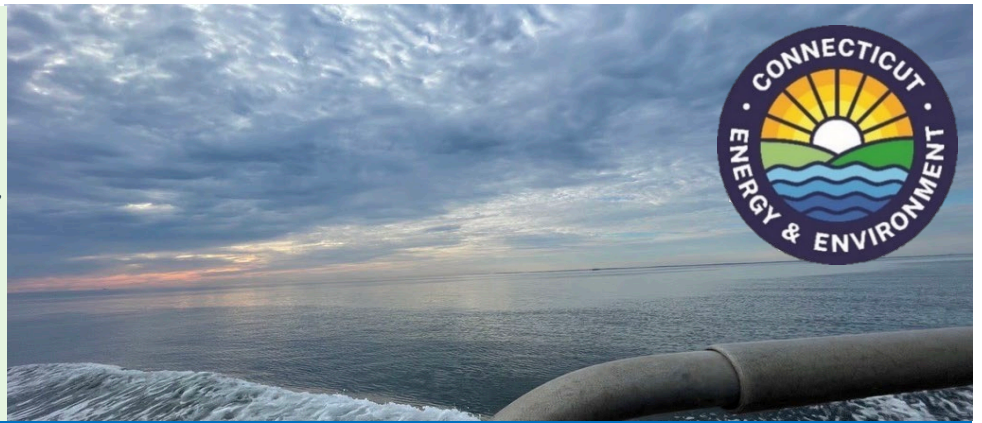


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Long Island Sound Water Quality Monitoring Program

September 26, 2023

# September



## Dempsey Update

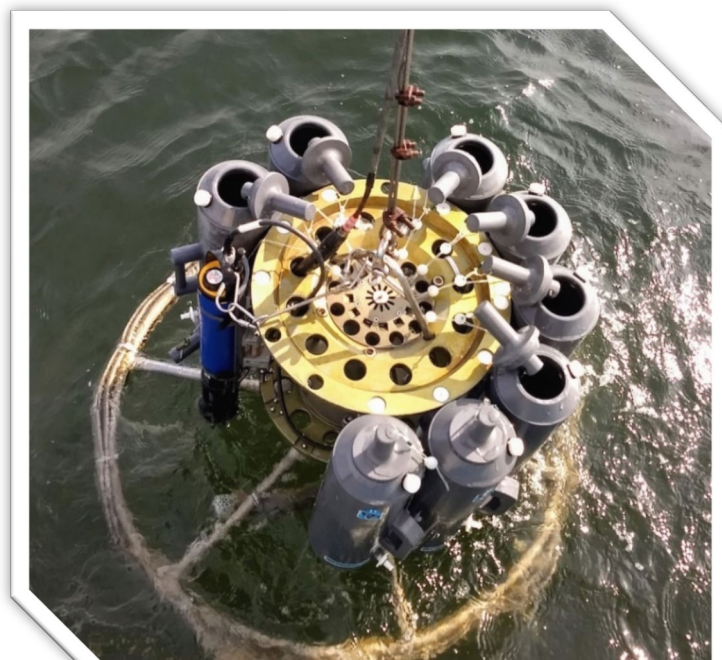
The Dempsey underwent emergency repairs on 9/7/23 to fix a broken hydraulic ram that controlled the rudder causing the WQSEP23 to be completed using the R/V Lynn. The Dempsey is currently underway for the September LIS Trawl survey.

If you have any questions or want more information on the Dempsey, please contact Matthew Lyman at: [matthew.lyman@ct.gov](mailto:matthew.lyman@ct.gov).

## 2023 Sampling Schedule

The 2023 Long Island Sound Sampling began on 3 January 2023. All scheduled cruises except for CHFEB23 and WQMAR23 (maintenance issues) were completed as scheduled.

Click the link to learn more about the program and our sampling schedule: [Long Island Sound Water Quality and Hypoxia Monitoring Program Overview \(ct.gov\)](#)



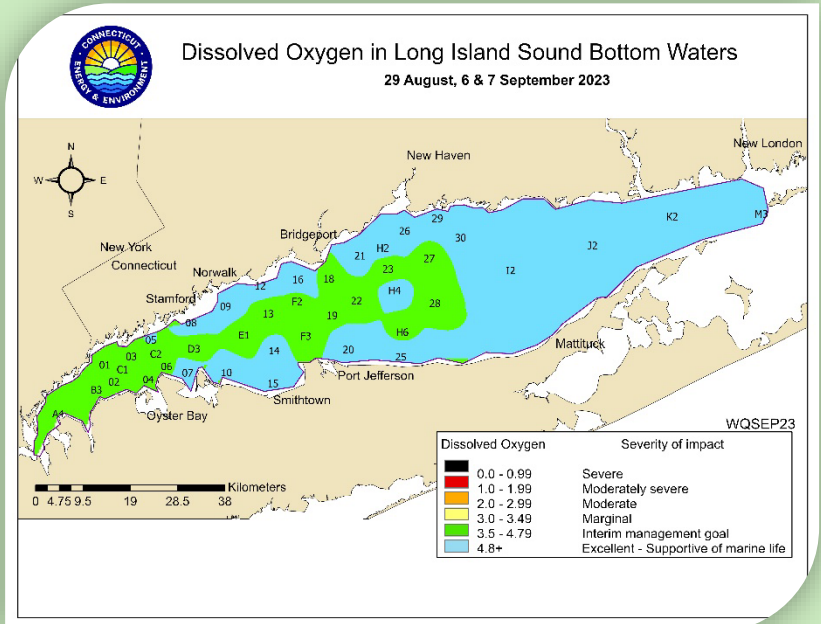
# Dissolved Oxygen Summary

CT DEEP sampled 42 stations during the WQSEP23 survey that was conducted from 29 August to 7 September 2023. Dissolved oxygen (DO) concentrations in the bottom waters of Long Island Sound during the WQSEP23 showed major improvements compared to HYAUG23 concentrations. Dissolved oxygen concentrations at all stations were above 3.0 mg/L. Half of the stations (21) continued to have concentrations below 4.8 mg/L. The lowest concentration measured during the survey was 3.56 mg/L at Station A4 and the highest was 6.84 mg/L measured at Station 25.

Of the 26 bottom water measurements recorded in September at Station A4 between 1998 and 2023, the median concentration was 2.95 mg/L with a range of 0.93 to 6.08 mg/L. The mean was 3.27 mg/L.

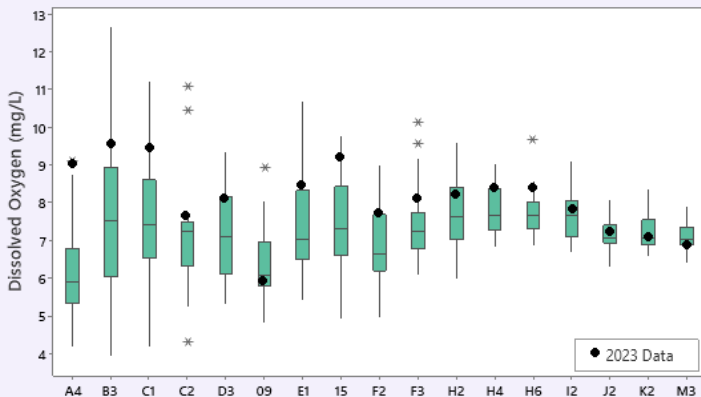
Leading up to the WQSEP23 survey, A4 had concentrations of 1.94 mg/L during HYAUG23 and 1.70 mg/L in WQAUG23.

During the WQSEP23 survey there were 0 km<sup>2</sup> (0 mi<sup>2</sup>) of bottom water with DO less than 3.0 mg/L and 864.0 km<sup>2</sup> (333.59 mi<sup>2</sup>) with concentrations between 3.0 and 4.8 mg/L.



Preliminary data from this survey and prior 2023 cruises are available in Excel spreadsheet format as well as on the [UCONN ERDDAP site](#).

Surface Dissolved Oxygen Concentrations in Long Island Sound  
WQSEP Cruises  
1998-2023



Minimum Dissolved Oxygen Concentrations in Long Island Sound  
WQSEP Cruises  
1998-2023

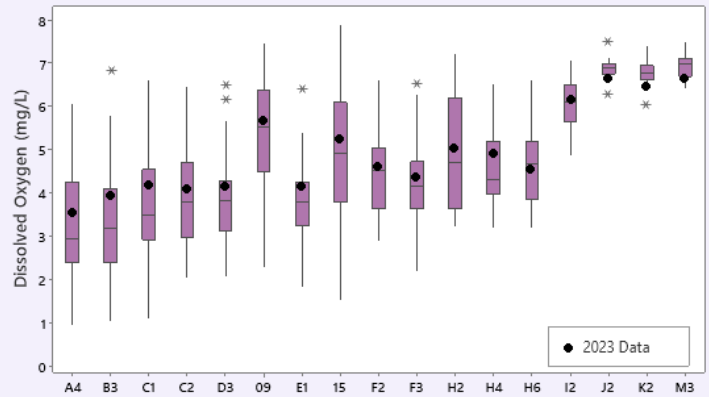
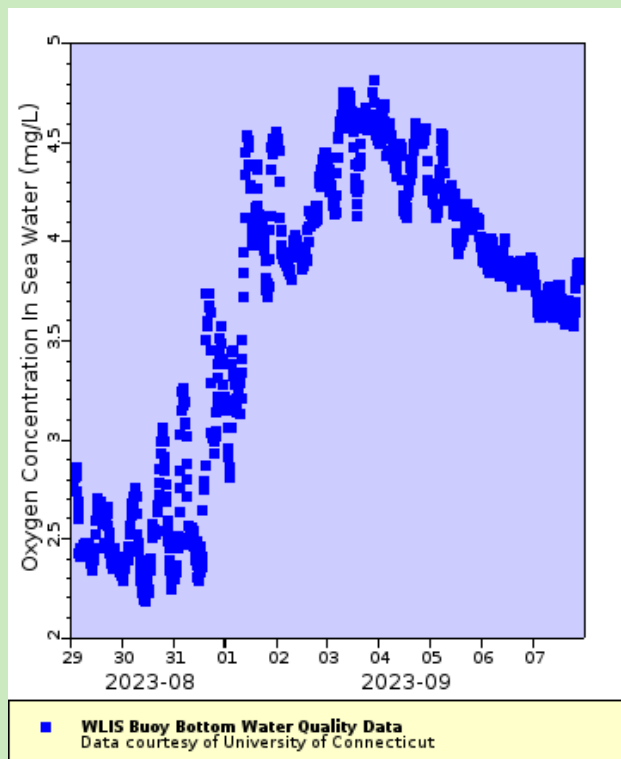
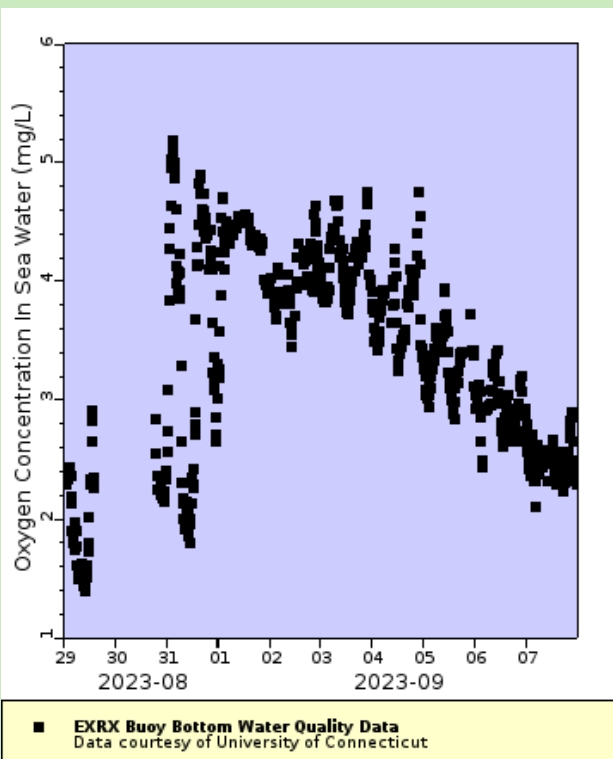


Table 1. Minimum Dissolved Oxygen Concentrations and Areal estimates for WQSEP Cruises Conducted from 1998-2023 by CT DEEP.

Cruise	Minimum DO Observed (mg/L)	Station with Minimum DO	Area under 4.8 mg/L (km <sup>2</sup> )	Area under 3 mg/L (km <sup>2</sup> )
WQSEP98	1.19	B3	1457.8	435.3
WQSEP99	3.75	H6	169.3	0
WQSEP00	3.39	15	455	0
WQSEP01	1.02	02	1216.7	292.4
WQSEP02	4.58	B3	107.5	0
WQSEP03	2.23	E1	1241.1	33.5
WQSEP04	0.93	A4	1396.7	296.1
WQSEP05	0.99	A4	1031.8	223.8
WQSEP06	2.89	F3	593.9	0
WQSEP07	2.88	A4	886	41.6
WQSEP08	2.17	02	1562.5	340.5
WQSEP09	1.84	E1	1234.1	332.1
WQSEP10	3.66	A4	213.7	0
WQSEP11	4.32	A4	75	0
WQSEP12	2.55	02	1643	131.7
WQSEP13	2.33	B3	1207.3	100.1
WQSEP14	2.74	A4	856.7	34.3
WQSEP15	2.52	A4	892.4	56.3
WQSEP16	1.87	A4	1170.1	139
WQSEP17	2.46	A4	565.9	109.8
WQSEP18	2.34	A4	1411.8	133.6
WQSEP19	2.74	E1	699	52.6
WQSEP20	2.79	A4	875.6	43.0
WQSEP21	1.69	B3	792.2	43.5
WQSEP22	1.90	A4	1109.1	153.3
WQSEP23	3.56	A4	864.0	0



# Temperature Data Summary

Surface water temperatures rose an average of 0.66 °C, while bottom water temperatures saw a 0.40 °C increase of average bottom temperatures from HYAUG23 to WQSEP23.

The maximum surface water temperature during the WQSEP23 survey occurred at Station 04 (25.87 °C) while the maximum bottom water temperature occurred at Station 09 (22.86 °C).

The average surface and bottom water temperature for WQSEP were lower in 2023 than in 2022.

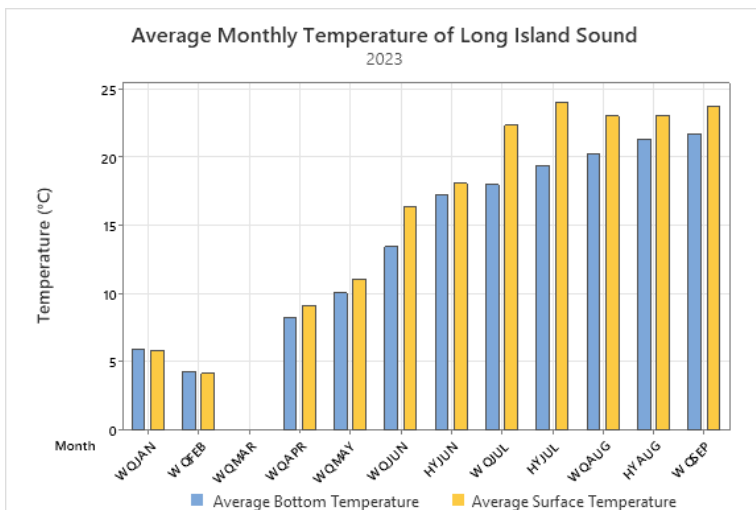
## Delta T ( $\Delta T$ )

The greatest temperature difference between the surface and bottom waters during the WQSEP23 survey was 2.98 °C, measured at Station H6. The smallest temperature difference was 0.29 °C at Station 09.

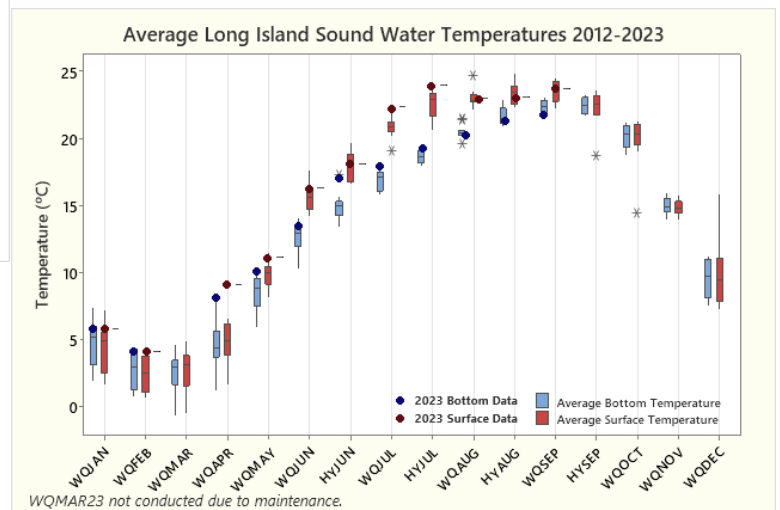
$\Delta T$ 's averaged 1.79 °C during the WQSEP23 survey compared to WQSEP22  $\Delta T$ 's average of 1.09 °C.

Delta T ( $\Delta T$ ) is the difference between the surface and bottom water temperature. Differences in water temperature contribute to stratification and exacerbate hypoxic conditions. In general, the shallower coastal stations tended to have the smallest temperature differences, as they are more susceptible to mixing, weather, and anthropogenic influences (human caused influences). The greater the delta T, the greater the potential for hypoxia to be more severe.

In June, DEEP's hypoxia monitoring cruises began. The DEEP's monitoring program records water temperatures and salinity during its hypoxia monitoring cruises to help estimate the extent of favorable conditions for the onset and ending of hypoxia. Water temperature plays a major role in the timing and severity of the summer hypoxia event. Water temperature differences in the western Sound during the summer months are particularly influential in contributing to the difference in dissolved oxygen content between surface and bottom waters.



Note: WQMAR23 survey could not be completed due to maintenance



# Weather

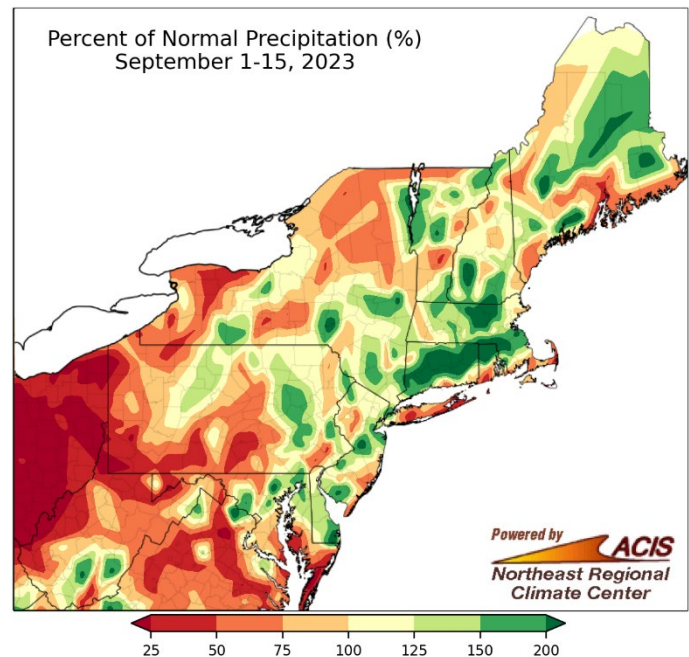
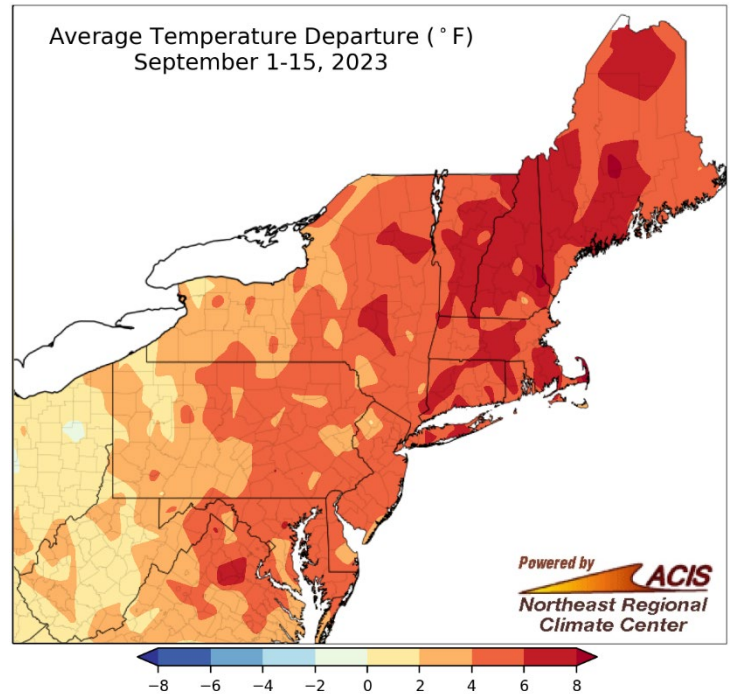


September has started off with extraordinarily warm weather and highly variable precipitation. Averages were up to 8°F above normal resulting in a record warm September for Islip, NY; Worcester, MA; Dulles Airport, VA; and Philadelphia, PA. September was also among the 10 warmest for another 20 major climate sites. Many other sites also experienced their warmest low temperatures on record. Nineteen of the 35 climate sites were wetter than normal and six major climate sites ranked this period among the 20 wettest on record. September precipitation ranged from 24% of normal in Huntington, WV to 235% of normal in Beckley, WV.

Hartford, CT had a 6.0°F departure from normal temperature of 67.6°F. The average temperature for the first half of September was 73.6°F. Hartford also experienced 176% of normal precipitation at 3.52 inches versus a typical 2 inches of rainfall in September.

Bridgeport, CT had a warmer than normal September averaging 74.5°F with a 4.4°F departure from a normal temperature of 70.1°F. Bridgeport's maximum temperature of 93°F made it the 3<sup>rd</sup> warmest September on record. Precipitation was 108% of normal at 2.03 inches compared to a normal 1.88 inches.

Islip, NY had a record warm minimum temperature of 77°F for September. There was a 5.8°F departure from a normal temperature of 69.4°F, with the average temperature in Islip, NY this August being 75.22°F. Islip, NY had 85% of normal precipitation at 1.47 inches. Normal precipitation was 1.72 inches.

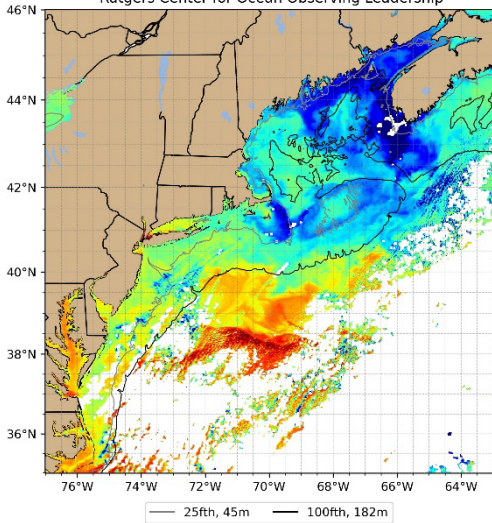


September 1-15 rainfall ranged from less than 25% of normal to more than 200% of normal.

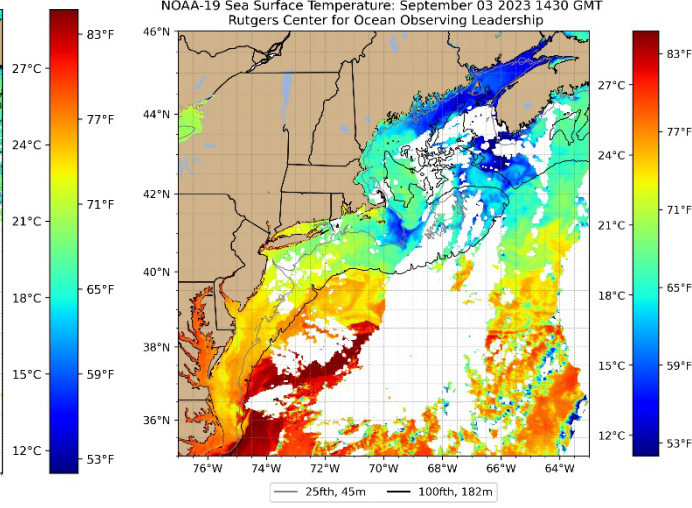
All data and images were from the Northeast Regional Climate Center's website. Please visit <http://www.nrcc.cornell.edu/> for more information.

# Sea Surface Temperature

NOAA-19 Sea Surface Temperature: September 01 2023 1313 GMT  
Rutgers Center for Ocean Observing Leadership



NOAA-19 Sea Surface Temperature: September 03 2023 1430 GMT  
Rutgers Center for Ocean Observing Leadership

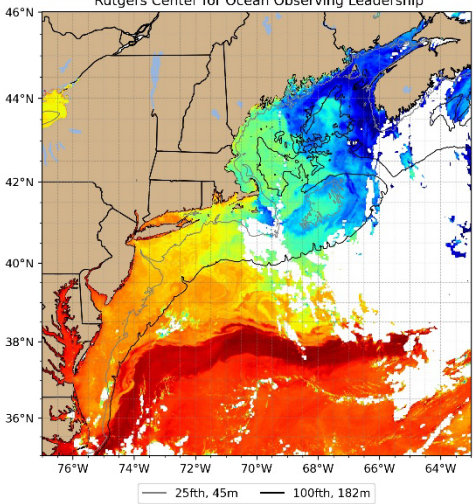


Sea Surface temperature data from Rutgers University IMCU Coastal Ocean Conservation Lab illustrates how currents and fronts impact water temperatures in the Sound and offshore.

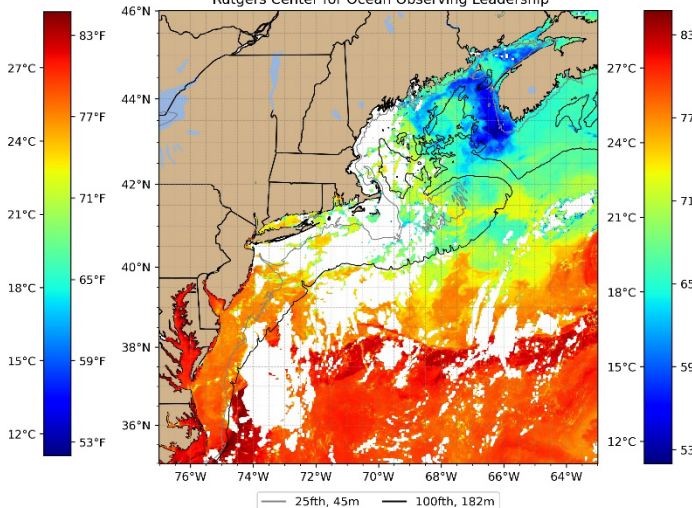
In the first image, taken on September 1<sup>st</sup>, the waters in Long Island Sound are slightly below 24°C (75.2°F).

The five other images (left) show warm waters in the south rising upwards to warm LIS. By September 6<sup>th</sup>, temperatures in the Sound increased to about 25°C (77°F).

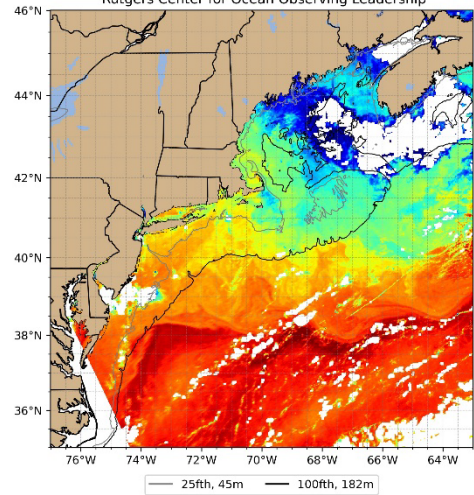
NOAA Sea Surface Temperature: September 06 2023 1353 GMT  
Rutgers Center for Ocean Observing Leadership



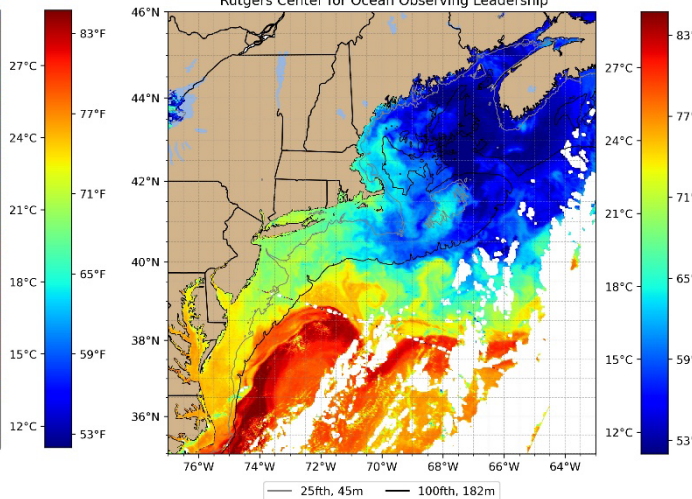
NOAA-19 Sea Surface Temperature: September 08 2023 1329 GMT  
Rutgers Center for Ocean Observing Leadership



NOAA-19 Sea Surface Temperature: September 13 2023 0004 GMT  
Rutgers Center for Ocean Observing Leadership



NOAA-19 Sea Surface Temperature: September 19 2023 1437 GMT  
Rutgers Center for Ocean Observing Leadership

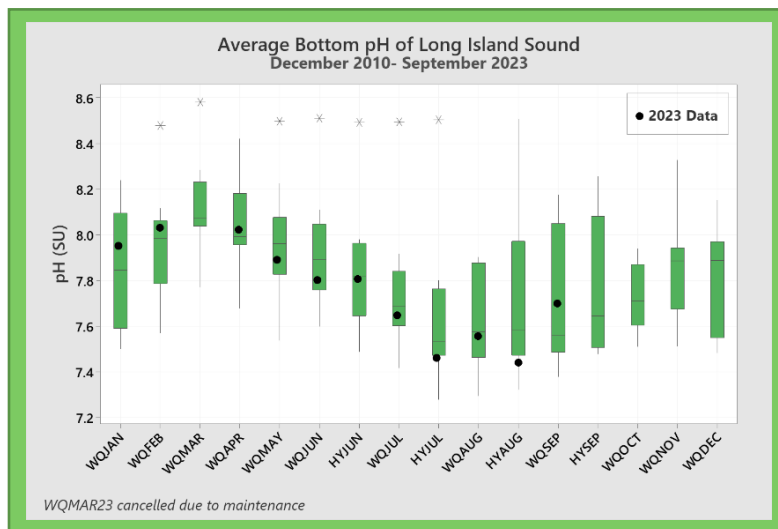
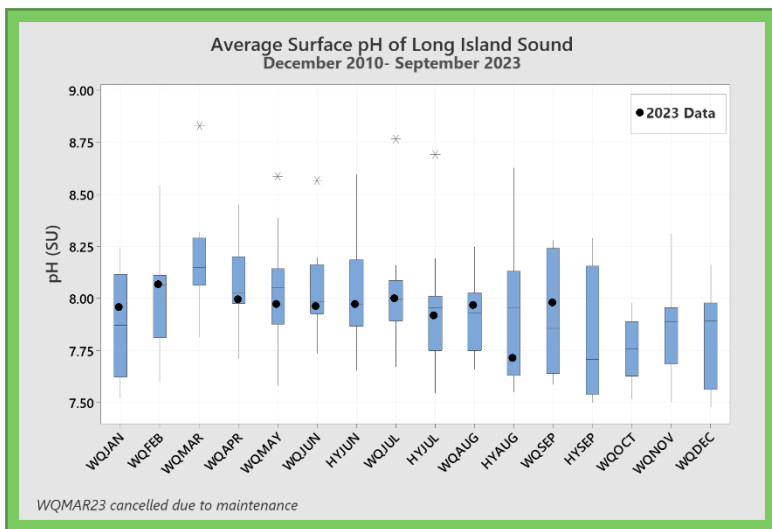
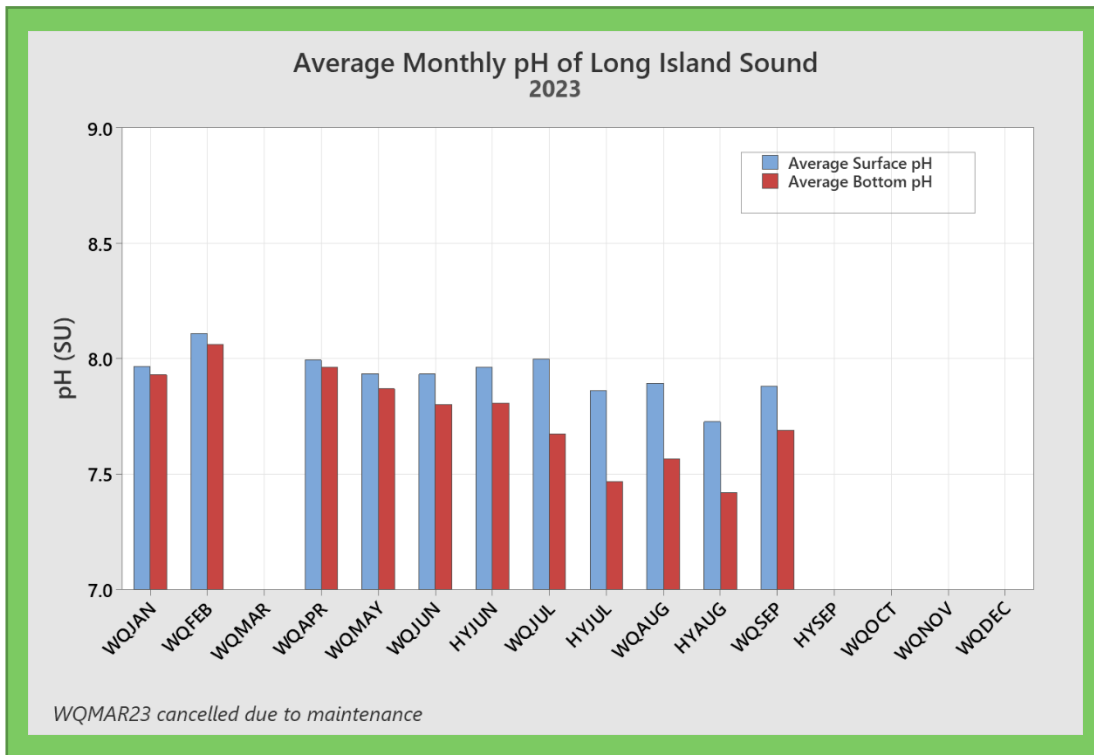


More information about sea surface temperature can be found on the Rutgers University Satellite Imagery website [Sea Surface Temperature - IMCS Coastal Ocean Observation Lab \(rutgers.edu\)](https://www.imcs.rutgers.edu/Sea-Surface-Temperature-Observation-Lab)

# pH

The average surface and bottom pH from all the stations across LIS during the HYAUG23 survey were 7.88 and 7.69 SU, respectively. The lowest bottom pH was 7.44 (Station A4), the highest bottom pH was 7.9 (Station M3), the lowest surface pH was 7.51 (Station 05), and the highest surface pH was 8.13 (Station 28).

The average surface and bottom pH graphs for all the cruises from 2010 to date only include the 17 year-round water quality stations

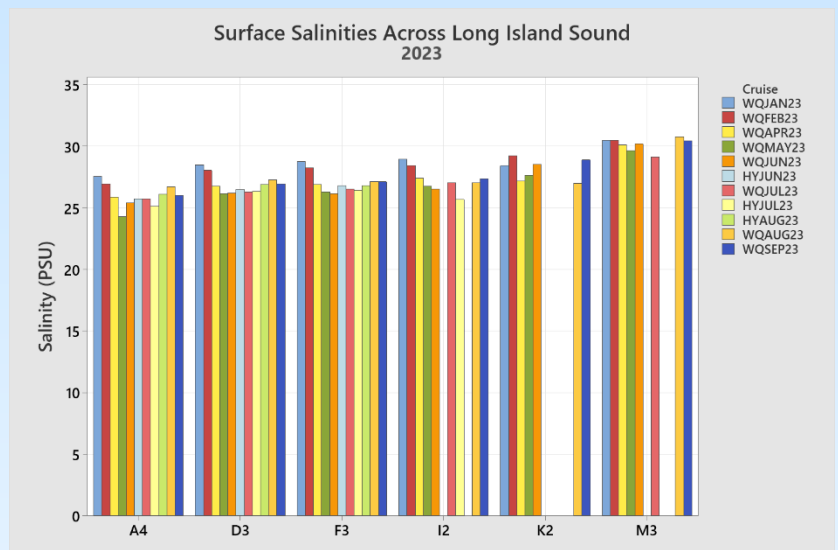
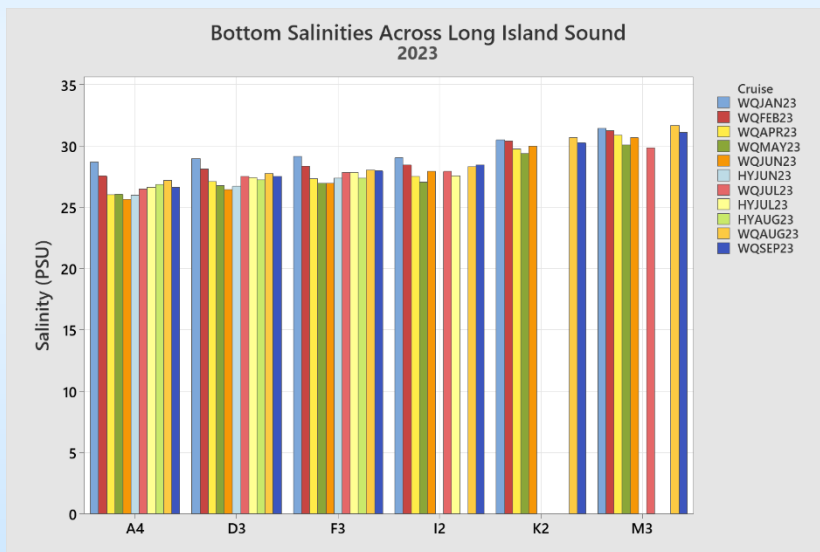


# Salinity

Surface salinities across Long Island Sound generally decrease slightly from January through May due to snow melt and spring rains. The less dense freshwater will float on top of the denser saltwater contributing to stratification and impacting hypoxia. Additionally, nutrients carried by runoff fuel phytoplankton growth. Surface and bottom water salinities in 2023 were constant across much of the Sound.

Surface and bottom salinity values during the WQSEP23 survey were slightly below the 2009-2023 average for Stations A4 and D3. (See table below).

	A4	D3
2023 Surface	26.0	26.95
2009-2023 Average Surface	26.52	27.51
2023 Bottom	26.64	27.52
2009-2023 Average Bottom	27.09	28.1



Note: WQMAR23 survey could not be completed due to maintenance  
 HYJUN23 only sampled two of the six stations represented (A4 & D3)  
 WQJUL23 did not have salinity data for station K2.  
 HYJUL23 only sampled four of the six stations represented (A4, D3, F3, I2)  
 HYAUG23 sampled three of the six stations represented (A4, D3, F3)

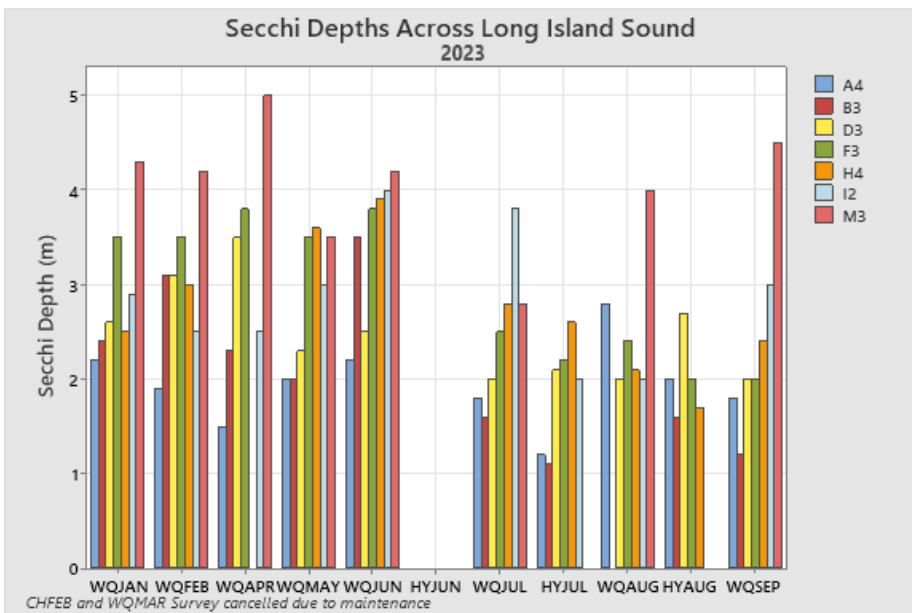
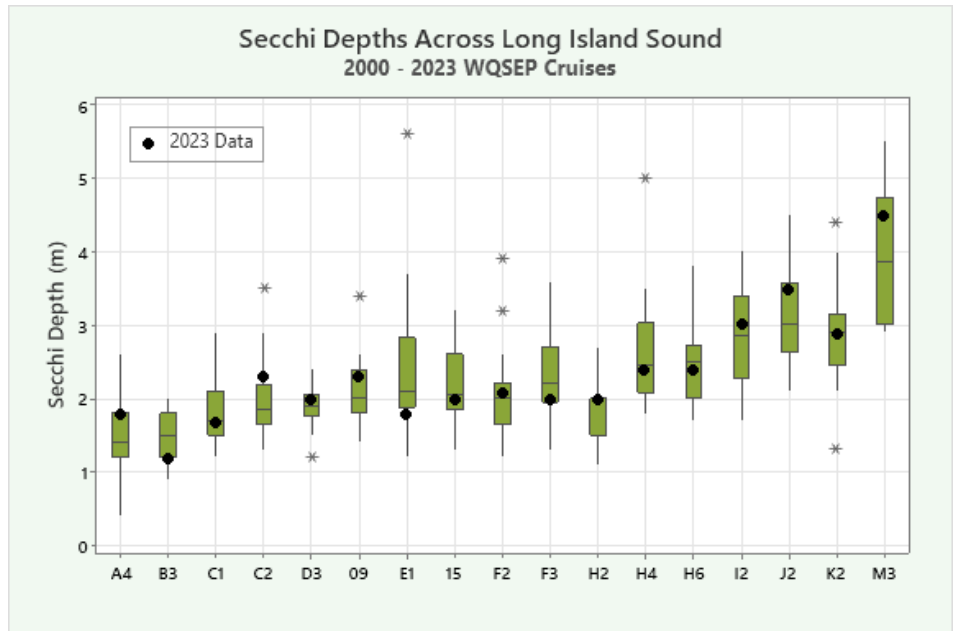
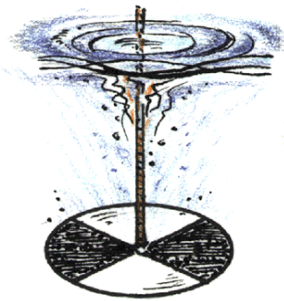


# Secchi Disk Depth

Water clarity is a measure of how much light penetrates the water column. Clarity can be reduced by the presence of suspended solids, organic matter, phytoplankton, and zooplankton.

To assess the water clarity across Long Island Sound, Secchi disks are used at each station. The black and white disk is lowered into the water column until such a depth is reached that the black and the white quarters can no longer be differentiated. This is called the Secchi depth.

Secchi depths were taken at 42 stations during the WQSEP23 survey; these depths ranged from 1.2 meters (Station B3) to 4.5 meters (Station M3)



## The [Long Island Sound Report Card](#)

developed by Save the Sound utilizes the following water clarity depths thresholds:

1.  $>2.28$  m (A- to A+; 90-100)
2. 2.12 to  $<2.28$  (B- to B+; 80-89)
3. 1.95 to  $<2.12$  (C- to C+; 70-79)
4. 1.8 to  $<1.95$  (D- to D+; 60-69)
5. 0 to  $<1.8$  (F;  $<60$ )

In Report Card terms, 17 stations were in the A- range ( $>2.28$ m), 3 station was in the B- range (2.12-2.28), 13 stations were in the C- range (1.95- $<2.12$ m), 3 stations were in the D- range (1.8 to  $<1.95$ m), and 6 stations failed ( $<1.8$ m).

For more information on the Long Island Sound Water Quality Monitoring Program please visit: [Long Island Sound Water Quality and Hypoxia Monitoring Program Overview \(ct.gov\)](#)

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