Water Quality Monitoring to Address Local Priorities in MassBays

Prassede Vella

MassBays National Estuary Partnership

ANEP Tech Transfer Meeting

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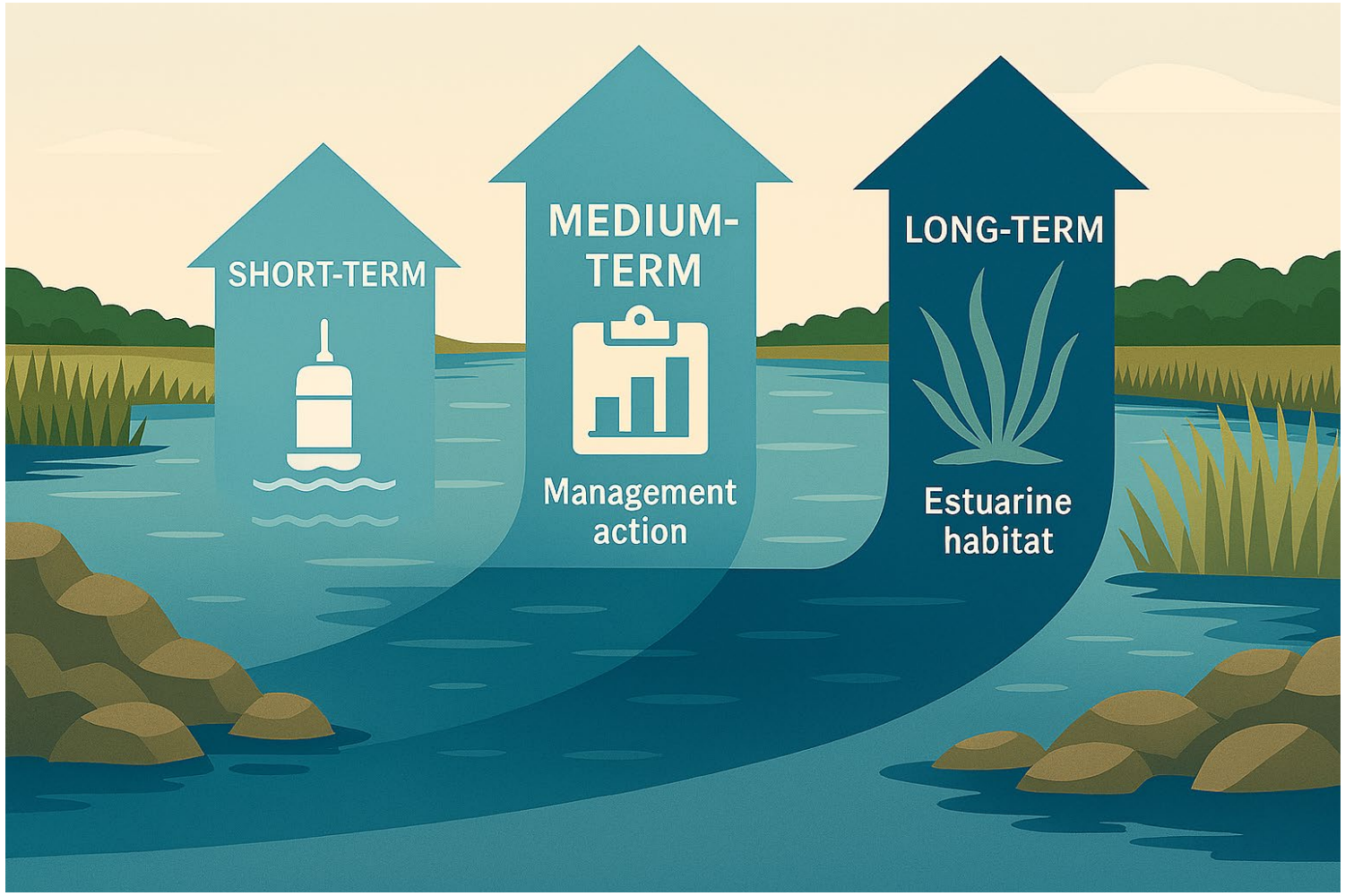
Mobile, AL

Massachusetts Bays
NATIONAL ESTUARY PARTNERSHIP

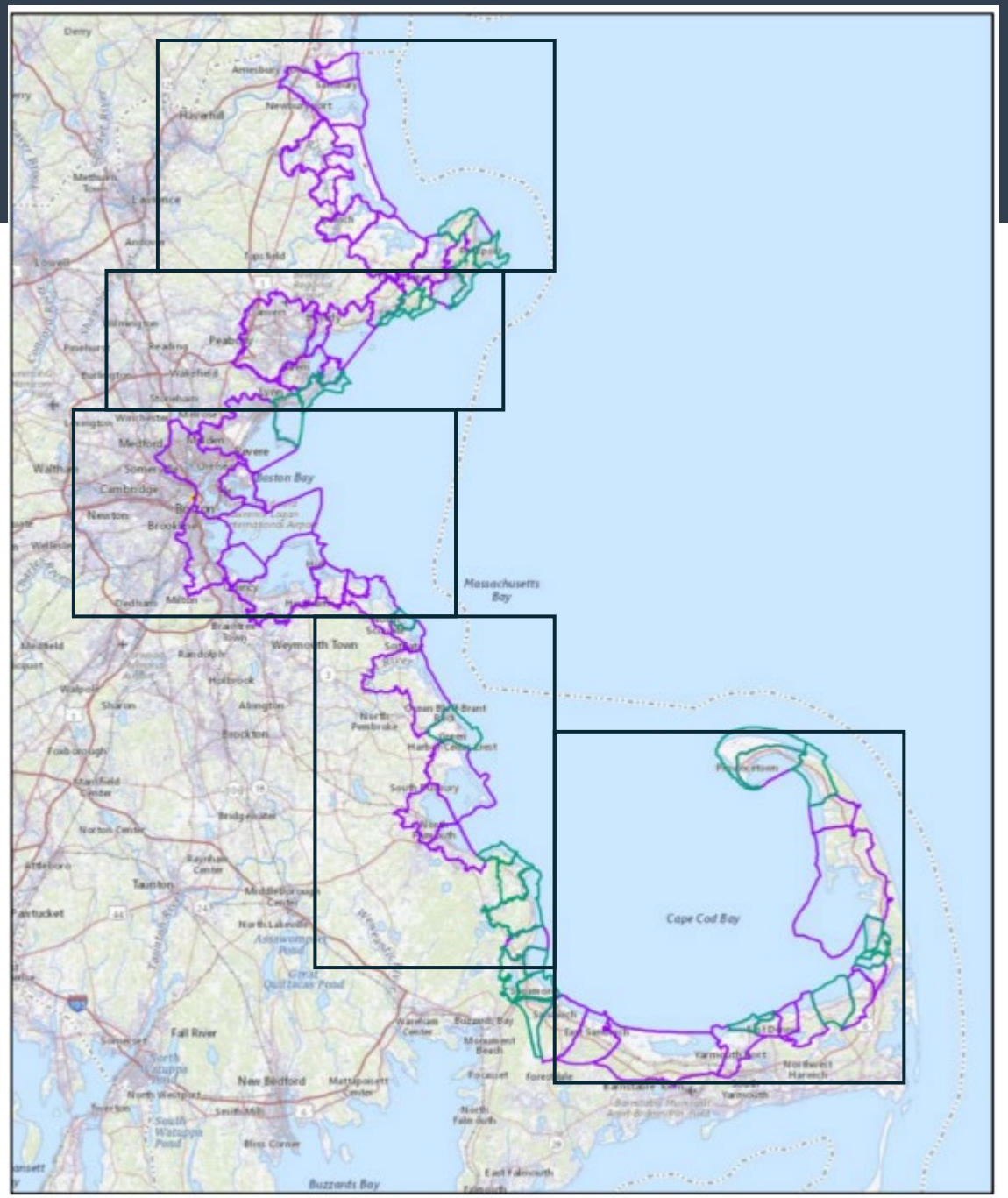
Addressing CCMP goals through monitoring

- Identify key water quality and habitat condition/ restoration challenges and priorities in 50+ communities
- Collect data to address gaps and inform decision-making
- Track progress towards CCMP goals
- State of the Bays reporting

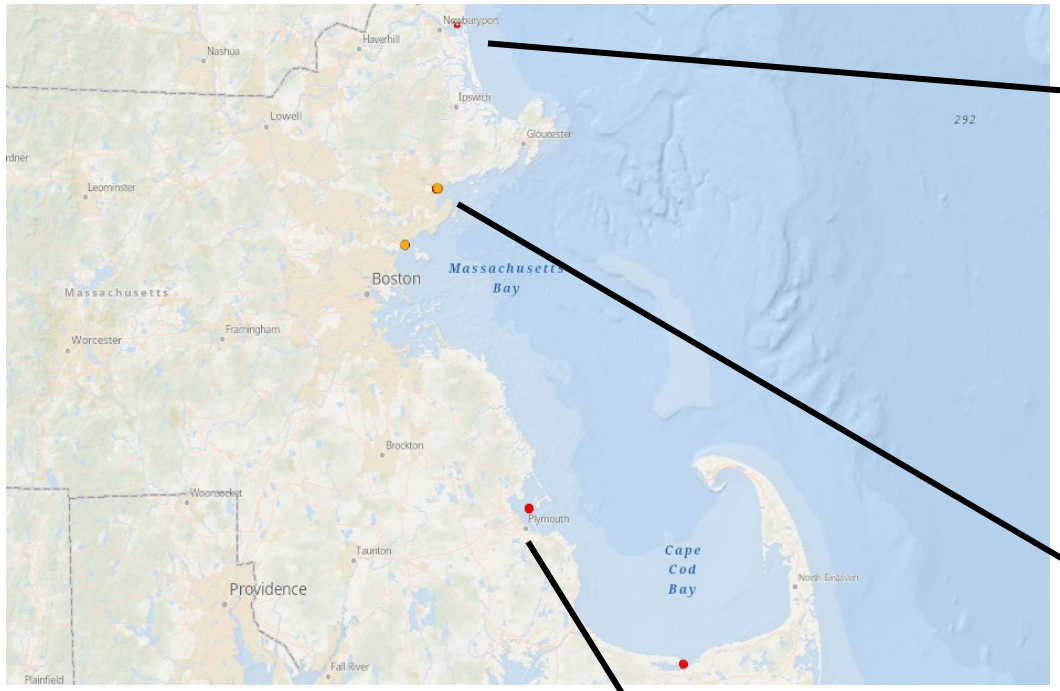


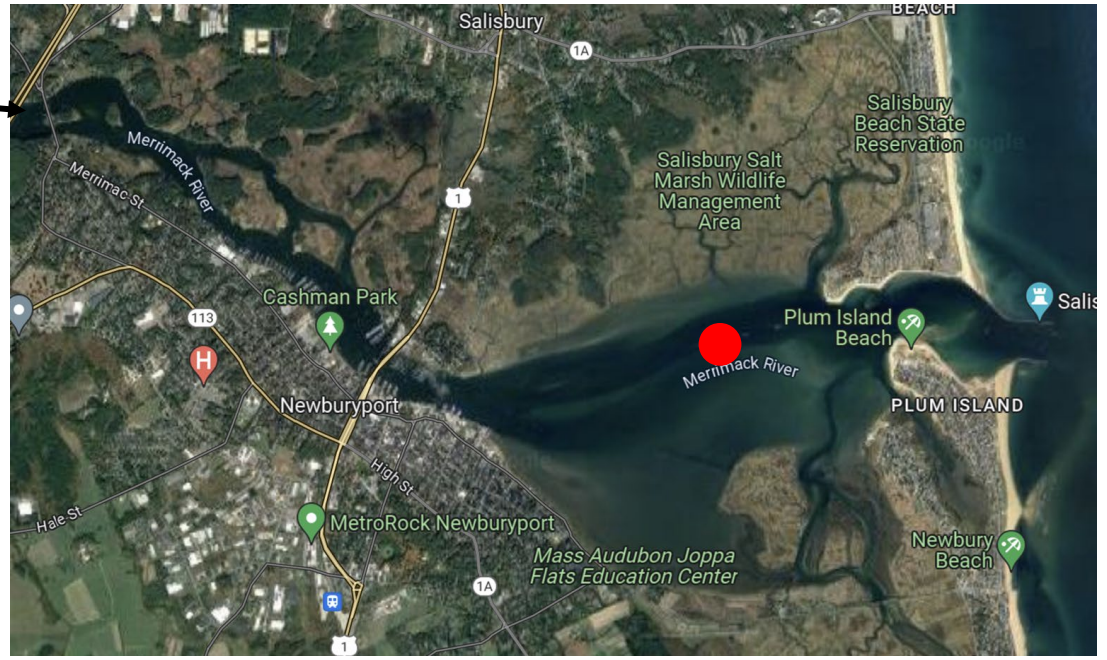
What do the people want?

- MassBays has 45 estuarine embayments with unique environmental challenges
- Questions to the five RCs - which are the top embayments with the highest priority issues that need to be addressed?
- Selected one embayment in each region
- Identified one priority question from each region that needs monitoring

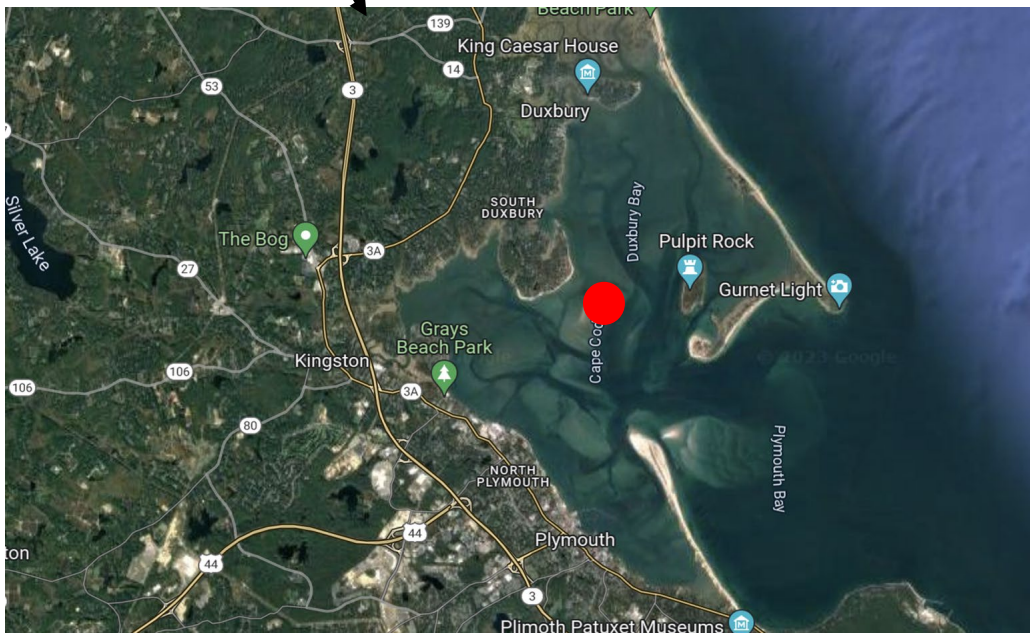


Stations for 2024/ 2025

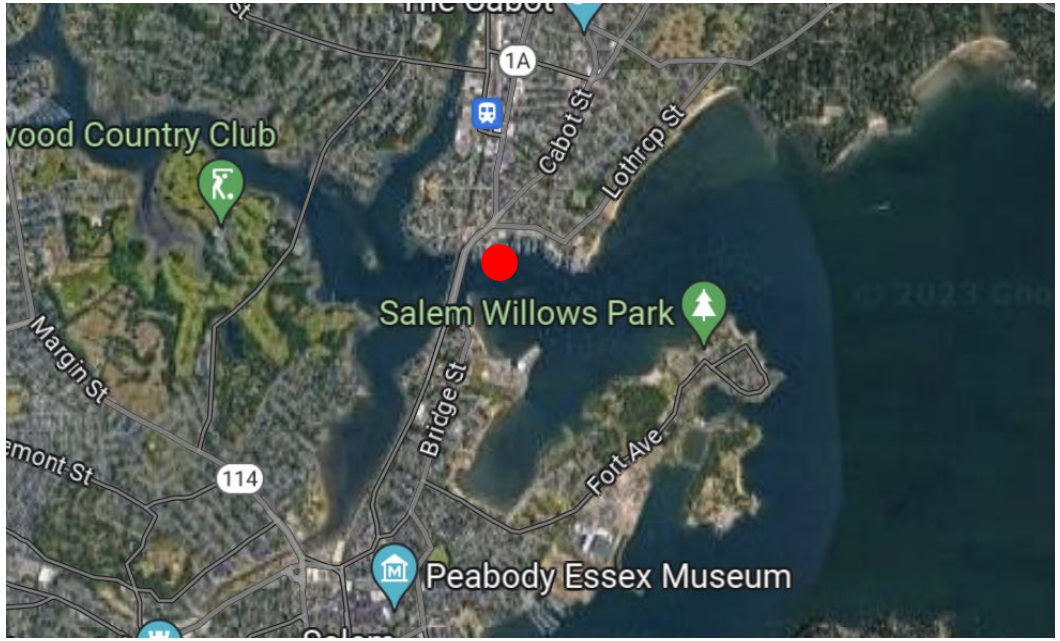




Merrimack River estuary



Duxbury-Kingston-Plymouth



Danvers River

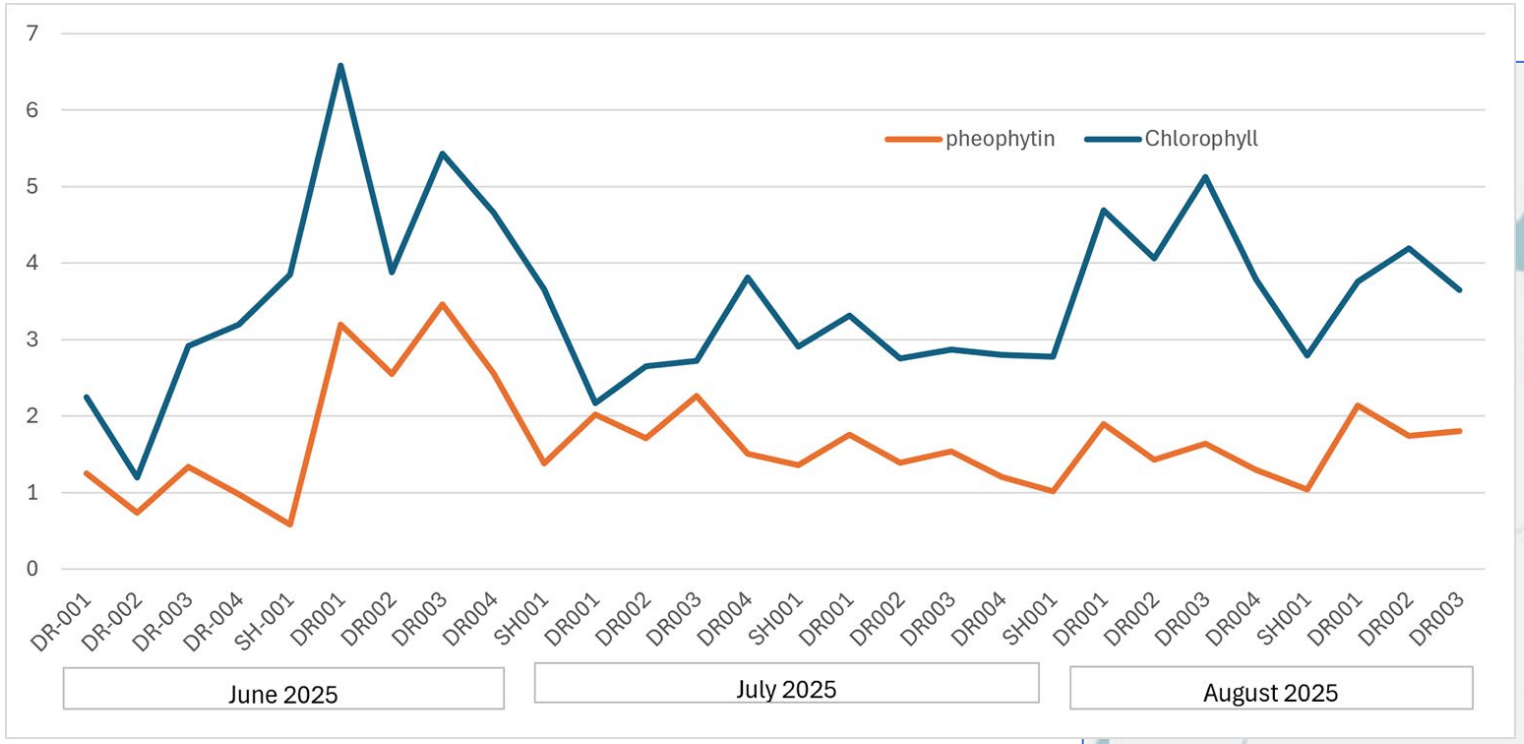
Monitoring strategy

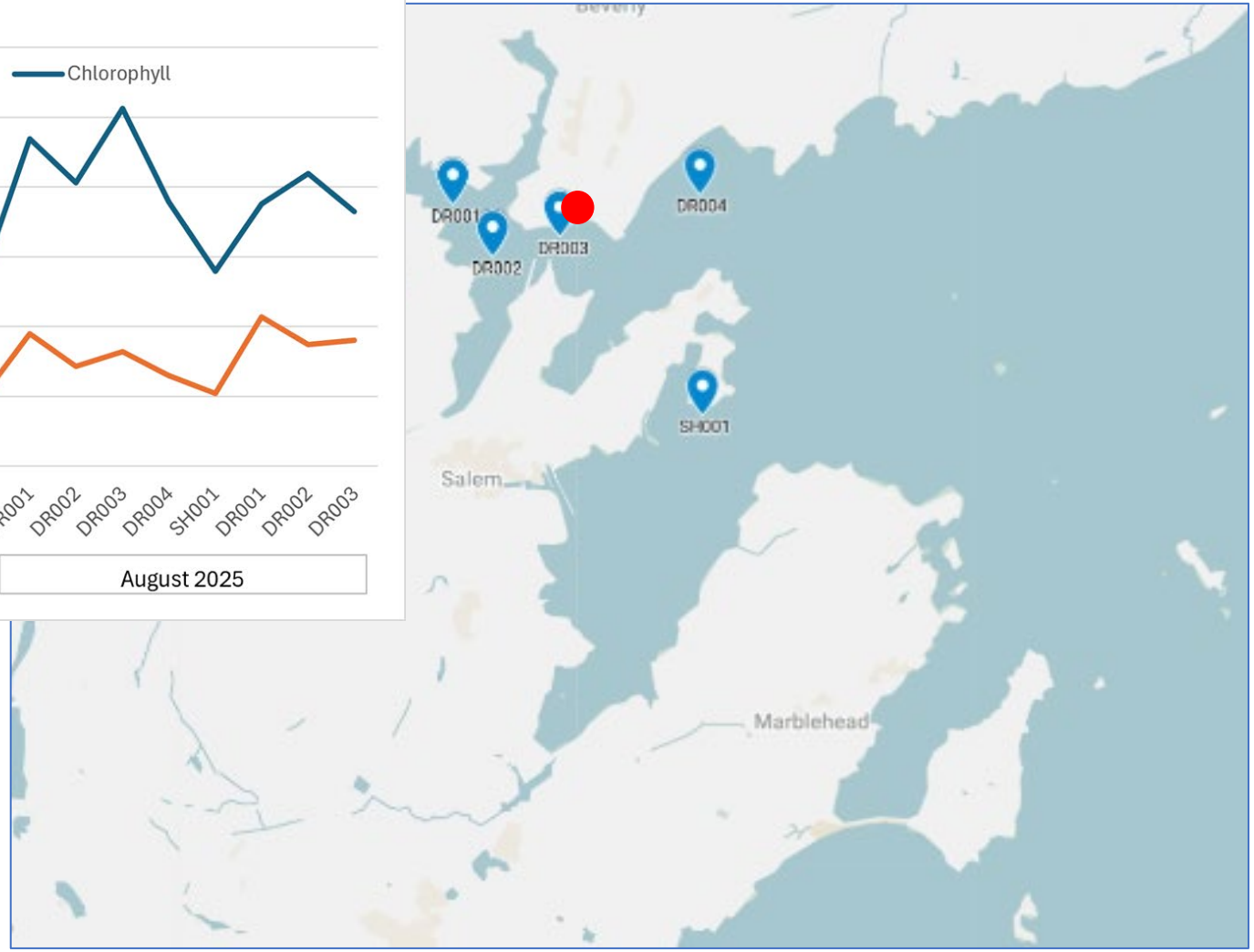
1) Sustained Estuarine **Continuous Water Quality** Array for Long-term Science (SECWQALS)

- Multisensor buoy systems (dockside, offshore)
- EXO YSI sensors and light HOBOs
- pCO_2 sensors
- Collect continuous data and transmit in real-time
- Partnered with USGS
- Funding: IIJA, NROC, EPA

Offshore USGS-MassBays buoy in the Lower Merrimack River 2025

Monitoring questions: What are characteristics of variability in water quality at the mouth of the Danvers River into Salem Sound? How are they related to river discharge, nutrient sources, shellfish habitat condition?





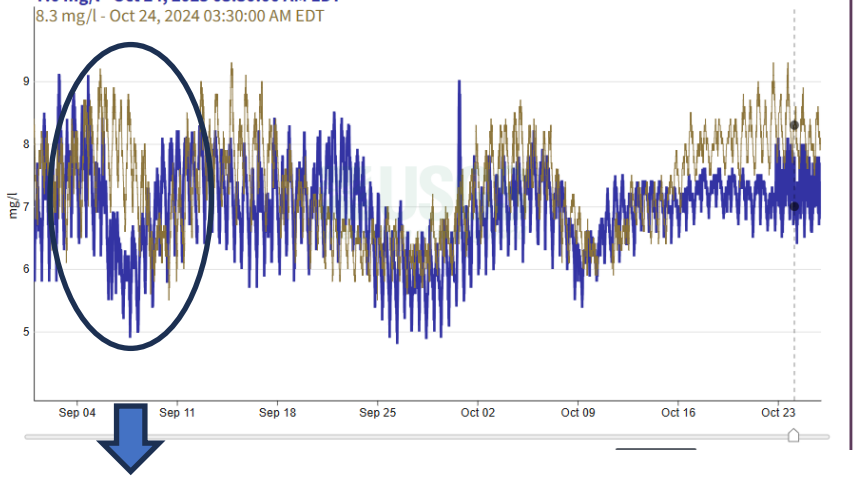
SECWQALS data (Danvers/Salem)
T, DO, pH, conductivity, turbidity, pCO2

Continuous data

Danvers River at Beverly Pier at Beverly MA - USGS-423223070531001 Subscribe to WaterAlert

- using custom time span -
September 1, 2025 - October 25, 2025
Dissolved oxygen, water, unfiltered, milligrams per liter

7.0 mg/l - Oct 24, 2025 03:30:00 AM EDT
8.3 mg/l - Oct 24, 2024 03:30:00 AM EDT

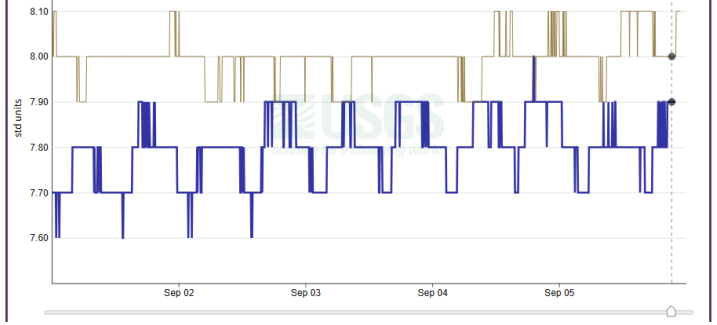


Continuous data

Danvers River at Beverly Pier at Beverly MA - USGS-423223070531001 Subscribe to WaterAlert

- using custom time span -
September 1, 2025 - September 5, 2025
pH, water, unfiltered, field, standard units

7.9 std units - Sep 05, 2025 09:20:00 PM EDT
8.0 std units - Sep 05, 2024 09:20:00 PM EDT

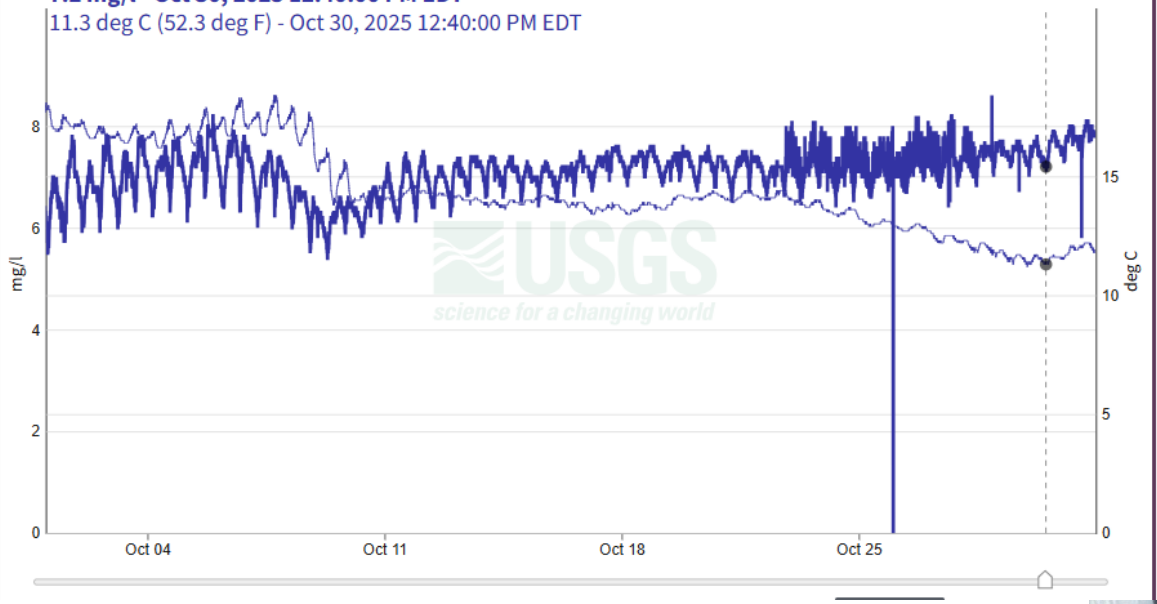


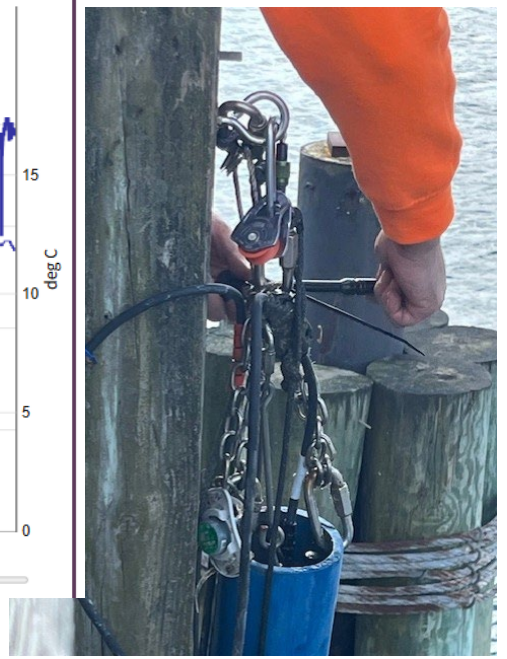
Continuous data

Danvers River at Beverly Pier at Beverly MA - USGS-423223070531001 Subscribe to WaterAlert

- using custom time span -
October 1, 2025 - October 31, 2025
Dissolved oxygen, water, unfiltered, milligrams per liter
Temperature, water, degrees Celsius

7.2 mg/l - Oct 30, 2025 12:40:00 PM EDT
11.3 deg C (52.3 deg F) - Oct 30, 2025 12:40:00 PM EDT



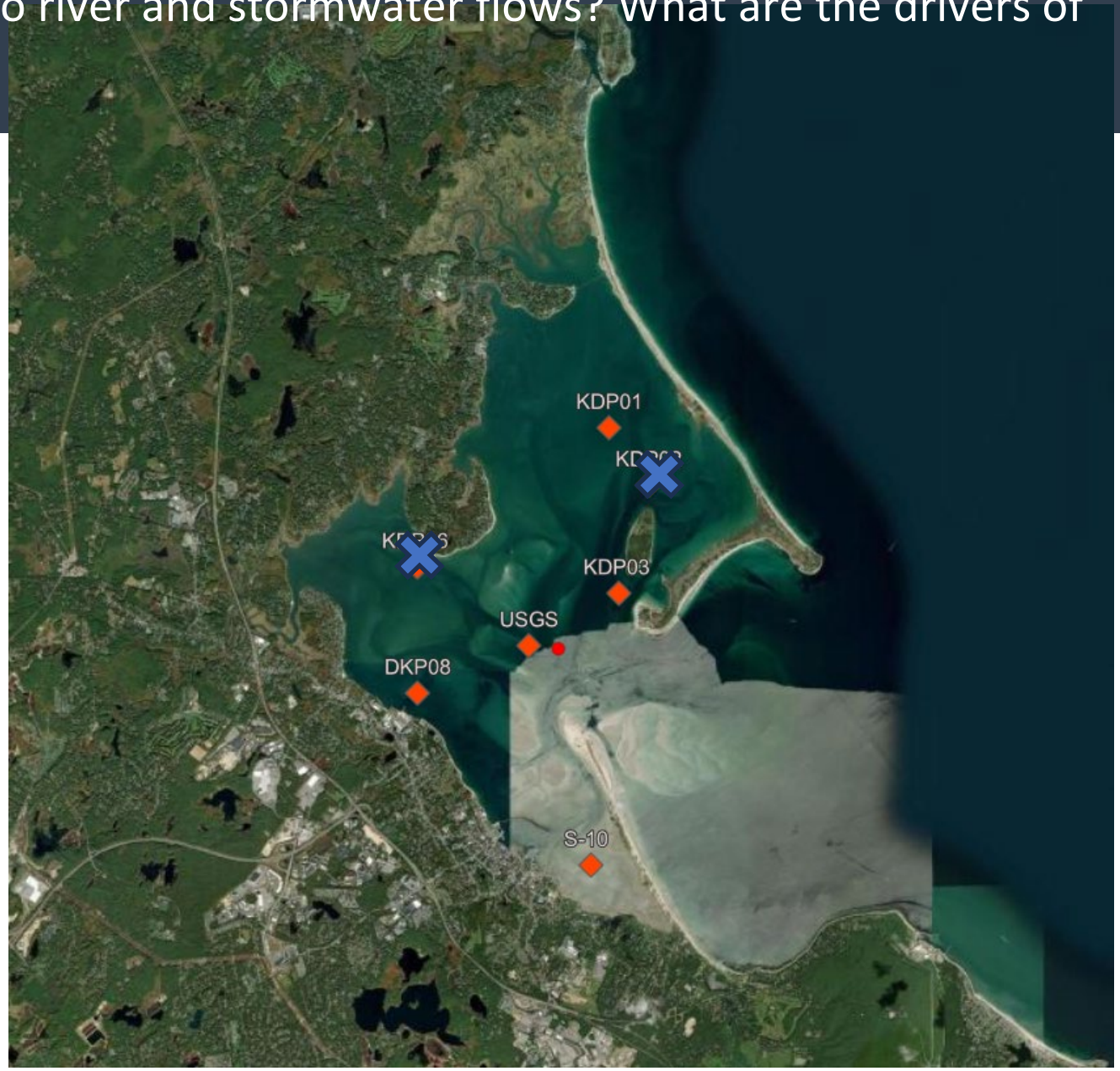


Dockside USGS-MassBays system
at the mouth of the Danvers River 2025

Monitoring questions: What are characteristics of variability in water quality in Duxbury-Kingston-Plymouth embayments? How do they relate to river and stormwater flows? What are the drivers of eelgrass loss?

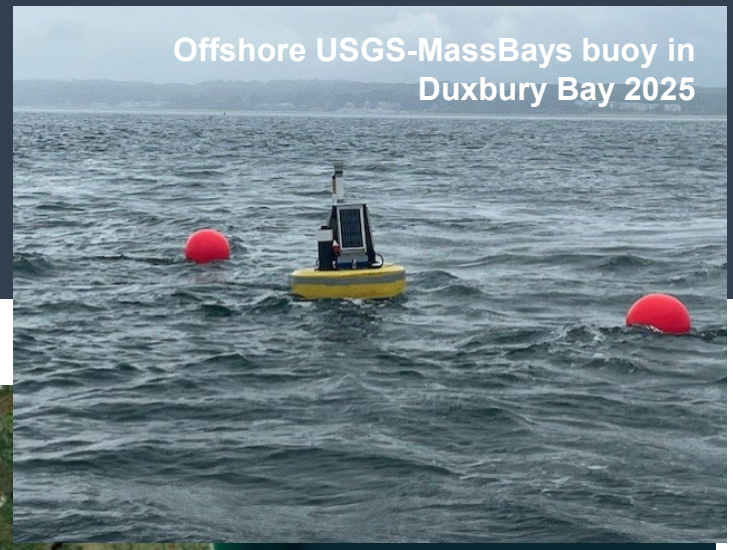
2) Grab sampling (nutrients, chl, TA, TSS)

- Stations in DKP
- Water column profiles
- Twice a month
- Outgoing tide
- Sampling team: MassBays, RC/NSRWA, Duxbury Bay Maritime School
- Lab: Center for Coastal Studies



SECWQALS data (DKP)

T, DO, pH, conductivity, turbidity, pCO2

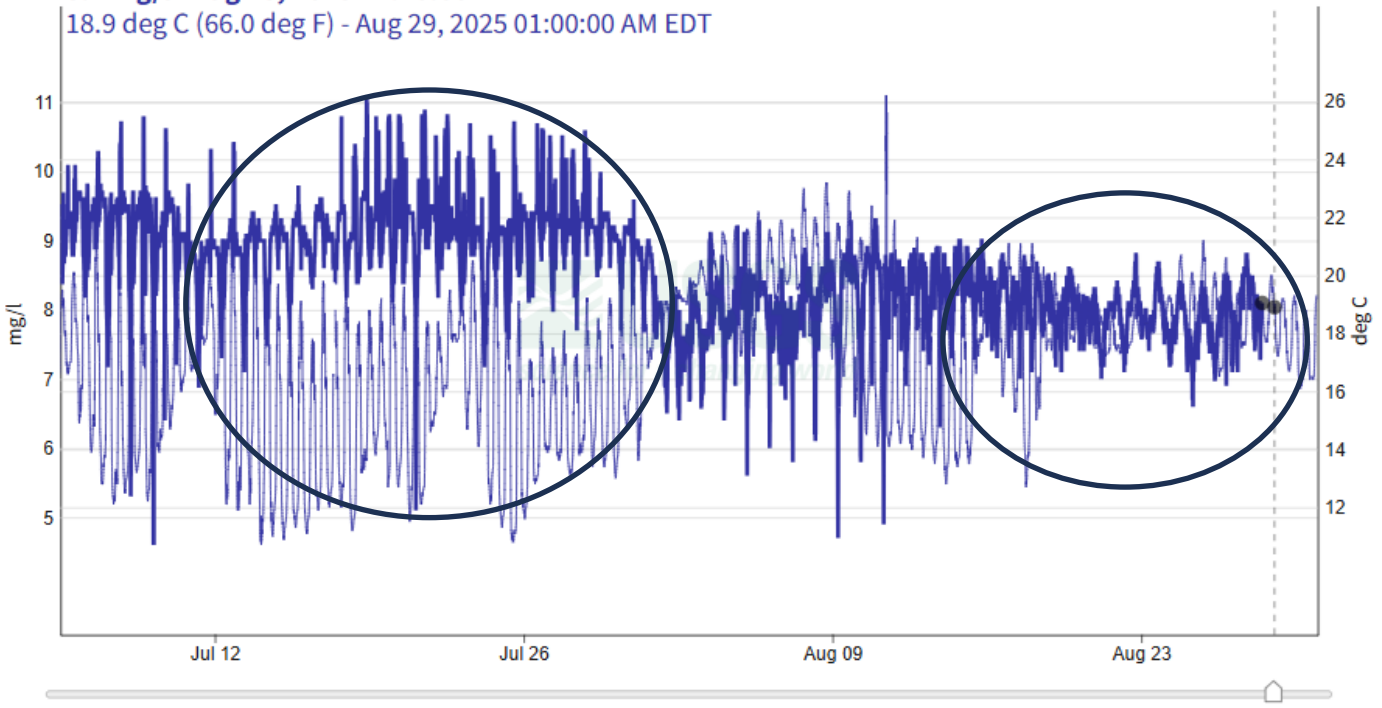


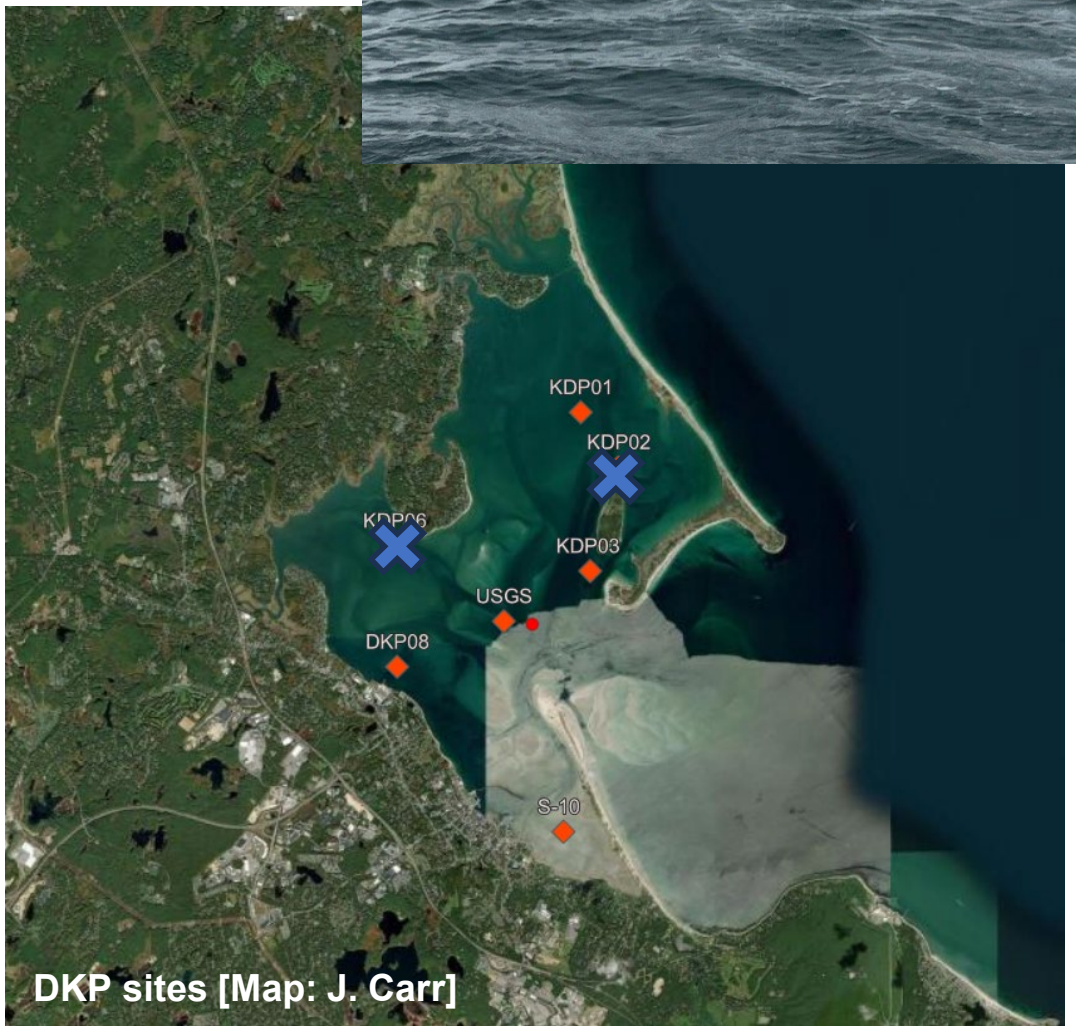
Continuous data

Kingston Bay Near South Duxbury, MA - USGS-415935070394501 Subscribe to WaterAlert

- using custom time span -
July 5, 2025 - August 30, 2025
Dissolved oxygen, water, unfiltered, milligrams per liter Bottom
Temperature, water, degrees Celsius Bottom

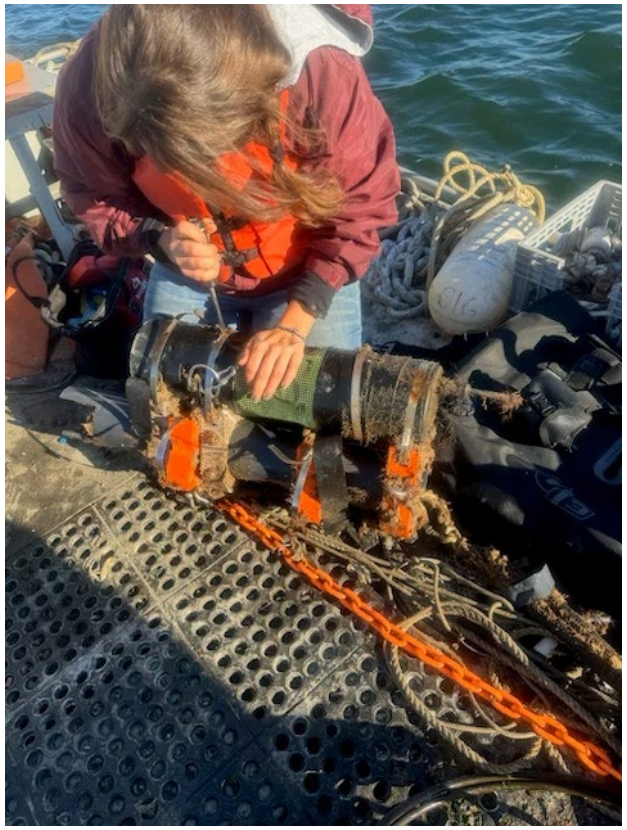
8.1 mg/l - Aug 28, 2025 11:40:00 AM EDT
18.9 deg C (66.0 deg F) - Aug 29, 2025 01:00:00 AM EDT





DKP sites [Map: J. Carr]

Some challenges and actions taken



Photos [MassBays, USGS]

Who will use the data? How and for what?

Access

- Real-time through USGS site (and MassBays site in 2026?)
- Download from WQX
- MassWateR: R-based tool for QA/QC, analysis, decision-making, and sharing with audiences.

Application

- **MassBays Ecohealth Tracking Tool** - MassBays reaches all municipalities with actionable information about coastal habitats
- Actionable information for resource managers and decision-makers to improve ecosystem health, alleviate the impacts of stressors on estuarine ecosystems, and improve the wellbeing of communities that depend on them

What comes next?

Use data to inform decision-making

- Communities act to improve water quality conditions (e.g., stormwater BMPs) which eventually allows the restoration of key estuarine habitats

Ensure the continuation of the program

- Expand to other embayments
- Refine existing program based on data collected to align with local needs

MassBays needs

- Identify sources of sustainable funding to build capacity (staff), continue monitoring, and keep supporting habitat restoration and infrastructure upgrades
- What happens when IIJA funds go away?

Questions?

Can you share your experiences, thoughts, suggestions on sustainable financial resources that we can tap into?

Data available from USGS

Merrimack: Merrimack R Estuary US of Shad Crk, Salisbury, MA - USGS Water Data for the Nation

DKP: Kingston Bay Near South Duxbury, MA - USGS Water Data for the Nation

Danvers: Danvers River at Beverly Pier at Beverly MA - USGS Water Data for the Nation