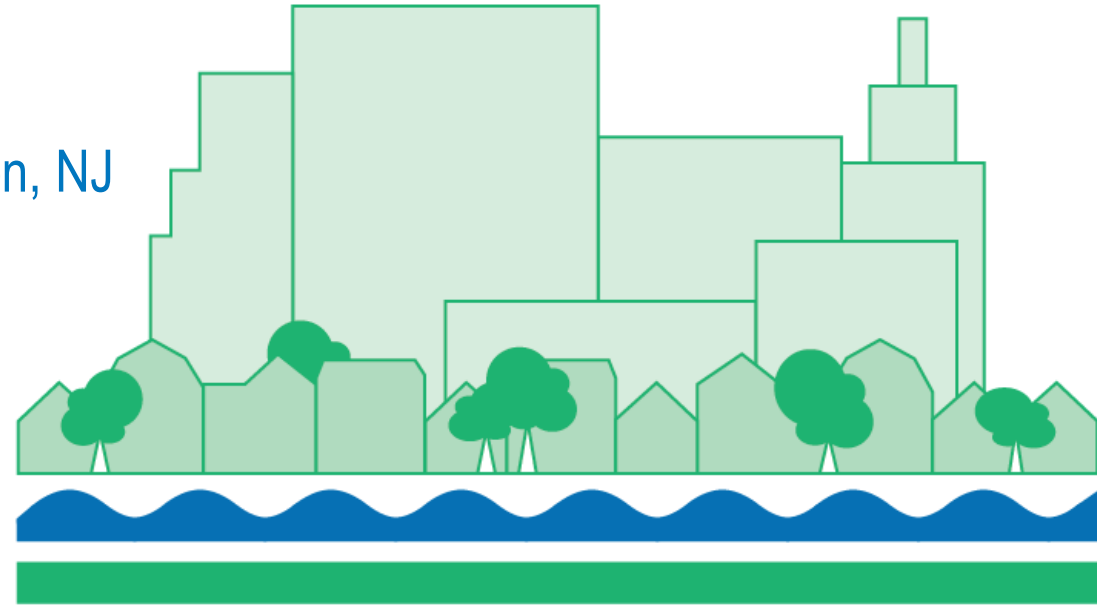


Supplemental CSO Team – Session 14  
PVSC Service Area / North Bergen Service Area  
January 9, 2020– 5:30 PM

Harrison High School  
401 Kingsland Avenue, Harrison, NJ



**CLEAN WATERWAYS**  
Healthy Neighborhoods

# Agenda

- Introduction and Recap
- Public Engagement Update
- Water Quality Model Results &
- Microbial Source Tracking Study
- Review of Public Comments and Responses for DEAR
- Discuss next steps for development of
  - Selection and Implementation of Alternatives Report
- Questions and Discussion
- Adjourn

# Introduction and Recap

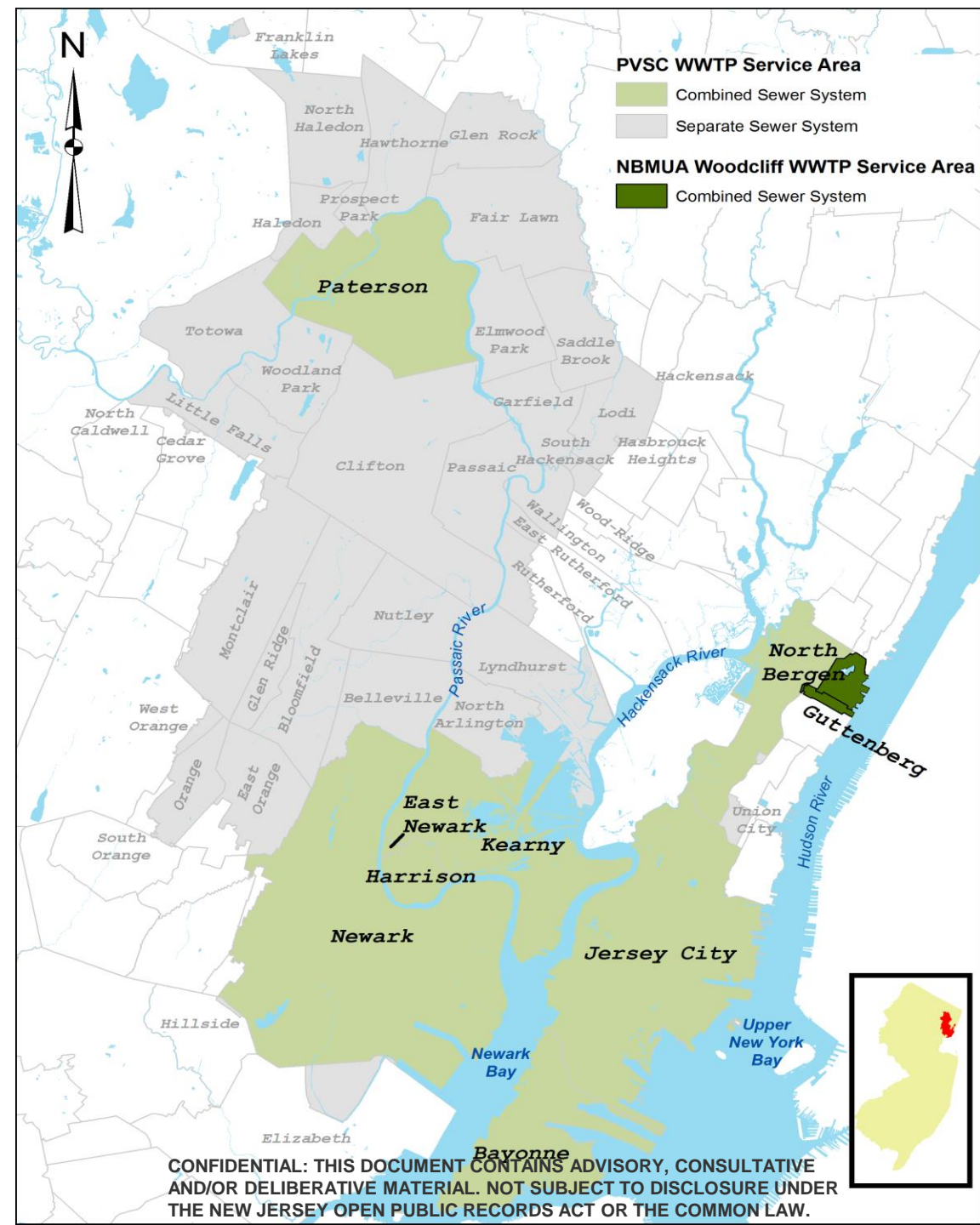
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# CLEAN WATERWAYS

## Healthy Neighborhoods

- City of Paterson
- City of Newark
- Town of Guttenberg
- Town of Harrison
- Town of Kearny
- Borough of East Newark
- North Bergen MUA
- Bayonne MUA
- Jersey City MUA
- Passaic Valley Sewerage Commission (PVSC)



# Supplemental CSO Team Members

Member	Organization	Member	Organization
Dan Smereda	Bayonne Water Guardians	Sue Levine	Paterson Smart
Lisha Smereda	Bayonne Water Guardians	Ruben Gomez	City of Paterson Economic Development
Nicole Miller	Newark DIG	Sheri Ferreira	Greater Paterson Chamber of Commerce
Drew Curtis	Ironbound Community Corporation	Betty Jane Boros	New Jersey Business & Industrial Association
Robin Dougherty	Newark Greater Conservancy/Newark Business Partnership	Leslie Brunell	Stevens Institute of Technology
Jorge Santos	Newark Community Economic Development Corporation	Christopher C. Obropta, Ph.D	Rutgers University - Cooperative Extension Water Resources
Christopher Pianese	Township of North Bergen	Captain Bill Sheehan	Hackensack Riverkeeper
Janet Castro	Hudson Regional Health Commission Town of North Bergen	Harvey Morginstin	Passaic River Boat Club & Passaic River Superfund CAG
Thomas Stampe	North Bergen "Sustainable Jersey" group	Laurie Howard	Passaic River Coalition
Nancy Kontos	Bunker Hill Special Improvement District	Ben Delisle	Passaic River Rowing Association
Alison Cucco	Jersey City Environmental Commission	Patricia Hester-Fearon	Town of Kearny
Michele Langa	NY/NJ Baykeeper	Christopher Vasquez	Town of Kearny

# 59-Month Program Schedule and Milestones



## Permit Effective Date

July 1<sup>st</sup>, 2015

We Are Here

2015

2016

2017

2018

2019

2020

January 1, 2016

- ✓ Coordinates of pumps, regulators, and outfalls
- ✓ System Characterization Work Plan
- ✓ Baseline Compliance Monitoring Program Work Plan

July 1, 2016

- ✓ Map of Combined and Separate Sewer Areas

 Permit Due Date

July 1, 2018

- ✓ System Characterization Report
- ✓ Public Participation Process Report
- ✓ Compliance Monitoring Program Report
- ✓ Consideration of Sensitive Areas Plan

July 1, 2019

- ✓ Development and Evaluation of Alternatives Report

June 1, 2020

Selection and Implementation of Alternatives Report in the Final LTCP

# Project Status

- Continued Evaluation of Alternatives by PVSC and Municipalities
- Conducted a Financial Capability Analysis
- Utilized the Water Quality Model to evaluate water quality impacts of alternatives
- Discussions with NJDEP to develop a path forward



# Water Quality Modeling Results





# NJ Pathogen Criteria

- Primary Contact Recreation:
  - Enterococci levels shall not exceed a geometric mean of **35/100 ml**, or a single sample maximum of **104/100 ml**. (SE1 and SC)
    - Hackensack R. (upper), Hudson R. (north of Harlem R.), Raritan R., Raritan Bay
  - E. coli levels shall not exceed a geometric mean of **126/100 ml** or a single sample maximum of **235/100 ml**. (All FW2)
    - Elizabeth R., Passaic R., Raritan R.
- Secondary Contact Recreation:
  - Fecal coliform levels shall not exceed a geometric mean of **770/100 ml**. (SE2)
    - Arthur Kill (lower), Hackensack R. (mid), Hudson R., Passaic R. (mid), Rahway R.
  - Fecal coliform levels shall not exceed a geometric mean of **1500/100ml**. (SE3)
    - Arthur Kill (upper), Elizabeth R., Hackensack R. (lower), Kill Van Kull, Newark Bay, Passaic R. (lower)

# NJ Pathogen Criteria

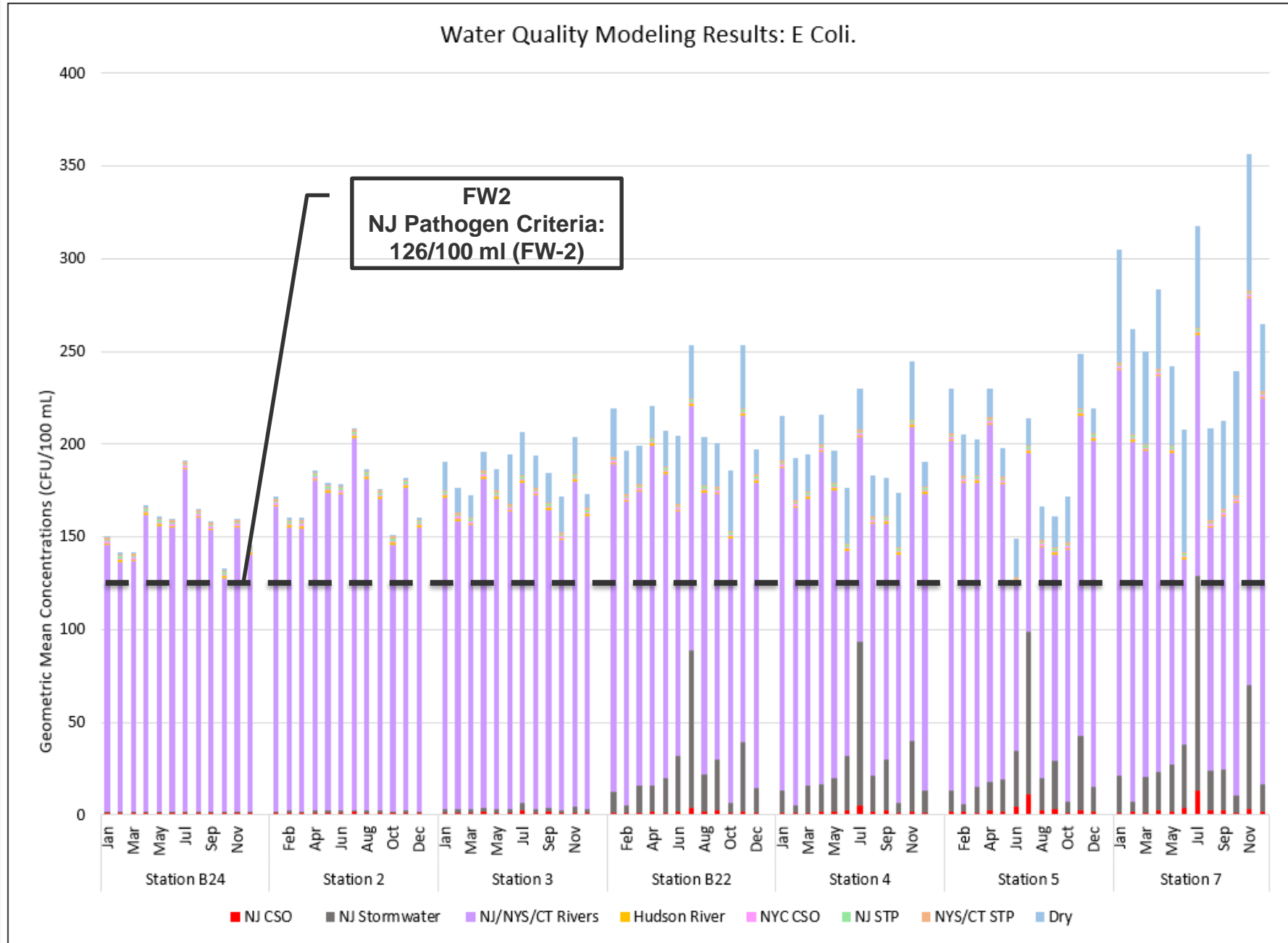
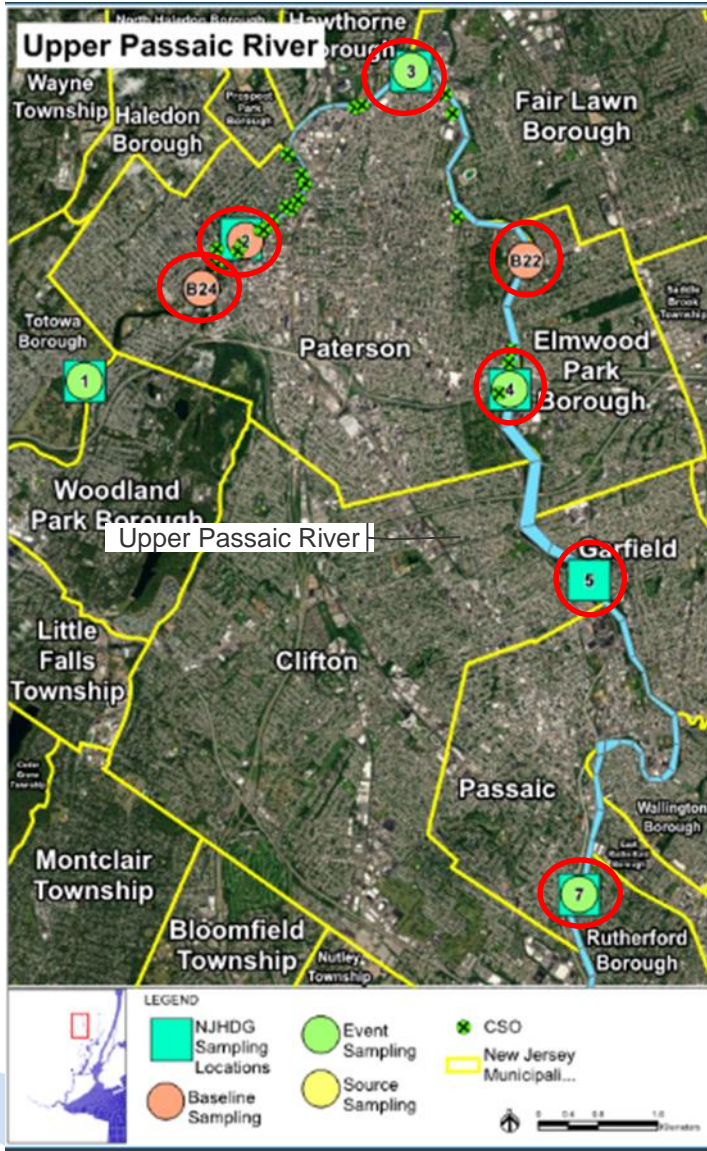
The Department shall **utilize a geometric mean to assess compliance** with the bacterial quality indicators at N.J.A.C.7:9B-1.14(d)1ii-iii. The geometric mean shall be calculated using a minimum of five samples collected over a thirty-day period. The **single sample maximum shall be used for beach notification** in accordance with N.J.A.C. 8:26 and to identify where additional ambient water quality sampling is needed to calculate a geometric mean (there are no beaches in the PVSC area).

# WQM Component Analysis

- WQ Component Analysis:
  - E. coli
  - Fecal
  - Enterococci
- Components:
  - NJ CSO
  - NJ SW/Runoff
  - NJ STP
  - NJ/NY/CT Rivers
  - Hudson River
  - Dry-weather
  - NYC CSO+SW
  - NY/CT STP

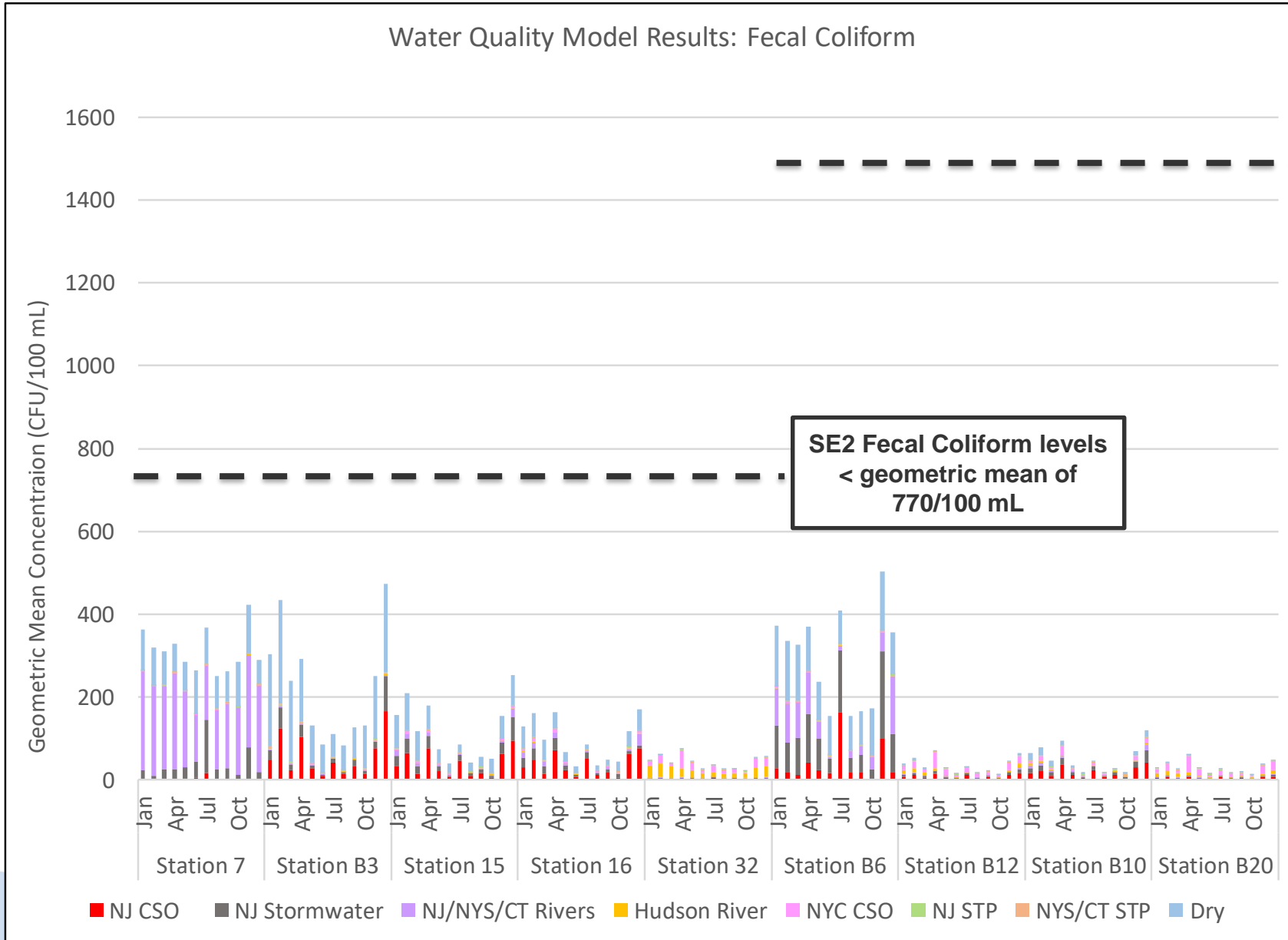


# WQM Component Analysis –Upper Passaic- E. Coli



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# WQM Component Analysis – Fecal Coliform- All Stations



SE3 Fecal Coliform levels < geometric mean of 1500/100 mL

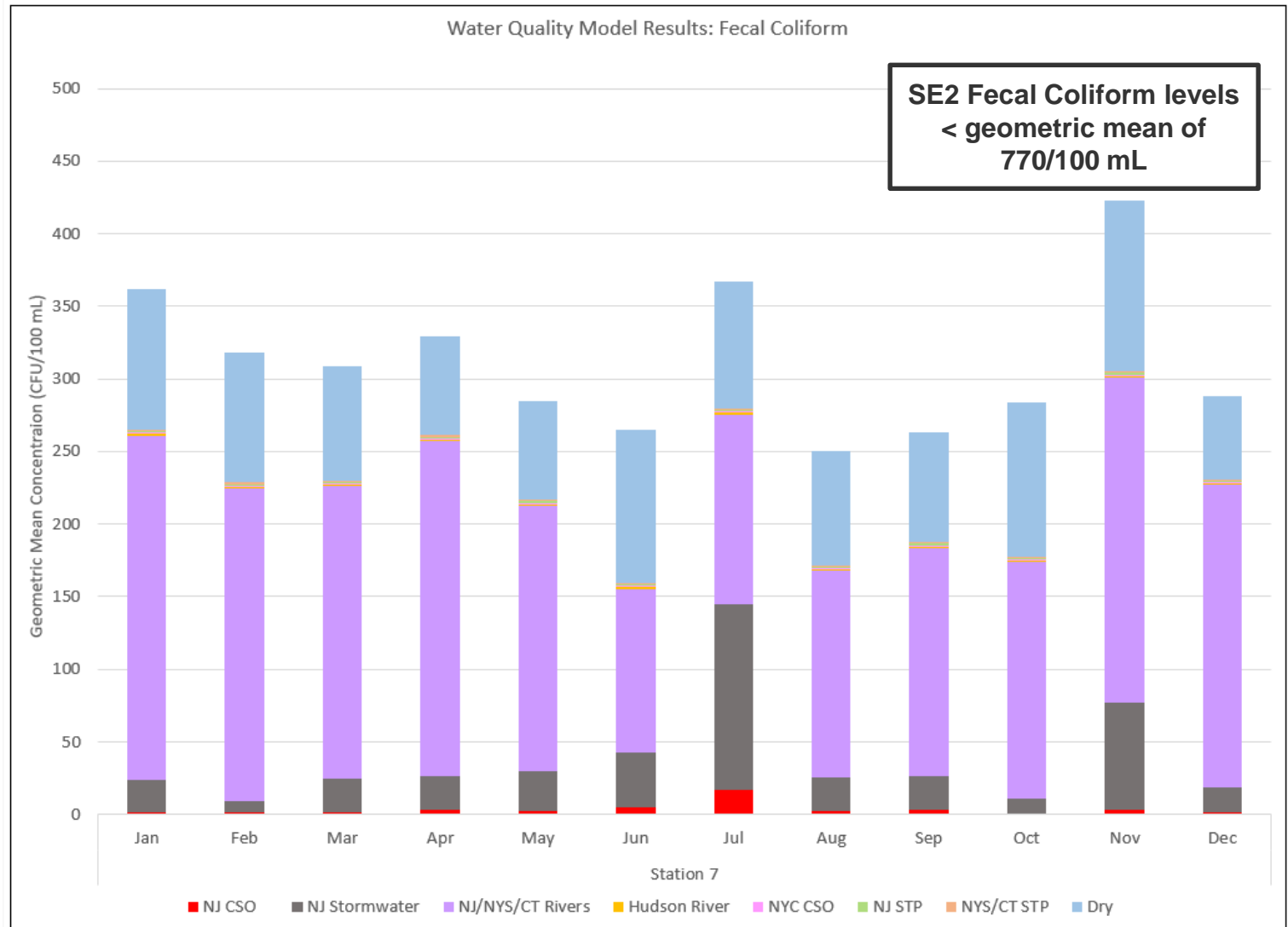
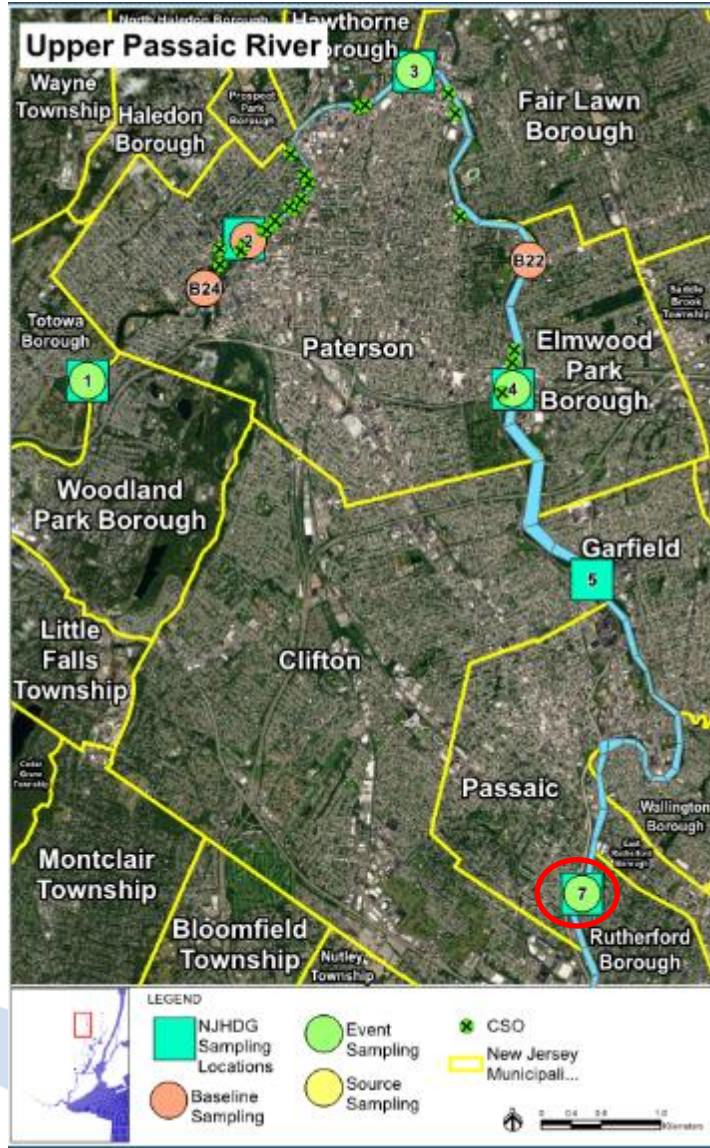
SE2 Fecal Coliform levels < geometric mean of 770/100 mL



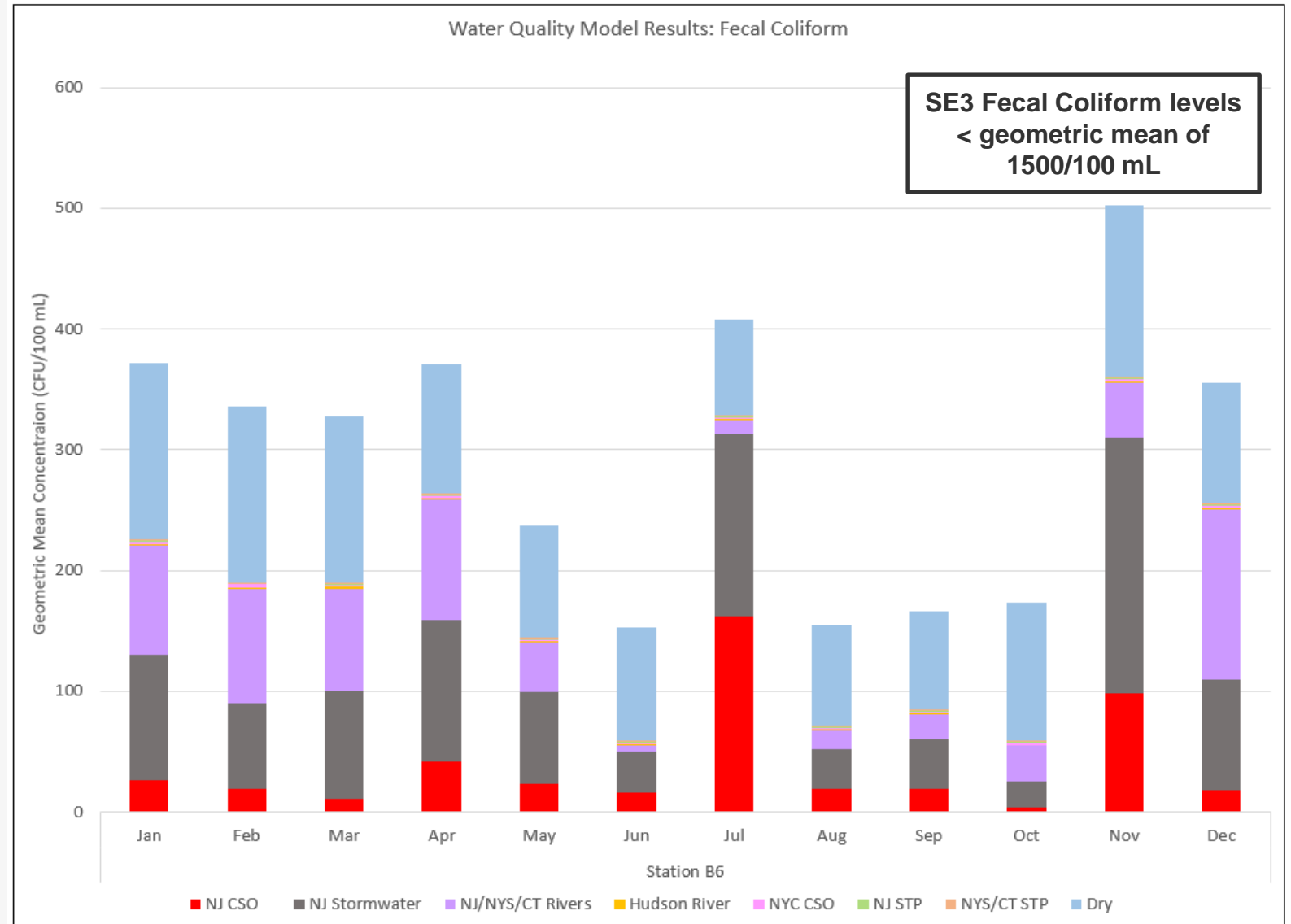
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# WQM Component Analysis – Upper Passaic River - Fecal Coliform

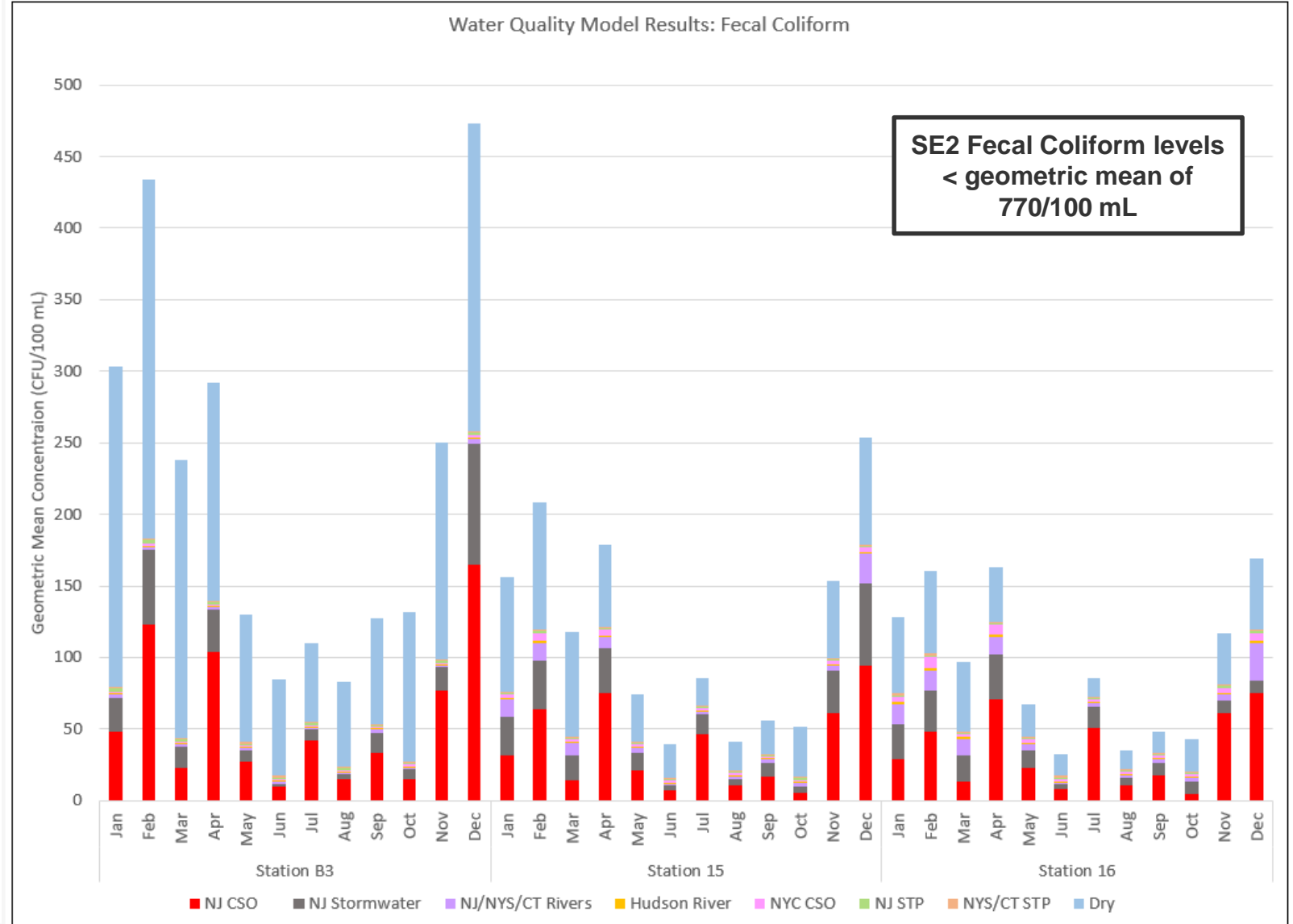


# WQM Component Analysis – Lower Passaic River- Fecal Coliform



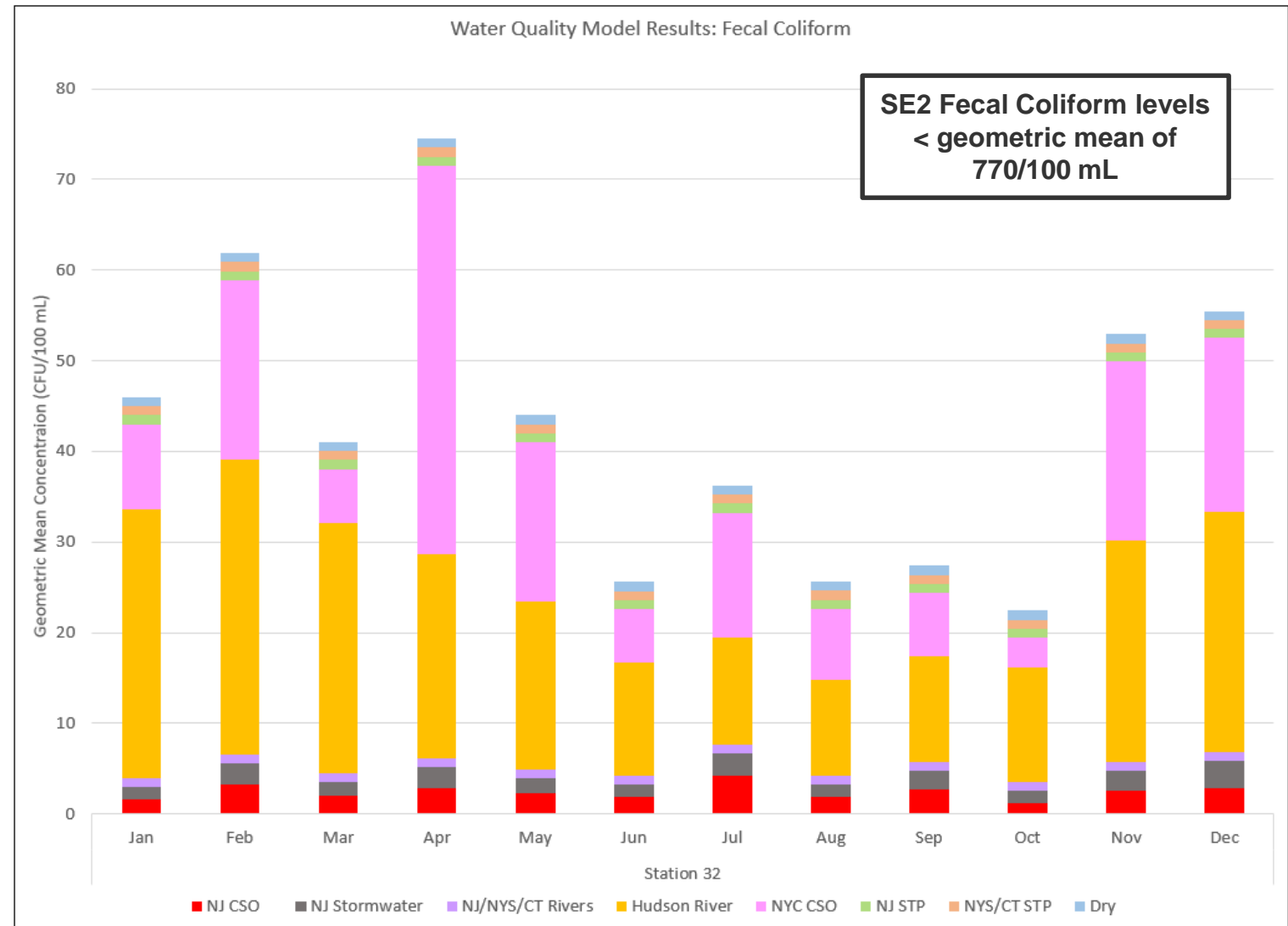


# WQM Component Analysis – Fecal Coliform- Lower Hackensack River

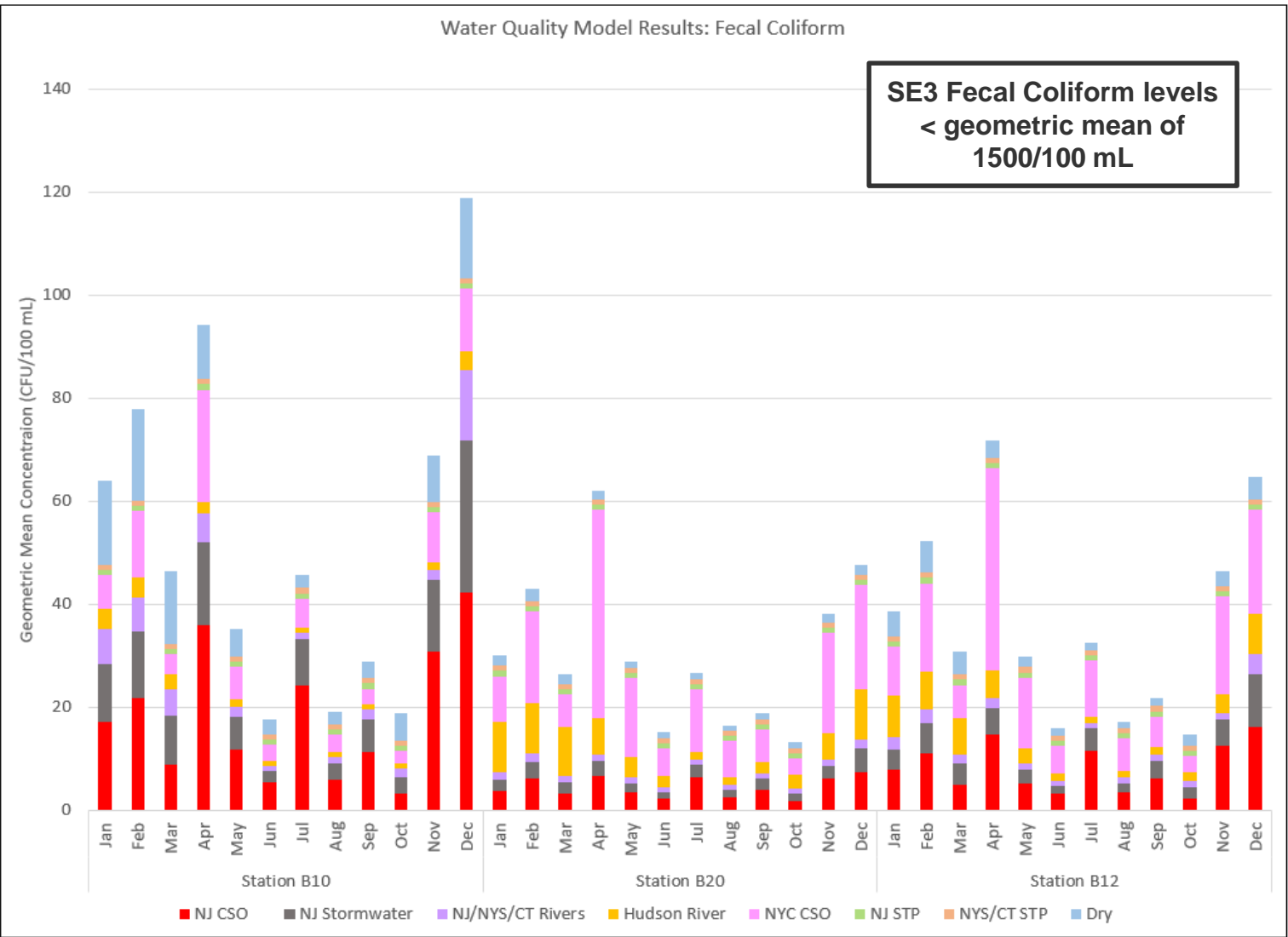




# WQM Component Analysis – Fecal Coliform-Hudson River



# WQM Component Analysis – Fecal Coliform- Newark Bay



# Financial Capability Analysis Summary- 20 Year Schedule

Permittee		Current Cost per Typical Single Family Residence in 2019			Capital Cost of CSO Program to Reach EPA-Defined "Affordable" Rates Equal to 2% MHI	Projected Annual Costs per Typical Single Family Residence in 2042 With "Affordable" CSO Program
		\$ / Household	Estimated MHI	Residential Indicator	(\$ Millions)	(\$ / Household)
1	Bayonne	\$380	\$58,811	0.65%	\$159.0	\$1,796
2	East Newark	\$436	\$61,376	0.71%	\$5.6	\$1,818
3	Guttenberg	\$535	\$56,348	0.95%	\$6.0	\$1,665
4	Harrison	\$429	\$63,639	0.67%	\$19.5	\$2,000
5	Jersey City MUA	\$482	\$65,294	0.67%	\$1,130.0	\$2,060
6	Kearny	\$548	\$65,400	0.84%	\$69.0	\$1,910
7	Newark	\$340	\$35,607	1.0%	\$320.0	\$917
8	North Bergen					
	PVSC Service Area	\$557	\$59,592	0.94%	\$107.0	\$1,878
	Woodcliff TP Service Area	\$557	\$59,592	0.94%	\$107.0	\$1,845
9	Paterson	\$463	\$36,157	1.28%	\$10.0	\$734

Based on a 20-yr implementation schedule in 2019 Dollars



# Microbial Source Tracking Study



# Outline

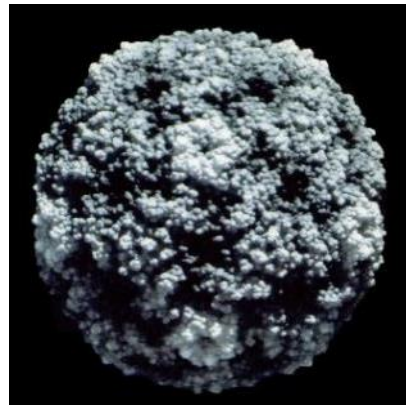
- Overview
- Background Sources and Microbial Source Tracking Techniques
- PVSC Source Sampling Program Description
- Summary of Laboratory Results
- Next Steps
- Conclusion

# Fecal Indicator Bacteria

- 1 g feces contains ~100 billion bacteria from >1000 species!
- Viruses
- Protozoa



Source: CDC



# Background Sources of Fecal Contamination

## Human

## Non-Human

Illegal Pipe Connections



Stormwater Runoff



Septic Systems



Landfill Leachate



CSOs

Biofilms



Wildlife



Decaying Plants

Domesticated Animals

Soil

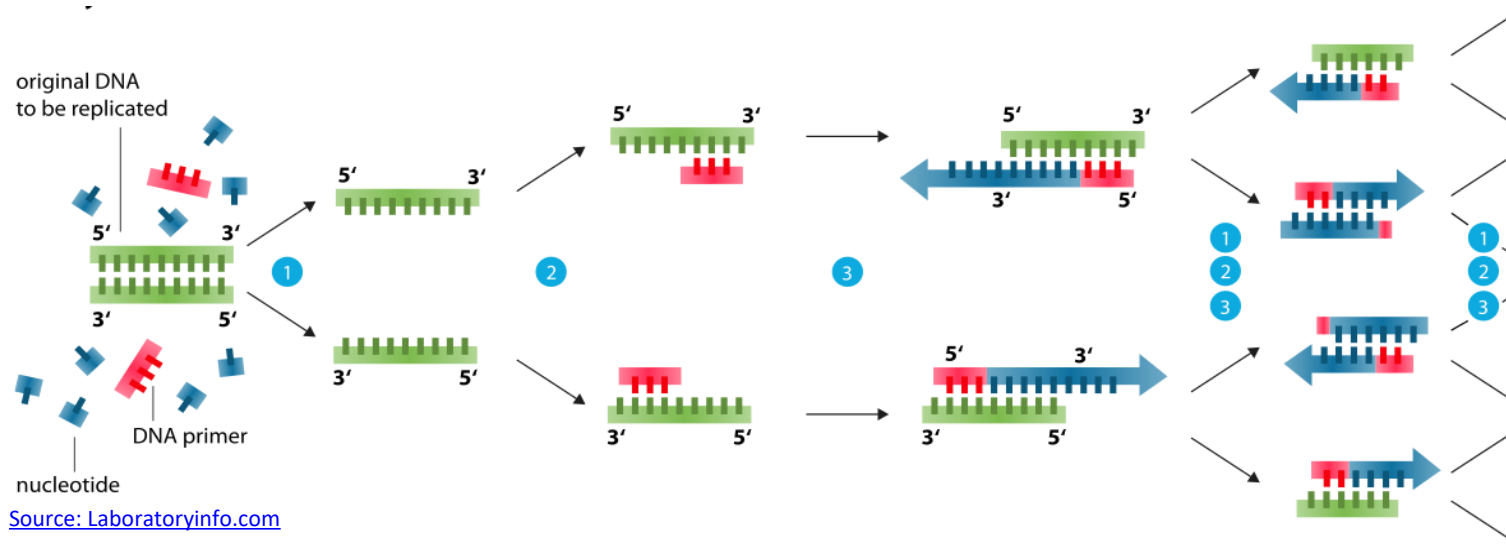


# Microbial Source Tracking Techniques

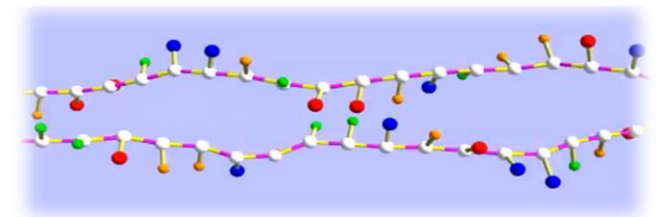
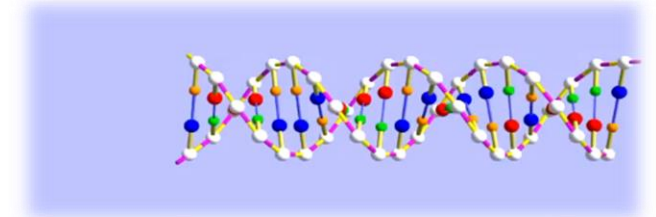
- Microbiological: *Bifodobacterium* and *Bacteroides* Cultures
- Phenotypic: MAR Analysis, Serotyping
- Chemical: Caffeine, Pharmaceuticals, Coprostanol
- Genotypic: PFG Electrophoresis, PCR, qPCR, Ribotyping



# Polymerase Chain Reaction (PCR)



1. Denaturation
  - High Heat, Breaks dsDNA
2. Annealing
  - Primer Hybridization
3. Extension
  - dsDNA Synthesis from Polymerase



# Source Sampling Program

- Purpose

- Determine pathogen concentration in Upper Passaic River and tributaries (upstream of CSOs).
- Generate sufficient data to establish existing ambient water quality conditions.
- Generate sufficient data under different environmental conditions.

- MST Techniques Used

- Traditional FIB *Enterococci* and *E. coli* as microbiological indicators.
- Caffeine as a chemical indicator.
- Microbial DNA biomarkers using qPCR methodology as genotypic indicators:
  - Human: EPA assay
  - Human: *B. dorei* assay
  - Bird *Helicobacter* assay
  - Dog Bacteroidetes assay
  - Ruminant Bacteroidetes assay
  - General Bacteroidetes fecal assay for presence/absence

# Source Sampling Locations

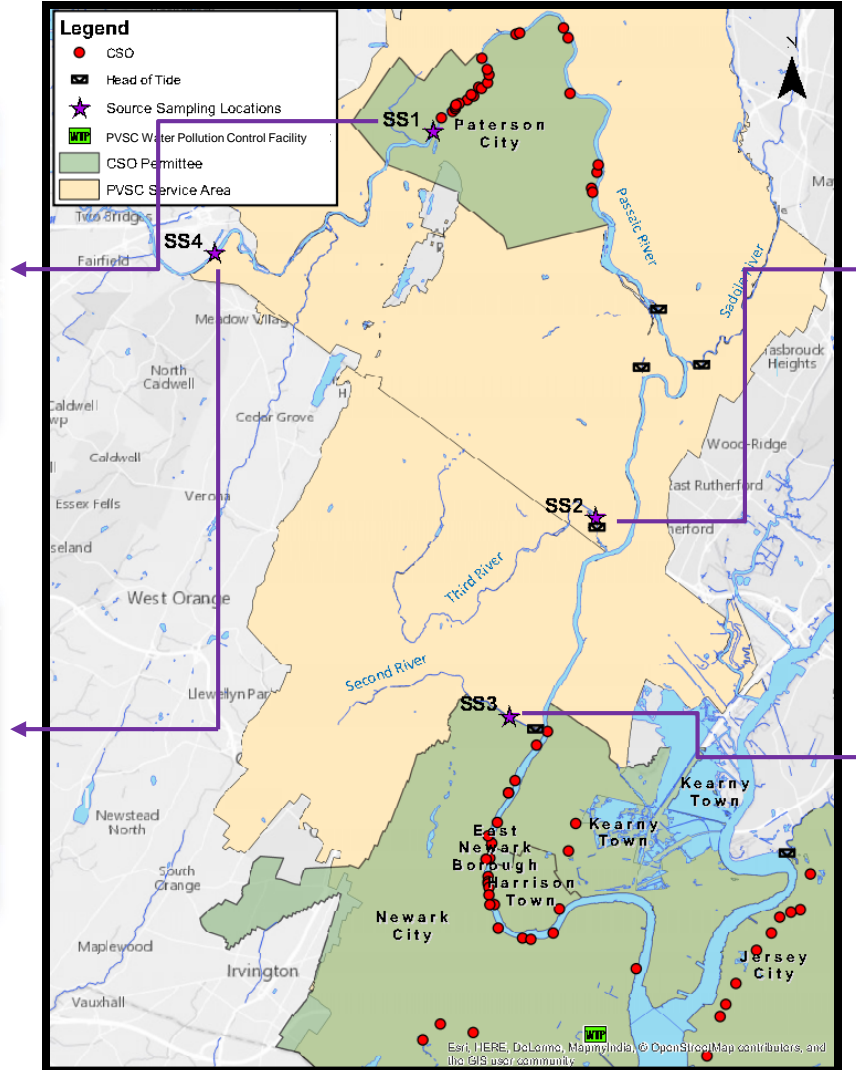
## Passaic River Sites



SS1 – Paterson, NJ



SS4 – Wayne, NJ



## Tributary Sites Third River



SS2 – Clifton, NJ

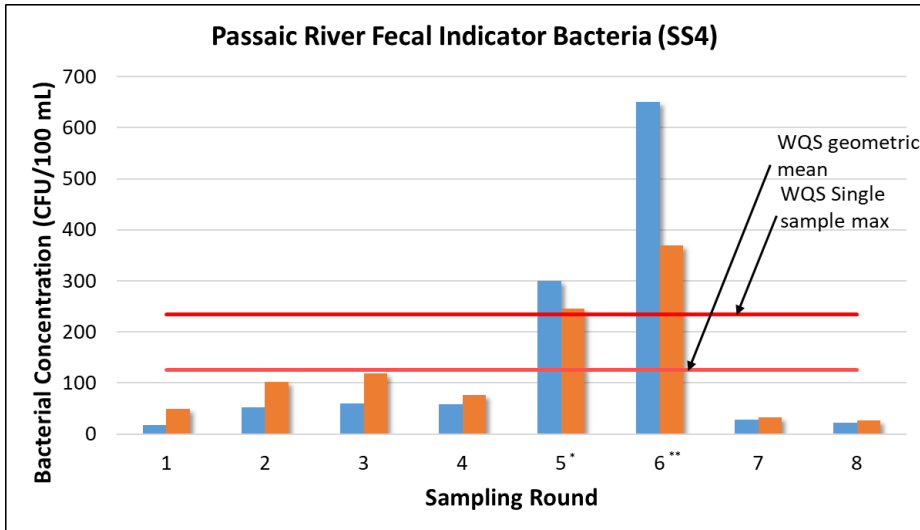
## Second River



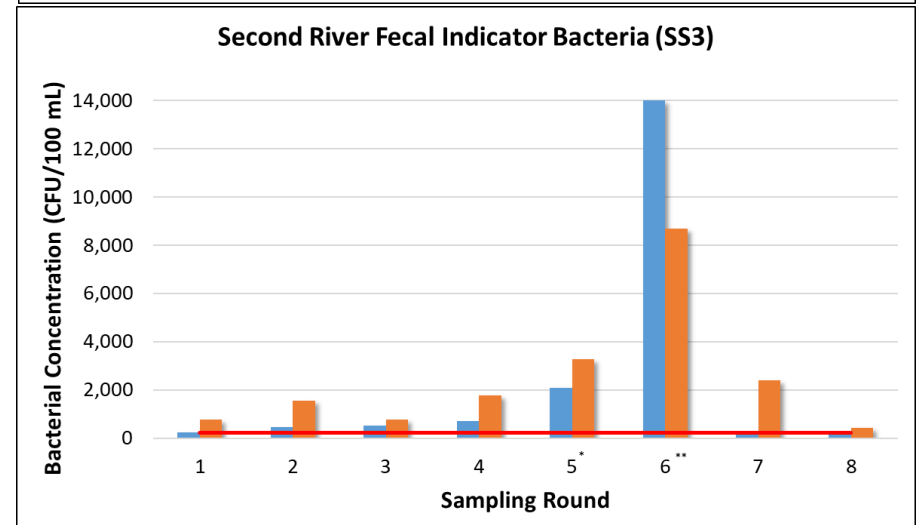
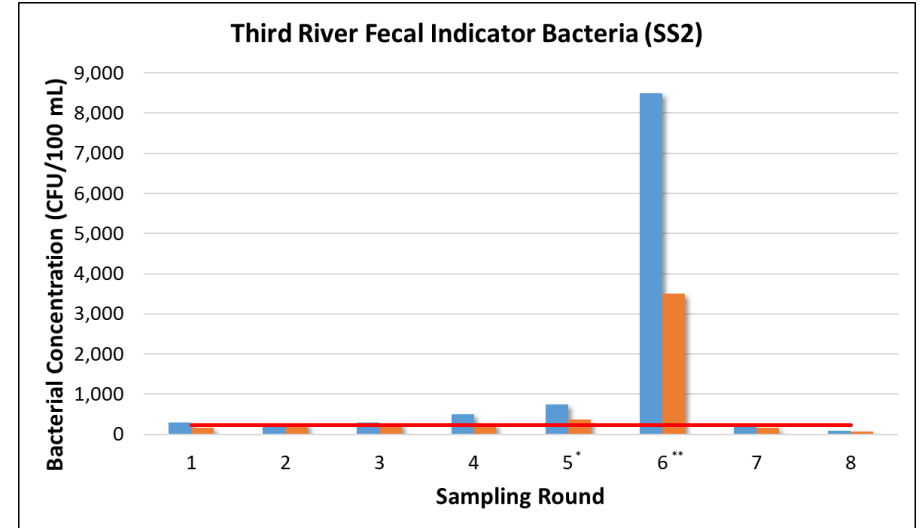
SS3 – Belleville, NJ

# MST Results – Fecal Indicator Bacteria

## Passaic River Sites



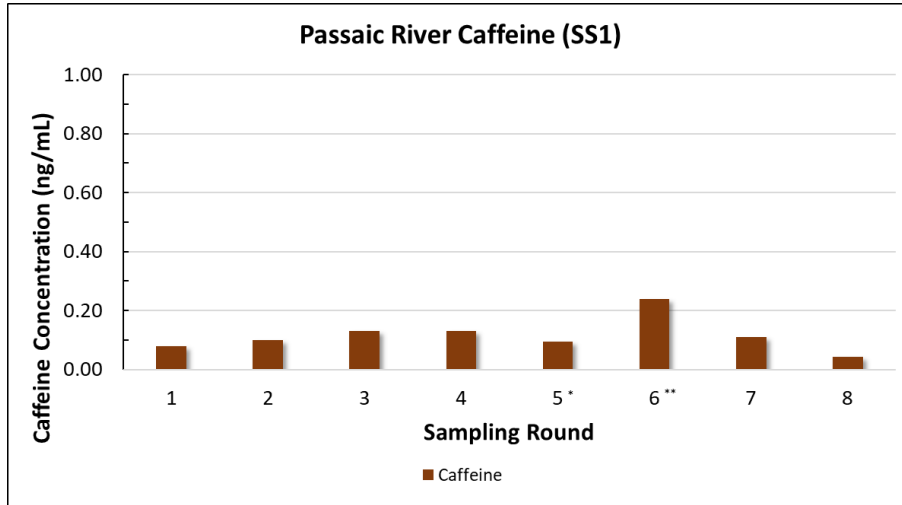
## Tributary Sites



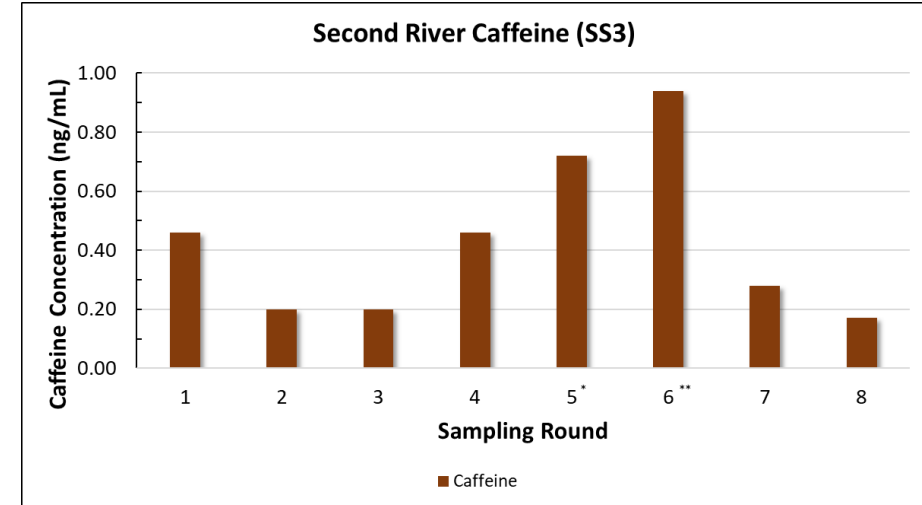
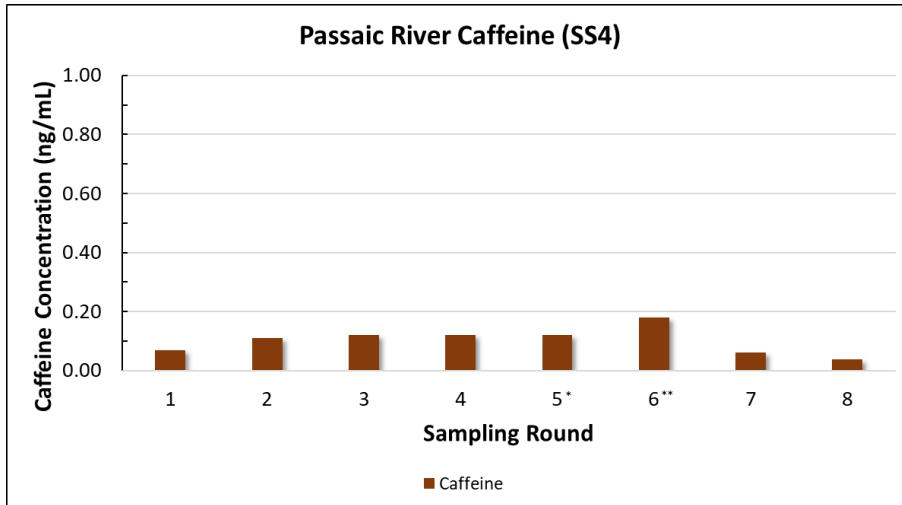
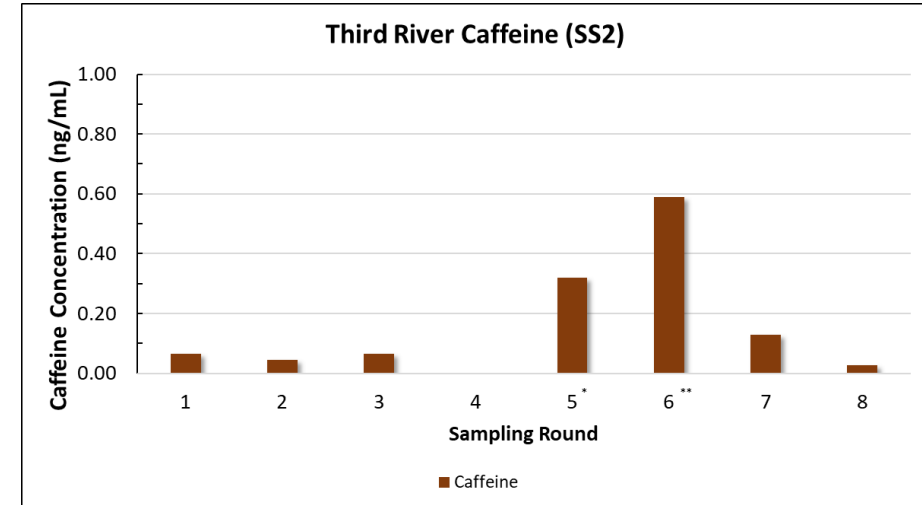
■ Enterococcus    
 ■ E. Coli    
 — WQS Single Sample Maximum

# MST Results – Caffeine

## Passaic River Sites

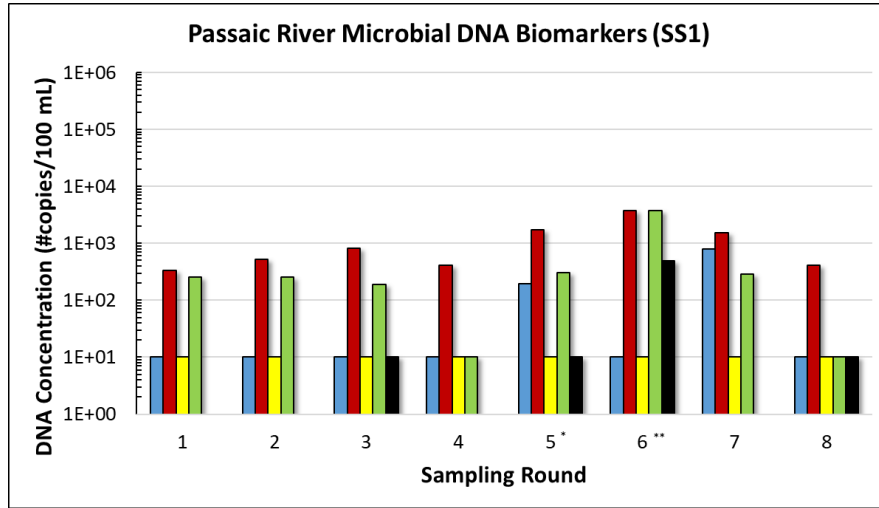


## Tributary Sites

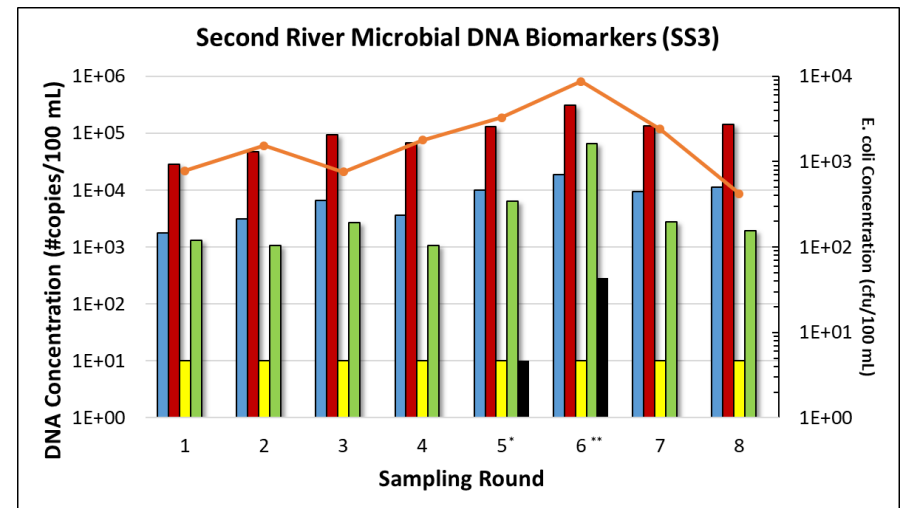
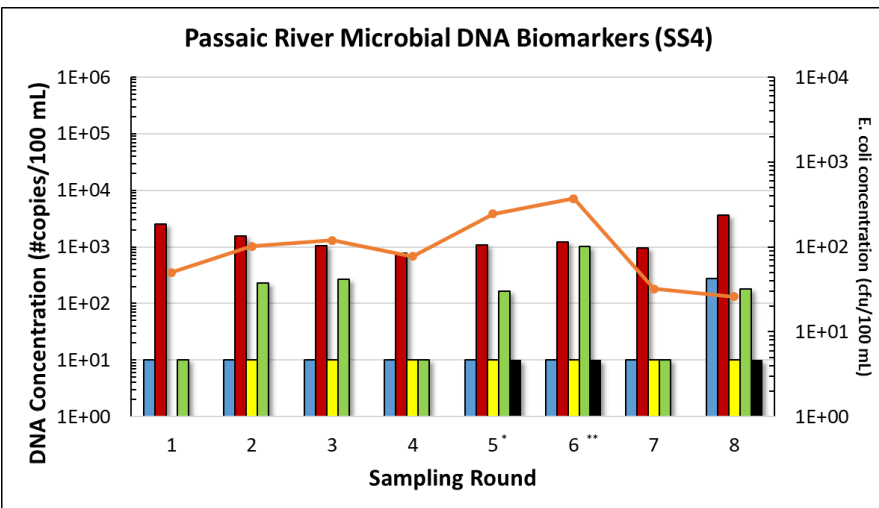
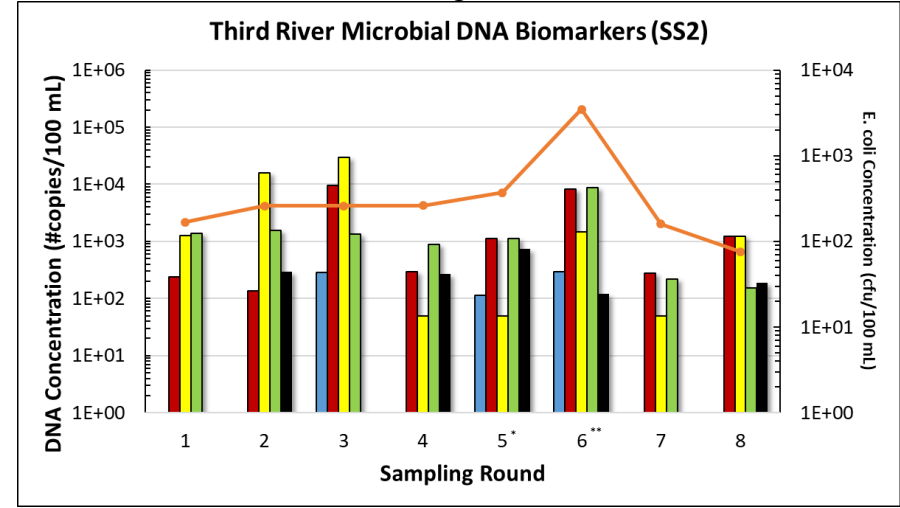


# MST Results – Microbial DNA Biomarkers

## Passaic River Sites



## Tributary Sites



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Legend: Huma: EPA (blue), Human: Dorei (red), Bird (yellow), Dog (green), Ruminant (black), E. coli (orange line)



# Comparison of Results

## Passaic River

- Lowest Dry Weather FIB
- Low caffeine, low sensitivity to wet weather.
- Presence of all DNA biomarkers, weak correlation to wet weather.
  - Human and Dog were highest, but low compared with tributaries.
- Suggestive of wide array of fecal contamination outside of CSO impact.

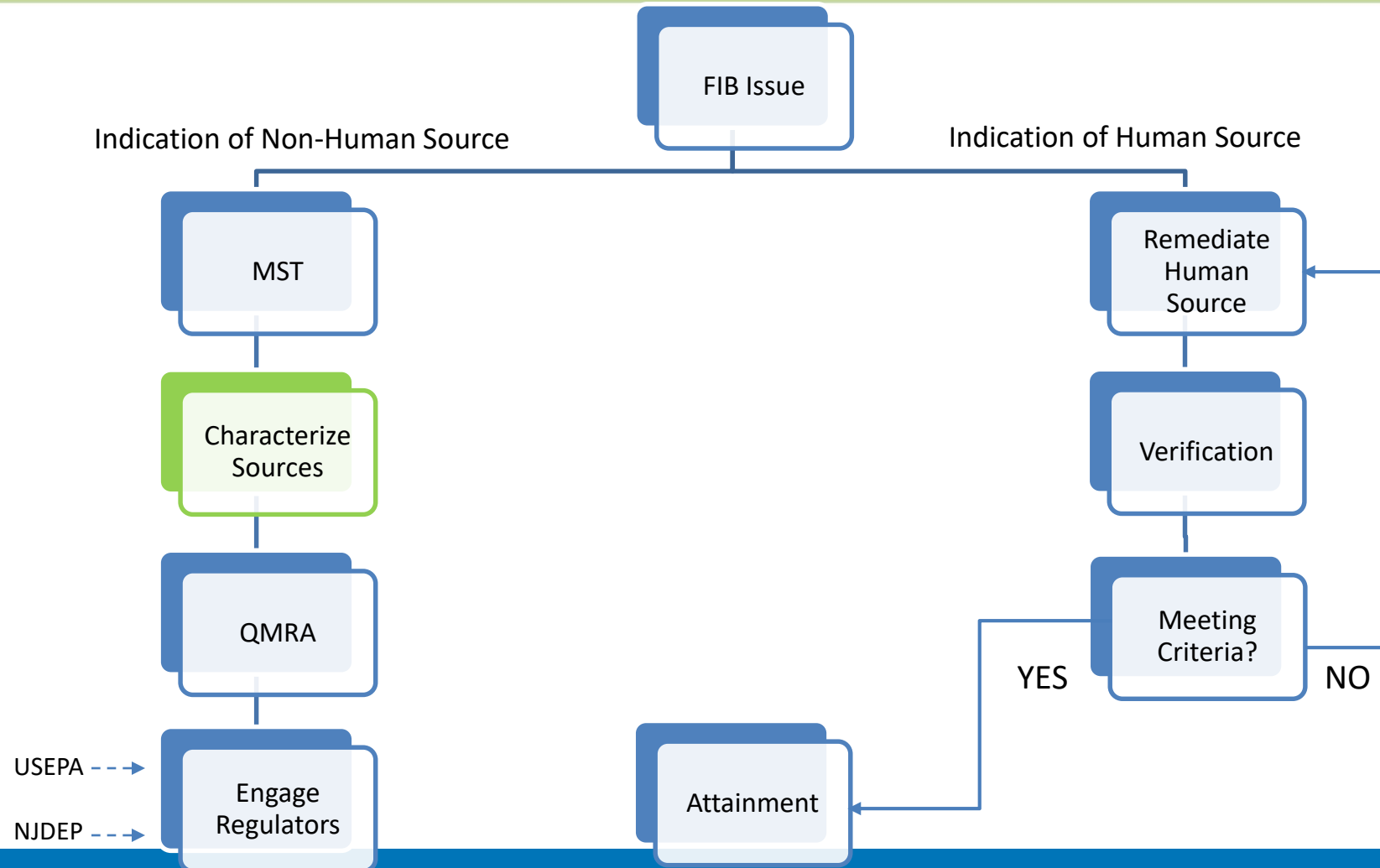
## Third River

- High FIB
- Low caffeine, high sensitivity to wet weather.
- Most diverse DNA biomarkers, some correlation to wet weather.
  - Bird and Dog were highest, with followed by human and ruminant.
- Suggestive of fecal contamination primarily from wildlife and domesticated animals.

## Second River

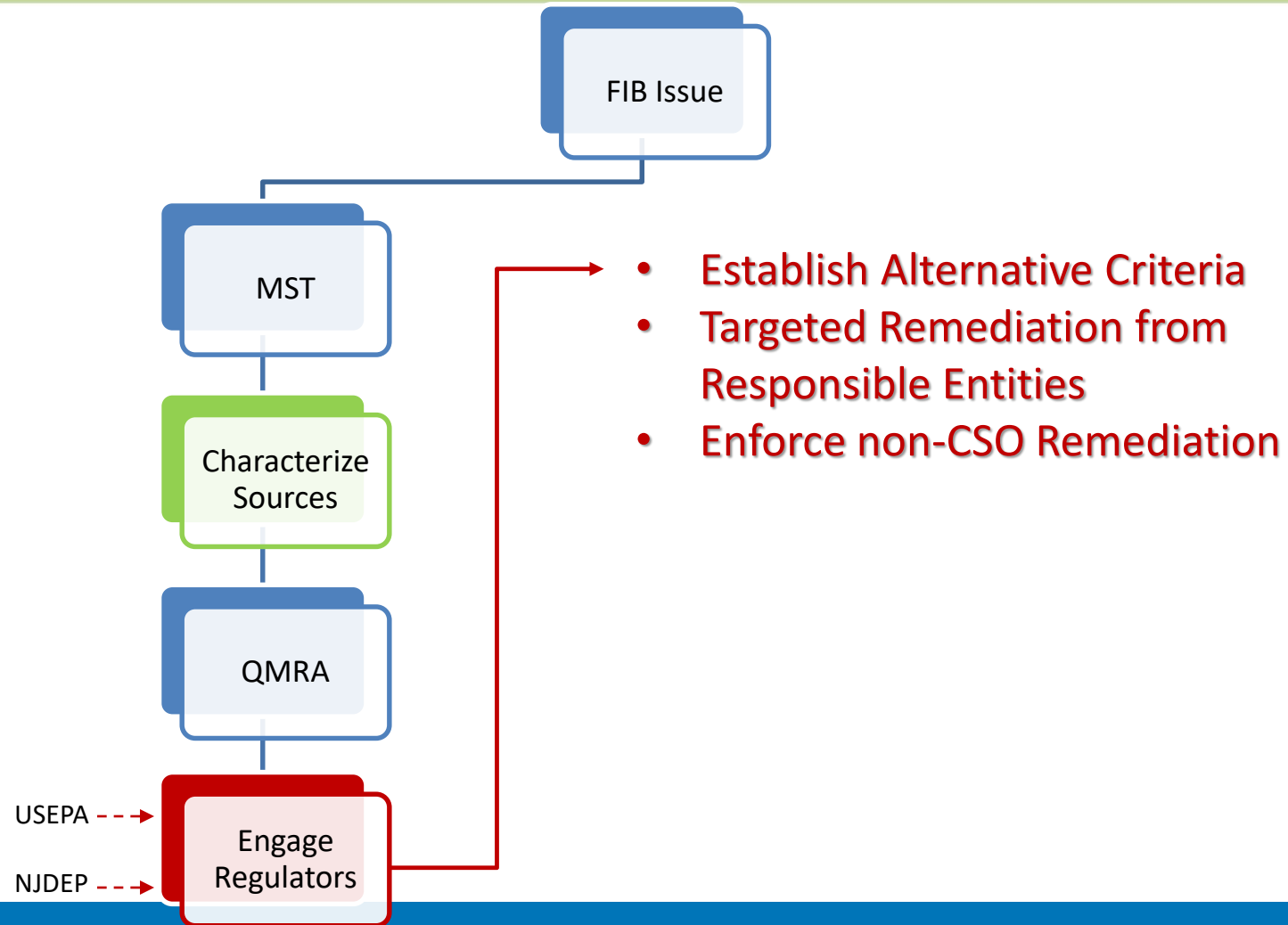
- Highest FIB
- Highest caffeine, very high sensitivity to wet weather.
- Presence of all multiple DNA biomarkers, high correlation to wet weather.
  - Highest amount of human and dog biomarkers of all sites.
- Suggestive of fecal contamination due to human sources (and domesticated animals).

# Possible Next Steps (CSOs)





# Possible Next Steps (CSOs)

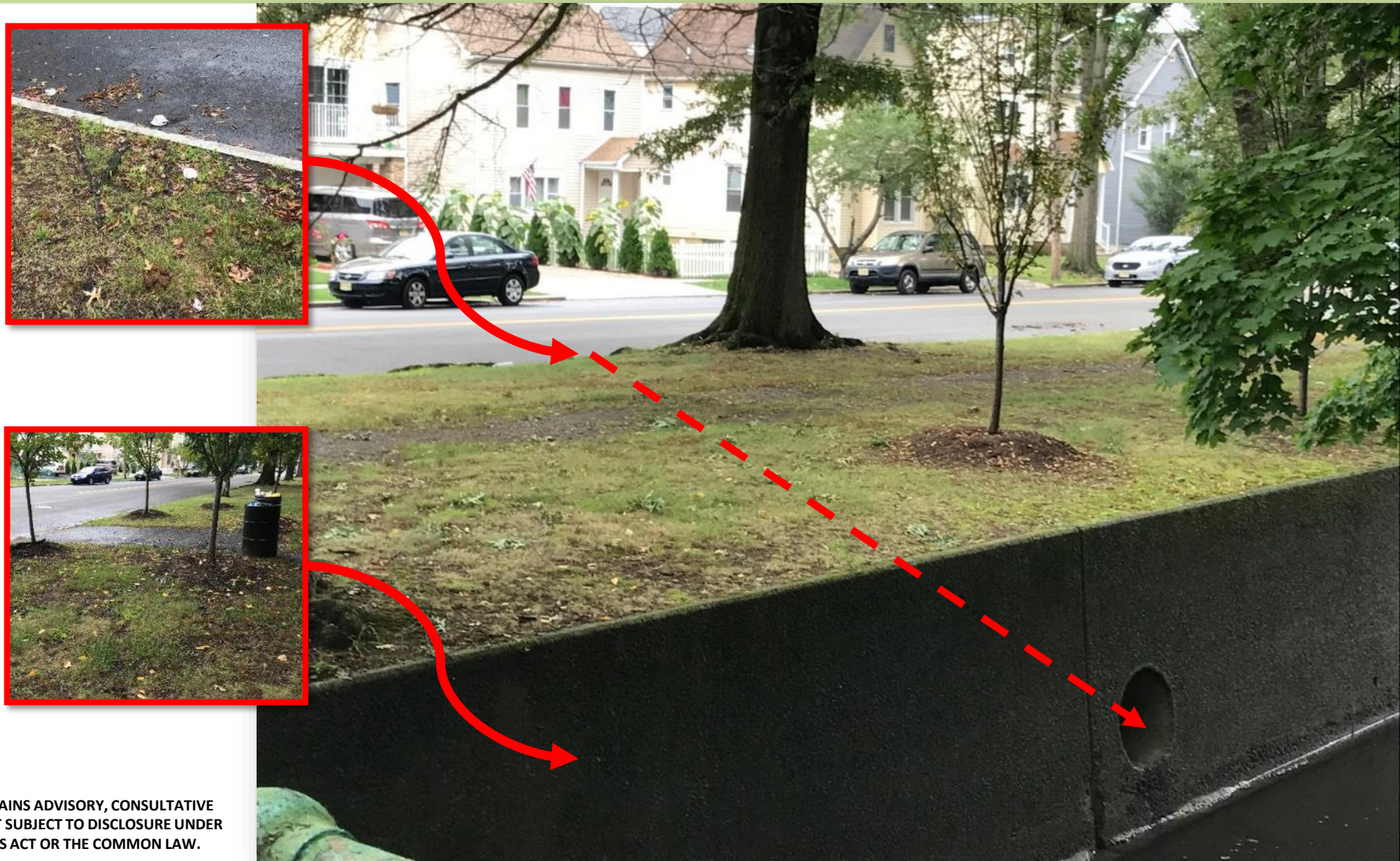


# Passaic Urban Waters Federal Partnership

- Partner with USGS
  - USGS NJ Water Science Center
  - EPA
- Expand previous MST Program
  - Focus on Passaic tributaries
  - Target known highly contaminated areas
  - Expected to commence in Spring 2020



# Conclusion



# Public Comments and Responses for Evaluation of Alternatives Report (DEAR)





# DEAR Report- Public Comments & Responses

- 134 Public Comments received through July 2019
- SCSO Team Contributors:
  - Sewage Free Streets and Rivers Partners
  - JC START
  - Paterson SMART
  - Bayonne Water Guardians
  - NJEJA
  - Sustainable Jersey City
- Comments and Responses are included in Appendix K of DEAR
- Grouped by Topic or Theme
- A common response is provided for questions under a theme.

**Appendix K**  
**Response to Public Comments to**  
**PVSC Regional Development and Evaluation of Alternatives Report**  
**November 2019**

Written comments for the Regional Development and Evaluation of Alternatives (DEAR) were received from public interest groups and members of the Supplemental CSO Team. For the reader's convenience, the comments are grouped into the general topics listed below. A common response is provided in bold for all of the comments that pertain to a topic.

Each entity that provided comments is listed herein and associated with a commenter number. The commenter numbers (eg. [1],[2]) are referenced throughout this Appendix.

**Public Comments- General Topics**

Topic 1: Climate Change and Selection of the Typical Year

Topic 2: Public Input & Outreach

Topic 3: Request for Executive Summary

Topic 4: Addressing Pollutants of Concern

Topic 5: Development and Implementation of Regional Alternatives

Topic 6: Regional Tunnels

Topic 7: Alternatives Evaluation Process

Topic 8: PAA Disinfection

Topic 9: Use of Receiving Waters

Topic 10: Green Infrastructure

Topic 11: Water Quality

Topic 12: DEAR Report Preparation

Topic 13: Construction and Community Impacts

Topic 14: Number of Overflows and Overflow Volume

Topic 15: Infiltration and Inflow

Topic 16: Sewer Separation

Topic 17: Financing

Topic 18: Modeling



# DEAR Report- Public Comments

Comment Theme	Number of Comments
Green Infrastructure	28
Public Input and Outreach	21
Development and Implementation of Regional Alternatives	13
PAA Disinfection	10
Construction and Community Impacts	8
Climate Change and Selection of the Typical Year	7
Alternatives Evaluation Process	6
DEAR Report Preparation	5
Infiltration and Inflow	4
General Statements	4
Paterson DEAR Questions	4

# DEAR Report- Public Comments

Comment Theme	Number of Comments
Request for an Executive Summary	3
Regional Tunnels	3
Water Quality	3
Financing	3
Modeling	3
Addressing Pollutants of Concern	2
Number of Overflows and Overflow Volume	2
Sewer Separation	2
Bayonne DEAR Questions	2
Use of Receiving Waters	1
<b>Total Number of Comments</b>	<b>134</b>

# Theme: Green Infrastructure (GI)- 28 Questions

## Comment:

We were encouraged to see that green infrastructure was given a “very good” rating in the alternative analysis. However, we would like to see an analysis of higher percentages of green infrastructure (15%, 20% and 30%) and more analysis of specific green infrastructure approaches. Why aren't permeable pavements recommended for Alternative Evaluation [?].

## Response:

- The evaluation of Green Infrastructure technologies has been evaluated as a CSO control element by the Permittees at the city level and the regional level.
- Regional Alternative 1 includes a GI as a CSO control strategy and is described in the Regional DEAR.
- City level GI solutions are described in detail in the Municipal DEAR Reports (Appendix B-Appendix I).
- GI will be implemented and maintained locally, and the specific technologies utilized will be evaluated by each individual municipality.





# Theme: Public Input & Outreach- 21 Questions

## Comment:

*What engagement and outreach will take place over the next year and how will additional public comment be incorporated into the final plan?*

## Response:

The public has and will have the opportunity to provide comments in the following ways:

- Quarterly Supplemental CSO Team Meetings
- Clean Waterways, Healthy Neighborhoods Website
- Social Media (Facebook Page, Twitter)
- Municipal Supplemental CSO Team Meetings
- Courses supported by Rutgers University and Stevens Institute of Technology
- Ad hoc meetings with the public

These activities and methods have been approved by the NJDEP as outlined in the “Public Participation Process Report,” on March 29, 2019.

The public will have the opportunity to comment on the final LTCP and the “Selection of Alternatives and Implementation Report” (SAIR) prior to submittal to the NJDEP.

# Theme: Development and Implementation of Regional Alternatives- 13 Questions

## Comment:

*The LTCP should optimize CSO reductions within each city, not just at a regional level. How does the regional plan help to reach maximum CSO reduction in each city, if at all?*

## Response

- The Regional Development and Evaluation of Alternatives Report (DEAR) identifies alternatives to meet CSO reduction targets at the regional level.
- Individual DEARs included in the appendices identify the same for each Permittee at the city-wide level.
- Each Permittee is responsible for meeting permit requirements as outlined in their NJPDES Permit. A regional approach if selected, must also meet the individual permittee's permit requirements.

# Next Steps : Selection and Implementation of Alternatives Report

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# 59-Month Program Schedule and Milestones



## Permit Effective Date

July 1<sup>st</sup>, 2015

We Are Here



January 1, 2016

- ✓ Coordinates of pumps, regulators, and outfalls
- ✓ System Characterization Work Plan
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- ✓ Map of Combined and Separate Sewer Areas

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- ✓ Development and Evaluation of Alternatives Report

June 1, 2020

Selection and Implementation of Alternatives Report in the Final LTCP



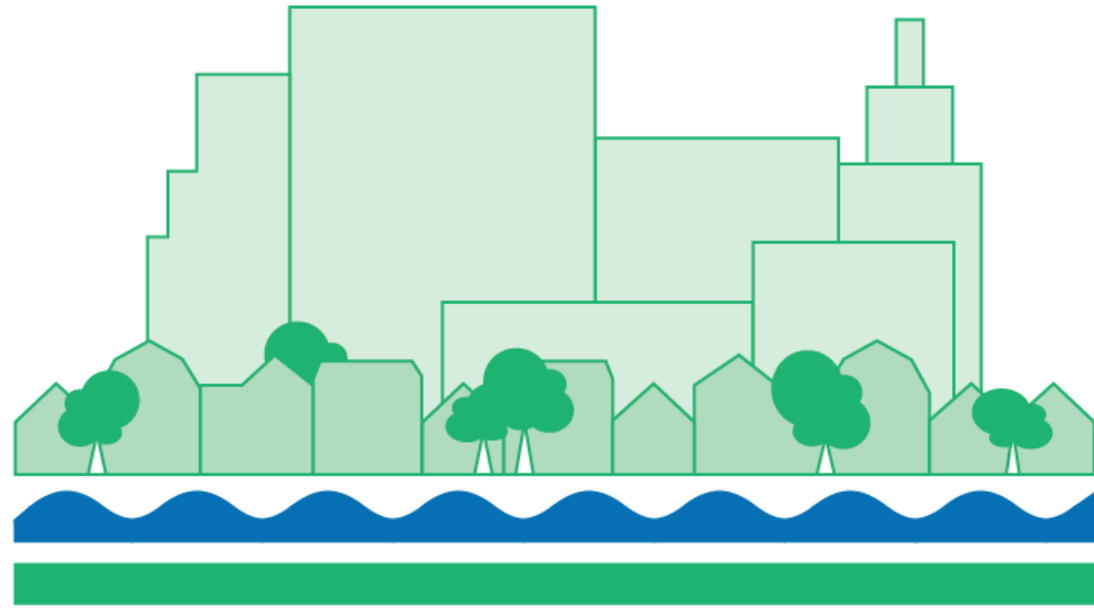
Permit Due Date

# Next Steps & Schedule

- January 31, 2020: Development of Implementation Schedule by each Permittee
- April 3, 2020- May 1, 2020: SCSO Team and Public Comment Period
- June 1, 2020: Final Selection of Alternatives Report to NJDEP
- June 1, 2020: Final LTCP to NJDEP



# Questions and Discussion



**CLEAN WATERWAYS**  
Healthy Neighborhoods