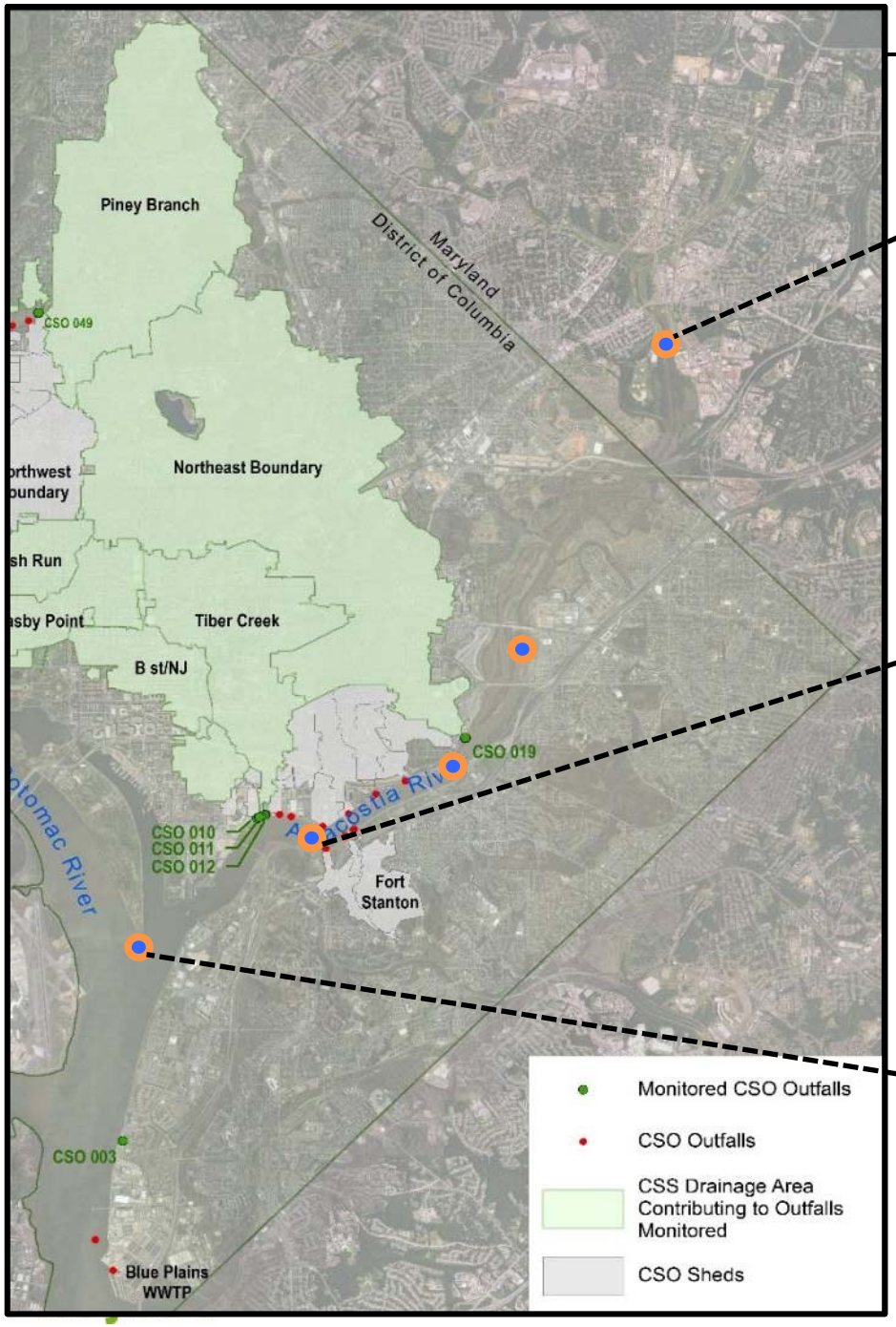
Receiving Water	# of Stations	No. of Sampling Events	Parameters Collected
Anacostia	5	71- Regular Sampling 4- Wet Weather Surveys	Fecal Coliform, E. Coli, CBOD5, TSS, Chlorophyll-a Field Parameters- Ph, D.O., Temperature, Conductivity
Potomac	4		
Rock Creek	4		Penn. Ave- Fecal, E.Coli, CBOD5, TSS Other Stations- Fecal , E.Coli Field Parameters (All Stations)- Ph, D.O., Temperature, Conductivity

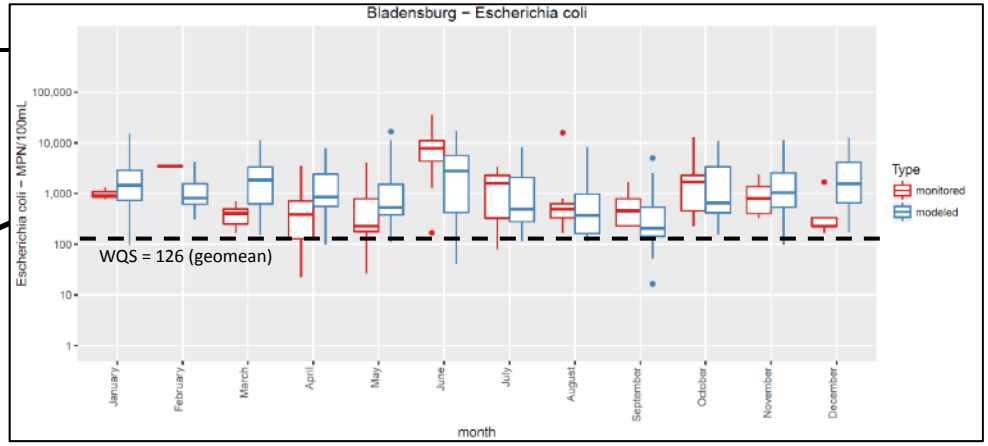
- Budget : $900,000
- Sampling Frequency:
  - Regular Sampling: twice on one week and once the following week. Since the sampling was at regular intervals, the data collected represents wet and dry weather conditions.
  - Wet Weather Sampling: 4 – 40 Hr sampling events

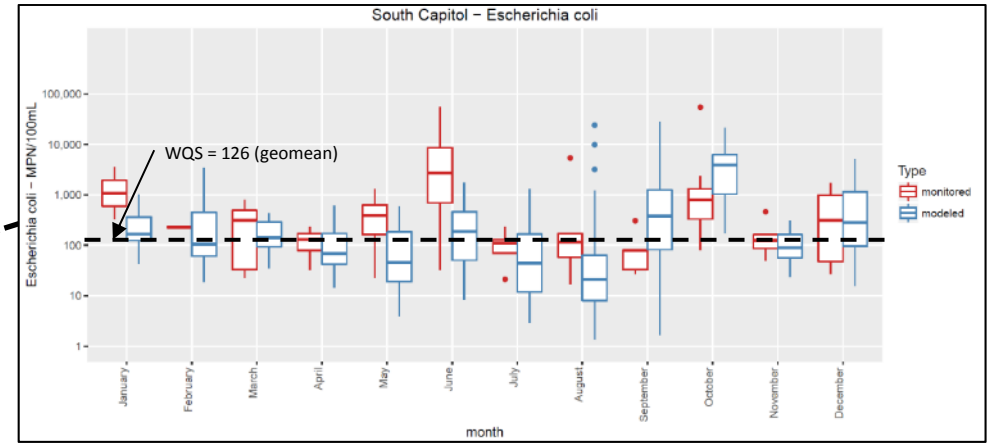


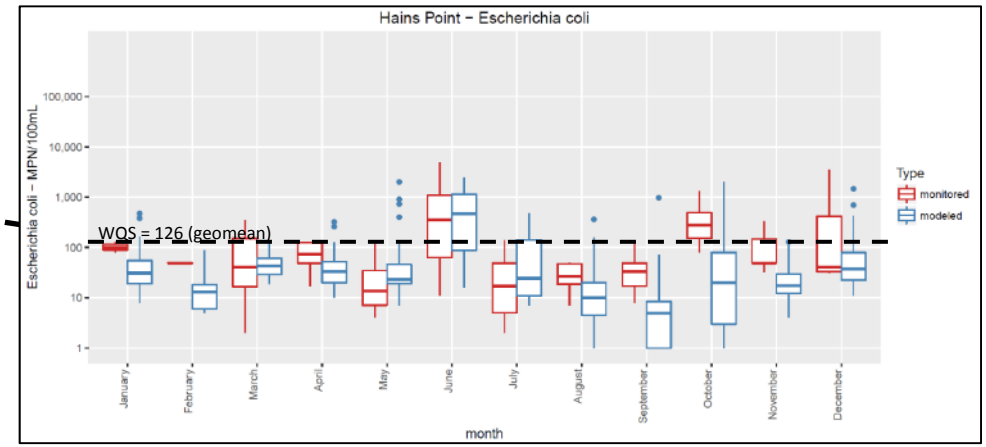
SUMMARY OF E.COLI RESULTS

Data Collected in Anacostia River: *E.coli*

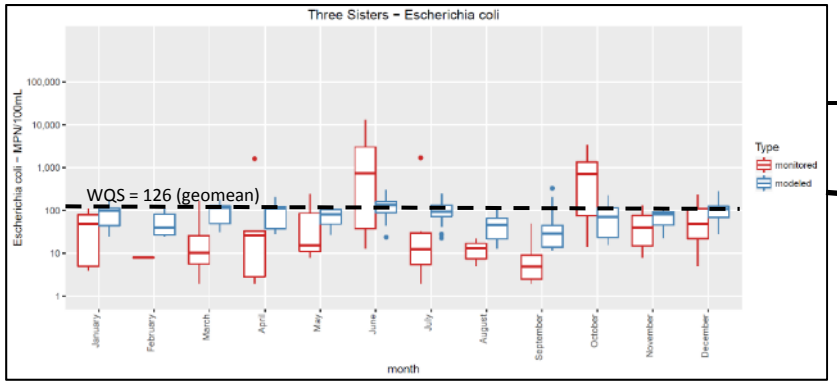


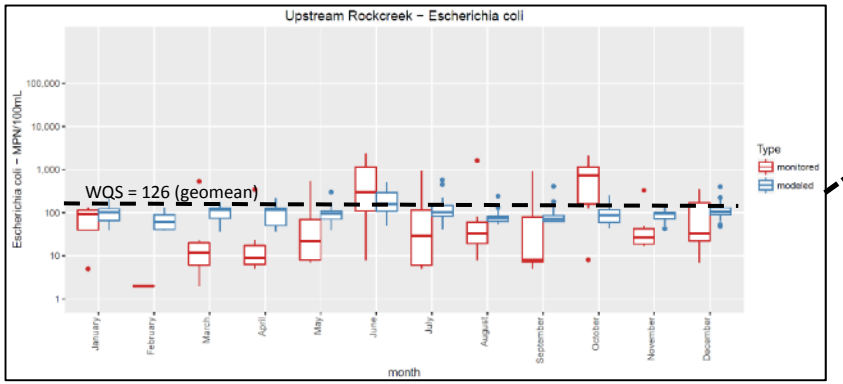


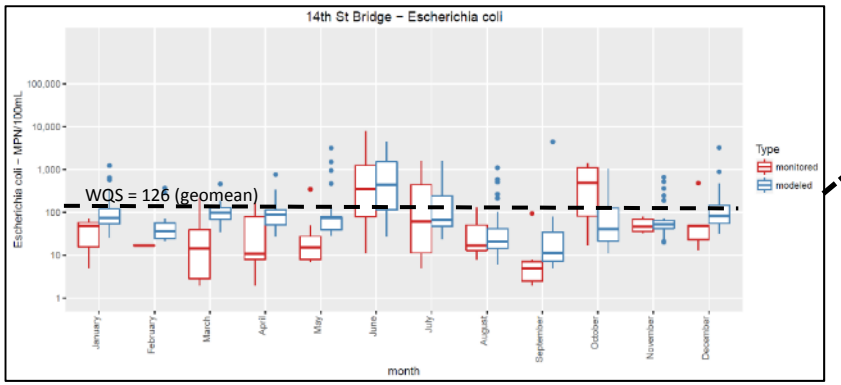


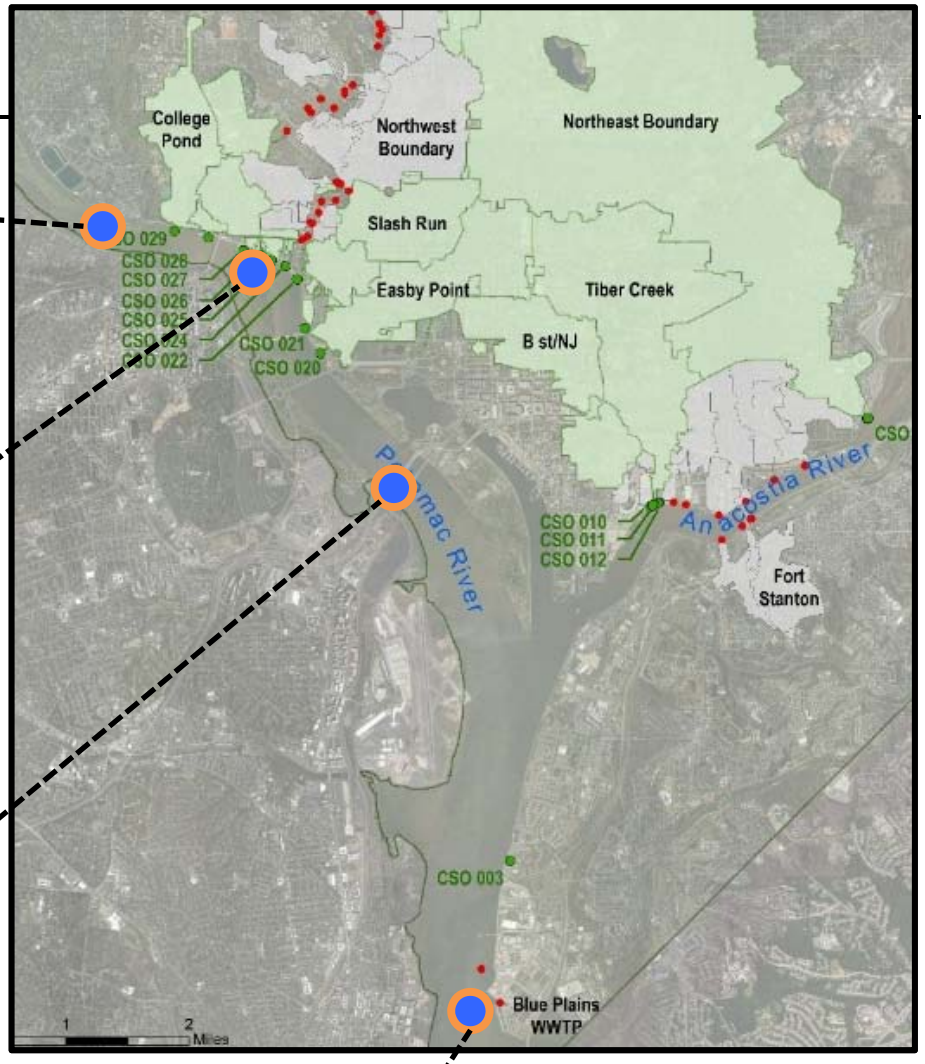


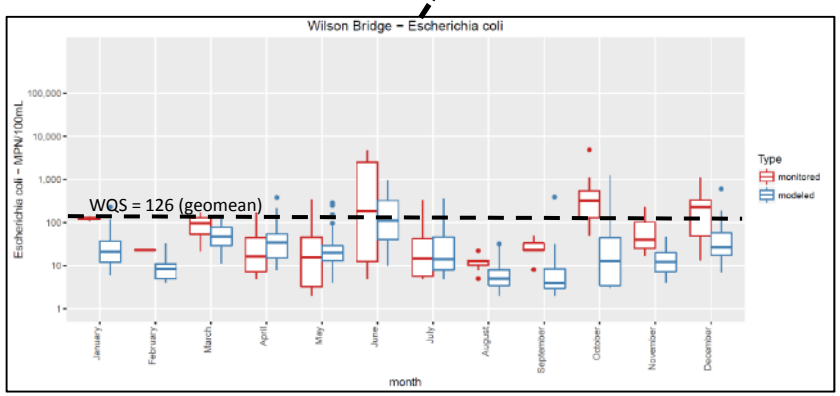
Data Collected in Potomac River: *E.coli*











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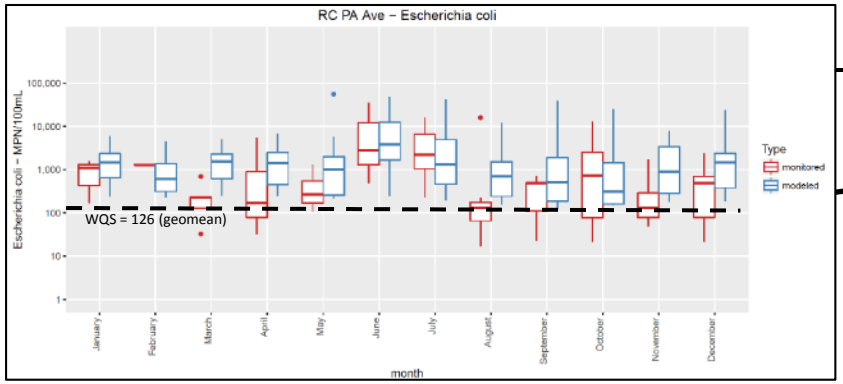
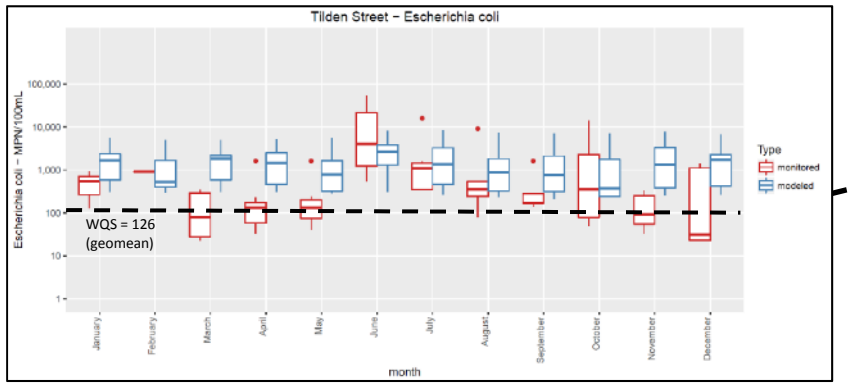
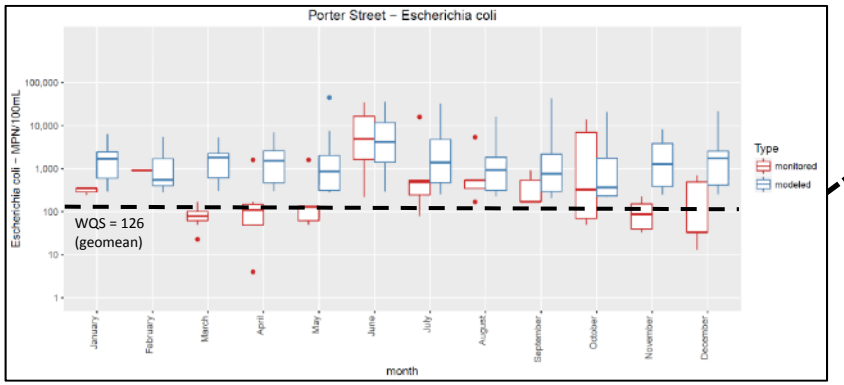
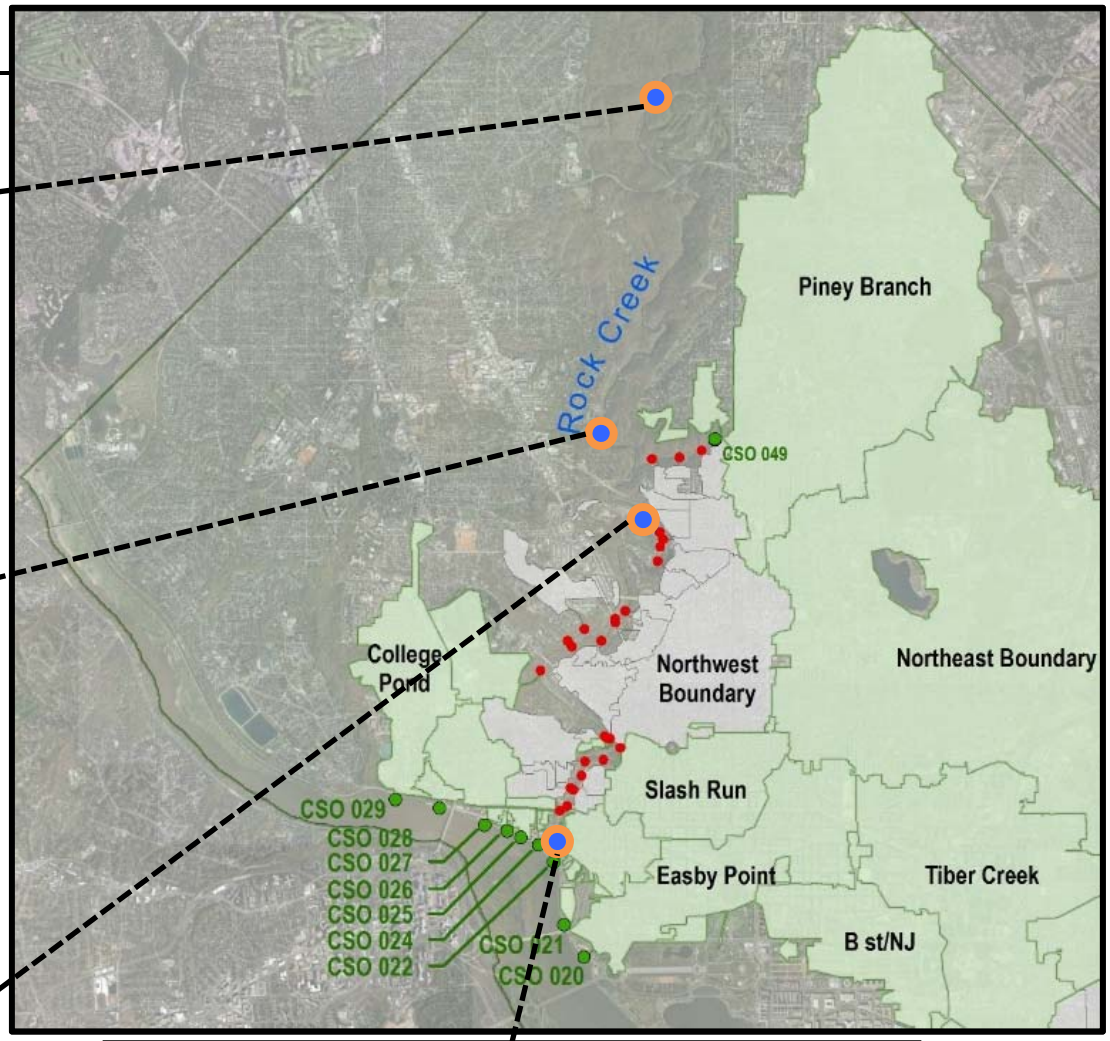
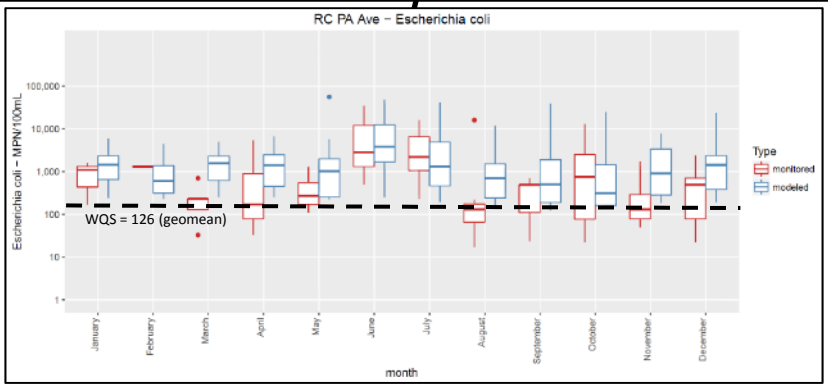
Data Collected in Rock Creek: *E.coli*











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Conclusions

- Phase I CSO controls reduced CSO volume by 38% - within the range of accuracy of modeling used to make LTCP predictions.
- DC Water operated Blue Plains conservatively and treated 266 million gallons of combined sewage beyond that required by its NPDES permit in 2015.
- Anacostia River – E.coli
  - Upstream flow entering the District has high concentrations of E.coli and does not typically meet water quality standards. However, the Phase I controls have reduced exceedance frequency of the E.coli water quality standard (geomean of 126 MPN/ 100 ml) by 1-3 months at most of the locations within the District.
  - Noticeable reductions are observed in the bacteria concentrations for the months of May through September.
- Potomac River– E.coli
  - Concentration by which the Potomac River is exceeding the E.coli quality standard (geometric mean of 126 MPN/ 100 ml) is small.
  - CSOs mostly cause transient elevations of bacteria levels in river reaches immediately downstream of outfalls in the Potomac River.
  - Monthly E.coli geomeans is most affected by the boundary conditions and least affected by transient wet weather sources like CSOs and storm water.
- Rock Creek– E.coli
  - Phase I controls did not have any effect in the monthly geometric mean concentrations due to low frequency of CSO discharges to Rock Creek
  - High background concentration of bacteria from upstream sources are evident in the data

Summary of Lessons Learnt – Receiving Water Quality Monitoring

Planning Phase:

- Sampling during winter months may not be feasible due to ice/snow. Plan the sampling program to accommodate some time extension for adequate data collection.
- Uncertainty in weather predictions could result in cancellations. Include adequate contingency in the budget.

Execution Phase:

- Careful planning of timely delivery of samples at the lab is critical. Bacteria has 8 hour maximum holding time.
- Ensure availability of lab, several days in advance before wet weather sampling due to:
  - Very few certified labs are available for bacteria testing in DC Metro. (Used Martel Labs in Baltimore, Maryland for Phase I PCM)
  - Several agencies in the area may be planning to sample for the same rain event. Lab can only accommodate certain number of bacteria samples for analysis at a time.
- Delay in the weather predictions could result in sampling during overnight, weekends and holidays. Notify changes in sampling schedule to the team and the lab as early as practical.
- Ensure availability of logistics - sampling personnel, boats, sampling bottles, labels, adequate bacteria media at lab etc
- Look out for any construction/ dredging work in the project area. Results for certain parameters may be impacted for such an activity.

Future Monitoring

- NPDES Permit Requirements:

Phase	Post-construction Condition
1	Following placement in operation of the inflatable dams and pumping stations rehabilitation
2	Following placement in operation of the Anacostia, Rock Creek and Potomac Storage tunnels, respectively as each tunnel is placed in operation
3	Following placement in operation of the complete CSO Tunnels storage system

Questions

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