



**Massachusetts Water Resources Authority**

## **Wastewater Advisory Committee Meeting**

**October 7, 2016**

### **MWRA's Water Quality Monitoring Program Mystic and Charles Rivers**

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# MWRA's Long Term Control Plan

## MWRA's Long Term Control CSO Program

184 milestones

Nearly \$900 million in MWRA funded projects

\$ 423 million in MWRA/CSO Community agreements

Last construction milestone in Dec 2015

As part of the program, EPA and DEP agreed not to add any other CSO control requirements through 2020, to allow time to evaluate the impacts of the LTCP projects. DEP agreed to issue a series of 3-year CSO variance extensions for the Charles River Basin and Alewife Brook/Upper Mystic River through 2020, and EPA agreed to approve the extensions, limited to the requirements in the LTCP.

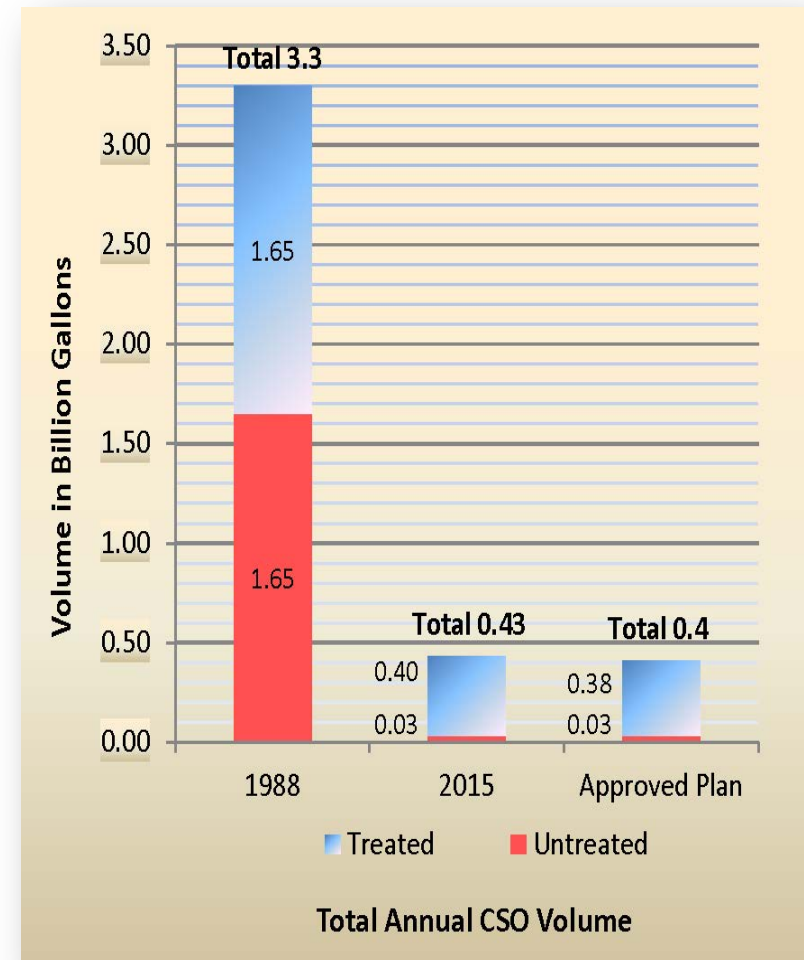


# Long-Term CSO Control Plan Benefits

The LTCP brings 84 CSO outfalls into compliance:

- 34 outfalls are closed to CSO discharges, including 10 outfalls along the Charles and 8 outfalls along Alewife and Upper Mystic.
- 5 outfalls along the South Boston beaches have 25-year storm level of control.
- 5 outfalls have upgraded wet weather treatment at CSO facilities, including the outfall from the Cottage Farm facility and the two outfalls from the Somerville-Marginal facility.
- Discharge frequency and volume are greatly reduced at remaining outfalls.

**Reduces system-wide CSO discharge volume in a typical year by 88%, with 93% of remaining volume treated at MWRA's CSO facilities.**





# Remaining Federal Court Obligations

## Two milestones are left:



January 2018: Commence 3-year CSO post-construction monitoring and performance assessment.

December 2020: Submit results of 3-year performance assessment to EPA and DEP.

In addition, the Variance extensions for 2016-2019 require MWRA to submit a proposed scope of the court-mandated 3-year CSO performance assessment to EPA and DEP by May 1, 2017.



# Variations, Court Orders, and Water Quality Designations

**Phase I is the 2016-2019 variance extension;**

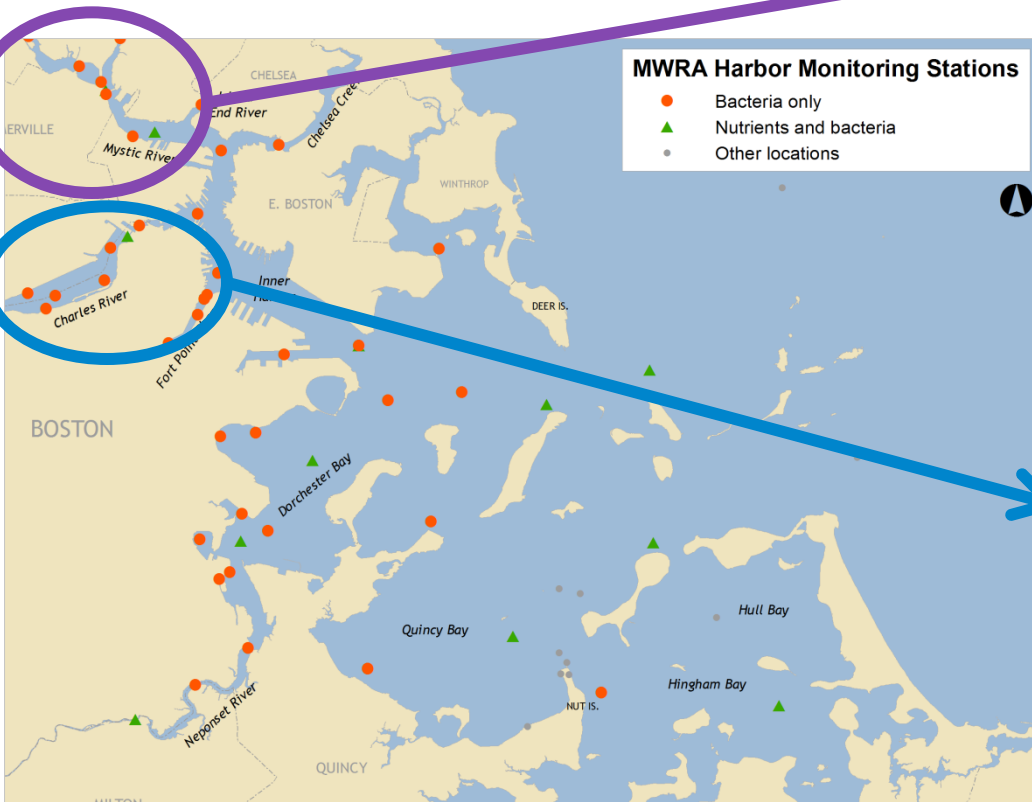
Phase II is the 2018-2020 court-ordered CSO post-construction assessment that would confirm that the LTCP targets are met;

Phase III is the 2019-2021 variance extension that would provide a water quality evaluation to support B<sub>CSO</sub> designations for the Alewife/Upper Mystic and the Lower Charles.

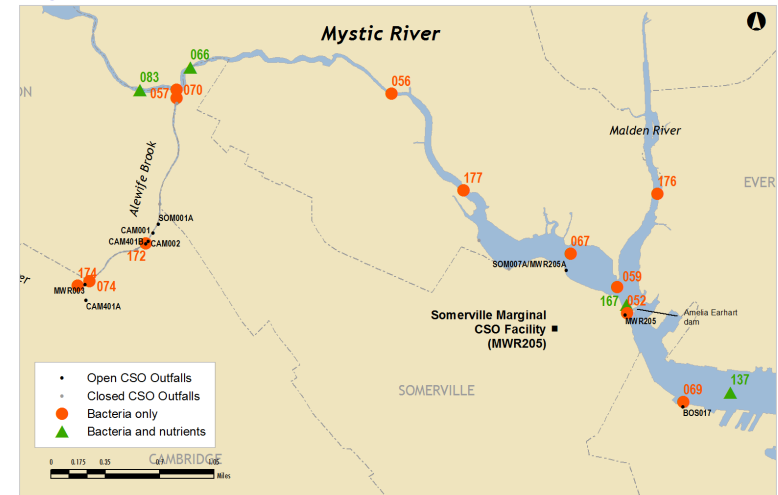




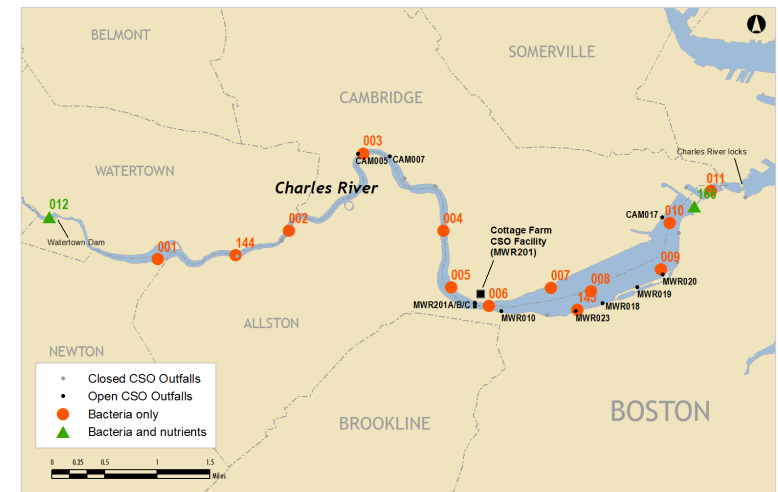
# Water Quality Monitoring required by the Variances



## Mystic River/Alewife Brook



## Charles River



## MWRA's Boston Harbor Monitoring Programs



## Enhancements to Monitoring for 2016 Forward

- Sampling was originally designed to characterize status and trends in both dry and wet weather as CSO control projects were completed.
- With the completion of the LTCP, monitoring has been shifted to quantify water quality impacts of CSOs following storm events and the duration of these impacts.
  - Sampling will rotate between three regions (Alewife/Mystic/Inner Harbor, Charles River, and Neponset River/Dorchester Bay/Outer Harbor) every two weeks, approximately April through October.
  - With this change, sampling will occur for several consecutive days in the current region, before, during, and after a storm, depending on safety, staffing, and other monitoring projects.
- This change has already been implemented for the 2016 field season.



## Other Monitoring - overview

**Watershed associations also perform monitoring. MWRA supports these effort by performing the laboratory analyses**

- Charles River Watershed Association – variety of programs in the tributaries and mainstem, wet weather events, hot spots, and stormwater. MWRA performs testing for 37 locations monthly, for *E. coli*, and 13 locations quarterly for NO<sub>2</sub>3, ammonia, total N, total P, orthophosphate, chlorophyll a, phaeophytin, TSS and *Enterococcus*.
- Mystic River Watershed Association - monthly samples from 10 sites analyzed for *E. coli*, total P, NO<sub>2</sub>3, TSS, Conductance, Temp, DO and turbidity. Bimonthly samples at 17 sites tested for total P, orthophosphate, turbidity, chlorophyll a, DO.





# Water Quality Monitoring Locations

- Monitoring locations selected to bracket CSOs and to provide representative picture of water quality in a given reach.
- Charles River: 15 locations in Lower Charles, from Watertown Dam to upstream of New Charles Dam.
- Mystic River: 16 locations in Alewife Brook/ Mystic River, from downstream of Mystic Lakes to upstream of the mouth of the Island End River.





# Water Quality Monitoring: Parameters Measured

## Laboratory analysis

- Indicator bacteria
  - *Enterococcus* at all locations, plus either:
    - *E. coli* at freshwater locations, or
    - Fecal coliform at marine locations
- Dissolved/total nitrogen and phosphorus, chlorophyll, and TSS at a subset of upstream and downstream locations.

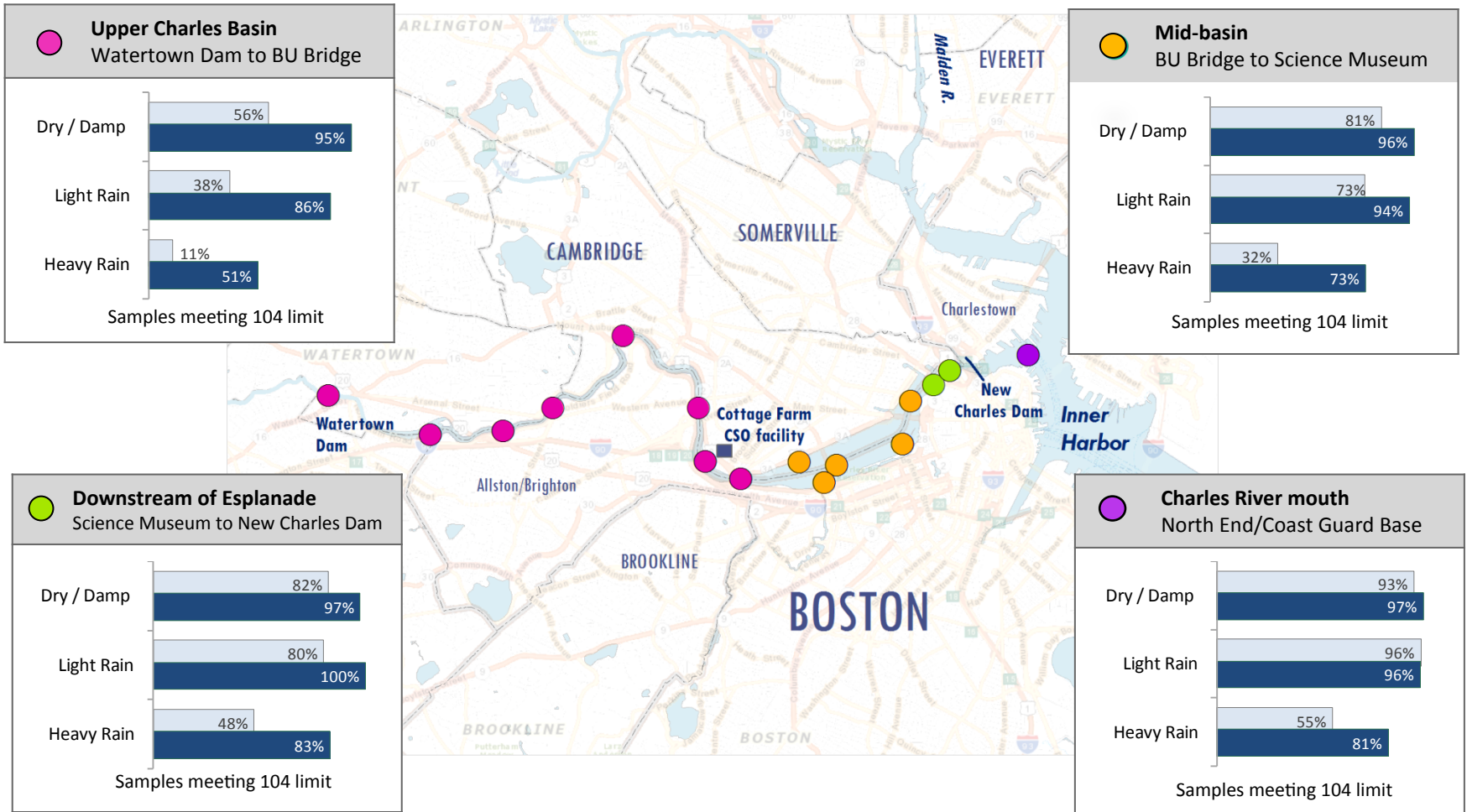
## Physical measurements

- Temperature, dissolved oxygen, pH, salinity, and turbidity at all locations.
- Secchi disk depth at all locations except during nutrient monitoring sampling.



# Lower Charles River Water Quality Improvement Over Time

Samples collected from: ■ 1989-1999 ■ 2008-2015

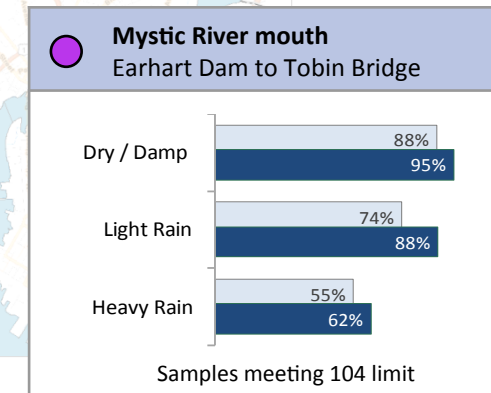
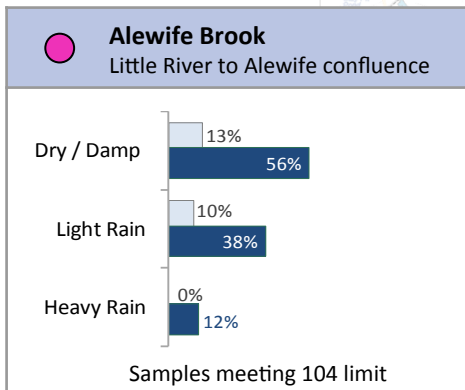
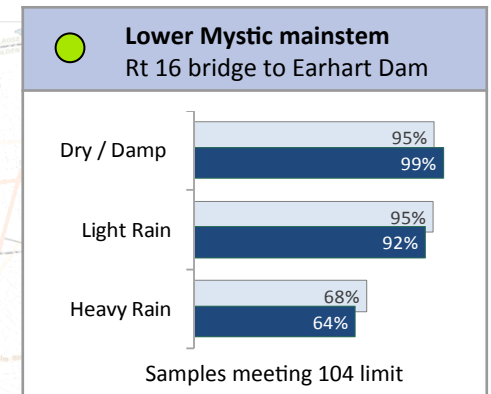
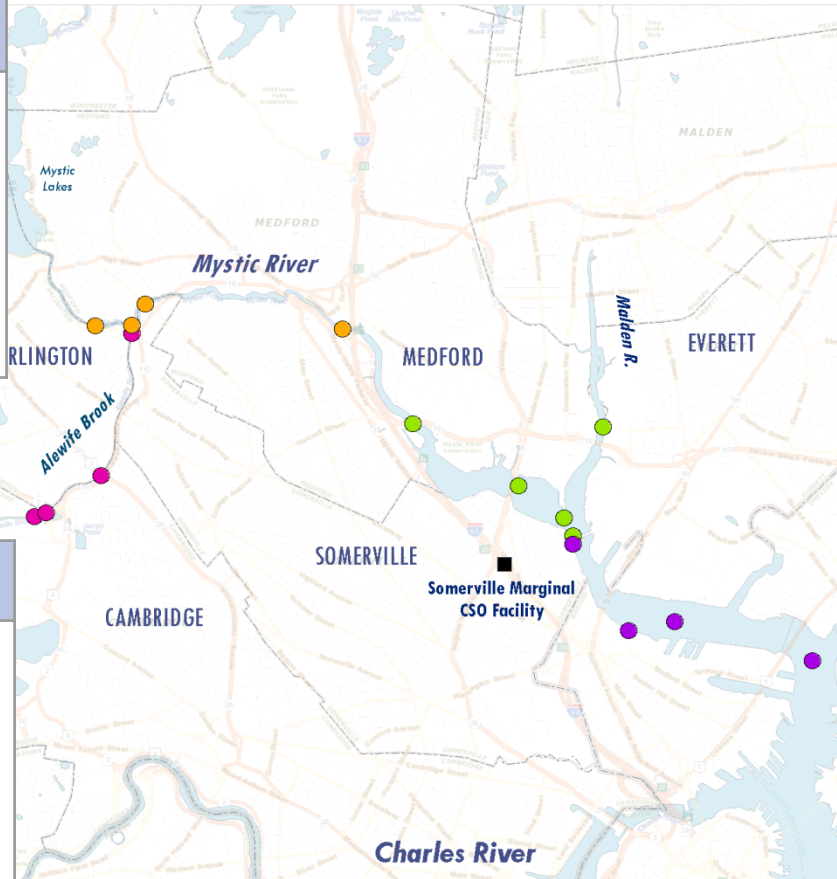
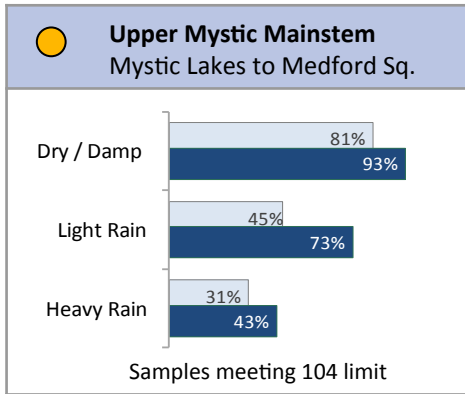


Dots are MWRA sampling locations. State swimming standards for *Enterococcus* single sample limit is 104 cfu/100 mL. Rainfall: Heavy Rain is at least 0.5 inches of rain in previous 48 hours; Light Rain is between 0.1 and 0.5 inches of rainfall in previous 48 hours. 2008 – 2015 period is considered current conditions, following substantial completion of infrastructure improvements. Data from intervening years (2000 – 2007) are excluded.



# Alewife Brook and Mystic River Water Quality Improvement Over Time

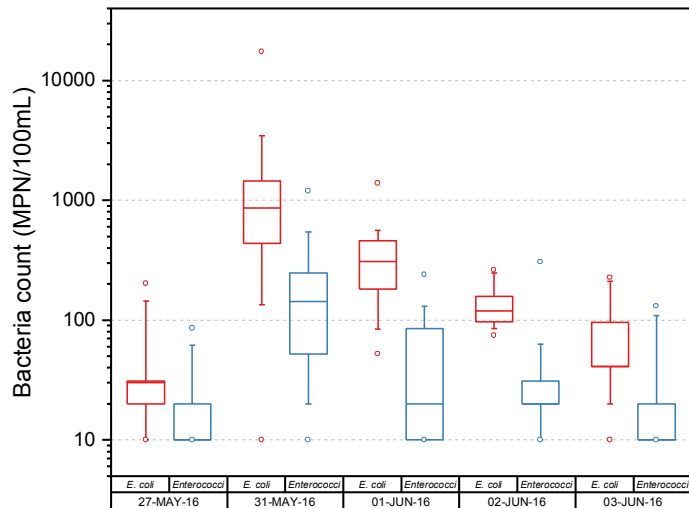
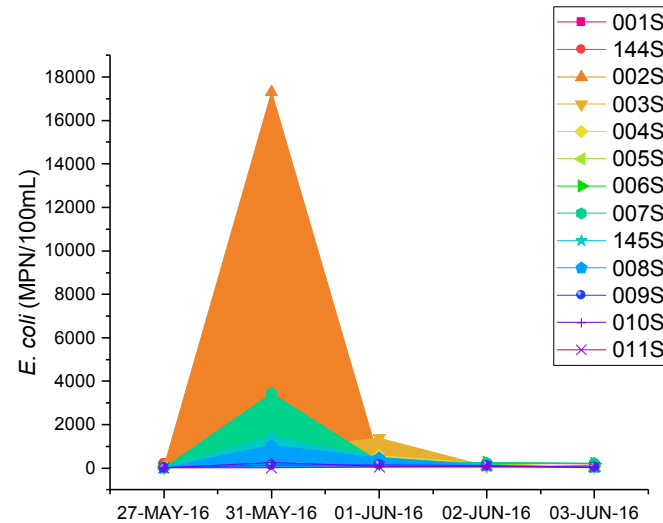
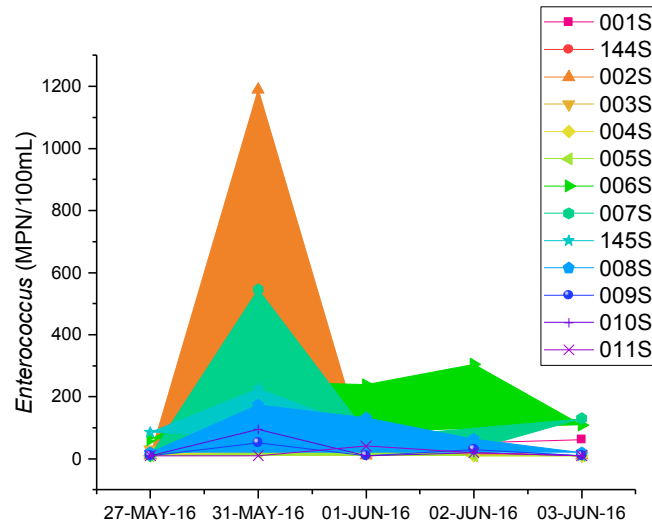
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# May 30, 2016 Storm Recovery – Charles River



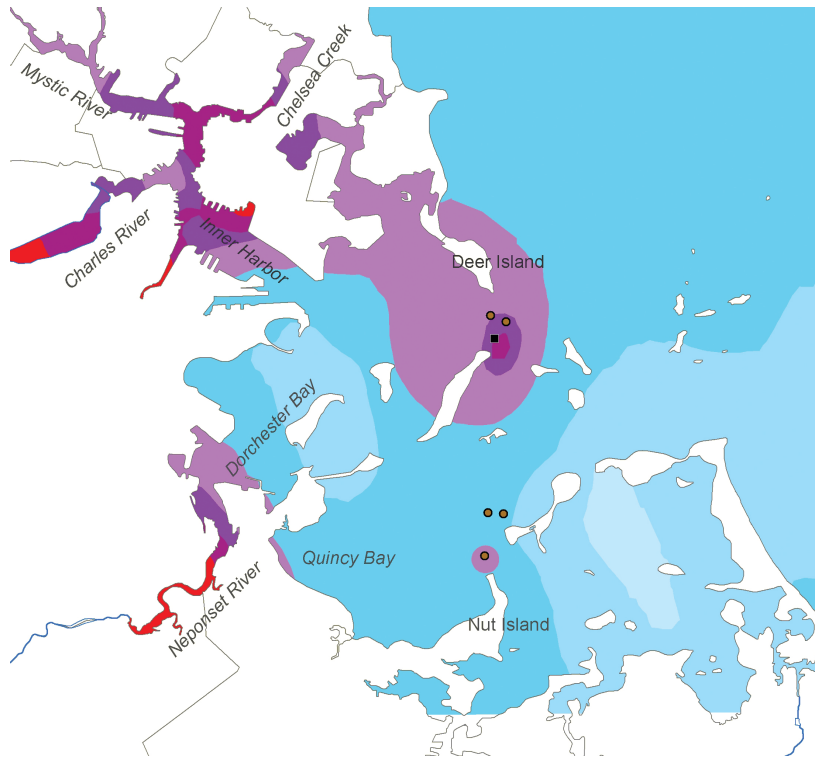
## Charles River

May 30: 1.13 inches rain  
 Sampled May 27 (pre-storm), and May 31-  
 June 3 (4 days post-storm)  
 Previous rain: May 24

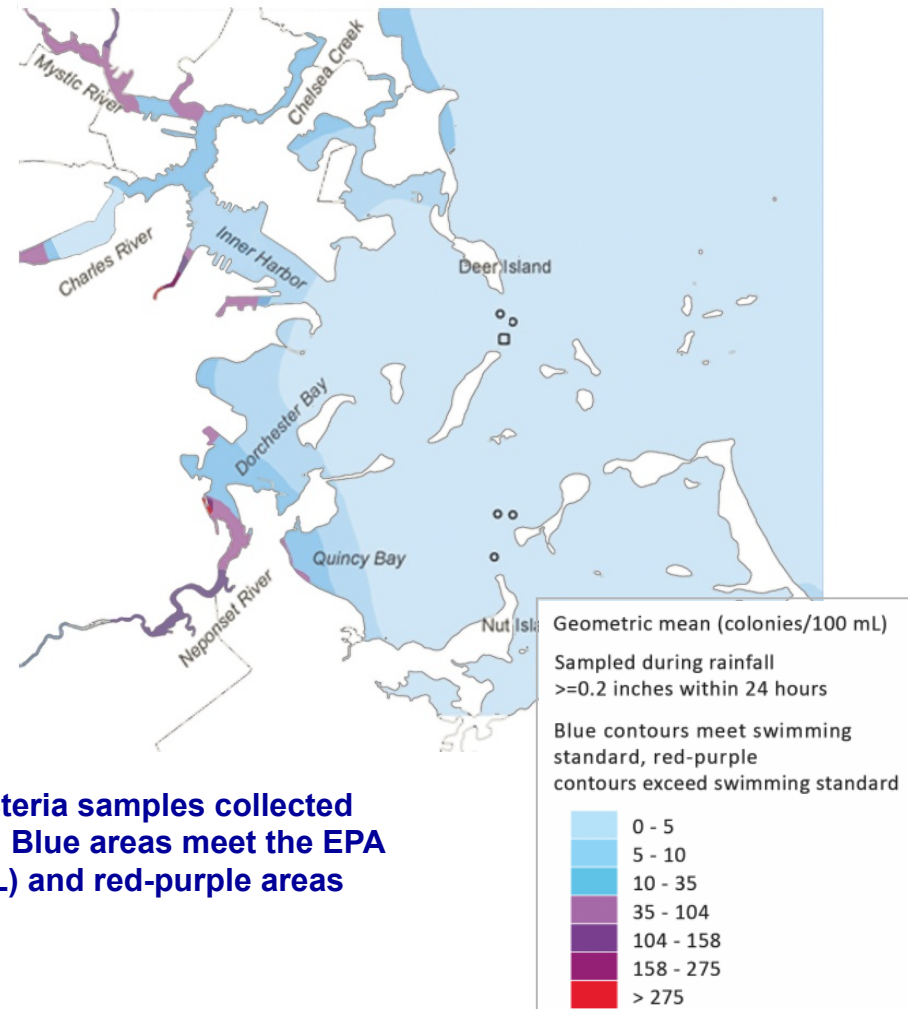


# Change in Boston Harbor *Enterococcus* Bacteria in Wet Weather

## Prior to Boston Harbor projects (1989-1991)



## Most Boston Harbor projects complete



Contours show the geometric means of *Enterococcus* bacteria samples collected when more than 0.2 inches of rain fell in the previous day. Blue areas meet the EPA geometric mean standard for *Enterococcus* (35 cfu/100 mL) and red-purple areas exceed the standard.





## Other actions - Public Information

- Charles River CSO discharge 12-hour notification – by MWRA, based on Cottage Farm activation
- Alewife Brook CSO discharge 12-hour notification – by City of Cambridge
- CSO web page on MWRA.com
- CSO identification sign at every outfall
- CSO public notification sign at John Wald Park
- MWRA web site for CSO treatment facility activations



**QUESTIONS?**



