



# Unified Water Study: LIS Eelgrass Data Applications

*Peter H. Linderoth, Director of Healthy Waters and Lands*

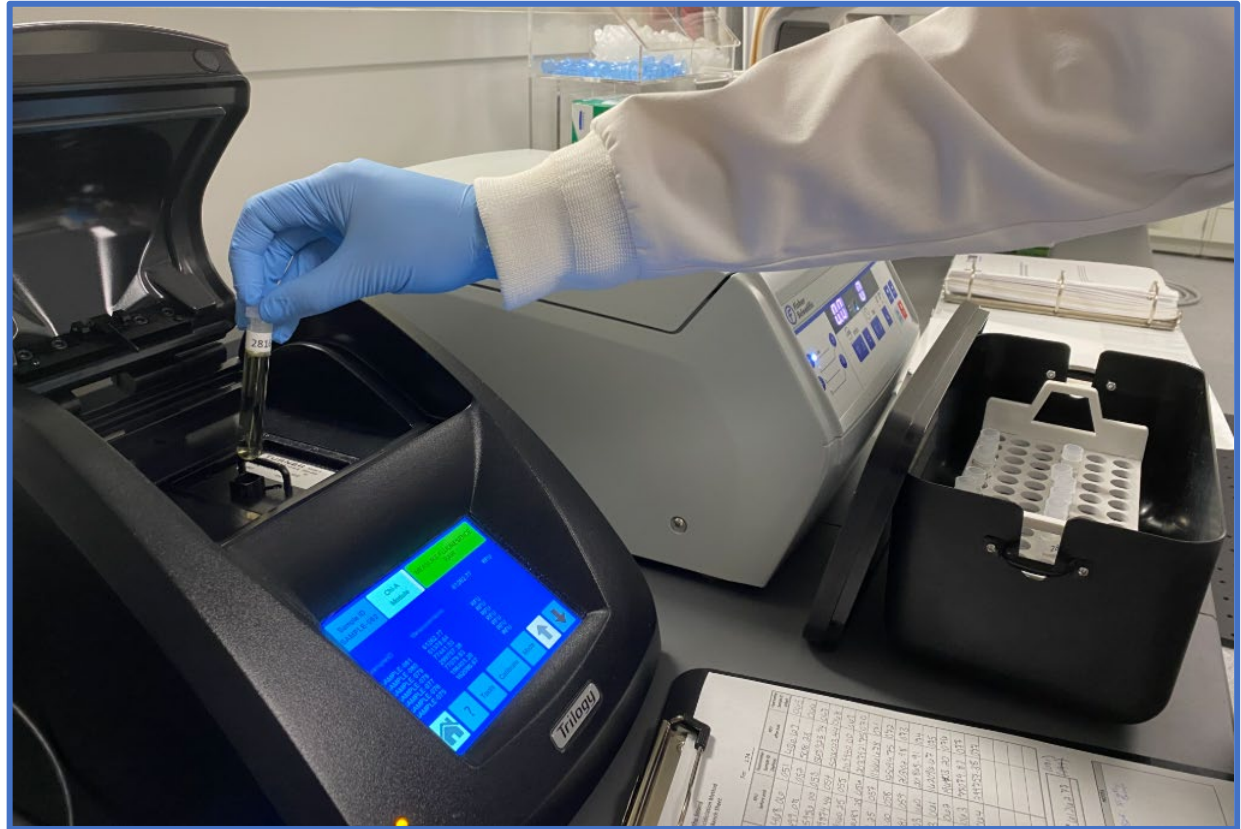


# Discussion Overview

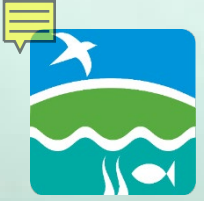
1. Unified Water Study  
& LIS Report Card

2. Potential Data  
Applications

3. Discussion



Save the Sound staff processing UWS chlorophyll  $\alpha$  samples



# Long Island Sound & Eelgrass





# Long Island Sound & Eelgrass

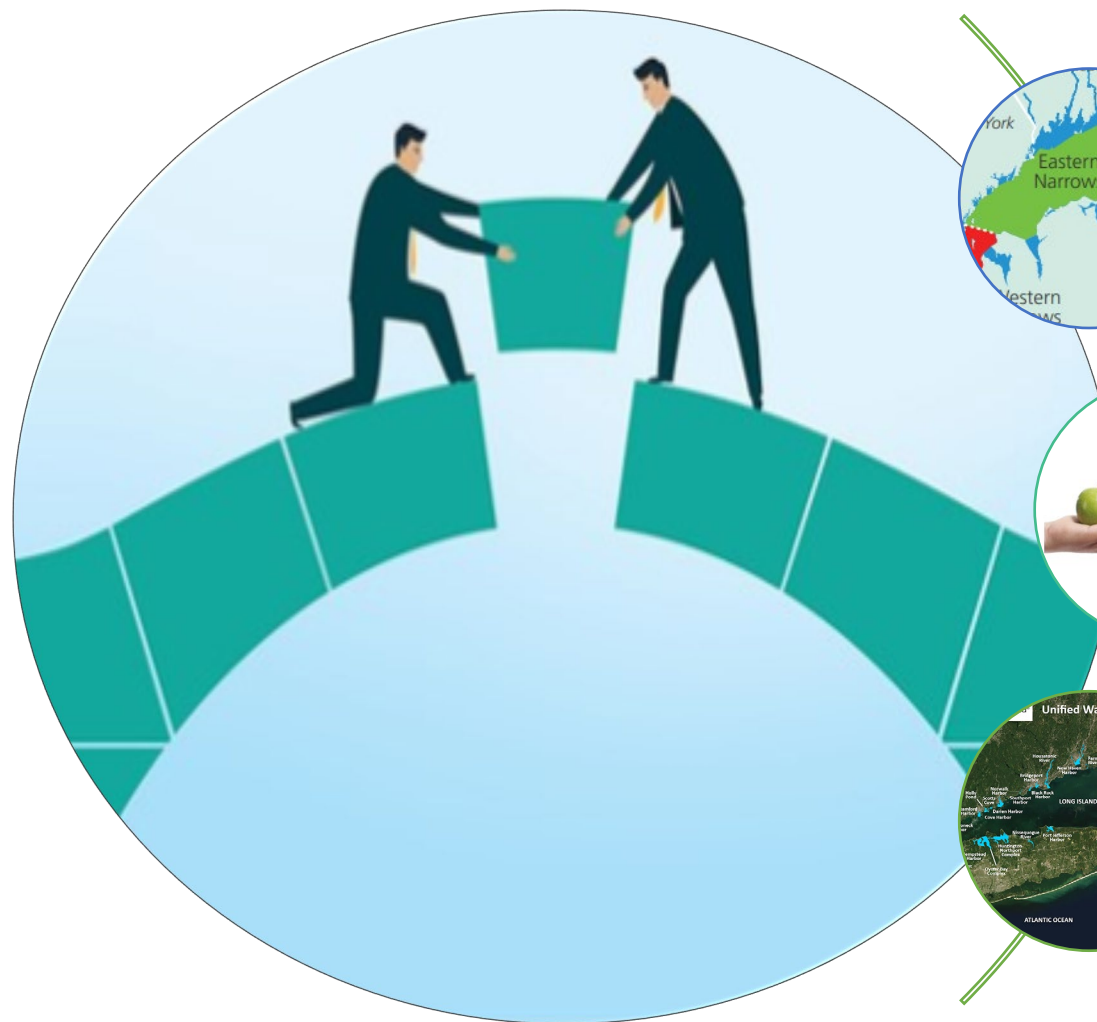


## Challenges

- ⚓ **Boating Activities**
- ⚓ **Eutrophication**
  - ⚓ **Water Clarity, Algae, pH, Excess N**
- ⚓ **Climate Change**
- ⚓ **Others....**



# Unified Water Study (UWS)



Abundance of data existed for LIS open waters, but not bays & harbors



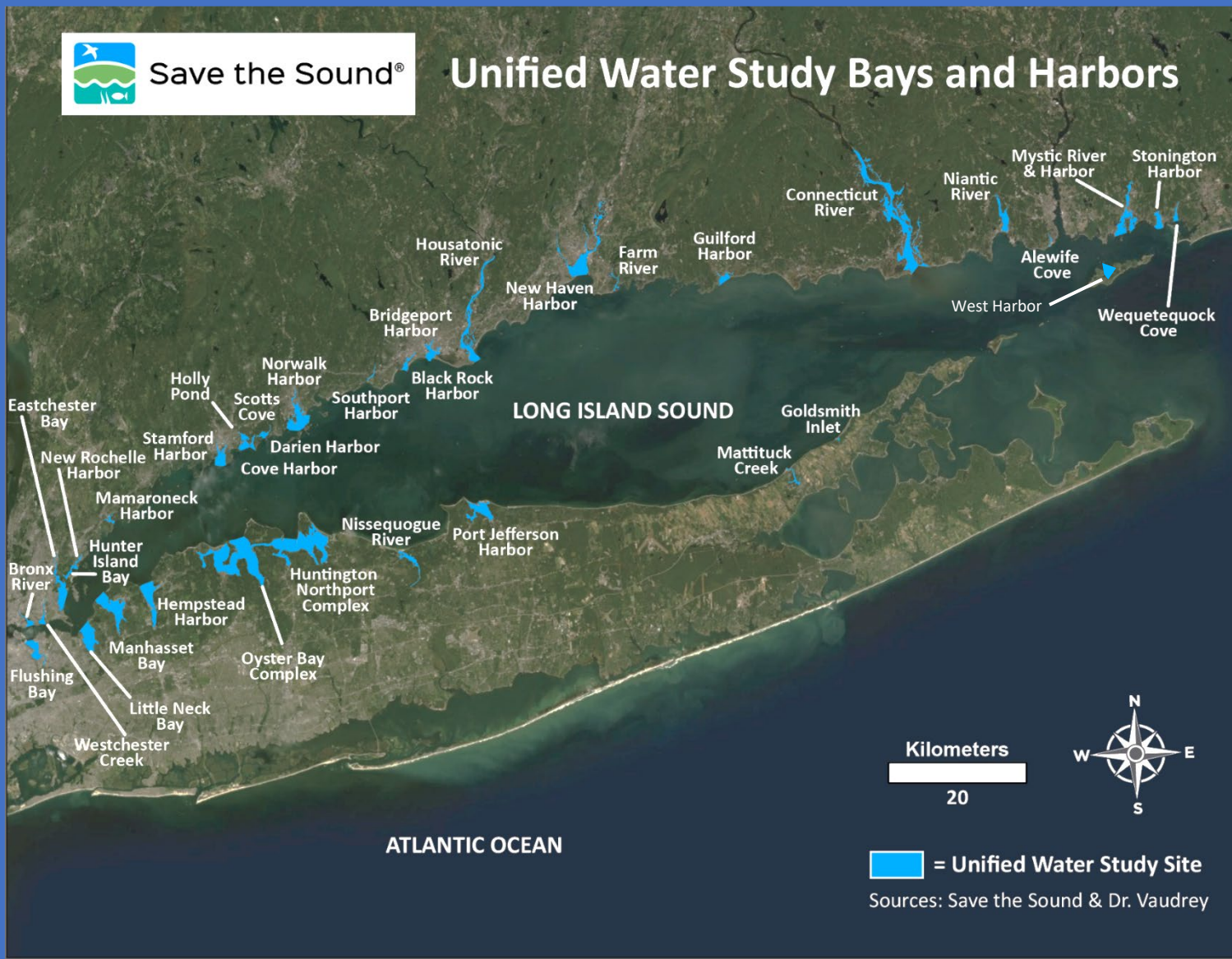
UWS provides comparable environmental health data around the margins of LIS



30 Groups monitoring in 52 embayments (2026)



# UWS Bridgeport Sites



**52** Tier I Embayments

**14** Tier II Embayments

**291** Tier I Stations

Monitored by Save the Sound	Tier I	Tier II
Eastchester Bay	X	X
Hunter Island Bay	X	
New Rochelle Harbor	X	
Mamaroneck Harbor		X



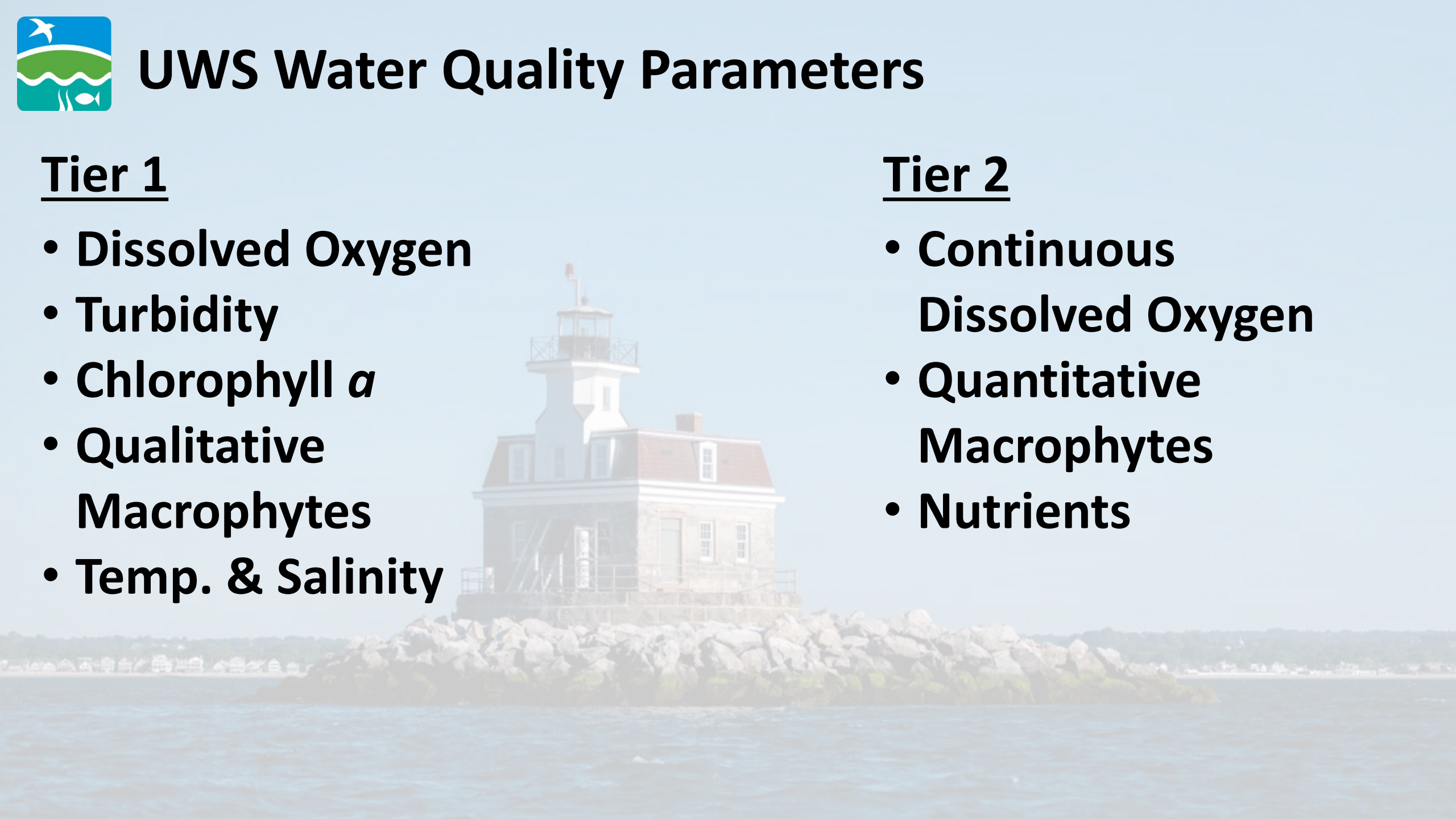
# UWS Water Quality Parameters

## Tier 1

- Dissolved Oxygen
- Turbidity
- Chlorophyll *a*
- Qualitative  
Macrophytes
- Temp. & Salinity

## Tier 2

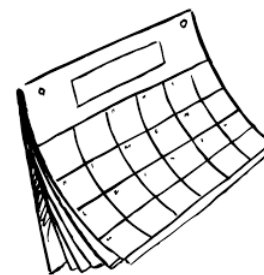
- Continuous  
Dissolved Oxygen
- Quantitative  
Macrophytes
- Nutrients





# Unified Water Study Season and QAPP

**6 Month Monitoring Season:  
May – October**

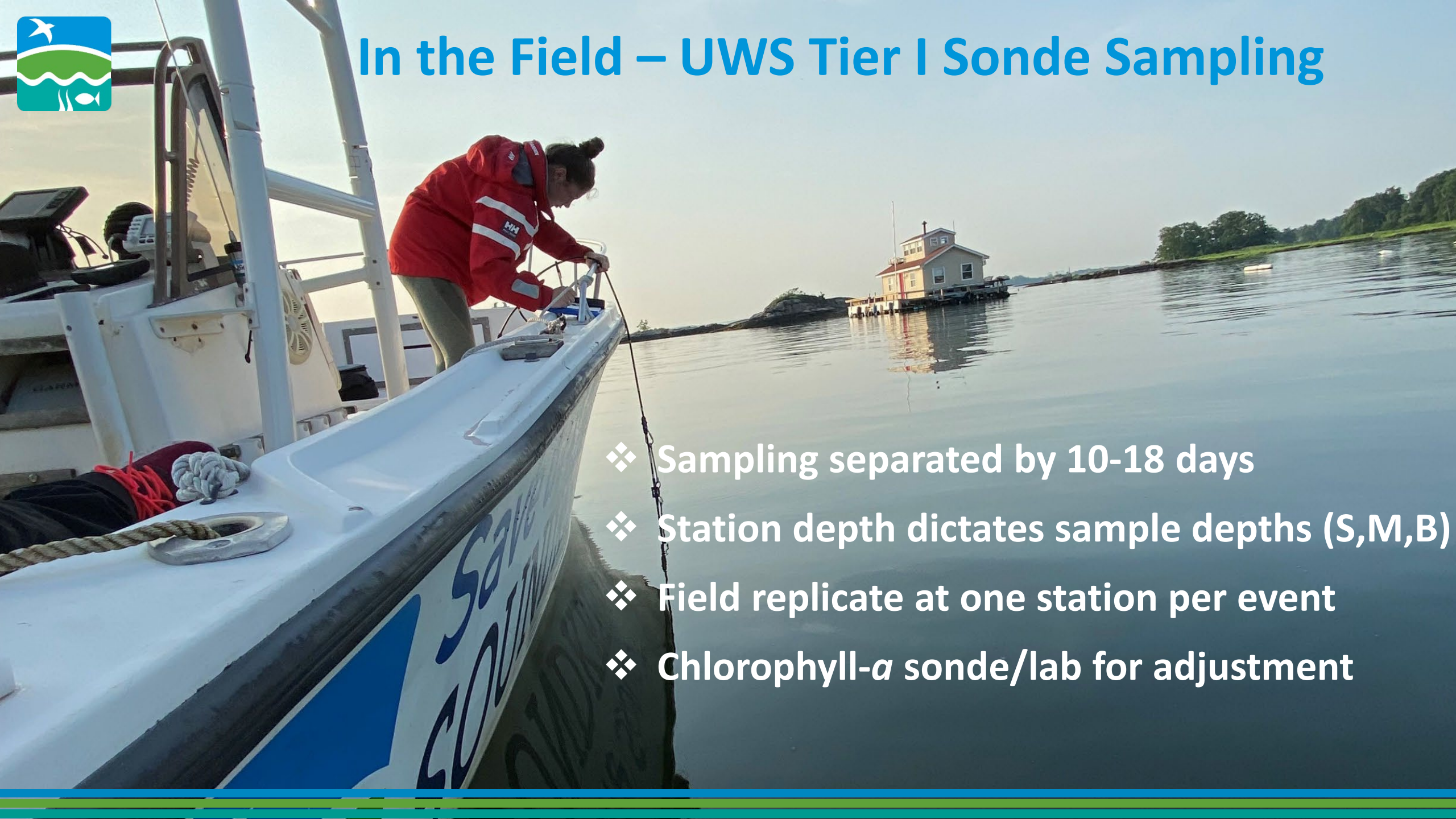


**Conducted in compliance with an EPA-  
Approved Quality Assurance Project Plan**





# In the Field – UWS Tier I Sonde Sampling

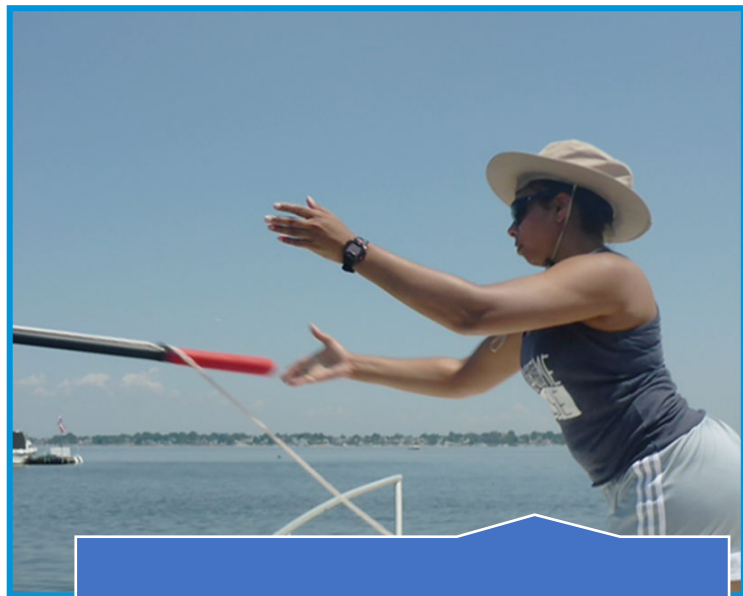


- ❖ Sampling separated by 10-18 days
- ❖ Station depth dictates sample depths (S,M,B)
- ❖ Field replicate at one station per event
- ❖ Chlorophyll- $\alpha$  sonde/lab for adjustment

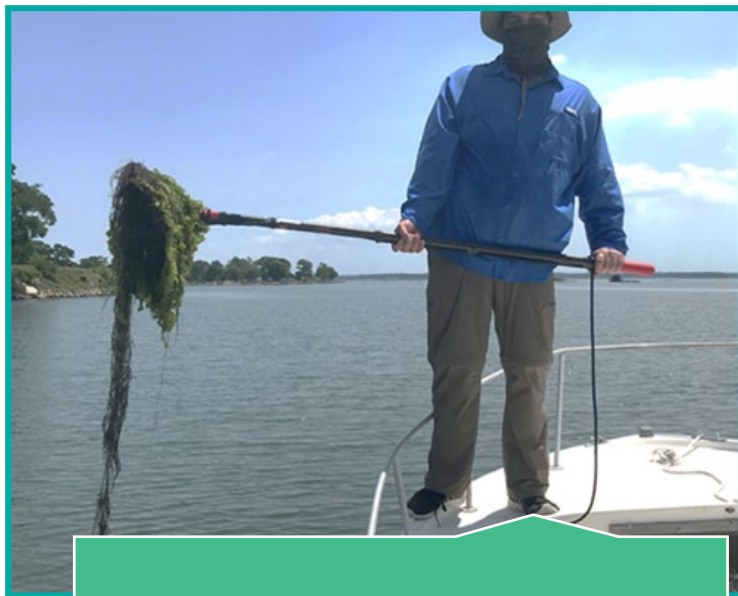


# In the Field – UWS Tier I

## Qualitative Macrophytes (None, Some, Lots)



3 Sampling Events



July 15 – August 7



3-7 stations per embayment



# UWS Tier II Nutrients

- ❖ 2400+ samples
- ❖ SEAL AQ400 Discrete Analyzer
- ❖ NYSDOH ELAP

Ammonia

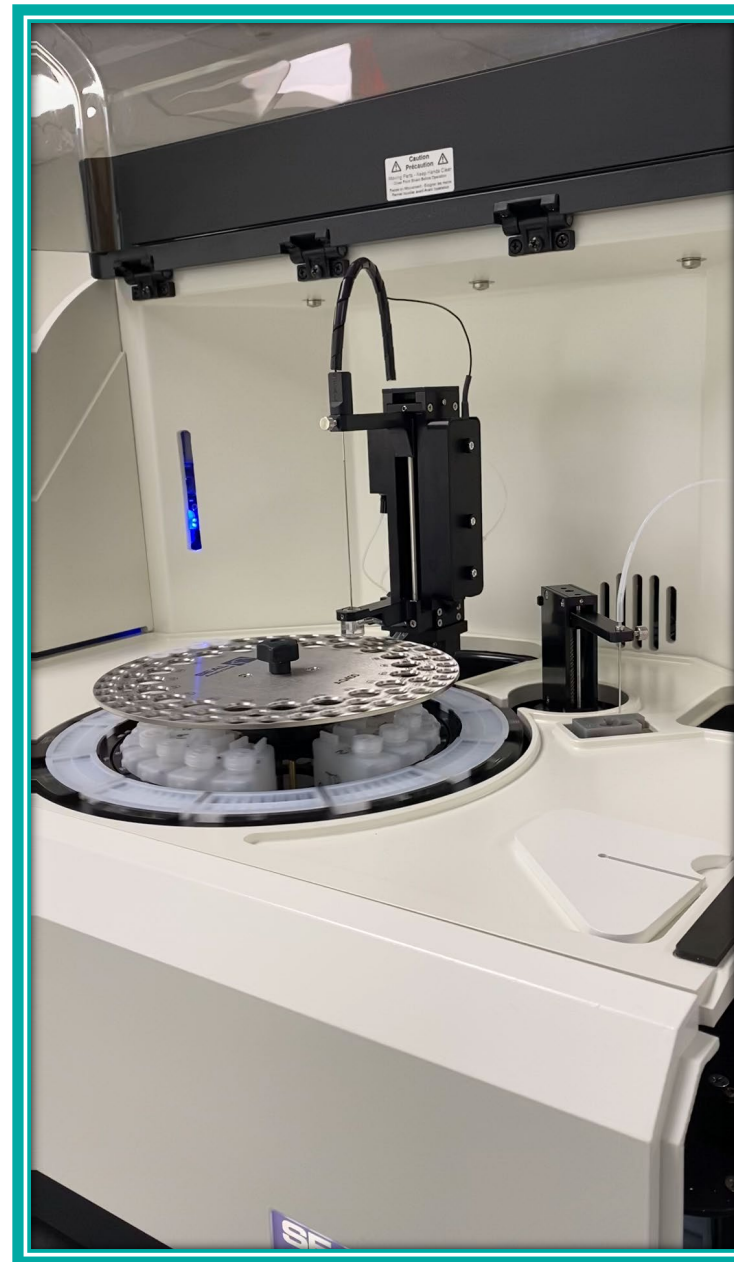
Nitrite

Nitrate-Nitrite

ortho-Phosphate

Total Nitrogen

Total Phosphorous





## In the Field – UWS Tier II

### Continuous Data Loggers

- Dissolved Oxygen
- Salinity
- Temperature
- Barometric Pressure
- Light



**May-Oct.**  
**One station per segment**  
**0.5 meters off bottom**





## In the Field – UWS Tier II



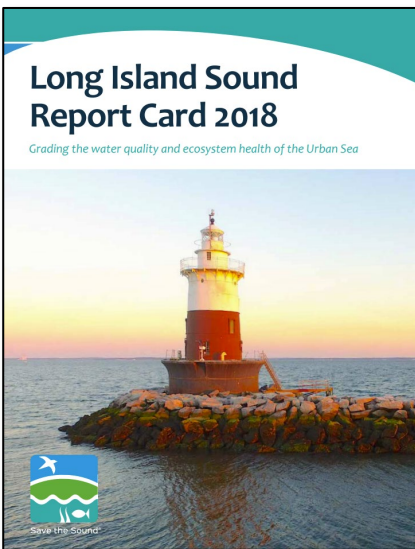
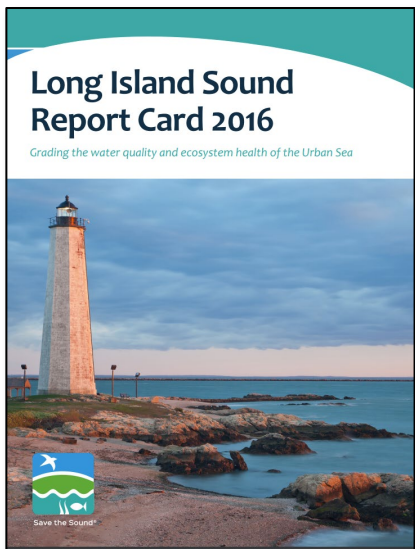
Quantitative Macrophytes

Completed once per season, per embayment

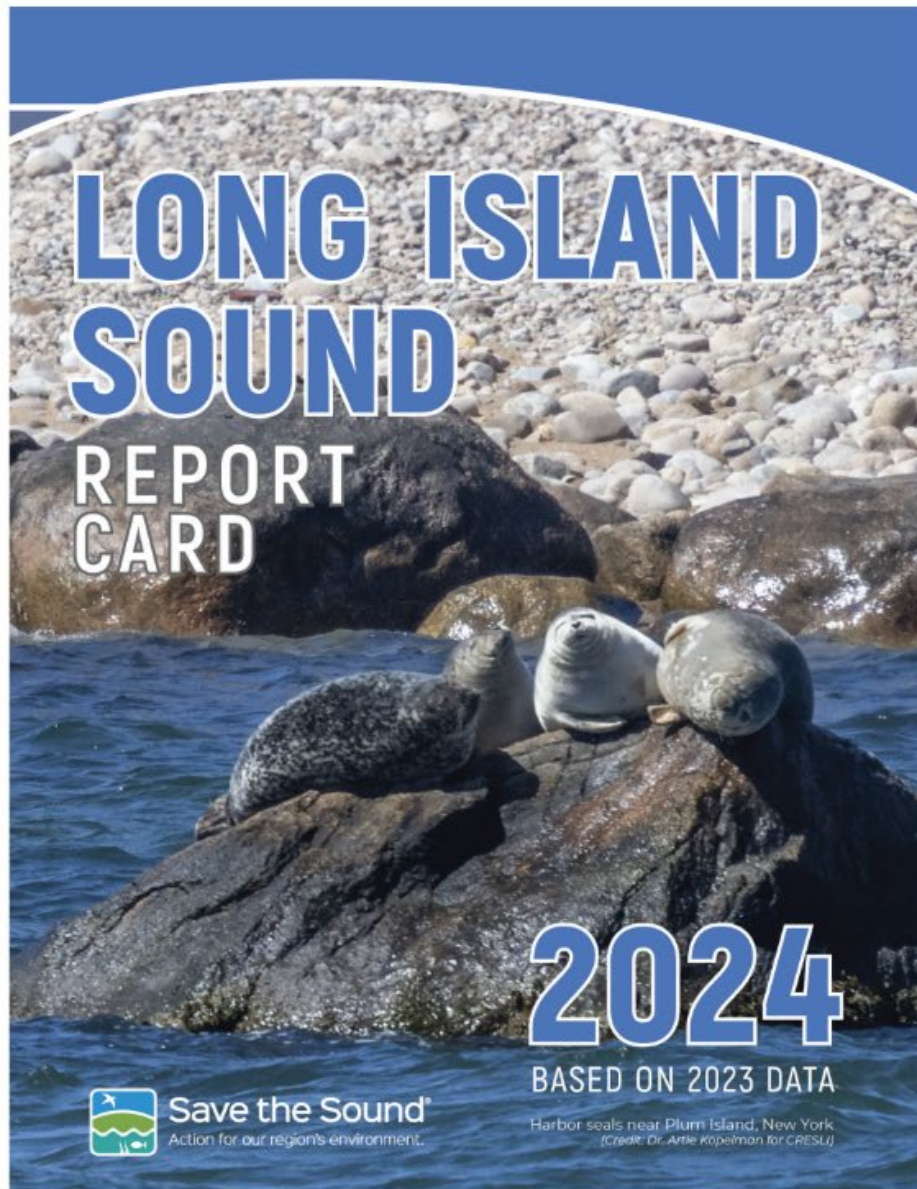
Water quality and rake toss stations



# Long Island Sound Report Card



# 2024 Long Island Sound Report Card



## Data Provided By

CT Dept. of Energy & Environmental Protection  
NYC Dept. of Environmental Protection  
Interstate Environmental Commission

## Unified Water Study Partners

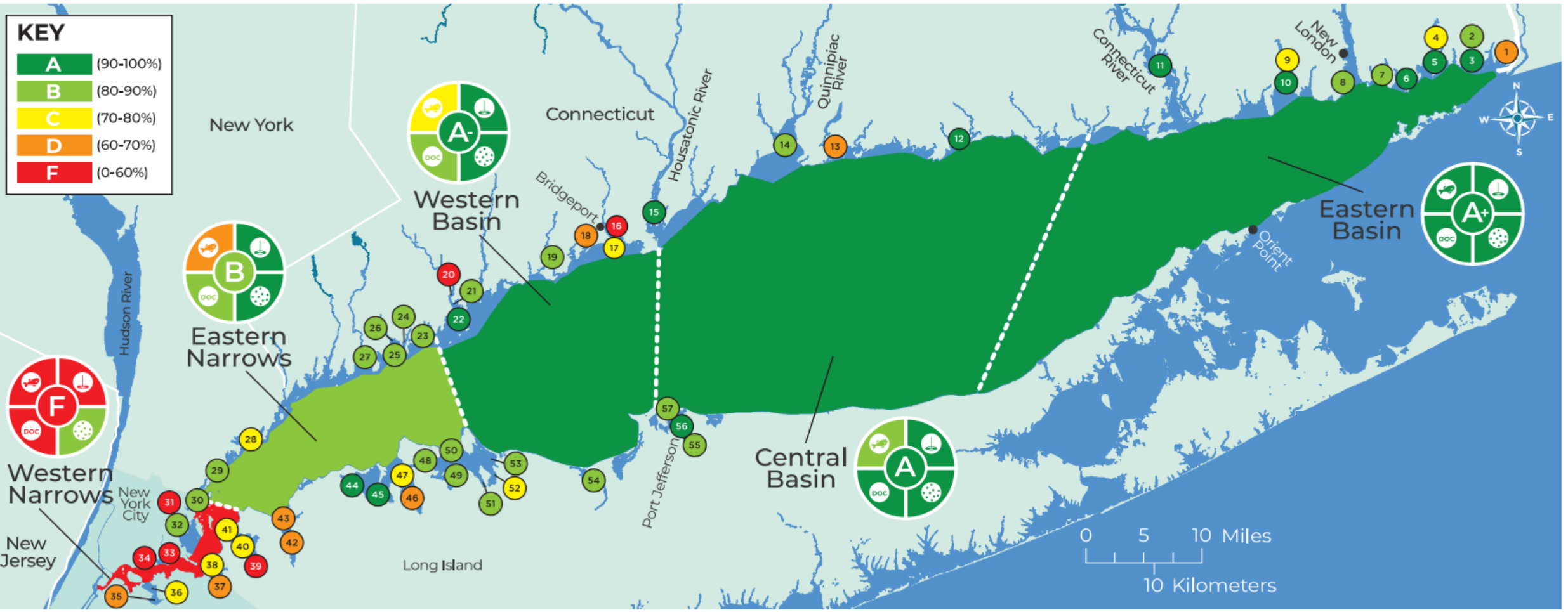
Ash Creek Conservation Association  
Bridgeport Regional Aquaculture Science and  
Technology Education Center  
Bronx River Alliance  
Clean Up Sound and Harbors  
Coalition to Save Hempstead Harbor  
Connecticut River Conservancy  
Cornell Cooperative Extension  
of Suffolk County Marine Program  
East Basin Enterprises, LLC  
East River Watershed Research Institute  
Friends of the Bay  
Friends of the Farm River Estuary  
Guardians of Flushing Bay  
Harbor Watch  
Interstate Environmental Commission  
The Maritime Aquarium at Norwalk  
New England Science & Sailing Foundation  
Project Oceanology  
River Advocates of South Central Connecticut  
Salonga Wetland Advocates Network  
Save the River — Save the Hills  
Save the Sound  
Setauket Harbor Task Force  
SoundWaters  
SUNY Maritime  
Town of Darien  
Town of Fairfield Conservation Department  
Town of Stratford Conservation Department

# 2024 Long Island Sound Grades



Save the Sound<sup>®</sup>  
Action for our region's environment.

KEY	
A	(90-100%)
B	(80-90%)
C	(70-80%)
D	(60-70%)
F	(0-60%)



A B C D F N/A

LEARN ABOUT GRADES

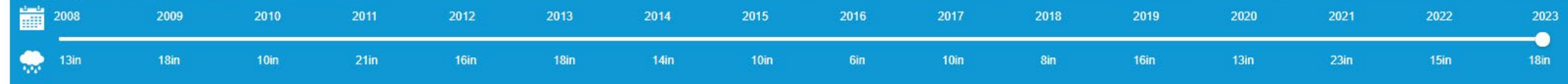
Search...

INDICATORS

- Overall Health Index
- DOC Dissolved Organic Carbon
- Dissolved Oxygen
- Water Clarity
- Chlorophyll a
- Seaweeds
- Oxygen Saturation

MAP LAYERS

REPORT POLLUTION





# Outer Norwalk Harbor

SUMMARY CHART TABLE GET HOOKED ON THE DATA



2023



Monitoring Group  
Maritime Aquarium of Norwalk



### CHALLENGES

- Climate Change
- Algae Blooms / Excess Nitrogen
- Sewer Discharges
- Stormwater Runoff

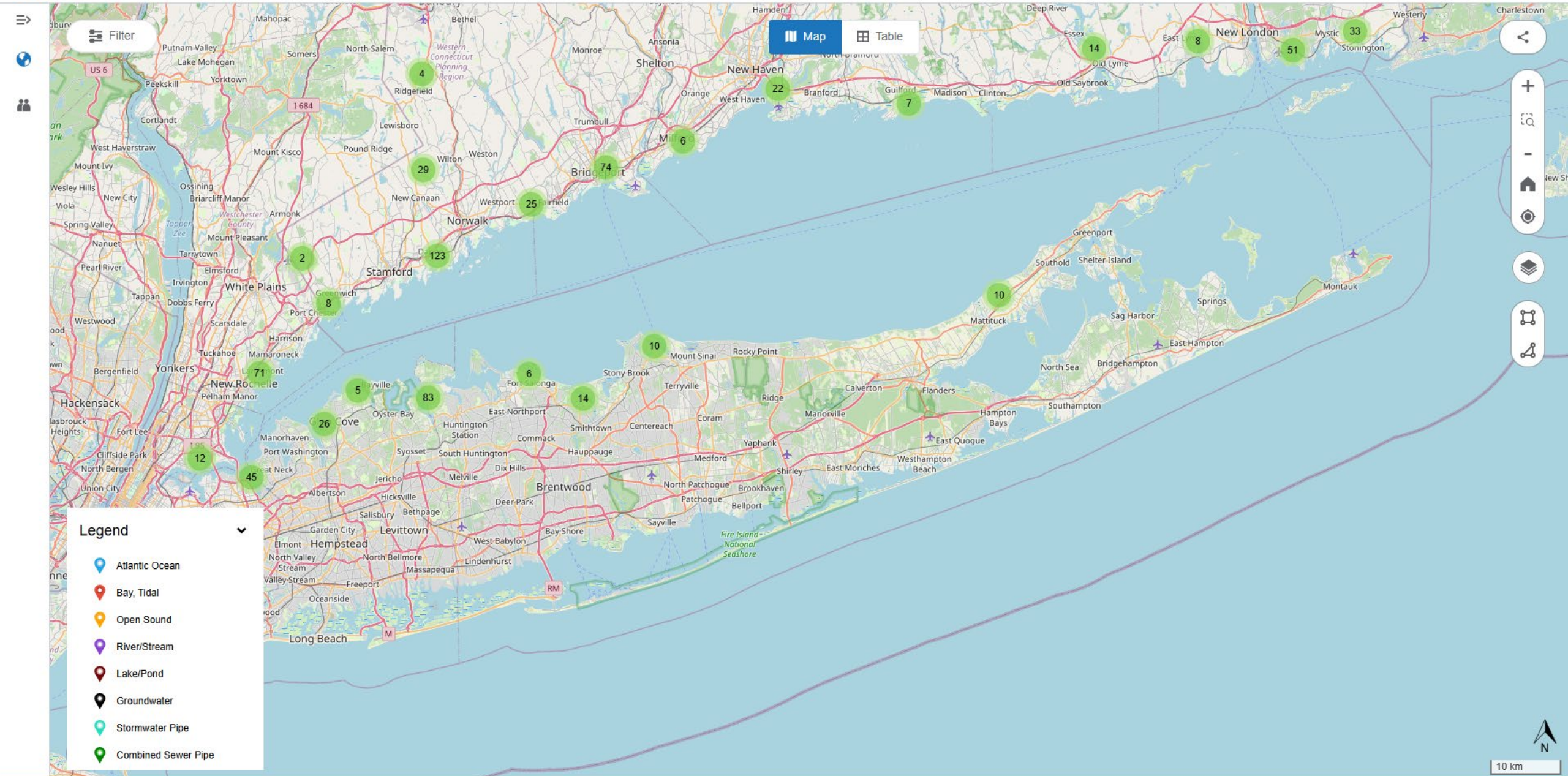
### HELP US STAY UP TO DATE

Outer Norwalk Harbor received an A- (91%), a very good grade. Seaweeds received a moderate grade while all other indicators were very good this year.

- Dissolved Oxygen
- Water Clarity
- Chlorophyll a
- Seaweeds
- Oxygen Saturation

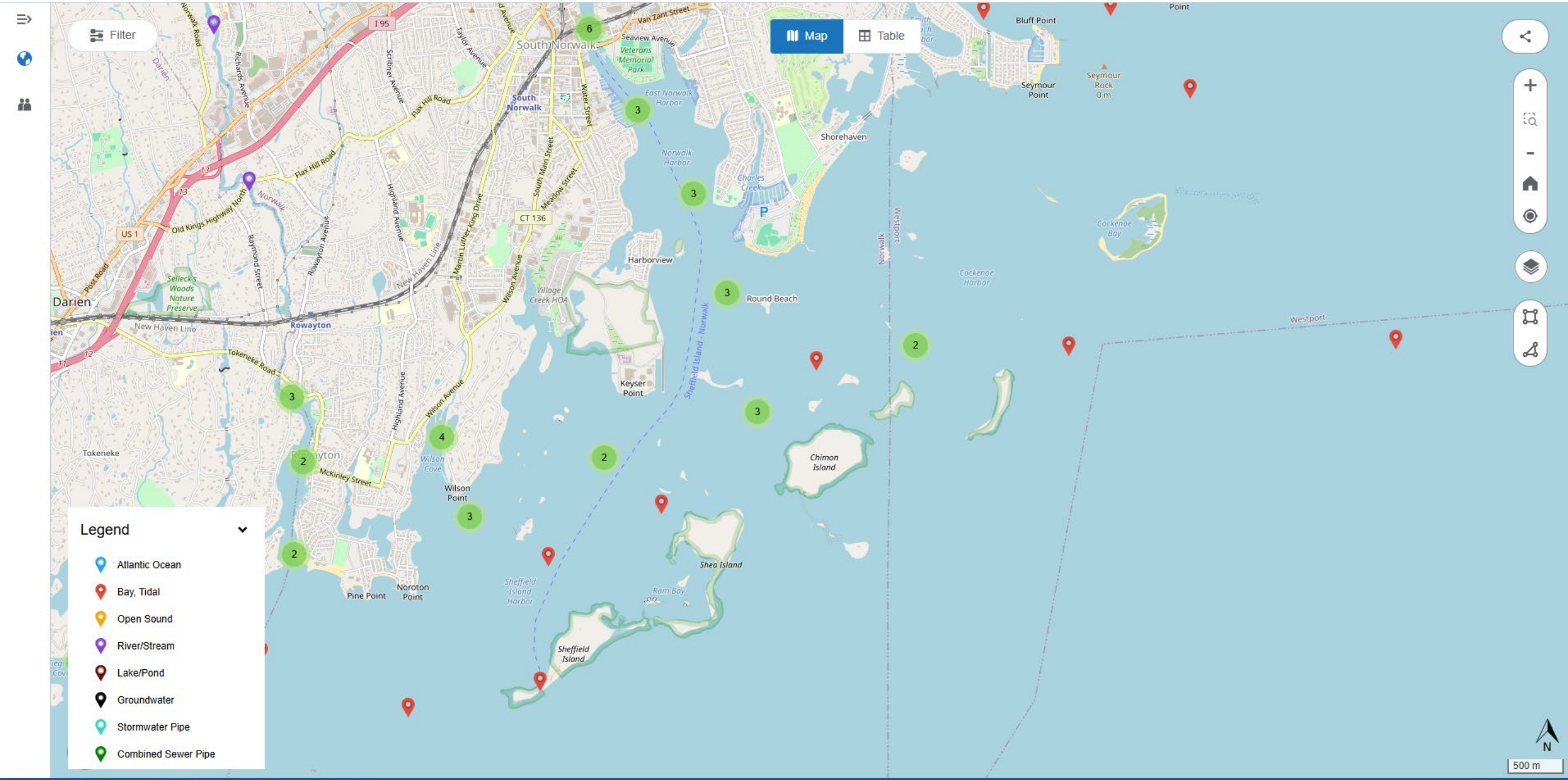


LEARN ABOUT GRADES



**Legend**

- Atlantic Ocean
- Bay, Tidal
- Open Sound
- River/Stream
- Lake/Pond
- Groundwater
- Stormwater Pipe
- Combined Sewer Pipe



Biological



✓ Chlorophyll a (probe) / Field\_SOP

Microbiological



Enterococcus / IDEXX ENTEROLERT

Nutrient



Ammonia, Filtered, field (as N) / USEPA 350.1

Nitrite, Filtered, field (as N) / USEPA 353.2

Nitrate + Nitrite, Filtered, field (as N) / USEPA 353.2

Total Phosphorus, mixed forms, Unfiltered (as P) / USEPA 365.1

Total Nitrogen, mixed forms (NH3), (NH4), organic, (NO2) and (NO3), Filtered, field (as N) / USDOI/USGS I-2650-03

Total Nitrogen, mixed forms (NH3), (NH4), organic, (NO2) and (NO3), Unfiltered (as N) / USDOI/USGS I-2650-03

Orthophosphate, Filtered, field (as P) / USEPA 365.1

Physical



Dissolved oxygen saturation / Field\_SOP

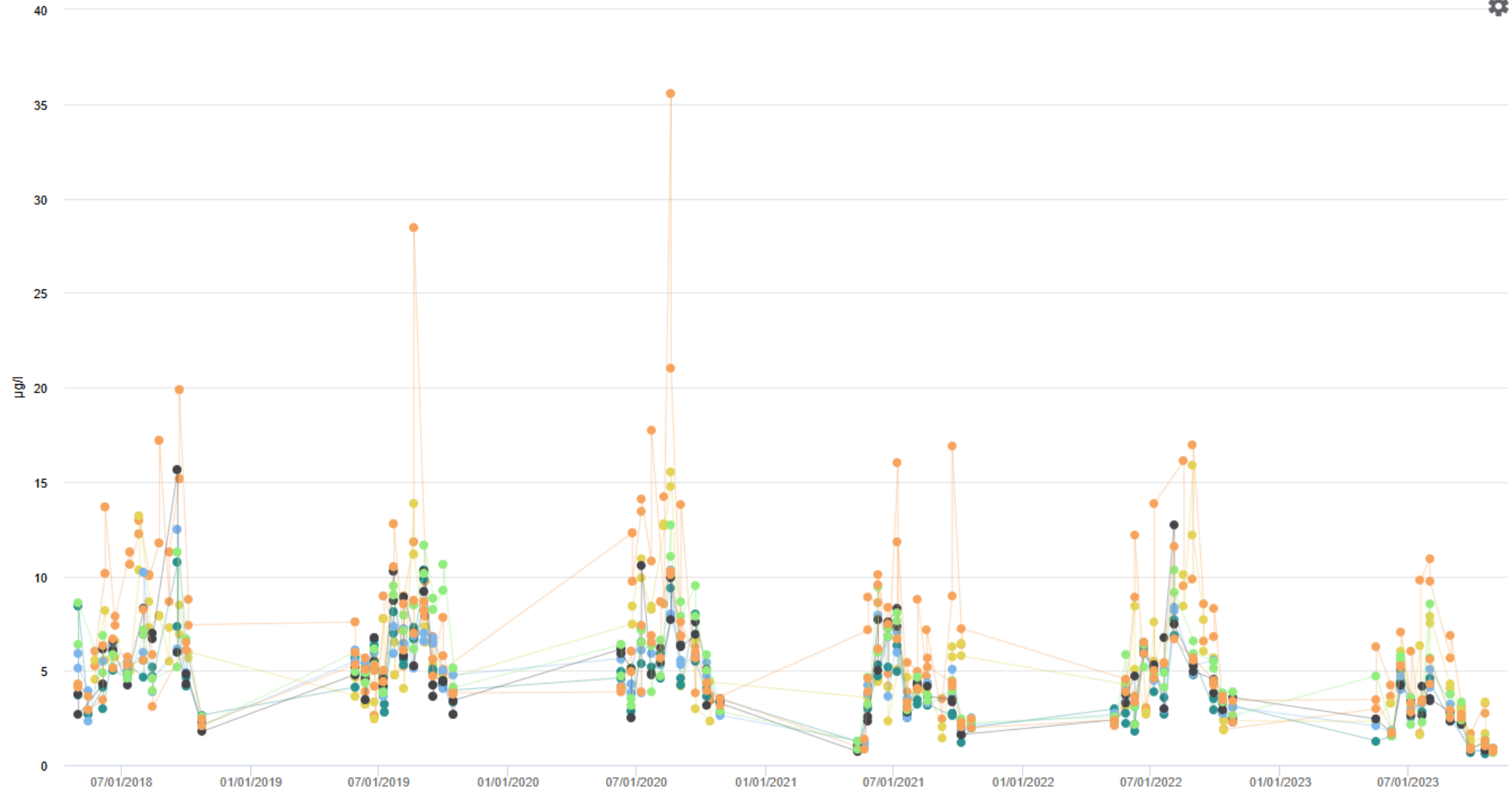
Dissolved oxygen (DO) / Field\_SOP

Salinity / Field\_SOP

Temperature, water / Field\_SOP

Turbidity / Field\_SOP

15 stations selected



- Buoy-G3 / No Data
- Norwalk-Harbor-4 / No Data
- NH-6 / No Data
- NWH-I-06 / Chlorophyll a (probe) / Sample results
- Norwalk-Harbor-5A / No Data
- NH-7 / No Data
- NWH-I-07 / Chlorophyll a (probe) / Sample results
- NWH-O-05 / Chlorophyll a (probe) / Sample results
- Buoy-G11 / No Data
- Norwalk-Harbor-5 / No Data
- NWH-O-04 / Chlorophyll a (probe) / Sample results
- NWH-O-03 / Chlorophyll a (probe) / Sample results
- NWH-O-01 / Chlorophyll a (probe) / Sample results
- NWH-O-02 / Chlorophyll a (probe) / Sample results
- NWH-LIS / No Data



Biological



✓ Chlorophyll a (probe) / Field\_SOP

Microbiological



Enterococcus / IDEXX ENTEROLERT

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Physical



Dissolved oxygen saturation / Field\_SOP

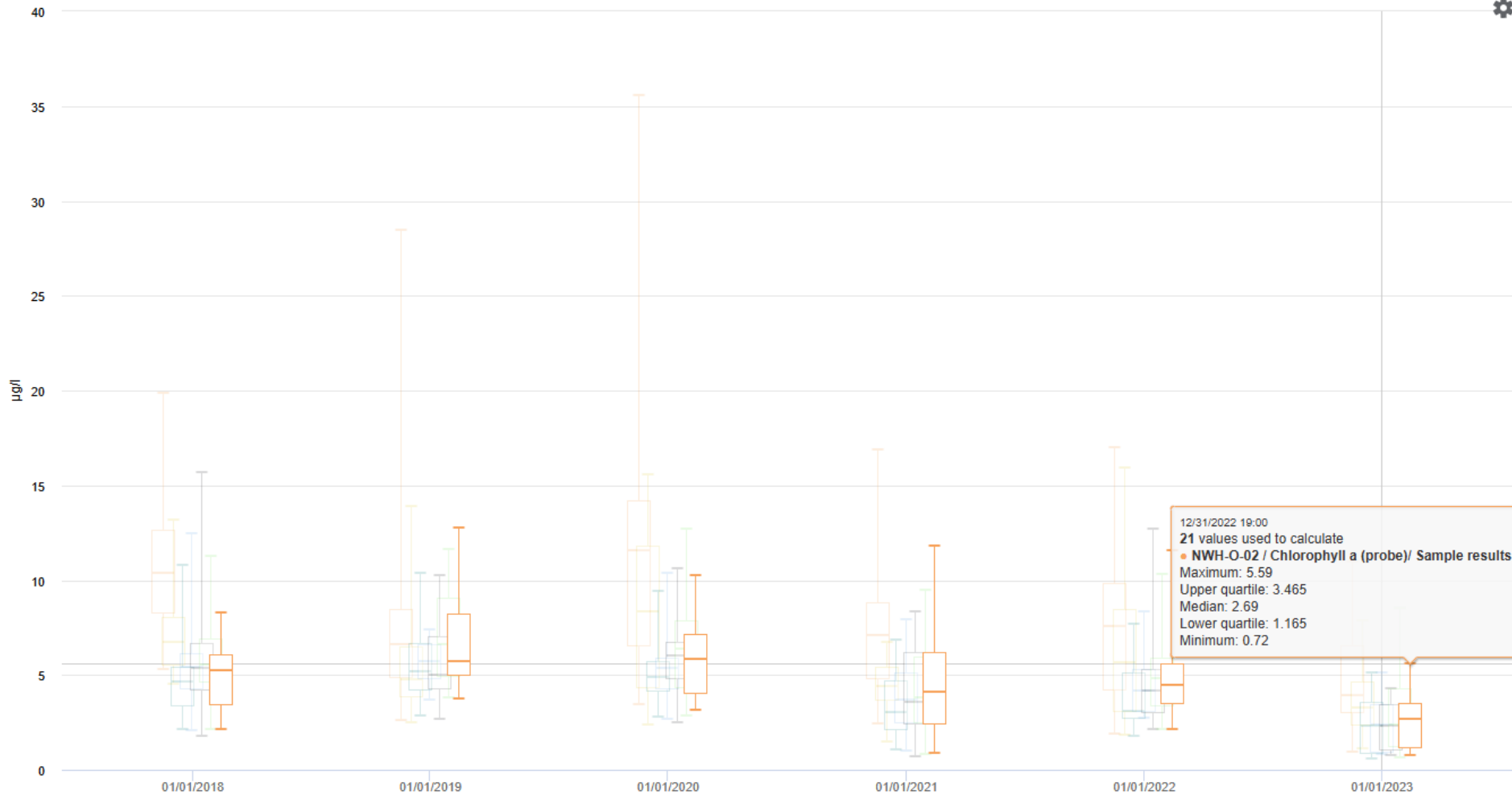
Dissolved oxygen (DO) / Field\_SOP

Salinity / Field\_SOP

Temperature, water / Field\_SOP

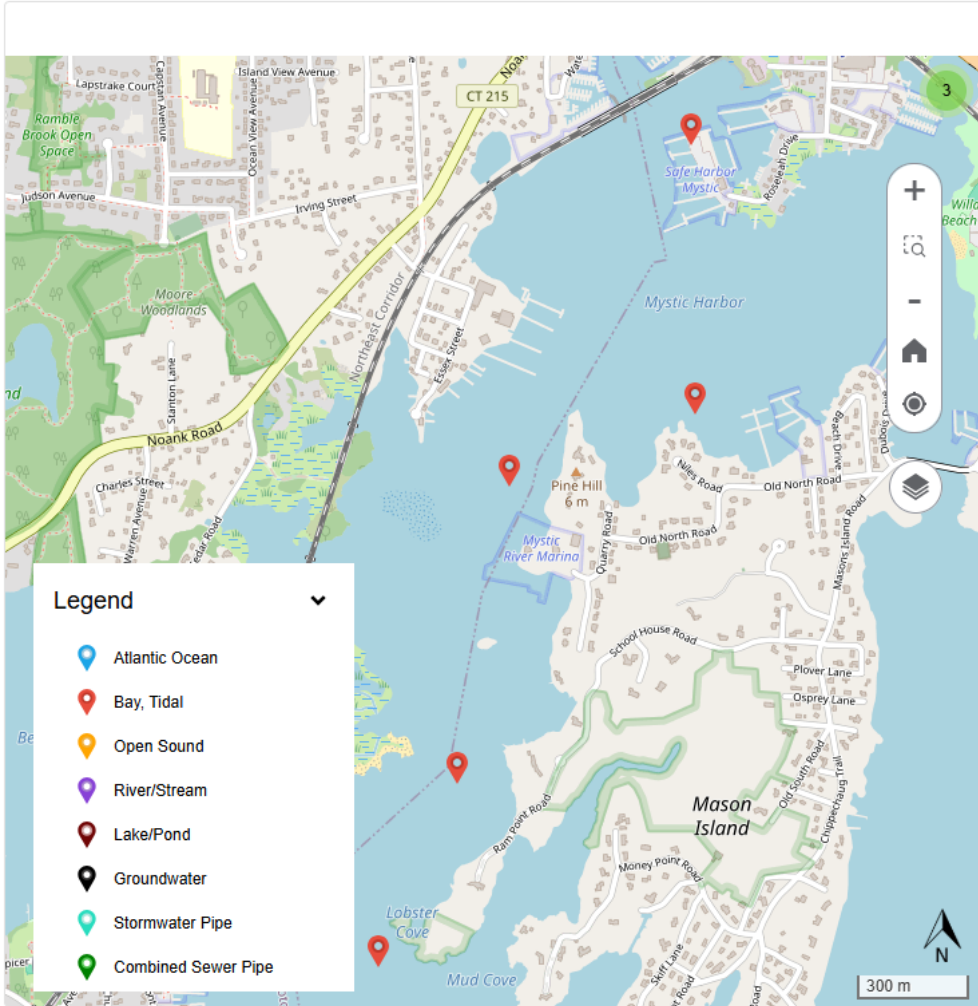
Turbidity / Field\_SOP

15 stations selected

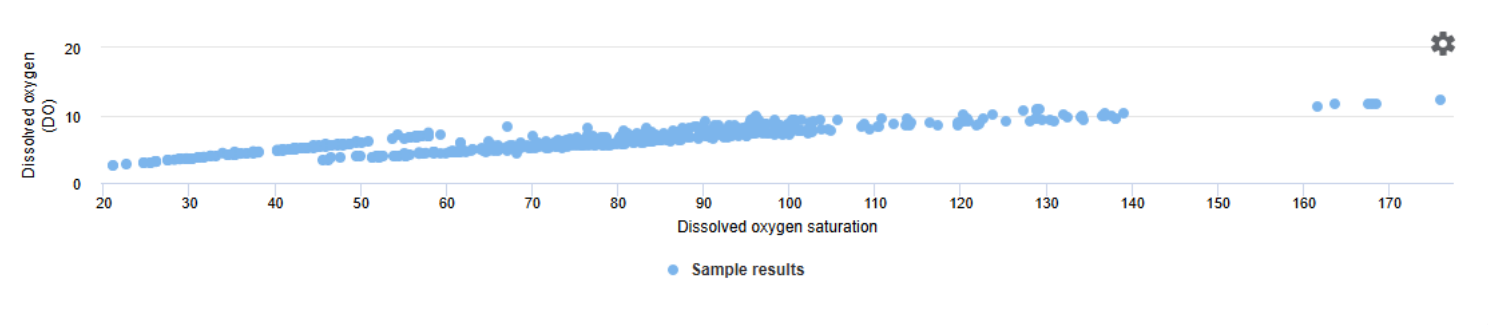


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- NWH-LIS / No Data

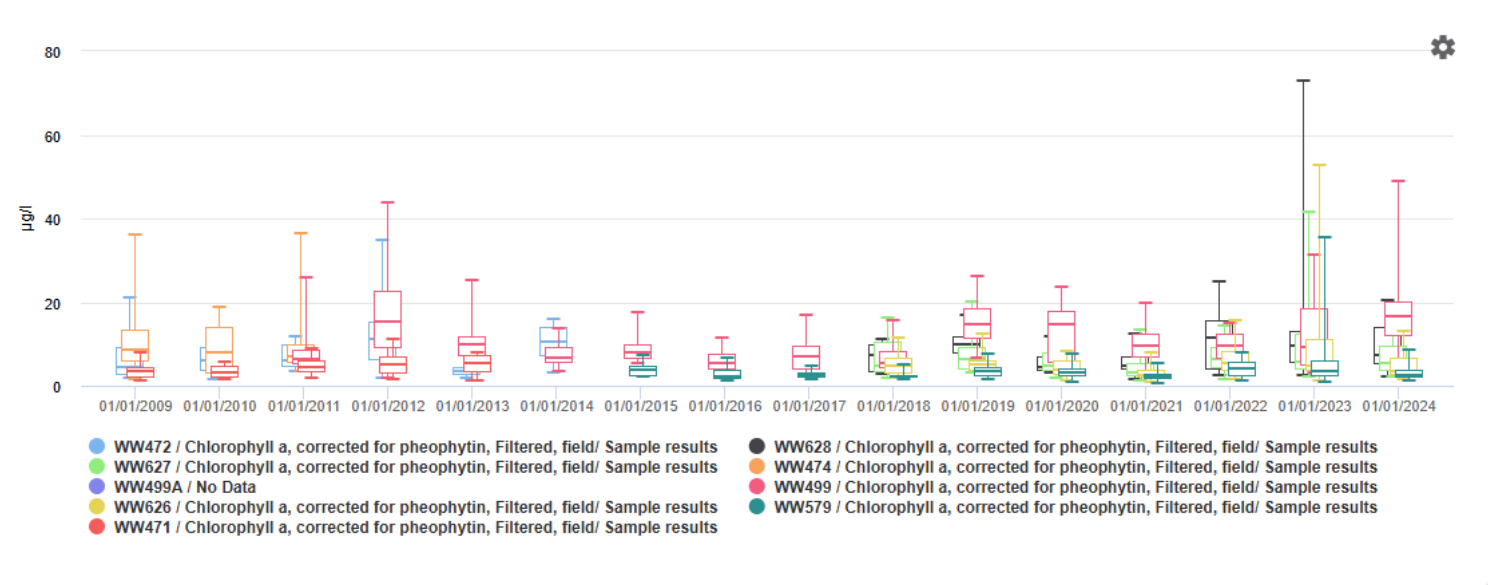
Mystic Harbor, CT Stations



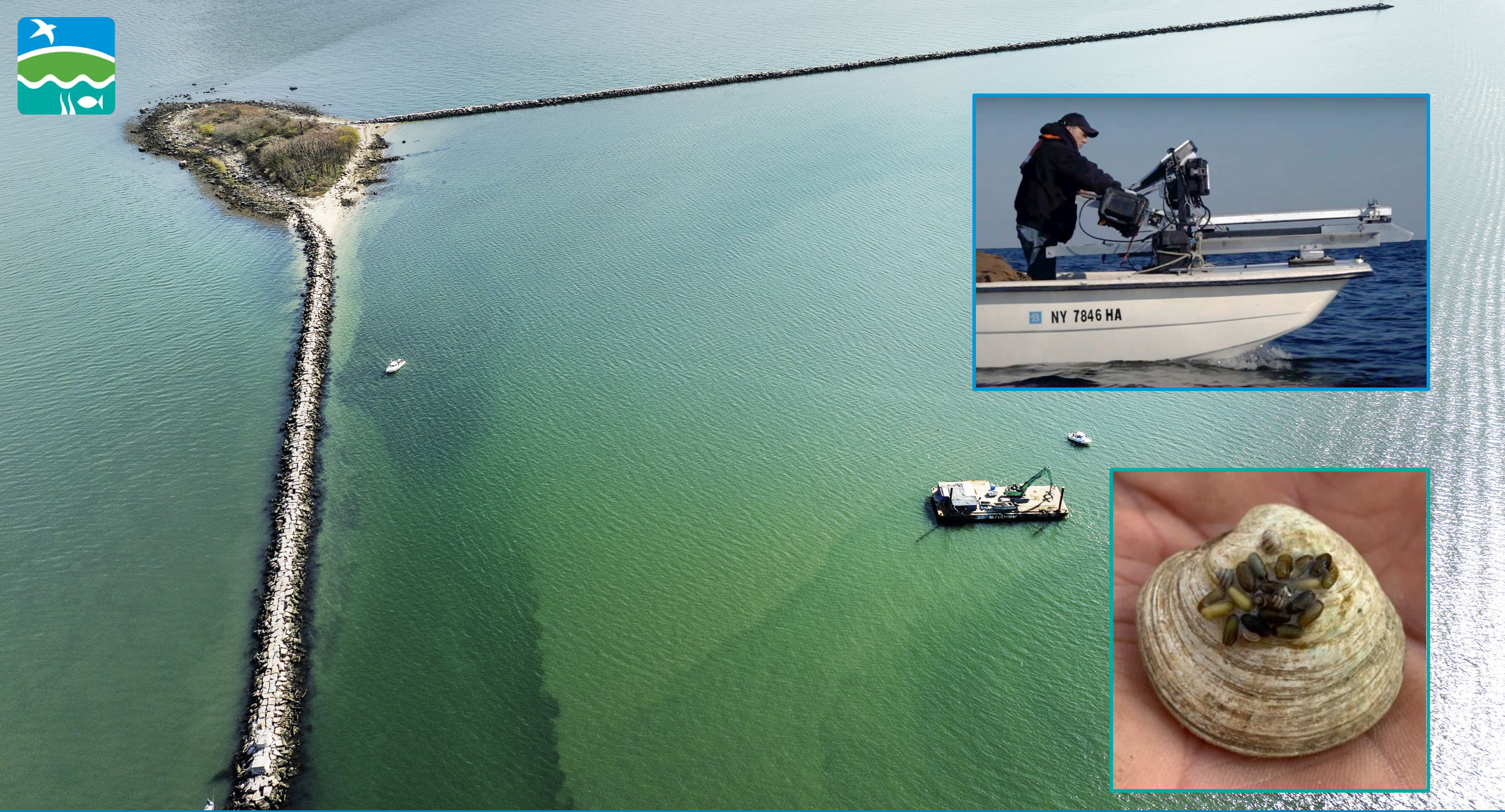
Mystic Harbor - Dissolved Oxygen (mg/L) vs Dissolved Oxygen Saturation



Chlorophyll a, 2009-2024









Discussion

[plinderoth@savethesound.org](mailto:plinderoth@savethesound.org)

Can I help you?

