



MWRA Monitoring Programs in Massachusetts Bay

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Why does MWRA conduct water quality monitoring?

- Effluent discharge was moved to Mass Bay in September 2000
- There was concern for deterioration in Mass Bay
- Differentiate between system wide events and conditions triggered by the outfall

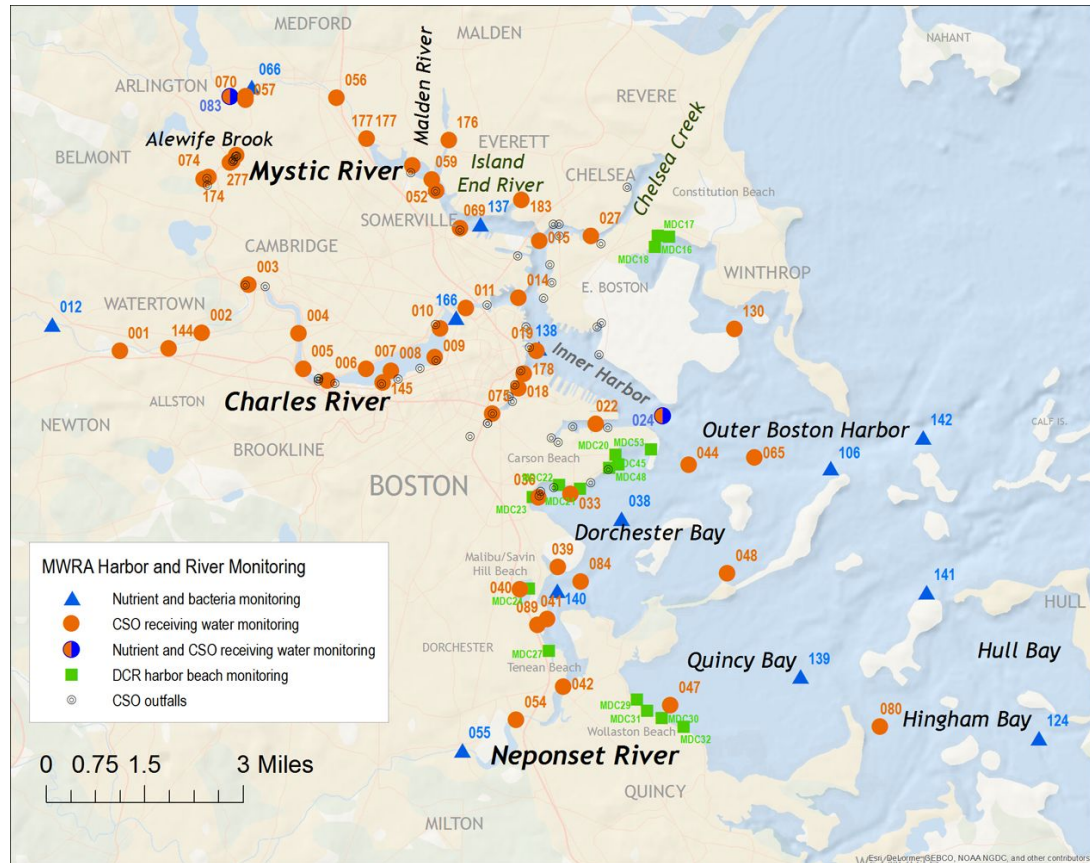


- System is so large that it takes many teams to complete the necessary monitoring
- Some monitoring is done by MWRA staff in Department of Lab Services
- Some monitoring is done by hired consultants (~\$1.5m annually)



Boston Harbor and Harbor rivers monitoring

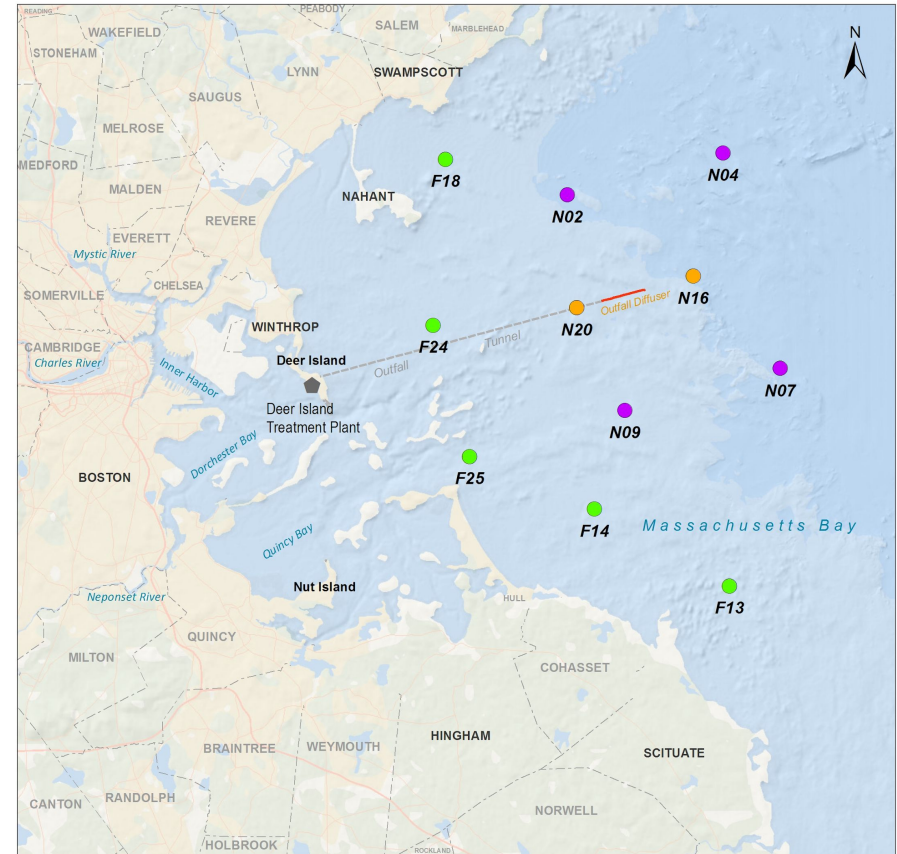
- Conducted by MWRA
- Multiple projects collecting bacteria, physical parameters and nutrients at numerous locations
- Some locations year-round, most others from April to October.





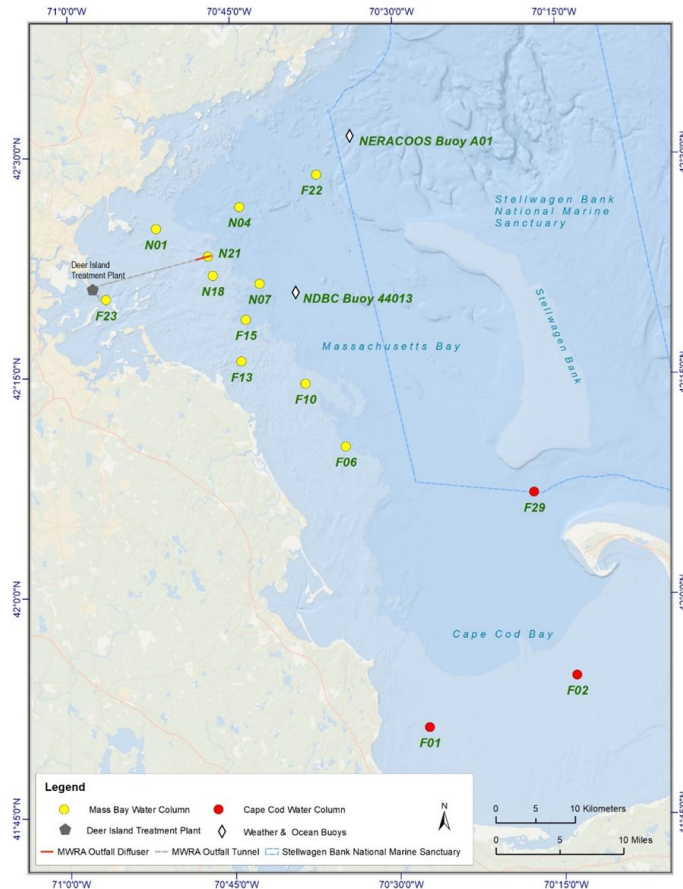
Bacteria Monitoring

- Conducted by MWRA
- Required by the Deer Island NPDES permit and an agreement with Division of Marine Fisheries to assess potential impacts to shellfish
- 12 locations in Mass Bay
- Monthly, year-round
 - Also required after extended high flow events
- Fecal coliform and *Enterococcus*





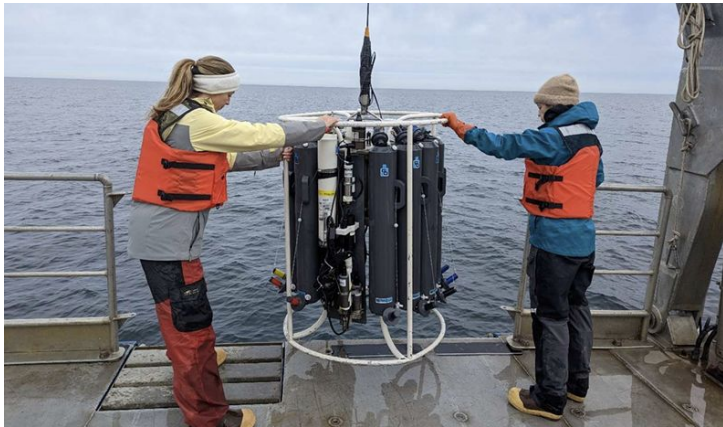
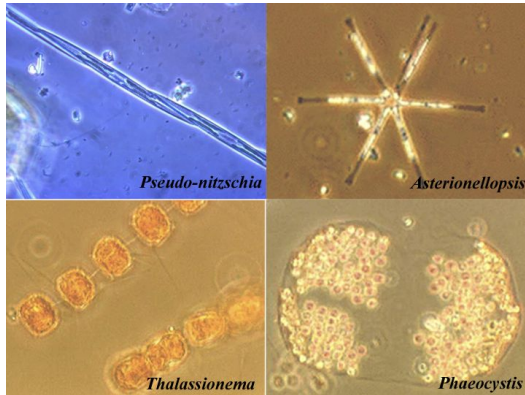
Water Column Monitoring



- Contracted to Battelle (yellow stations) and Center for Coastal Studies (red stations)
- Required by the NPDES permit (Ambient Monitoring Plan)
- 11 locations in Mass Bay, 3 in Cape Cod Bay
- 9 times annually
- Under certain conditions, additional surveys triggered due to *Alexandrium* counts and/or shellfish toxicity



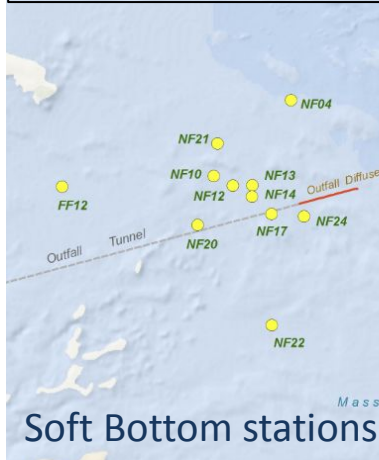
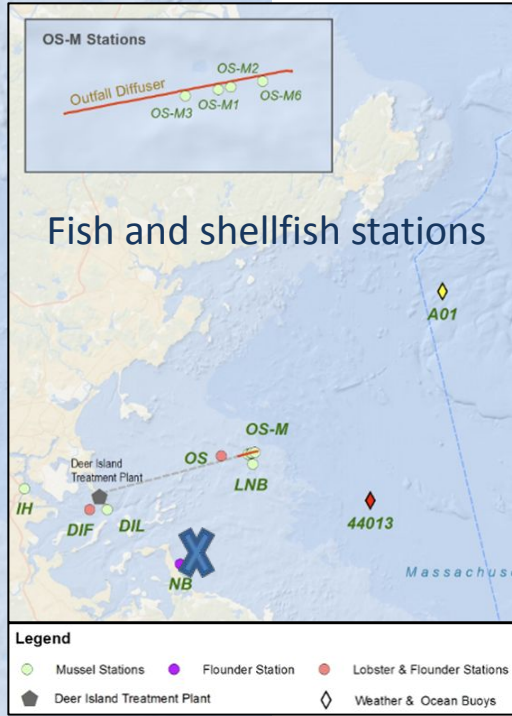
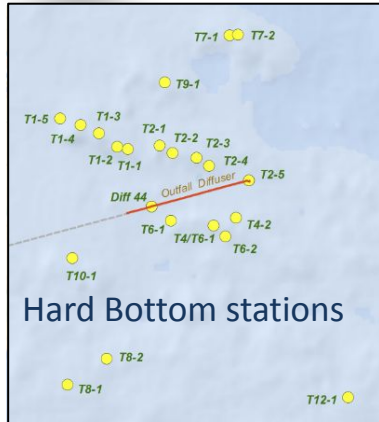
Water Column Monitoring



- *In situ* physical measurements
 - Conductivity, temperature, DO, fluorescence, pH, transmissivity, irradiance
- Chlorophyll
- Nutrients
 - DIN, TDNP, PCN
- Phytoplankton counts
- Zooplankton counts



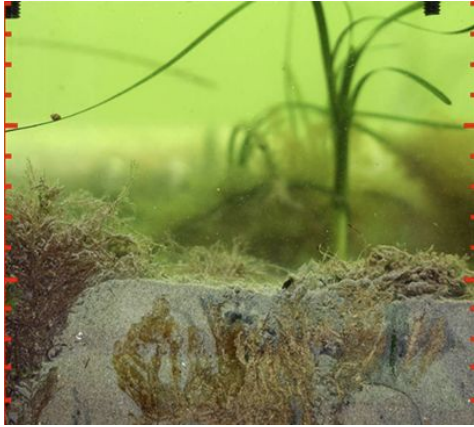
Benthic Monitoring



- Contracted to Normandeau Associates
- Required by the NPDES permit (Ambient Monitoring Plan)
- Benthic locations cover both soft and hard bottom communities in Mass Bay
- Fish (flounder) and shellfish (lobster and mussels) locations near the outfall and in Boston Harbor



Benthic Monitoring



- Soft bottom locations
 - Benthic species abundance, sediment grain size, total organic carbon, *Clostridium*
 - Boston Harbor only: Above plus sediment profile imaging
 - Once a year
- Hard bottom locations
 - Qualitative analysis of video taken by ROV
 - Once every three years





Fish and Shellfish Monitoring



- Flounder
 - Histopathology
 - Annually
- Tissue chemistry
 - Mercury, PCBs, chlorinated pesticides in flounder, lobster, and mussel tissue
 - PAHs in lobster and mussels
 - Lead in mussels
 - Every three years



Data Access and Reporting

- While data is not directly available to public, it is available upon request
- Please contact david.wu@mwra.com or chris.goodwin@mwra.com with requests



Image courtesy of Wikipedia

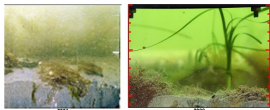


2022 Outfall Monitoring Overview

Massachusetts Water Resources Authority
Environmental Quality Department Report 2023-09



2022 Boston Harbor Benthic Monitoring Report



2022 Water Column Monitoring Results



- Technical reports...lots of technical reports
 - Six major annual technical reports
 - Annual “semi-technical” report: the *Outfall Monitoring Overview*
 - <https://www.mwra.com/node/6478>
- Papers in the peer-reviewed literature



Questions?



Thanks to Lucner Charlestra, Chris Goodwin, and Jenny Rogers for their contributions.