Environmental Protection

Citywide/Open Waters

CSO Long Term Control Plan

Public Kickoff Meeting

Hudson River and Harlem River

Manhattan College – Leo Engineering Building

January 31, 2018

Agenda

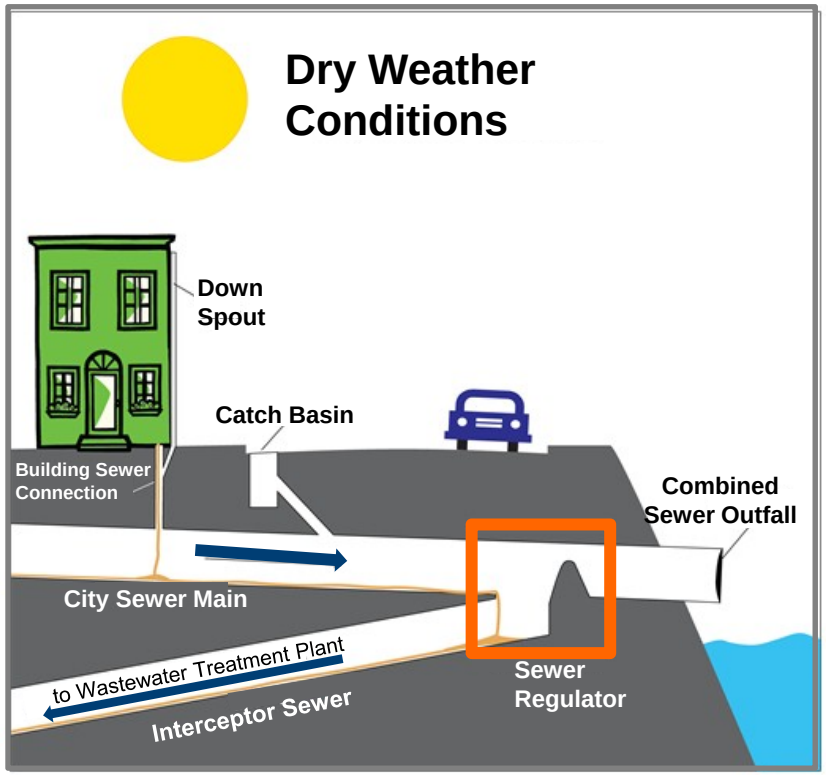
	Topic	Speaker
1	**Welcome & Introduction**	Mikelle Adgate
2	**Waterbody & Watershed Characteristics and Water Quality Sampling**	Keith Mahoney
3	**Water Quality Improvement Projects**	
	• Grey Infrastructure	Keith Mahoney
	• Green Infrastructure	Melissa Enoch
4	**LTCP Modeling & Alternative Development Process**	Keith Mahoney
5	**Next Steps**	Mikelle Adgate
6	**Discussion and Q&A Session**	All

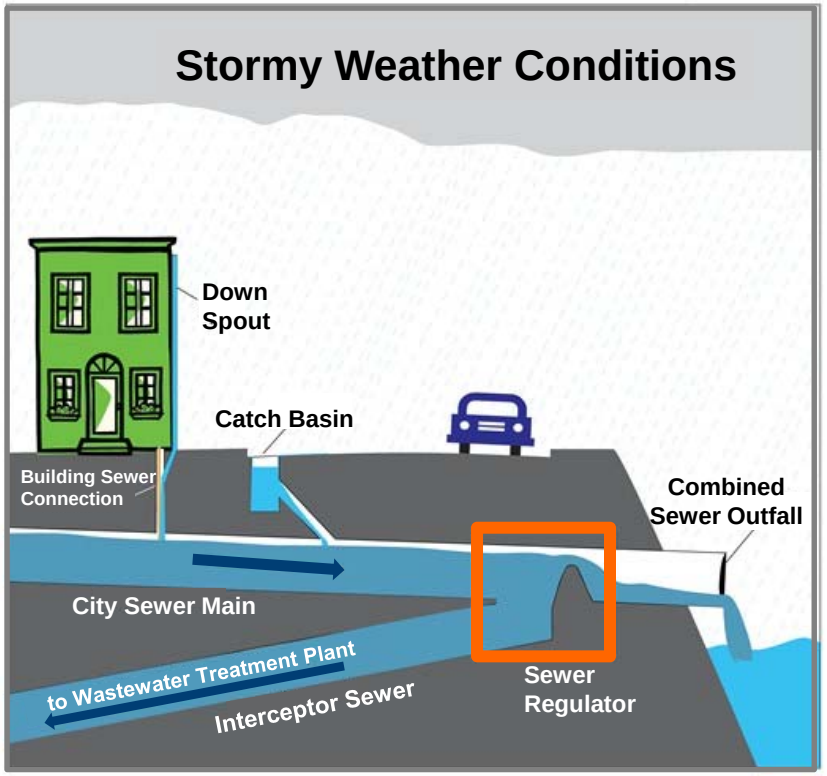
Welcome & Introduction

Mikelle Adgate
Senior Policy Advisor
DEP

What is a Combined Sewer Overflow (CSO)?

- NYC's sewer system is approximately 60% combined, which means it is used to **convey both sanitary and storm flows**.





- 65% to 90% of **combined** sanitary & storm flow is captured at treatment plants.
- When the sewer system is at full capacity, a diluted mixture of rain water and sewage may be released into local waterways. This is called a combined sewer overflow (CSO).

How does rainfall affect CSOs?

- Rainfall characteristics that trigger a CSO event at Hudson River and Harlem River:
  - Constant rainfall over a period of 2 to 10 hours totaling 0.4 to 1 inch

- **Not every rainfall causes a CSO event:**
  - Approximately 25% of the average rainfall events per year may trigger a CSO at Hudson River and Harlem River

Photo Credit: Baptisete Pons
https://www.flickr.com/photos/bpt/2882285636/

What is a LTCP and CSO Consent Order?

Long Term Control Plan (LTCP)

identifies appropriate CSO controls to achieve applicable water quality standards

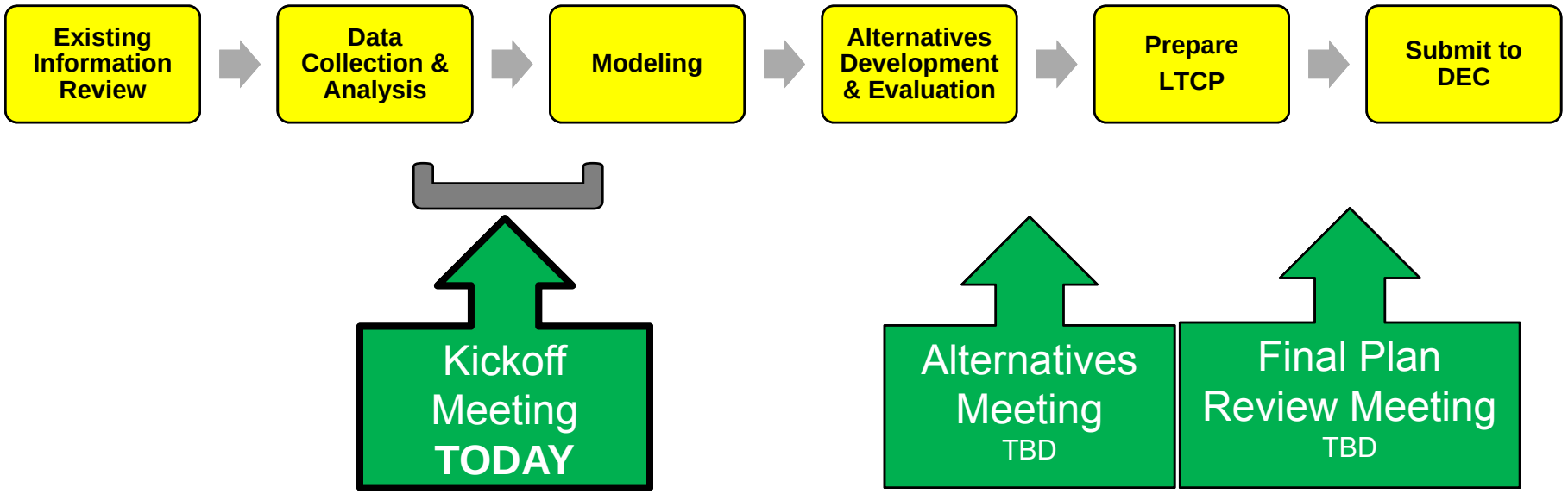
consistent with the Federal CSO Policy and Clean Water Act

CSO Consent Order

an agreement between NYC and DEC that settles past legal disputes without prolonged litigation

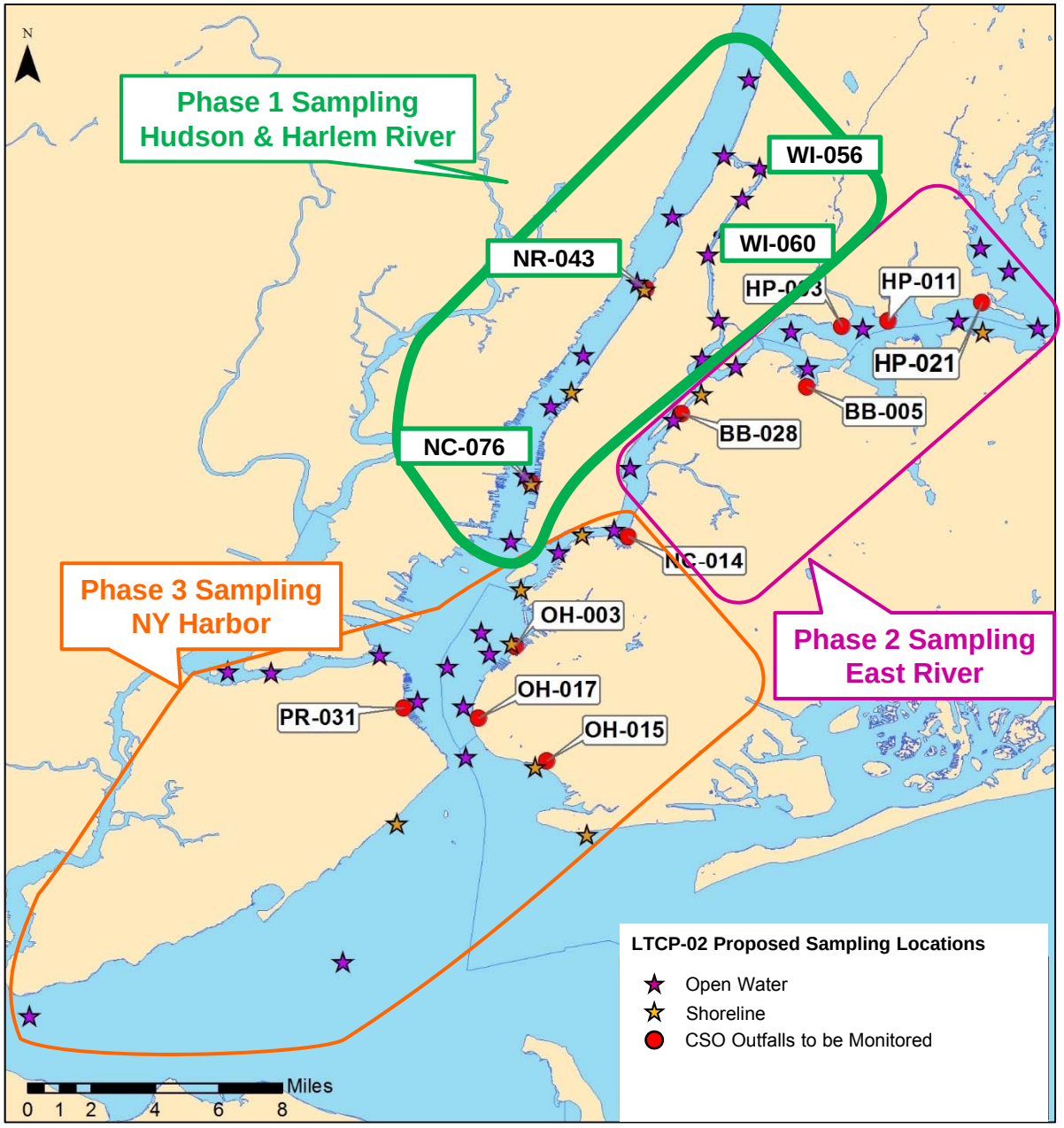
DEC requires DEP to develop LTCPs and mitigate CSOs

LTCP Process and Public Involvement



Harlem & Hudson River in Phase 1 Sampling

- The Citywide/Open Waters Sampling Program was divided into 3 Phases
- Harlem and Hudson River were covered under Phase 1



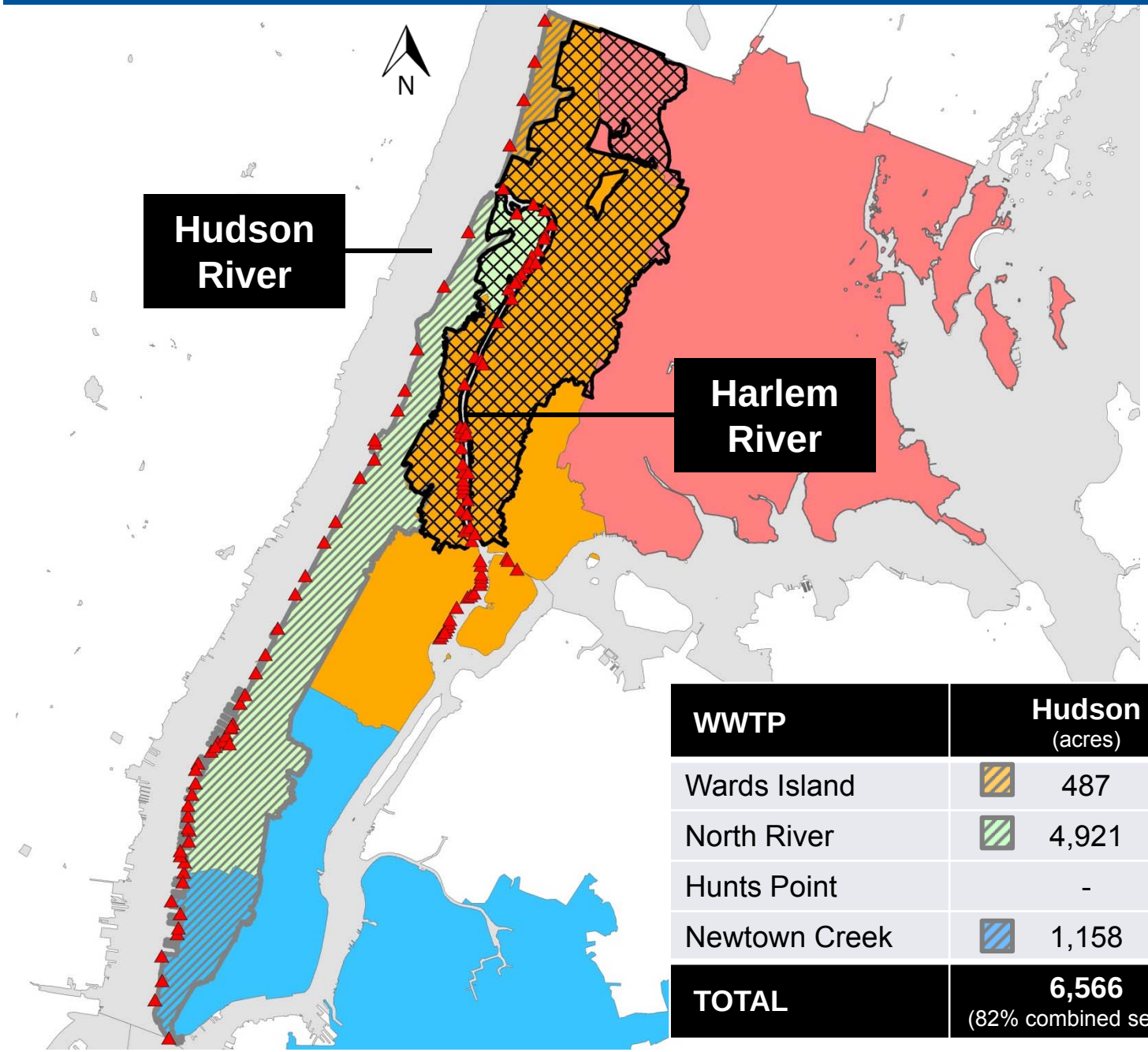
Public Comments Received

1. Consider Green Infrastructure as Preferred Alternative
2. Fund maintenance for all GI projects being built
3. Keep to Harlem/Hudson River LTCP Planning Schedule
4. Begin EAS process concurrent with LTCP
5. Host Separate Meetings for Harlem/Hudson Rivers
6. Adopt new Design Criteria to achieve zero discharge to local pipes
7. Consider Specific Alternatives:
   1) Recognize Tibbetts Brook Daylighting and Brook Park Wetland Projects as GI Projects
   2) Assess for Rain Gardens in vicinity of Hudson/Harlem Rivers
   3) Consider Private Sector for GI Projects
   4) Consider Waterfront Development/GI

Waterbody & Watershed Characteristics and Water Quality Sampling

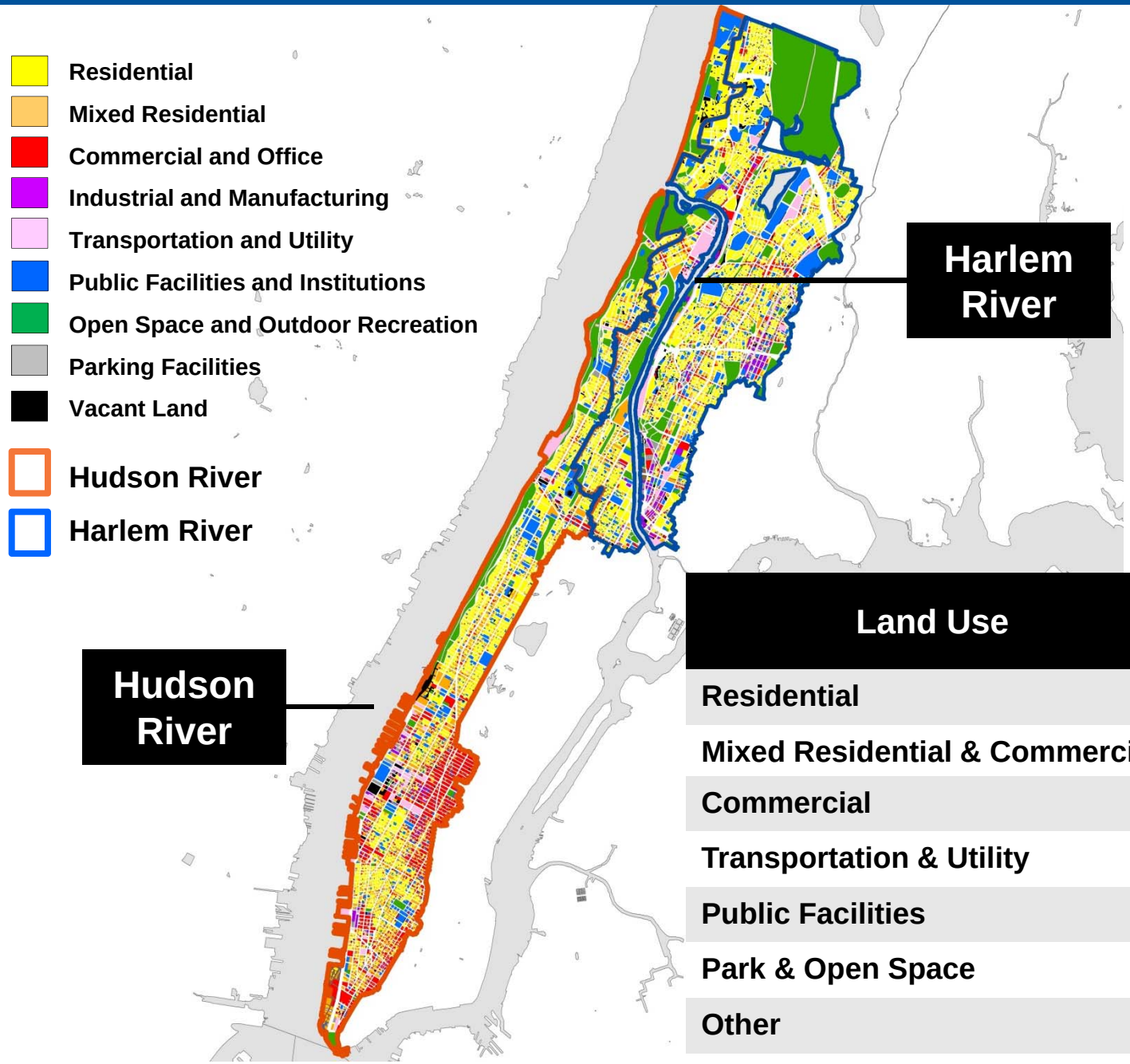
Keith Mahoney, PE
Director of Water Quality Planning
DEP

Drainage Areas



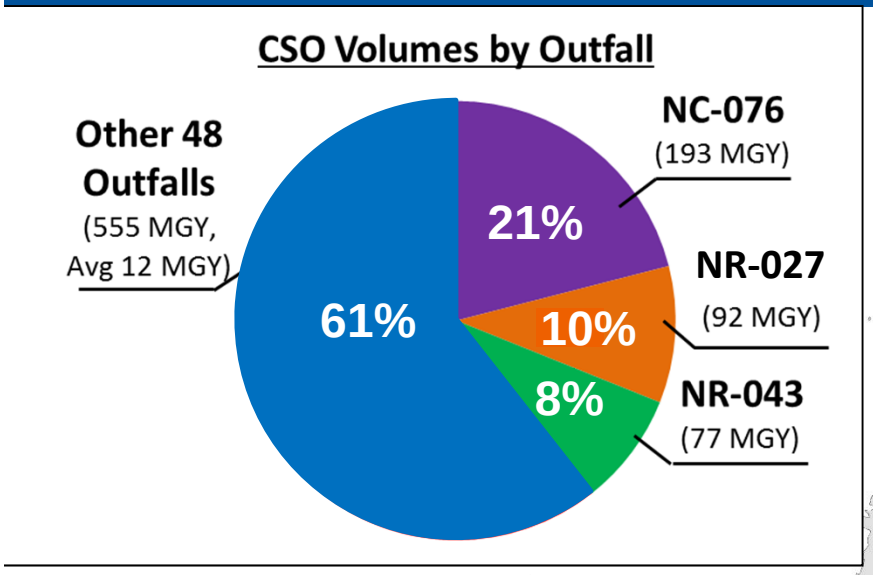
WWTP	Hudson (acres)	Harlem (acres)
Wards Island	487	6,833
North River	4,921	571
Hunts Point	-	1,006
Newtown Creek	1,158	-
TOTAL	**6,566** (82% combined sewers)	**8,410** (90% combined sewers)

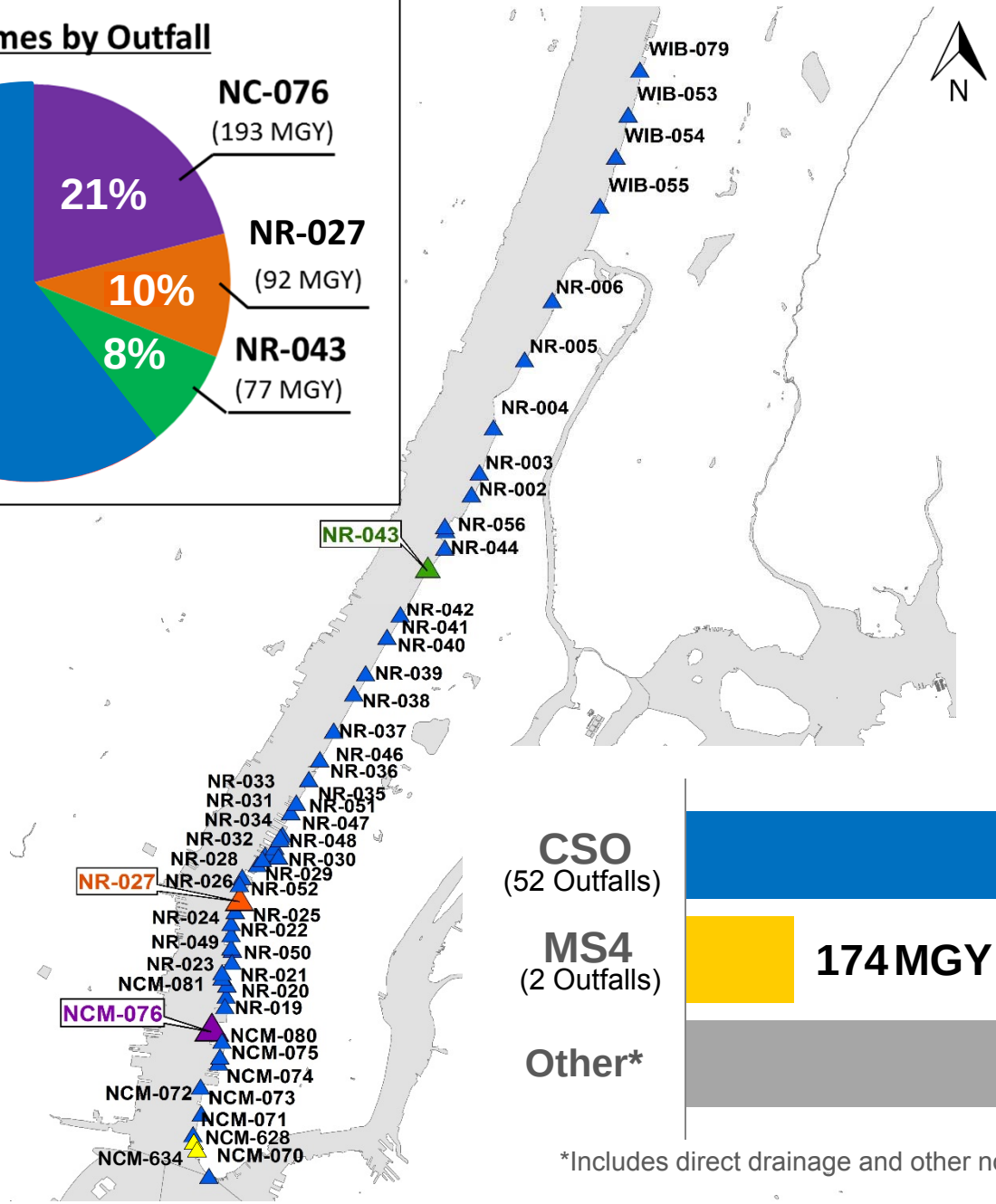
Land Use

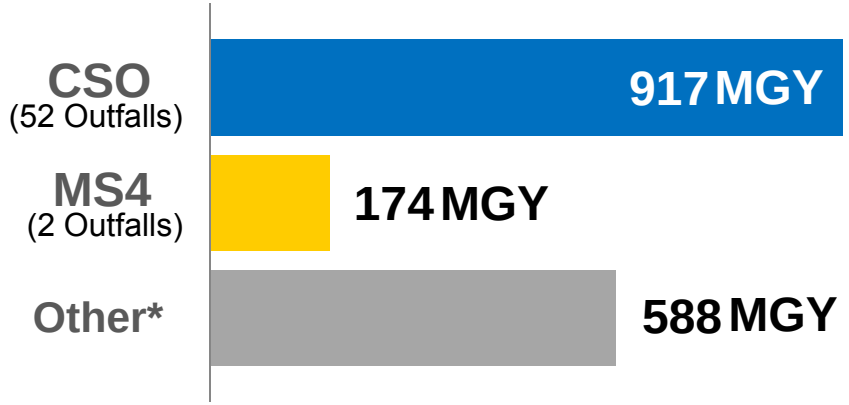


Land Use	Hudson River	Harlem River
Residential	28%	33%
Mixed Residential & Commercial	14%	7%
Commercial	14%	4%
Transportation & Utility	9%	7%
Public Facilities	13%	12%
Park & Open Space	17%	31%
Other	5%	6%

Hudson River CSO Outfalls

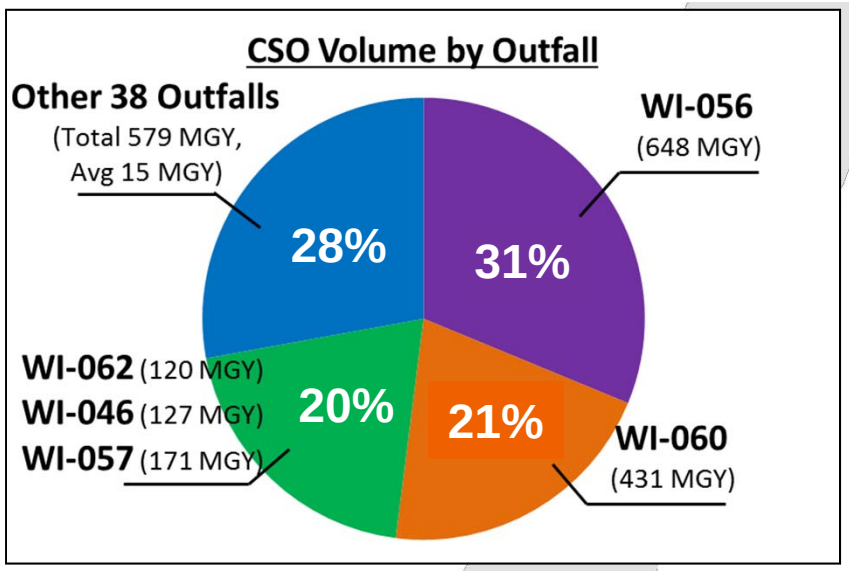


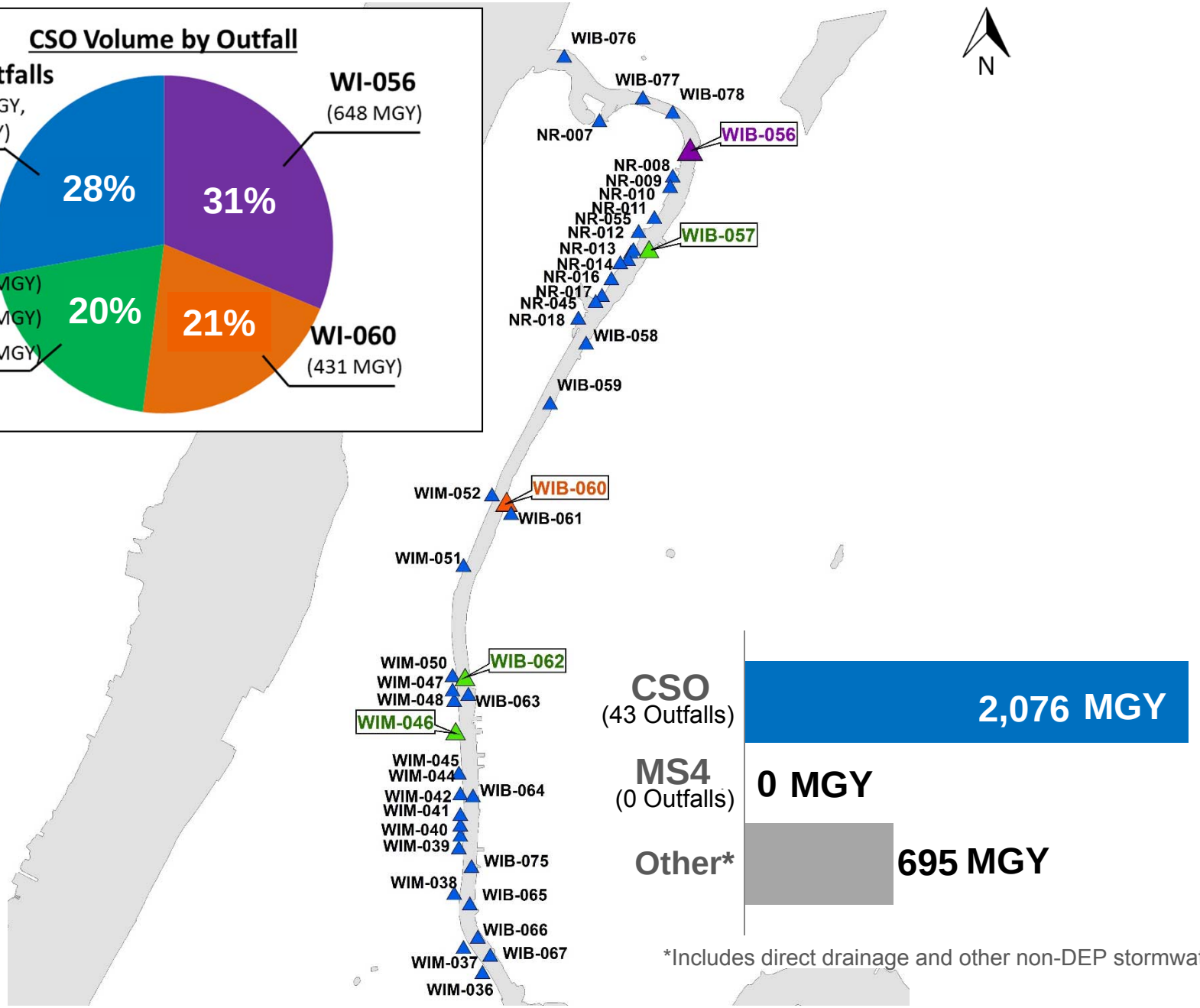




*Includes direct drainage and other non-DEP stormwater

Harlem River CSO Outfalls





*Includes direct drainage and other non-DEP stormwater

Water Quality Standards and LTCP Goals

CLASS SB
Bathing

The best usage of Class SB water are **primary and secondary contact** recreation and fishing. These waters shall be suitable for fish, shellfish and wildlife propagation and survival.

CLASS I
Boating/Fishing

The best usage of Class I water is **secondary contact** recreation and fishing. These waters shall be suitable for fish, shellfish and wildlife propagation and survival. In addition, the water quality shall be suitable for primary contact recreation, although other factors may limit the use for this purpose.

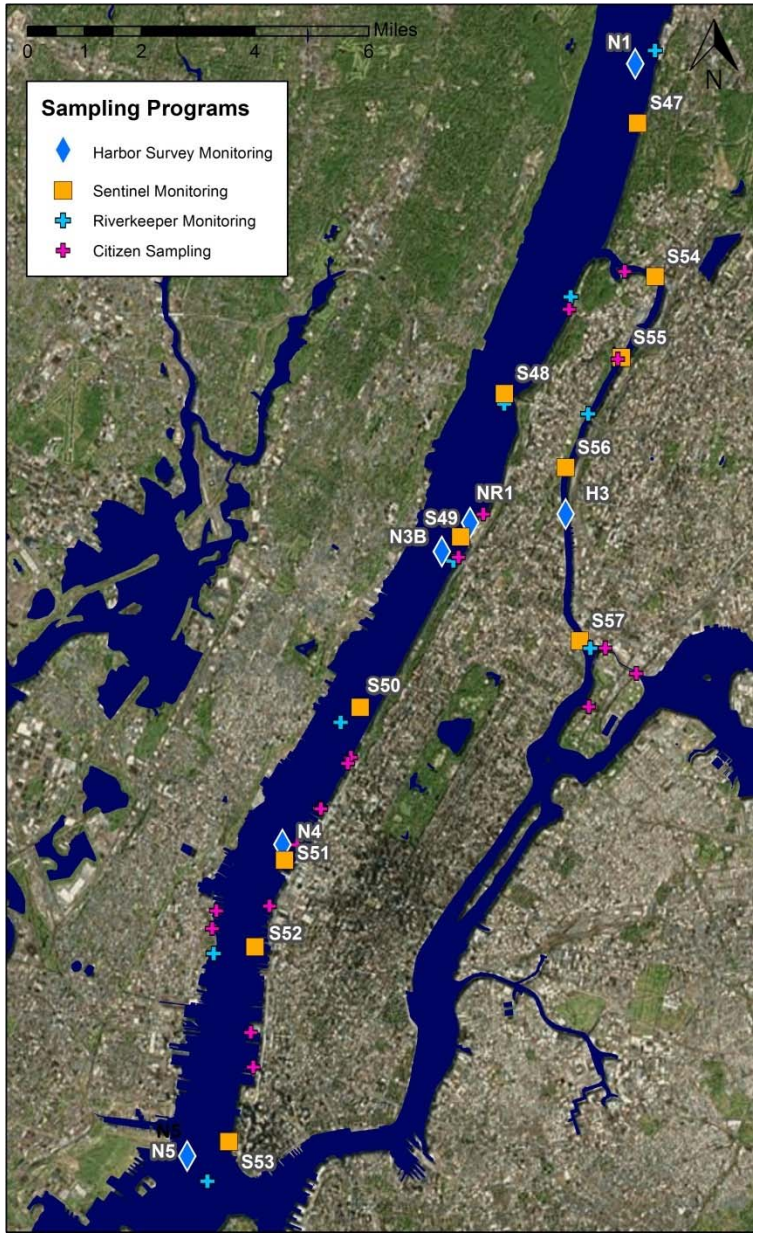
Location	Class	Dissolved Oxygen (mg/L)	Fecal Coliform (col/100 mL)	Total Coliform (col/100 mL)
Hudson River (North of Harlem River)	SB	≥ 4.8 (daily average) ≥ 3.0 (acute, never less than)	Monthly Geometric Mean ≤ 200	Monthly Median ≤ 2,400 and 80% ≤ 5,000
Hudson River (South of Harlem River)	I	≥ 4.0 (acute, never less than)		
Harlem River				
Reference		• New York Codes, Rules and Regulations • (NYCRR Part 703.3)	• New York Codes, Rules and Regulations • (NYCRR Part 703.4)	• New York Codes, Rules and Regulations • (NYCRR Part 703.4)

CSO LTCP Goals and Targets:

- Seasonal Bacteria Compliance
- Annual Dissolved Oxygen Compliance
- Time to Recovery for Bacteria of ≤ 24 hours
- Floatables Control
- Assessing against Recreational Water Quality Criteria

Ongoing Receiving Water Sampling Programs

Program		Harbor Survey Monitoring ◆	Sentinel Monitoring ■	Riverkeeper Sampling ✚	Citizen Sampling ✚
Sampling Frequency		Monthly (Oct – May) Weekly (Jun – Sept)	Quarterly	Monthly (May – Oct)	Weekly (May – Oct)
HUDSON RIVER					
# of Sampling Locations		6	7	9	12
Parameters	Fecal	✓	✓		
	Entero	✓		✓	✓
	*YSI	✓			
HARLEM RIVER					
# of Sampling Locations		1	4	2	5
Parameters	Fecal	✓	✓		
	Entero	✓		✓	✓
	*YSI	✓			



*YSI Parameters: Dissolved Oxygen, Temperature, Conductivity, and Salinity.

Data is available here:
http://www.nyc.gov/html/dep/html/harborwater/harbor_water_sampling_results.shtml
https://www.riverkeeper.org/water-quality/hudson-river/nyc-hudson-bergen/

LTCP Sampling & Monitoring Programs

Sampling Period: 4/27/2016 – 11/19/2016

Flow Monitoring

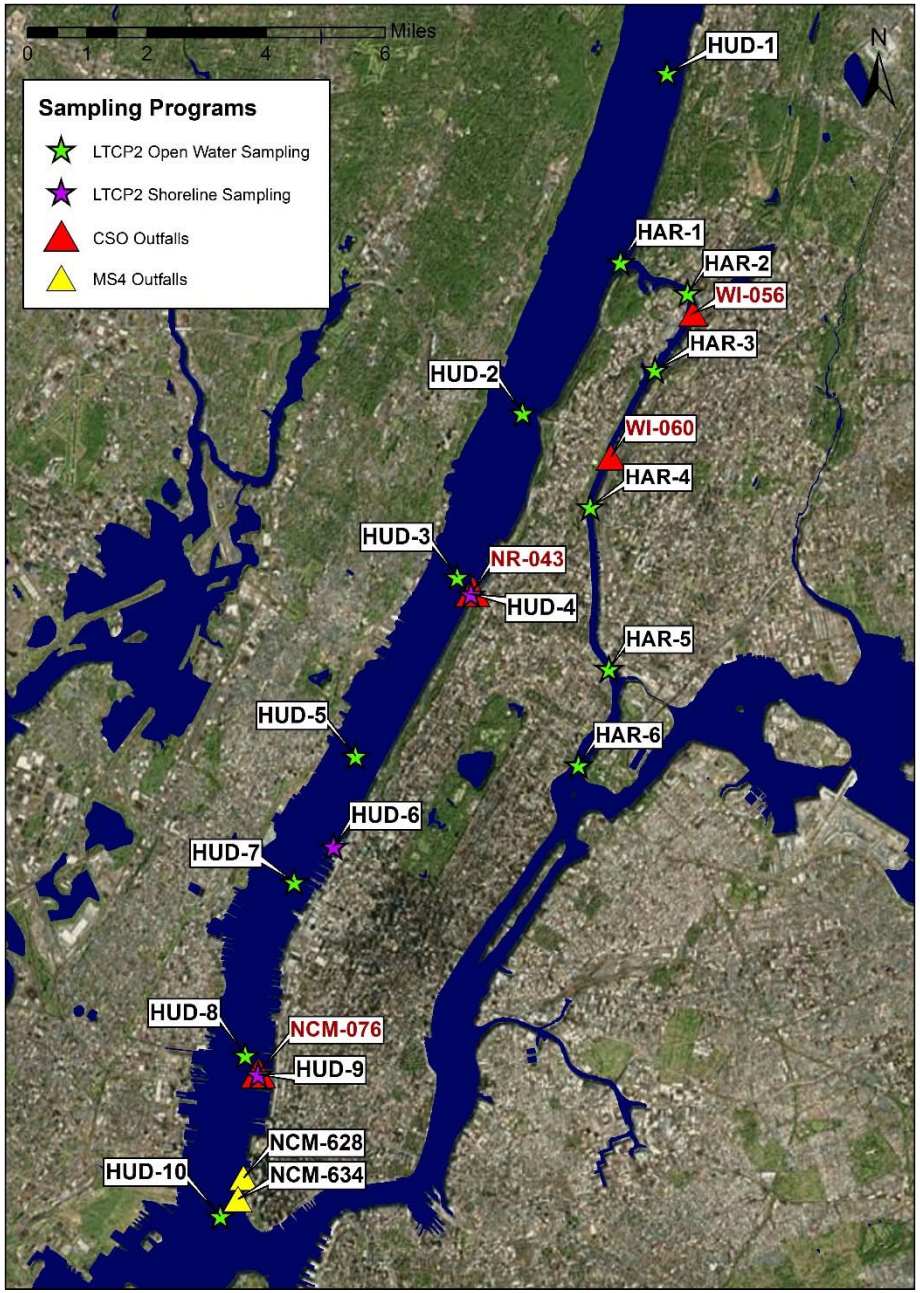
- 3/2/2016 – 12/5/2016
- 2 locations in Hudson River
- 2 locations in Harlem River
- Continuously monitored
- Depth & Velocity measurements

★ Receiving Water

- 10 locations in Hudson River
- 6 locations in Harlem River
- Three 4-day events
- Fecal, Entero, YSI

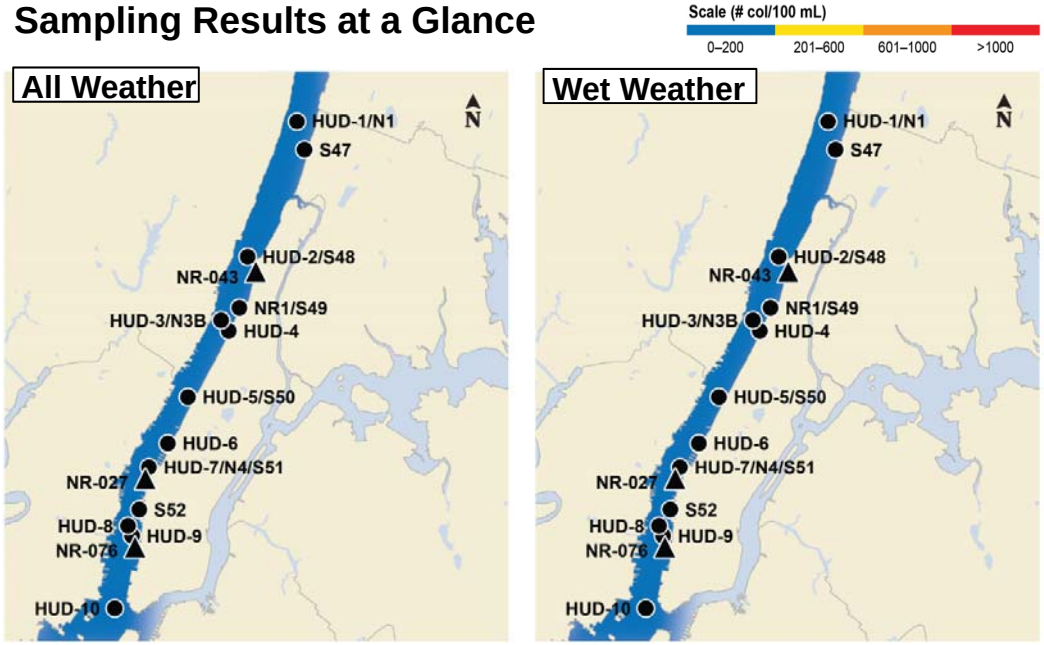
▲ CSO / △ MS4 Sampling

- 2 CSO, 2 MS4 locations in Hudson River
- 2 CSO locations in Harlem River
- 5 wet weather events
- Fecal, Entero, YSI, TSS, CBOD, Nitrogen



Hudson River – Fecal Coliform

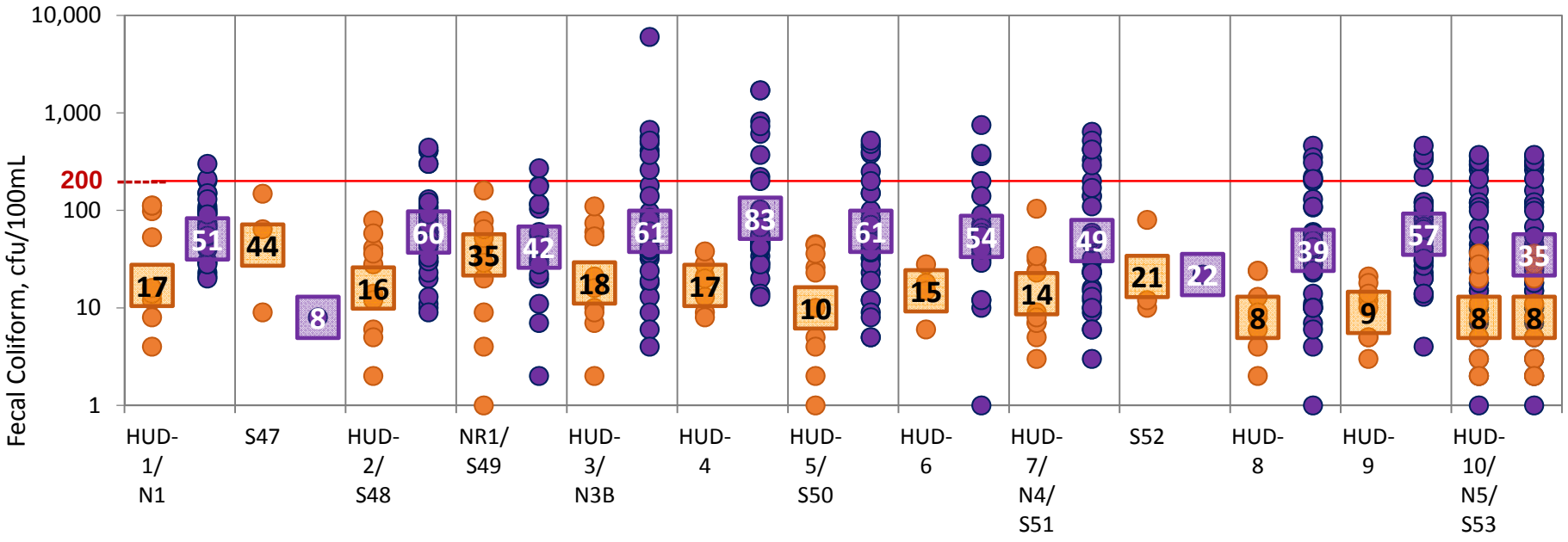
Sampling Results at a Glance



Sampling Details

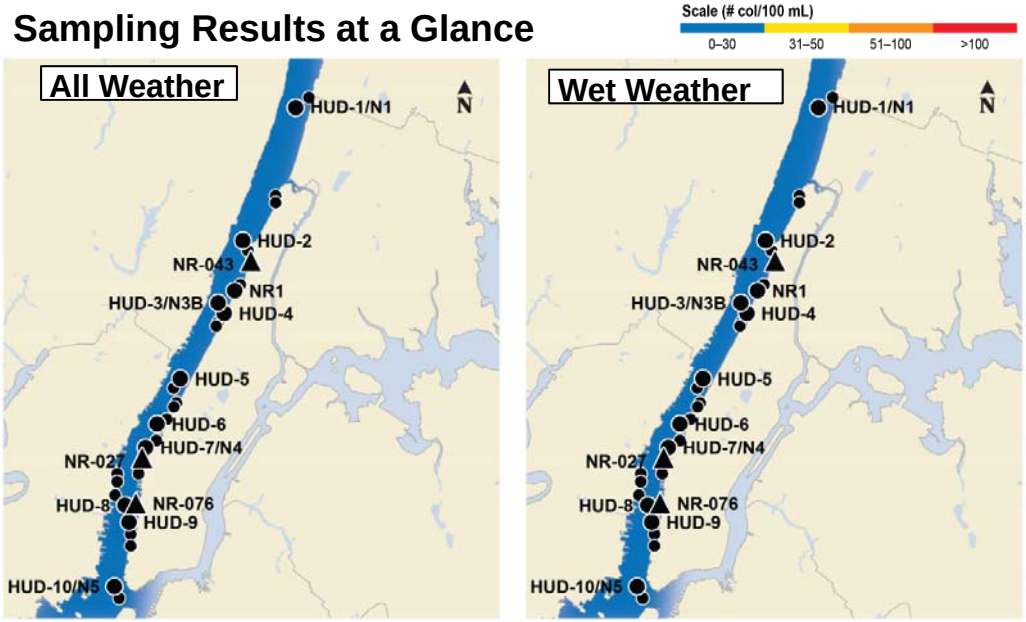
	Sampling Period (2016)	# Locations	# Samples Dry	# Samples Wet
LTCP	Apr 27 – Jun 9 Nov 16 – Nov 19	10	8	38
HSM	Jan 4 – Dec 12	6	12	15
SM	Mar 8 – Oct 19	7	3	1

Dry Weather Data
Wet Weather Data
Dry Weather Geomean
Wet Weather Geomean



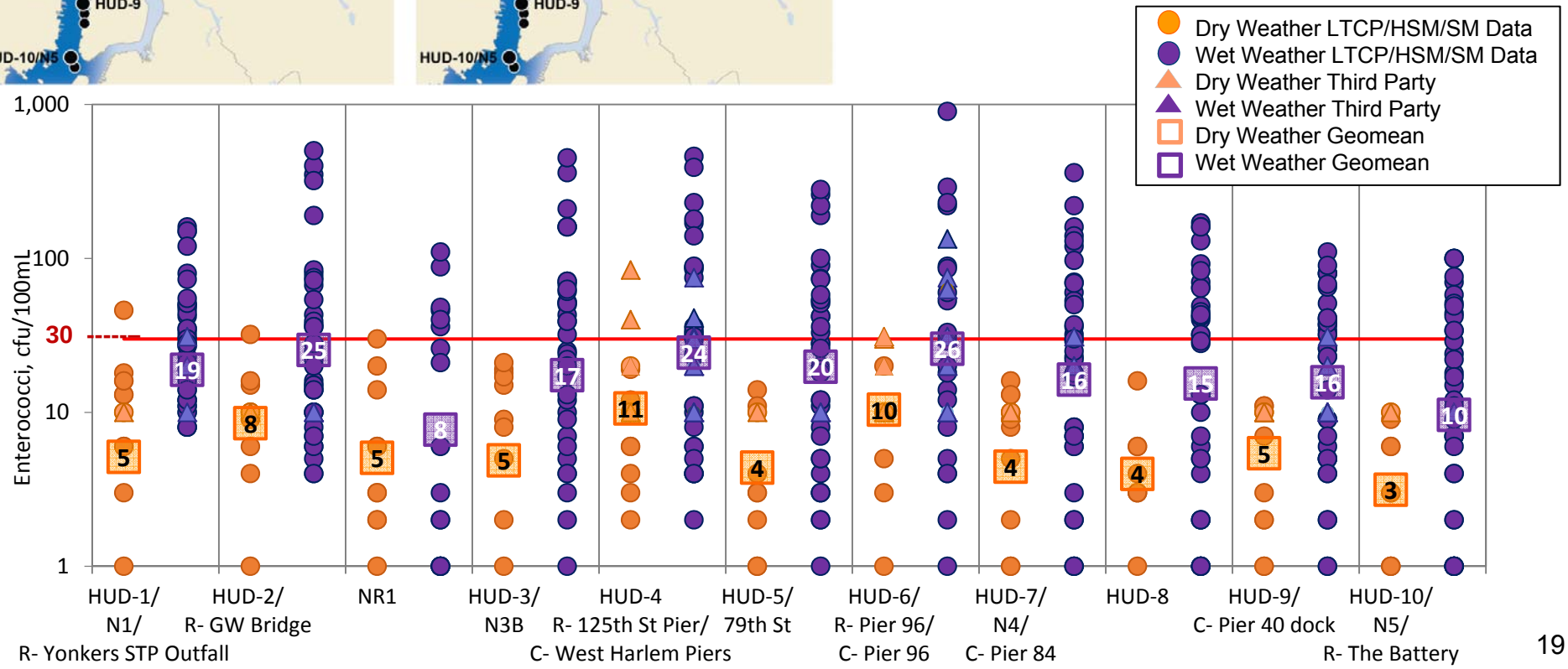
Hudson River – Enterococcus

Sampling Results at a Glance



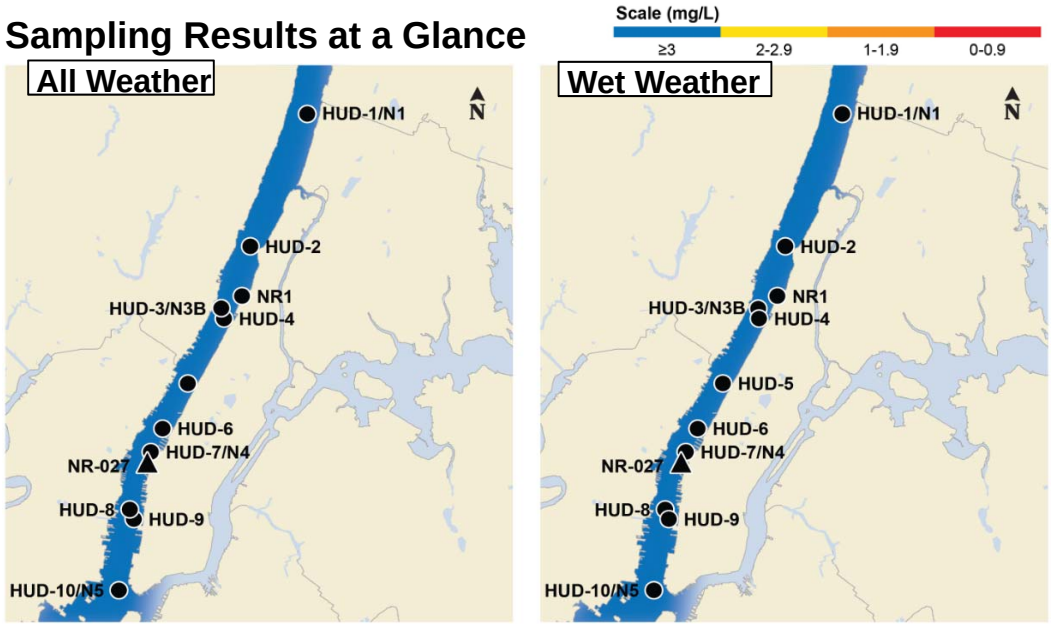
Sampling Details

	Sampling Period (2016)	# Locations	# Samples Dry	# Samples Wet
LTCP	Apr 27 – Jun 9 Nov 16 – Nov 19	10	8	38
HSM	Jan 4 – Dec 12	6	12	15
Riverkeeper	May 1 – Oct 31	9	3	3
Citizen	May 1 – Oct 31	12	14	10



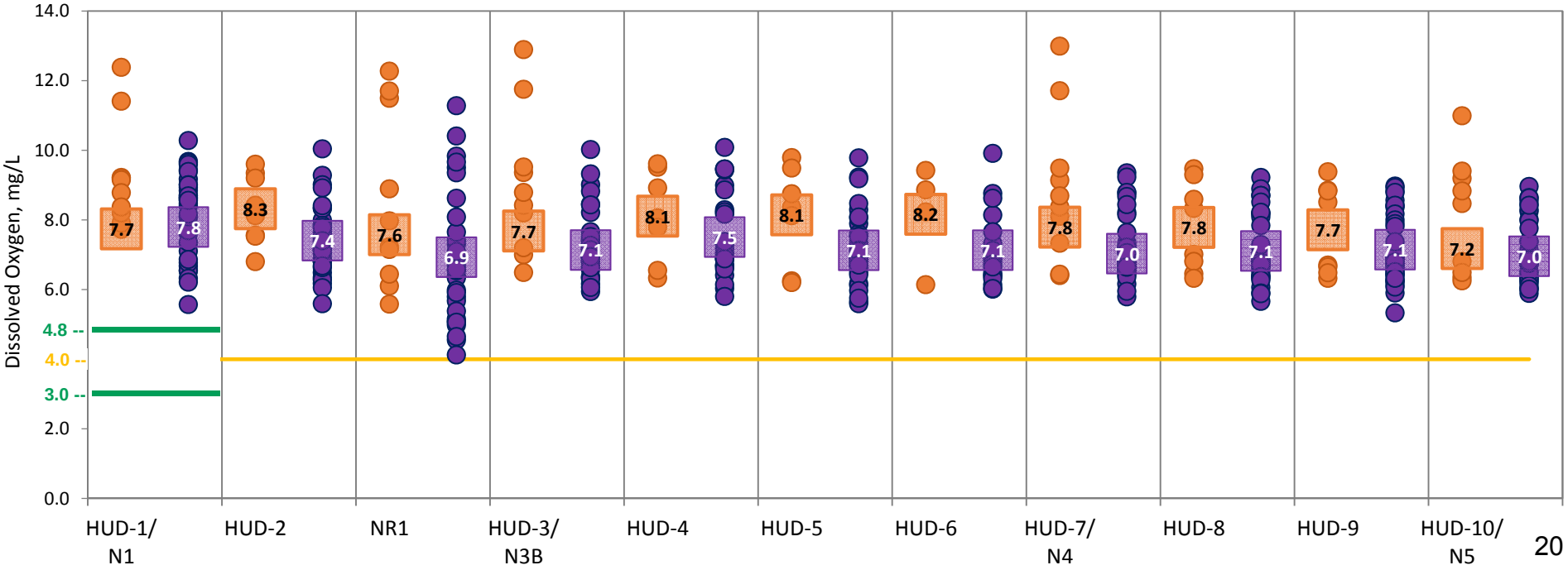
Hudson River – Dissolved Oxygen

Sampling Results at a Glance



Sampling Details

	Sampling Period (2016)	# Locations	# Samples	
			Dry	Wet
LTCP	Apr 27 – Jun 9 Nov 16 – Nov 19	10	8	38
HSM	Jan 4 – Dec 12	6	20	30



Hudson River Projected % Attainment

Station	Baseline Fecal Coliform		Baseline Enterococcus	
	Annual Monthly GM ≤ 200cfu/100mL	Recreational Season Monthly GM ≤ 200cfu/100mL	Recreational Season Monthly GM ≤ 30cfu/100mL	Recreational Season Monthly STV ≤ 110cfu/100mL
HUD-1	✓	✓	✓	✓
HUD-2	✓	✓	82%	✓
HUD-3	92%	✓	94%	✓
HUD-4	✓	✓	✓	✓
HUD-5	✓	✓	✓	✓
HUD-6	✓	✓	✓	✓
HUD-7	✓	✓	✓	✓
HUD-8	✓	✓	✓	✓
HUD-9	✓	✓	✓	✓
HUD-10	✓	✓	✓	✓

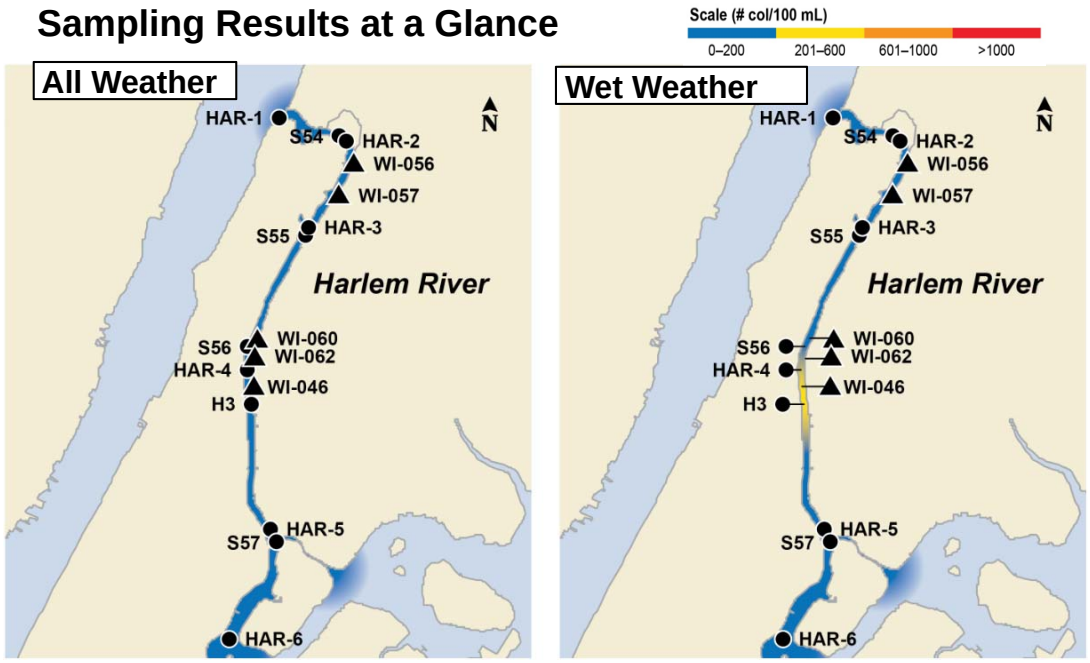
✓ ≥ 95% Attainment

Note: Preliminary Gap Analysis; Model does not yet include loads from NJ CSOs. Attainment based on modeled 10-year averages.

- Hudson River has a total of 51 CSO outfalls; almost 40% of the annual CSO volume occurs in 3 outfalls
- Sampling has shown a wet weather impact on bacteria concentrations
- Models predict attainment of existing WQS criteria

Harlem River – Fecal Coliform

Sampling Results at a Glance



Sampling Details

	Sampling Period (2016)	# Locations	# Samples	
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LTCP	Apr 27 – Jun 9 Nov 16 – Nov 19	6	8	38
HSM	Jan 4 – Nov 9	1	12	15
SM	Mar 8 – Oct 19	4	3	1

Note: Sampling conducted when Wards Island WWTP was not at 2xDDWF capacity

Dry Weather Data
Wet Weather Data
Dry Weather Geomean
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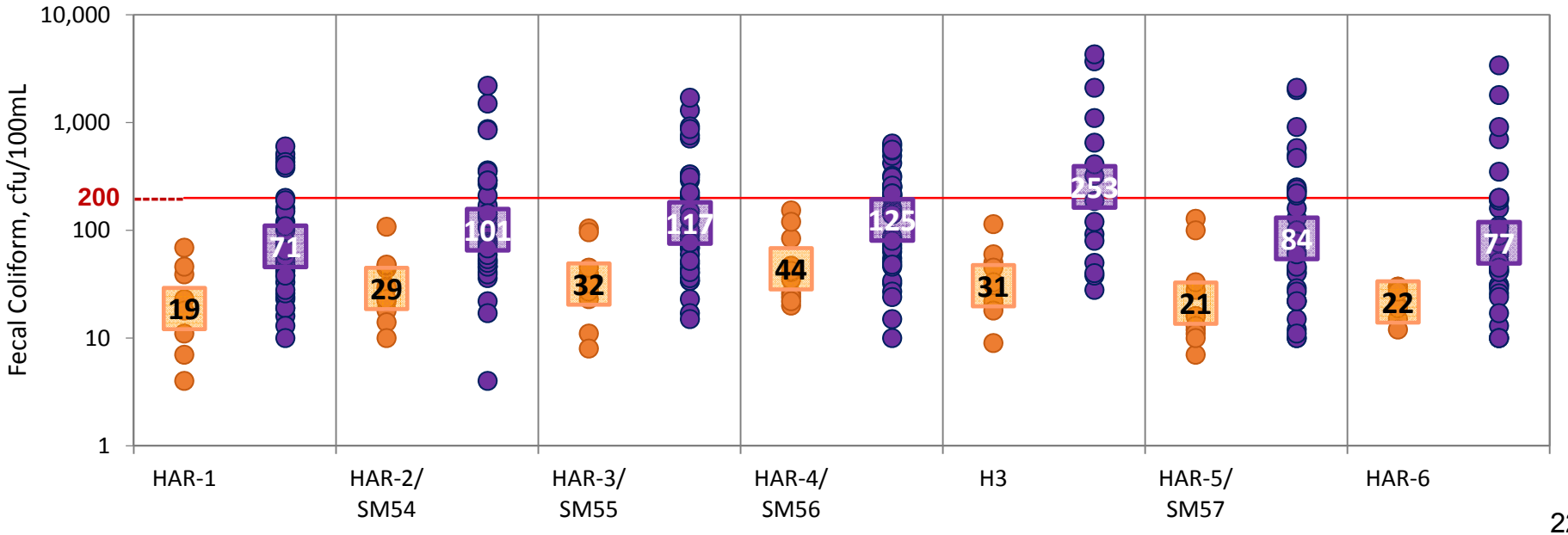

Harlem River – Enterococcus

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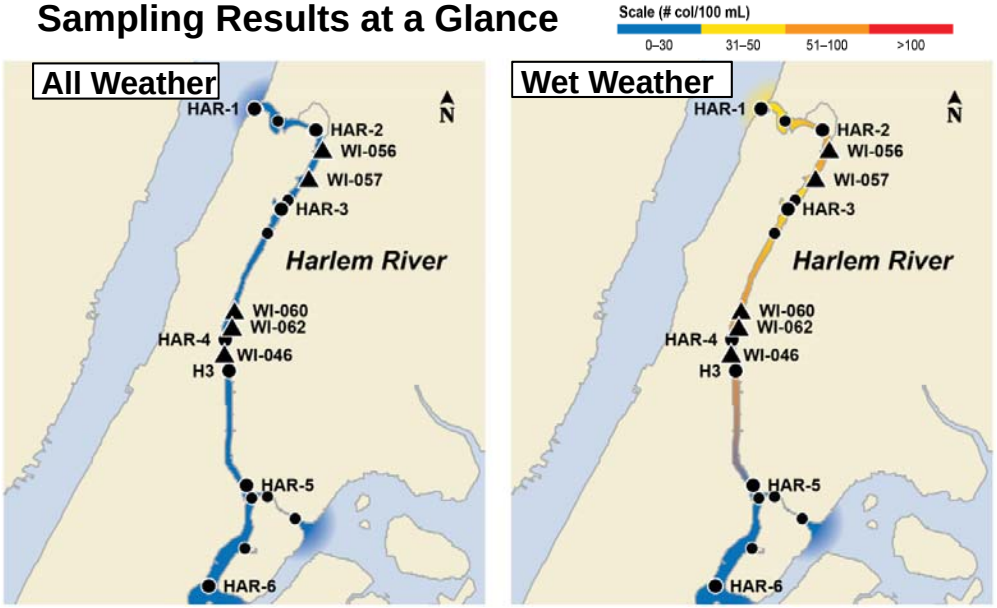

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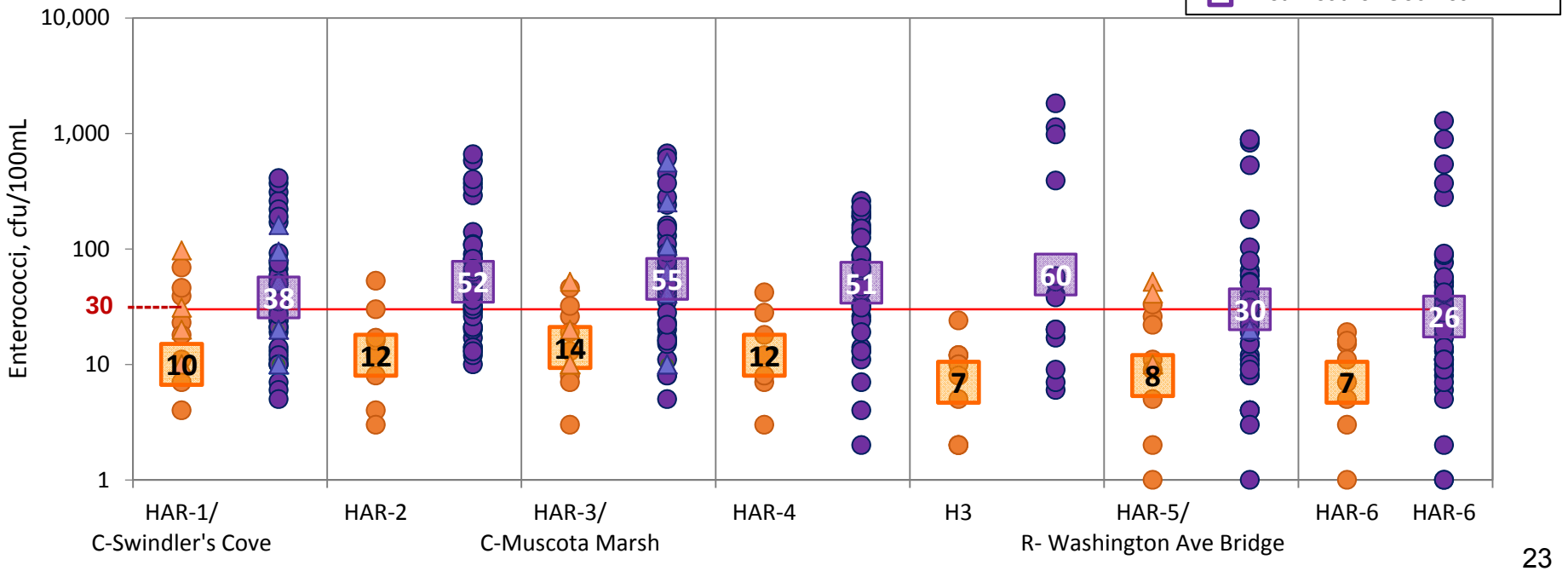
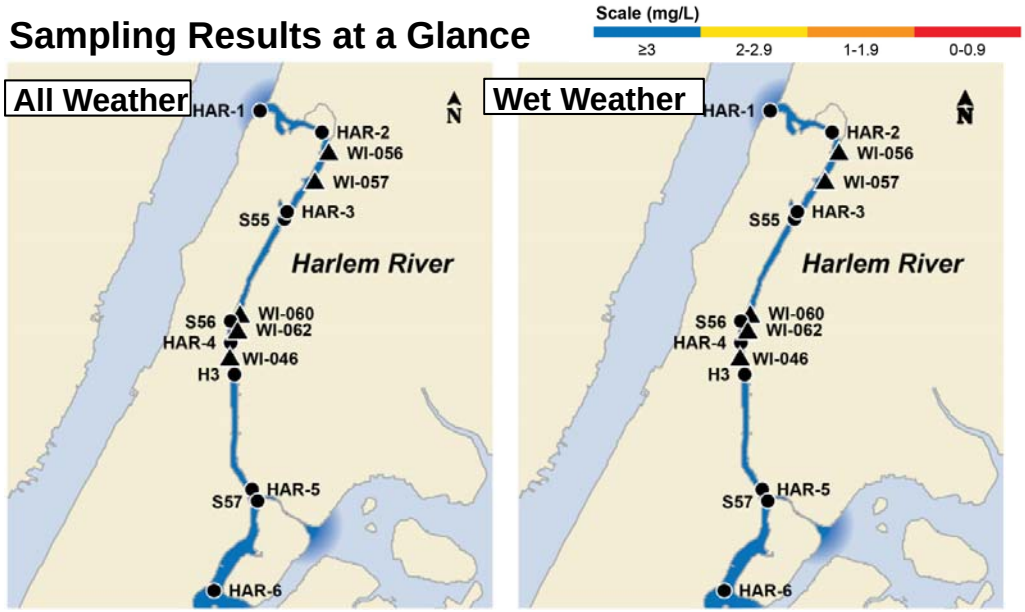
Riverkeeper	May 1 – Oct 31	2	5	1
Citizen	May 1 – Oct 31	5	7	13

Note: Sampling conducted when Wards Island WWTP was not at 2xDDWF capacity



Harlem River – Dissolved Oxygen

Sampling Results at a Glance



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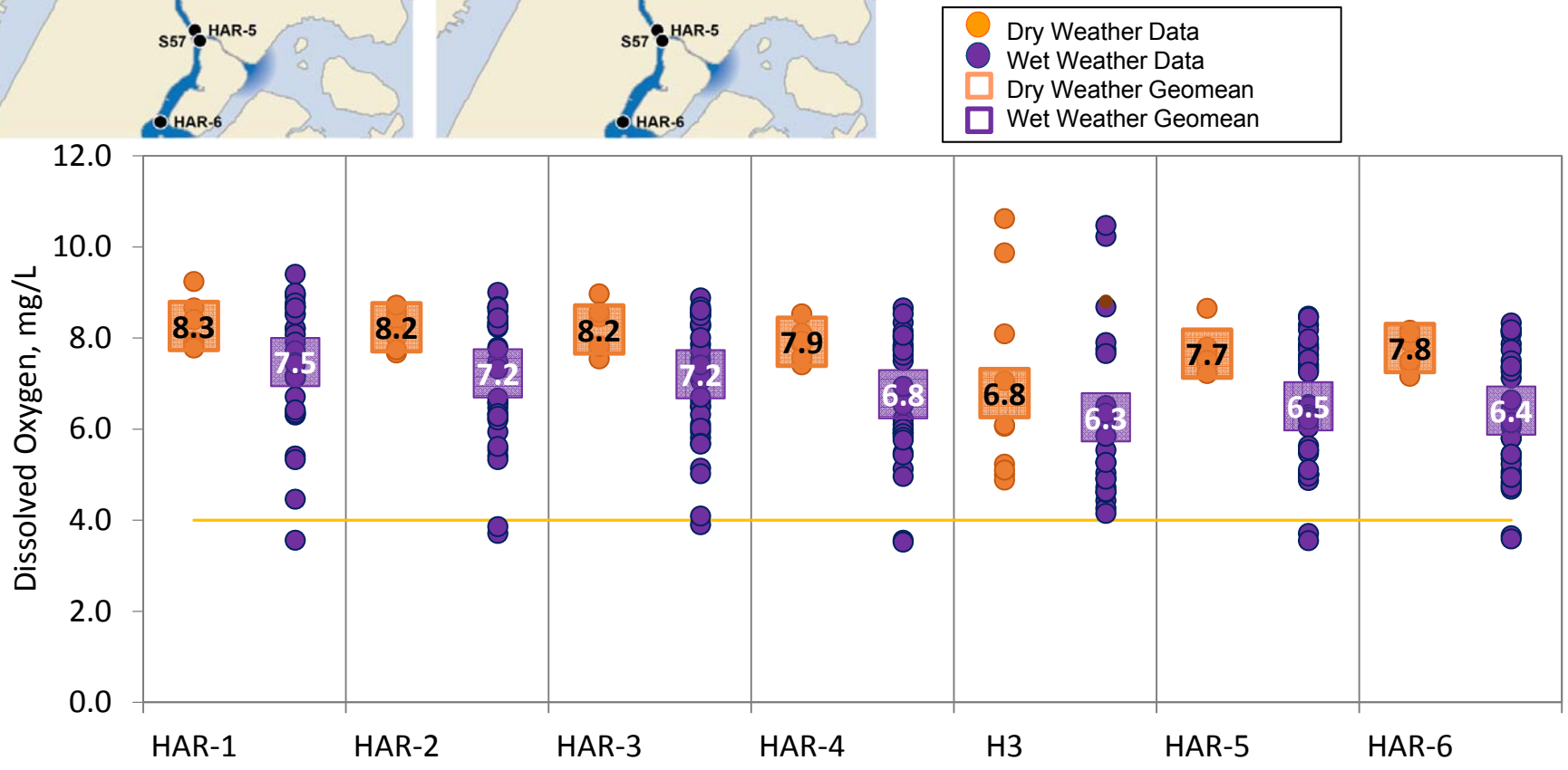

Harlem River Projected %Attainment

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HAR-1	✓	✓	✓	✓
HAR-2	✓	✓	✓	93%
HAR-3	✓	✓	✓	76%
HAR-4	✓	✓	✓	74%
HAR-5	✓	✓	✓	74%
HAR-6	✓	✓	✓	75%

✓ ≥ 95% Attainment

Note: Preliminary Gap Analysis; Model does not yet include loads from NJ CSOs. Attainment based on modeled 10-year averages.

- Harlem River has a total of 43 CSO outfalls; almost 72% of the annual CSO volume occurs in 5 outfalls
- Sampling has shown a wet weather impact on bacteria concentrations
- Models predict attainment of existing WQS criteria

Water Quality Improvement Projects

Grey Infrastructure

Keith Mahoney, PE
Director of Water Quality Planning
DEP

Existing Grey Infrastructure Projects

- Wards Island WWTP Upgrades
  - **$5.3 M** Reconstruction of Six (6) Main Sewage Pumps
  - **$13.7 M** Replace Bar Screens at Bronx and Manhattan Grit Chambers

- North River WWTP Upgrades
  - **$177 M** Replacement of existing pumps and blower engines with new dual fuel cogeneration engines and electric motors
  - **Benefits:**
    - ✓ Reduction of GHG, NOx, CO, VOCs
    - ✓ Reduction of truck traffic from fuel deliveries
    - ✓ Elimination of fuel oil use
    - ✓ Use of digester gas as renewable fuel to power the engines
    - ✓ Increase reliability and flexibility

Water Quality Improvement Projects

Green Infrastructure

Melissa Enoch
Program Manager
DEP

Private Property GI Programs

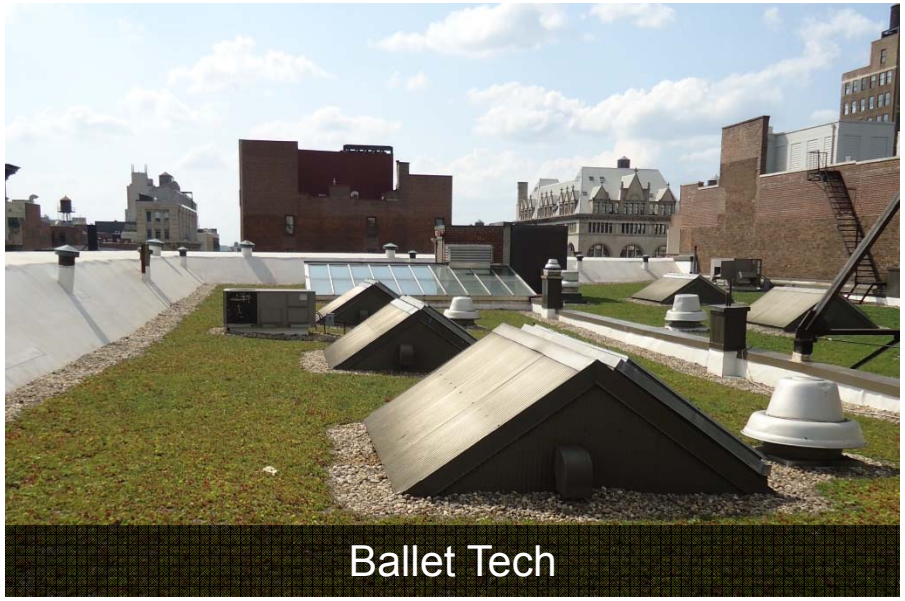
NYC Environmental Protection

Green Infrastructure Grant Program

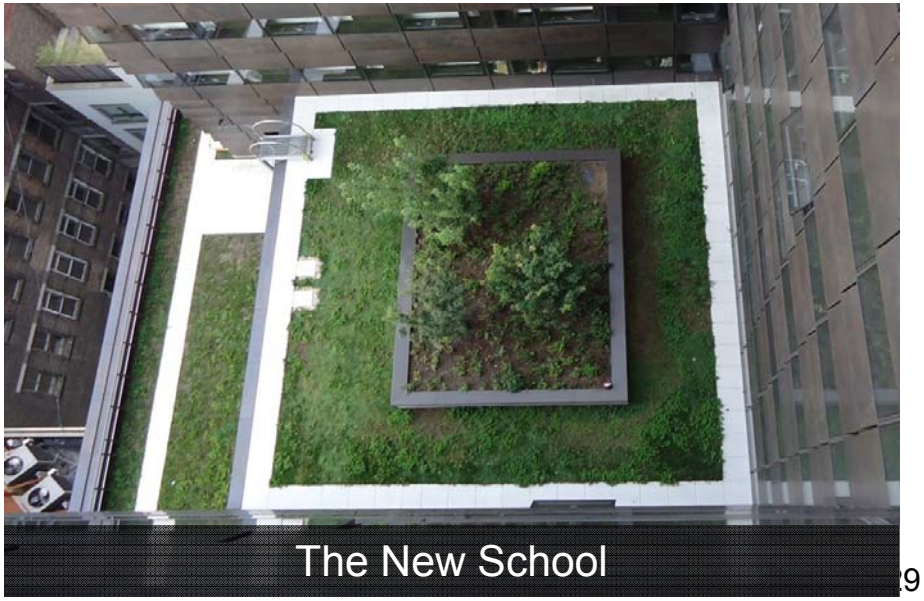
- More than $15 million committed to date to 34 private property owners
- 4 projects completed, 2 projects started in 2016

NYC Housing and Preservation Department Partnership

- Establishing on-going funding source for GI as part of HPD new affordable housing development
- 1 project in FY18, up to 5 projects in FY19 as initial investment



Ballet Tech



The New School

Private Property GI Programs

New Private Property Retrofit Program

- Phase One Goal: retrofit 200 Greened Acres* in Tier 1 and Tier 2 sites

Privately Owned Sites in Combined Sewer Area	
Tier 1 – Over 100,000 sf	693
Tier 2 – 50,000-99,999 sf	896

- RFP to select Program Administrator **anticipated release date:** Q2 2018

- DEP will jumpstart outreach to Tier 1 and Tier 2 property owners and community organizations in 2018

**a Greened Acre is defined as 1" of rainfall on one acre of impervious surfaces or 1.5" on 0.67 acre of impervious surfaces, etc.*

Other Private Property GI Opportunities

- **Green Roof Tax Abatement:**
  The City provides a one-year property tax abatement for private properties that install green roofs. The abatement value is $5.23 per square foot (up to the lesser of $200,000 or the building's tax liability) and is available through March 15, 2018.

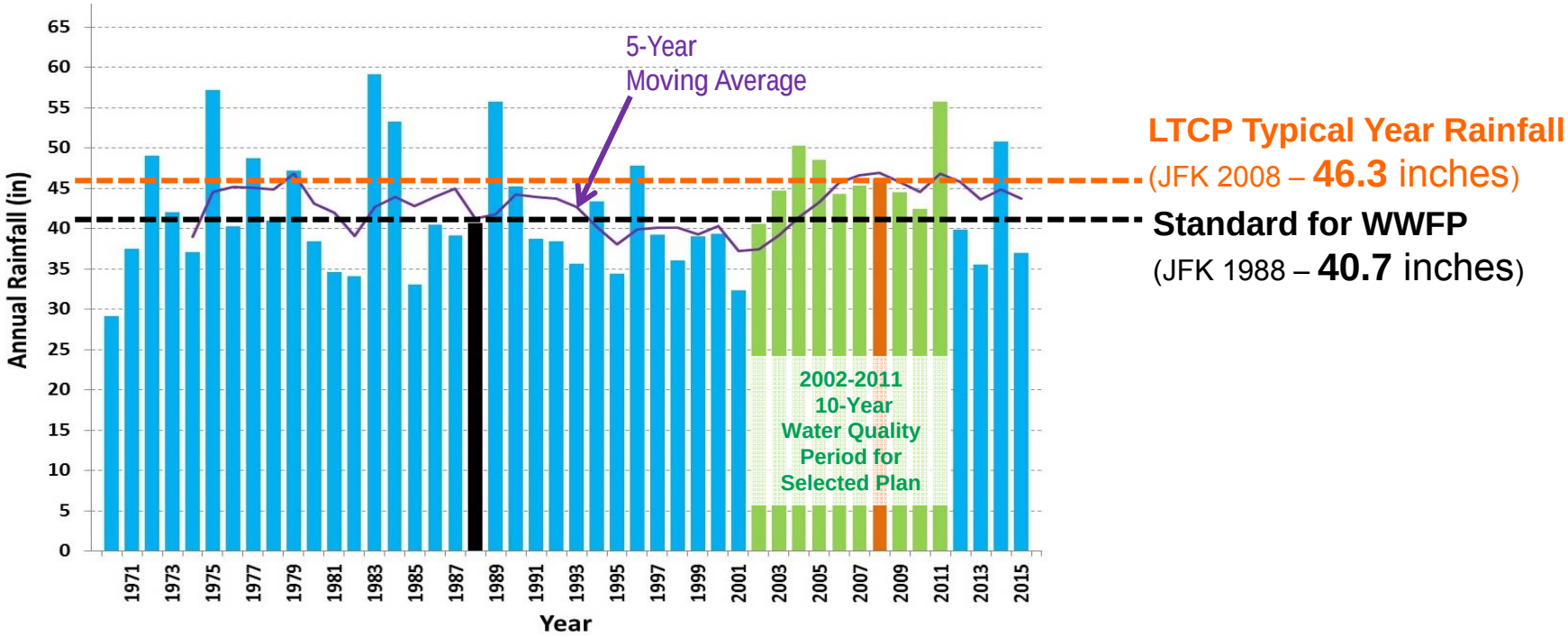
- **2012 Stormwater Rule:**
  In 2012, DEP amended the allowable flow rate of stormwater to the City's combined sewer system for new and existing development. Site Connection Proposals may include green infrastructure technologies to meet the new allowable rate.

LTCP Modeling and Alternatives Development Process

Keith Mahoney, PE
Director of Water Quality Planning
DEP

Model Inputs and Assumptions

- **Landside Model** calibrated based on flow monitoring data, gauge adjusted radar rainfall data, and satellite flyover impervious data
- **Water Quality Model** calibrated with Harbor Survey and LTCP sampling data
- Calibrated modeling inputs and assumptions include:
  - Committed CSO and BNR projects
  - 2040 sanitary flows and loads
  - JFK 2008 "Typical Year Rainfall" for Alternative Analysis
  - JFK 10-yr data (2001 to 2011) for baseline and selected alternatives



CSO Control Evaluation Process

1. Bacteria Source Component Analysis
   - CSO, stormwater and direct drainage
2. Gap Analysis for Water Quality Standard (WQS) Attainment
   - Calculate bacteria and dissolved oxygen for:
     - Baseline Conditions
     - 100% CSO Control Conditions
3. Assess Levels of CSO Control Necessary to Achieve WQS
4. Identify Technologies to Cost-Effectively Achieve the Required Level of CSO Control

Sample Technologies:

- **Storage**
- **Treatment**
- **System Optimization**
- **Source Control**

CSO Mitigation Toolbox

INCREASING COMPLEXITY

INCREASING COST

Source Control	Green Infrastructure		Storm Sewers		
System Optimization	Fixed Weir	Parallel Interceptor / Sewer	Bending Weirs Control Gates	Pump Station Optimization	Pump Station Expansion
CSO Relocation	Gravity Flow Tipping to Other Watersheds	Pumping Station Modification	Flow Tipping with Conduit/Tunnel and Pumping		
Water Quality / Ecological Enhancement	Floatables Control	Environmental Dredging	Wetland Restoration	Daylighting	
Treatment ***Satellite:***	Outfall Disinfection	Retention Treatment Basin (RTB)		High Rate Clarification (HRC)	
Centralized:	WWTP Expansion				
Storage	In-System	Shaft	Tank	Tunnel	

Next Steps

Mikelle Adgate
Senior Policy Advisor
DEP

Next Steps

- **Kick-off Meetings for remaining 2 Citywide/Open Waters LTCP Areas** (East River/Staten Island) – **March 2018**

- **Alternatives Meetings #2**, **TBD**

- **Final Plan Meetings #3, TBD**

- Public opportunity to review and comment on DEP's selected alternative before the LTCP is submitted to DEC

- **Comments can be submitted to:**
  - New York City DEP at: **ltcp@dep.nyc.gov**

Additional Information & Resources

- Visit the informational tables tonight for handouts and poster boards with detailed information

- Go to www.nyc.gov/dep/ltcp to access:
  - LTCP Public Participation Plan
  - Presentation, handouts and poster boards from this meeting
  - Links to Waterbody/Watershed Facility Plans
  - CSO Order including LTCP Goal Statement
  - NYC's Green Infrastructure Plan
  - Green Infrastructure Pilots 2011 and 2012 Monitoring Results
  - NYC Waterbody Advisory Program
  - Upcoming meeting announcements
  - Other LTCP updates