



Long Island Sound Water Quality Monitoring Program

October 15, 2024

Mid-August



The HYAUG24 survey started on August 12, 2024 and finished on August 14, 2024 visiting 40 total stations distributed across the Eastern, Central, and Western portions of Long Island Sound. Water quality parameters including pH, dissolved oxygen, salinity, and temperature were measured, and are documented for analysis. For more information and to learn more about our monthly surveys, please visit our [website](#).

Hypoxia surveys conducted by CT DEEP in August monitor the seasonal extent of hypoxia in Long Island Sound. Data collected aboard the RV John Dempsey provide valuable insights that help inform management strategies to mitigate the effects of hypoxia and enhance the ecological resilience of Long Island Sound.



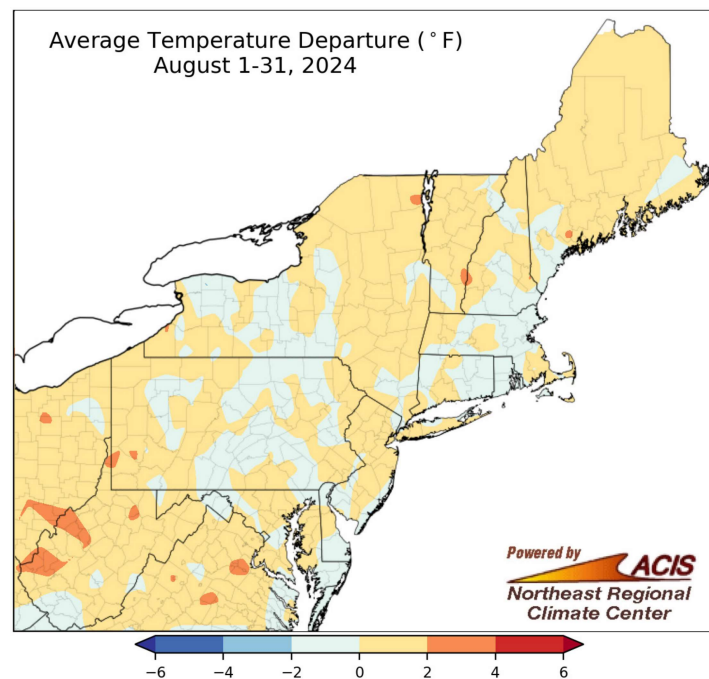
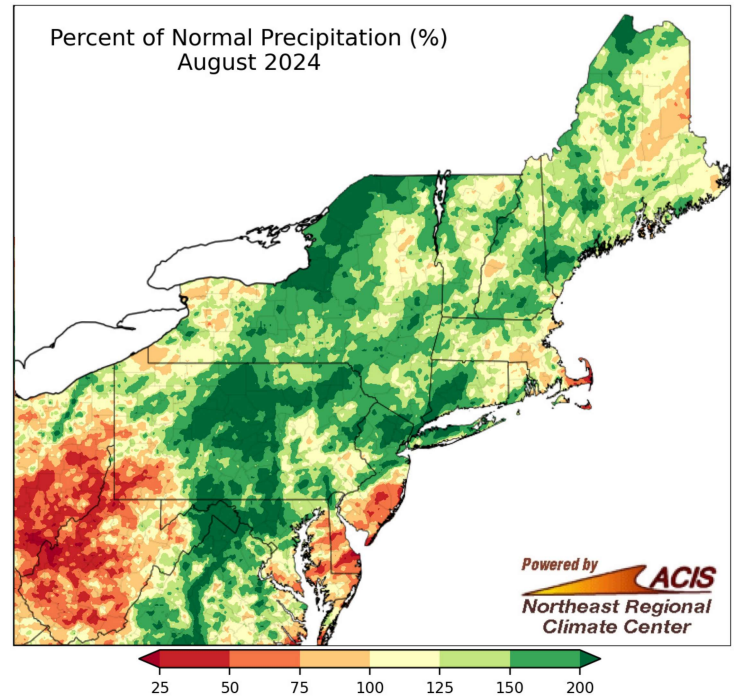


In August 2024, temperatures in the Northeast returned to near-normal levels following an unusually hot June and July. The average temperature for the month was 69.0°F, which was 0.3°F warmer than normal. However, the summer season as a whole was exceptionally warm, making it the fourth-hottest summer on record for the Northeast, with an average temperature of 69.9°F, 1.8°F above normal. Connecticut experienced its sixth-hottest summer since records began in 1895, contributing to the overall regional heat.

The Northeast experienced its 13th-wettest August, receiving 5.29 inches of precipitation, which was 132% of the normal amount. August precipitation levels ranged from 78% of normal in West Virginia to 156% in New York, with 10 states experiencing wetter-than-normal conditions. Connecticut was among the states that saw higher-than-average rainfall, contributing to a total summer precipitation of 13.07 inches, or 102% of normal across the region. By mid-August, remnants of Hurricane Debby brought rainfall that eased drought conditions in parts of the region, though areas like West Virginia and southwestern Pennsylvania continued to face severe drought. By the end of the month, 15% of the Northeast remained in drought, particularly in parts of the Mid-Atlantic.

Bridgeport, Connecticut, recorded a notable daily precipitation total of 1.61 inches on August 6, surpassing the previous record set in 1952. This high rainfall was part of a broader pattern of heavy precipitation across the Northeast during the month, contributing to potential impacts on water quality and conditions in Long Island Sound. Additionally, nearby Islip, New York, saw 2.80 inches of rain on August 6, breaking the previous record from 1979

One of the most significant weather events occurred between August 18 and 19, when southwestern Connecticut and New York's Long Island experienced catastrophic flash flooding. Rainfall totals ranged from 8 to 15 inches, with Oxford, Connecticut, receiving 14.83 inches, a possible state record. This extreme rainfall caused widespread damage, evacuations, and water rescues, with two flood-related fatalities in Connecticut. Earlier in the month, from August 12–14, remnants of Hurricane Debby had already brought significant rainfall to the region.



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

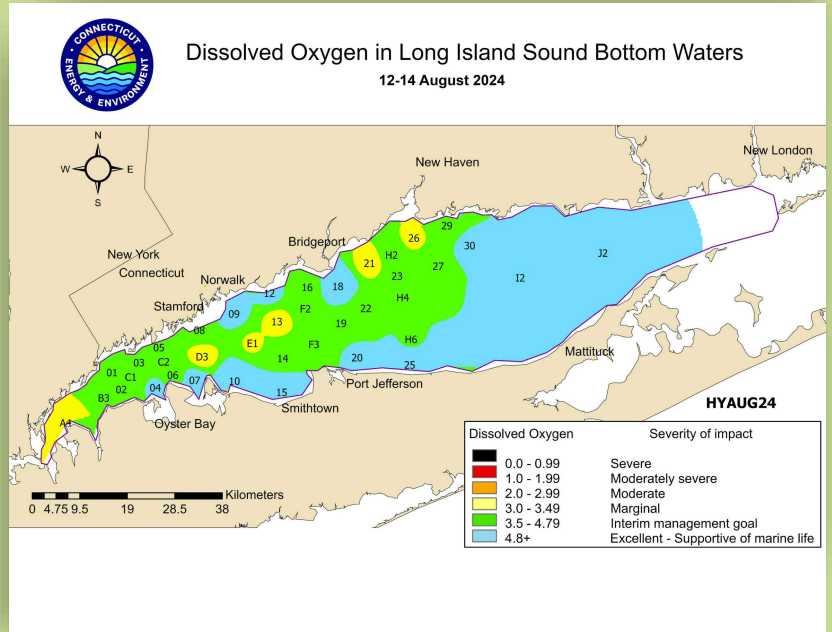
Dissolved Oxygen Summary

CT DEEP sampled 39 stations during the HYAUG24 survey that was conducted on 12-14 August 2024. Dissolved oxygen (DO) concentrations in the bottom waters of Long Island Sound during the HYAUG24 showed improvements compared to WQAUG24 concentrations. All stations were above 3.0 mg/L, six (6) stations were below 3.5 mg/L and and 21 stations were below 4.8 mg/L. The lowest concentration measured during the survey was 3.0 mg/L at Station D3 and the highest was 7.3 mg/L measured at Station 25.

Of the 30 bottom waters measurements recorded in August at Station A4 between 1994 and 2024, the median concentration was 1.85 mg/L with a range of 0.11 to 5.21 mg/L. The mean was 2.11 mg/L.

Leading up to the HYAUG24 survey, A4 had concentrations of 2.25 mg/L in early August and 2.43 mg/L in HYJUL24. During HYAUG24, DO rebounded and was 3.43 mg/L at A4.

During the HYAUG24 survey there was 172.6 km² (66.64 mi²) of bottom water with concentrations between 3.0 and 3.5 mg/L. An additional 979.1 km² (378.03 mi²) had concentrations between 3.5 and 4.8 mg/L.



Preliminary data from this survey and prior 2024 cruises are available on the [Water Quality Portal](#) as well as on the [UCONN ERDDAP site](#).

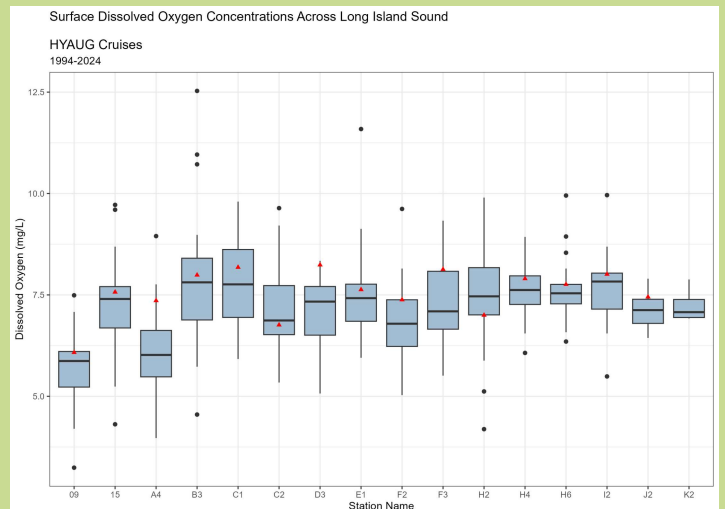
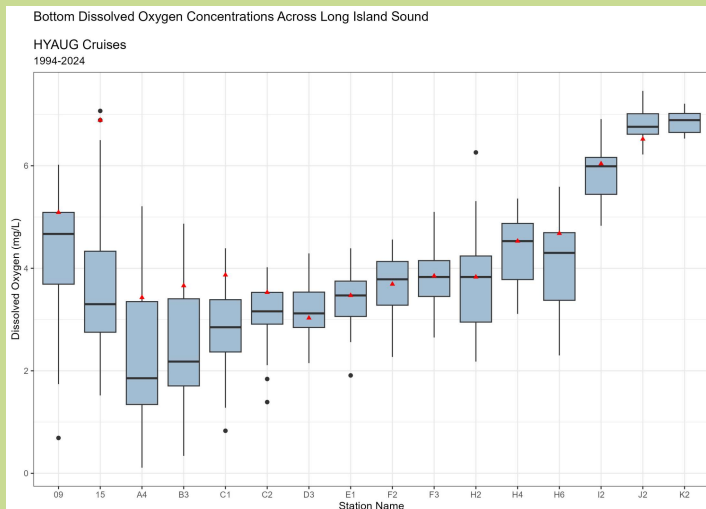
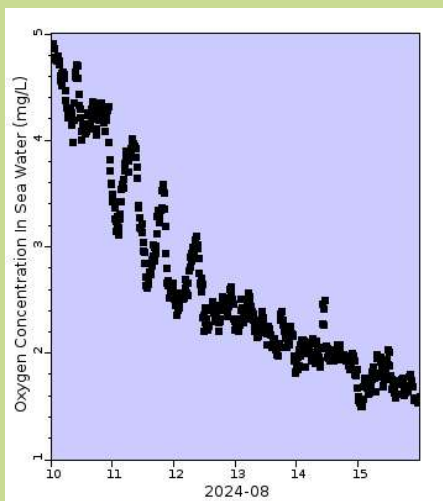
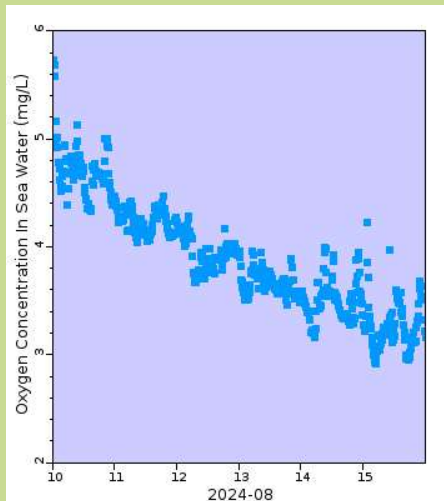


Table 1. Minimum Dissolved Oxygen Concentrations and Areal estimates for HYAUG Cruises Conducted from 1998-2024 by CT DEEP.

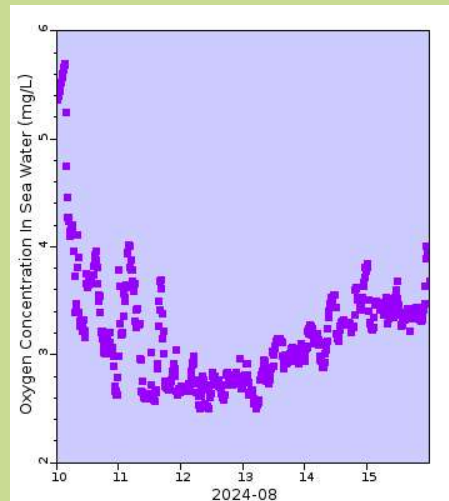
Cruise	Minimum DO Observed (mg/L)	Station with Minimum DO	Area under 4.8 mg/L (km ²)	Area under 3 mg/L (km ²)
HYAUG98	1.5	A4	1423	237.7
HYAUG99	2	A4	1379.6	115.2
HYAUG00	3.11	27	1114.3	0
HYAUG01	1.6	O2	1571.1	344.1
HYAUG02	0.82	A4	1206	220.6
HYAUG03	0.11	A4	1890.5	894
HYAUG04	0.28	A4	1353.3	523.5
HYAUG05	0.51	A4	1565.4	448.6
HYAUG06	1.73	A4	1214.7	131.7
HYAUG07	1.84	E1	1428.5	255.3
HYAUG08	0.14	A4	1387.3	466.5
HYAUG09	1.49	A4	1615.3	438
HYAUG10	3.12	D3	1303.8	0
HYAUG11	1.89	A4	1659.5	337.6
HYAUG12	0.9	A4	1500.4	747.1
HYAUG13	1.34	A4	1051.3	209.1
HYAUG14	3.5	21	1072.9	0
HYAUG15	2.12	A4	1448.8	99.2
HYAUG16	1.37	A4	1384	511.4
HYAUG17	1.11	A4	1254	114.3
HYAUG18	2.81	O3	909.1	19.7
HYAUG19	0.89	A4	1251	192
HYAUG20	3.56	26	1090	0
HYAUG21	1.34	A4	1386.1	367.9
HYAUG22	2.47	14	401.9	48.6
HYAUG23	1.94	A4	1249.1	314.7
HYAUG24	3.0	D3	1151.7	0



■ EXRX Buoy Bottom Water Quality Data
Data courtesy of University of Connecticut



■ WLIS Buoy Bottom Water Quality Data
Data courtesy of University of Connecticut



■ ARTG Buoy Bottom Water Quality Data 1
Data courtesy of University of Connecticut

Temperature Data Summary



Surface water temperatures rose an average of 0.04°C, while bottom water temperatures saw a 1.08°C increase of average bottom temperatures from WQAUG24 to HYAUG24.

The maximum surface water temperature during the HYAUG24 survey occurred at Station 04 (24.16°C) while the maximum bottom water temperature occurred at Station 25 (23.07°C).

The average surface (23.04°C) and bottom water (21.43°C) temperature for HYAUG24 were lower in 2023 than in 2022.

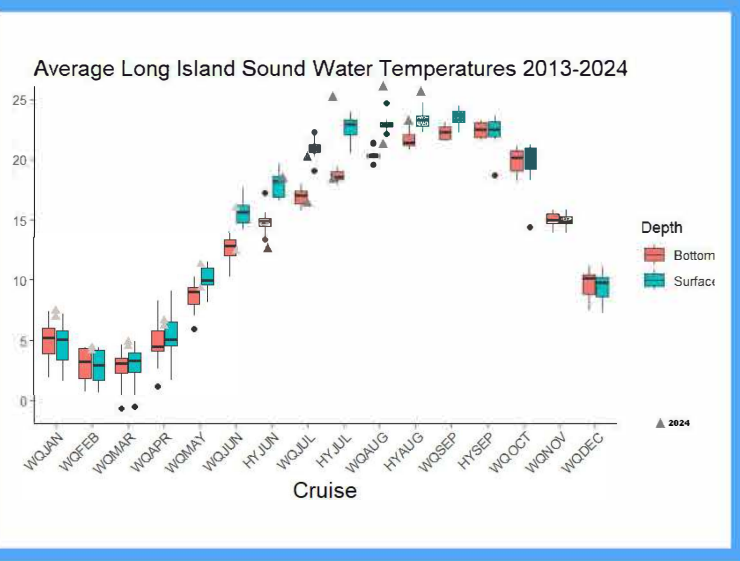
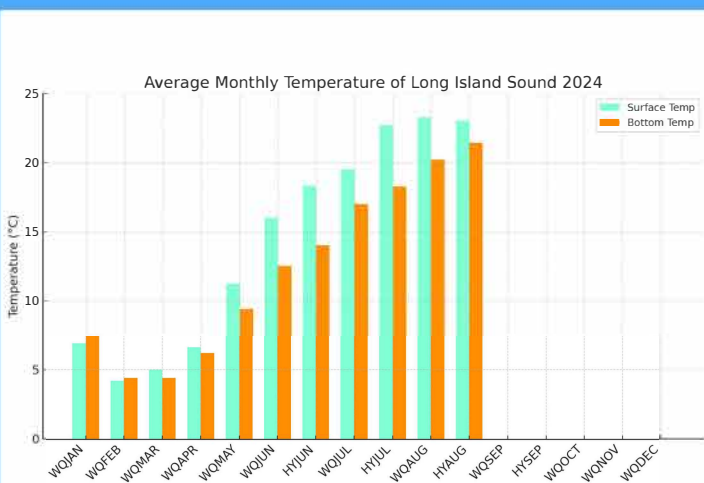
Delta T (ΔT)

The greatest temperature difference between the surface and bottom waters during the HYAUG24 survey was 3.55°C, measured at Station H6. The smallest temperature difference was 0.32°C at Station 15.

The average ΔT calculated for the 17 stations sampled year-round was 1.79 °C during HYAUG24, compared to 1.83°C during the HYAUG23 survey and 0.94 °C during HYAUG22.

Delta T (ΔT) 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.

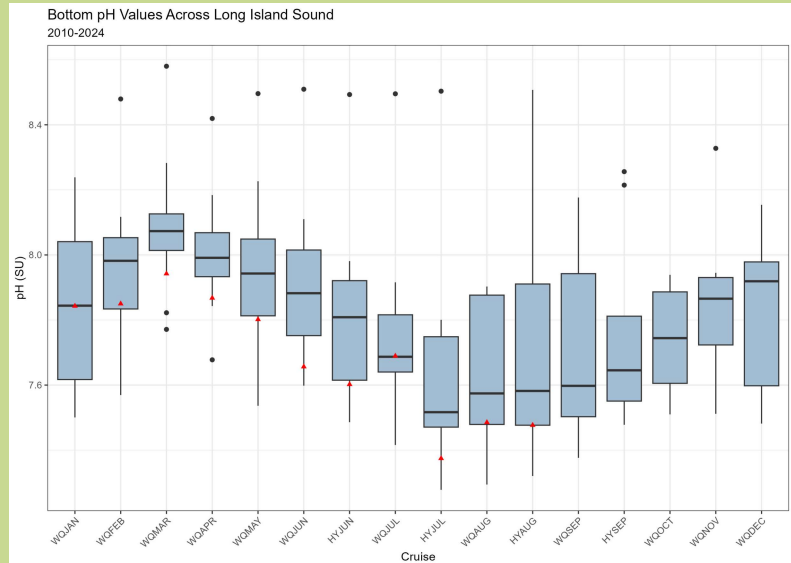
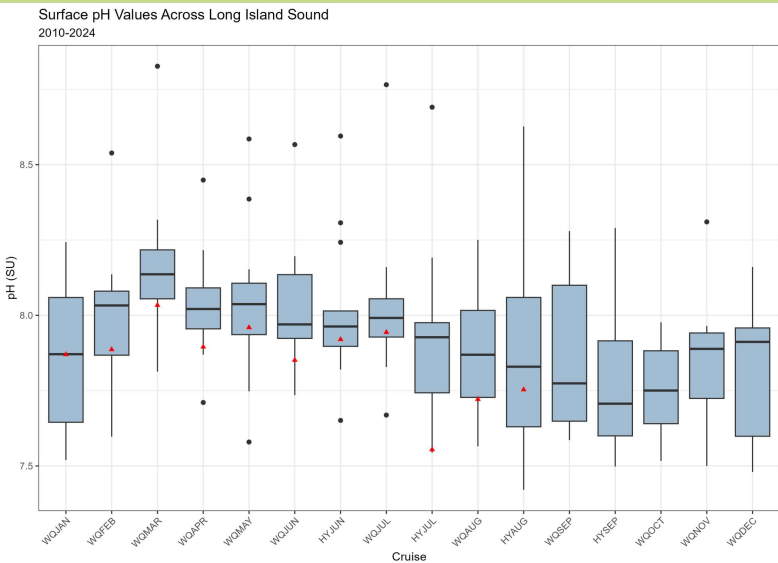
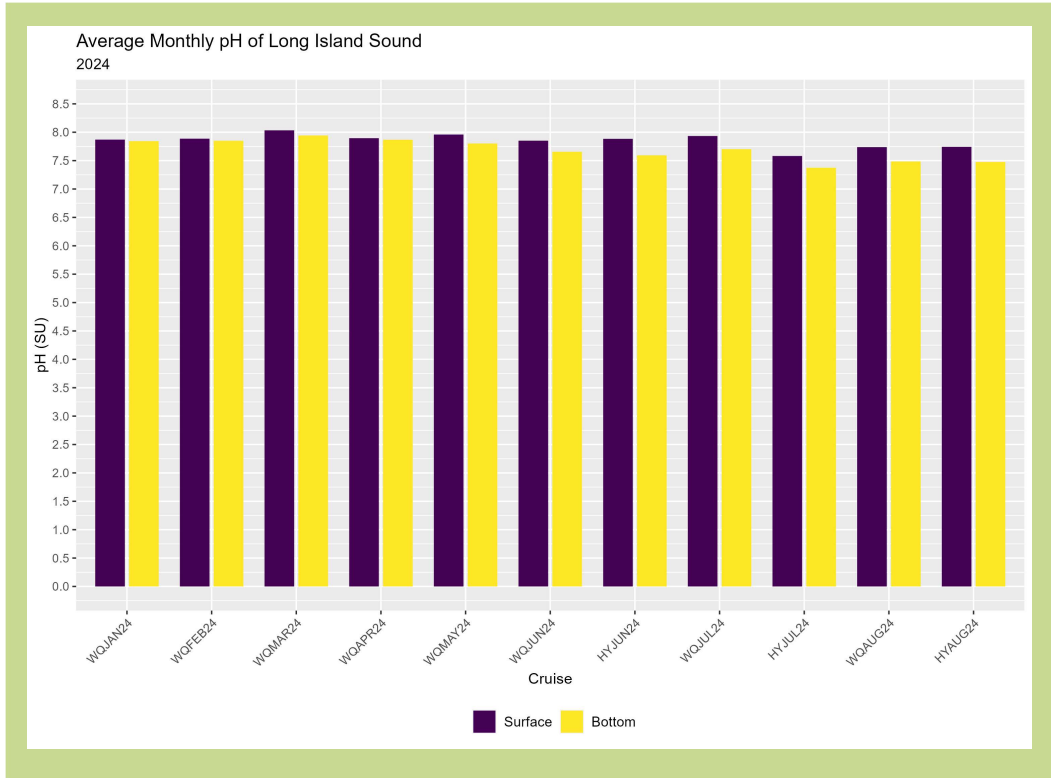
In June, DEEP's hypoxia monitoring cruises began. The DEEP's monitoring program records water temperatures and salinity during its hypoxia monitoring cruises to help estimate the extent of favorable conditions for the onset and ending of hypoxia. Water temperature plays a major role in the timing and 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.



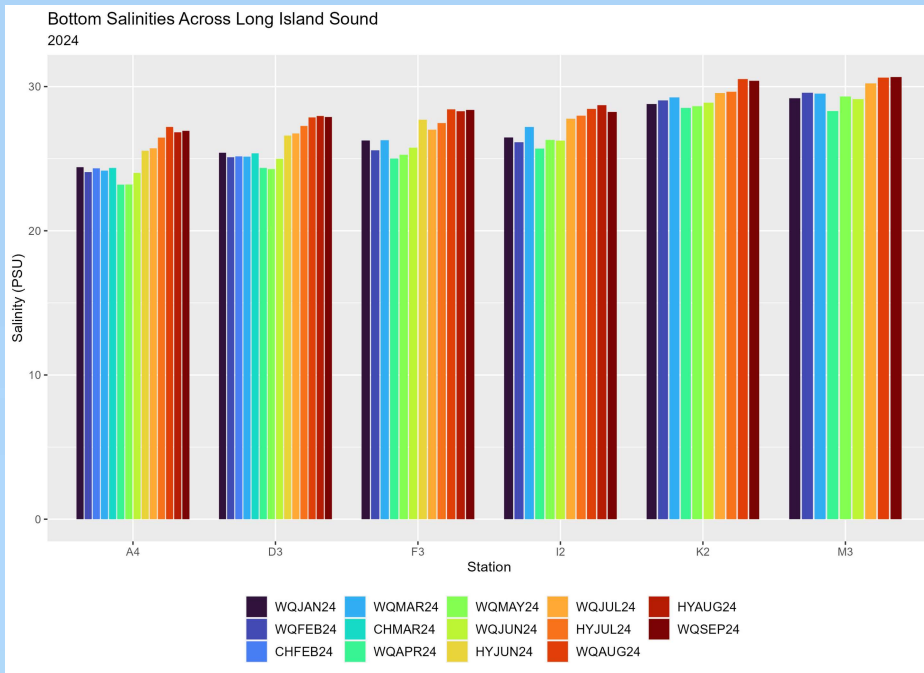
pH Levels

The average surface and bottom pH from all the stations across LIS during the HYAUG23 survey were 7.74 and 7.47 SU, respectively. The lowest bottom pH was 7.31 (Station A4), the highest bottom pH was 7.81 (Station 25), the lowest surface pH was 7.56 (Station 09), and the highest surface pH was 7.91 (Station I2).

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

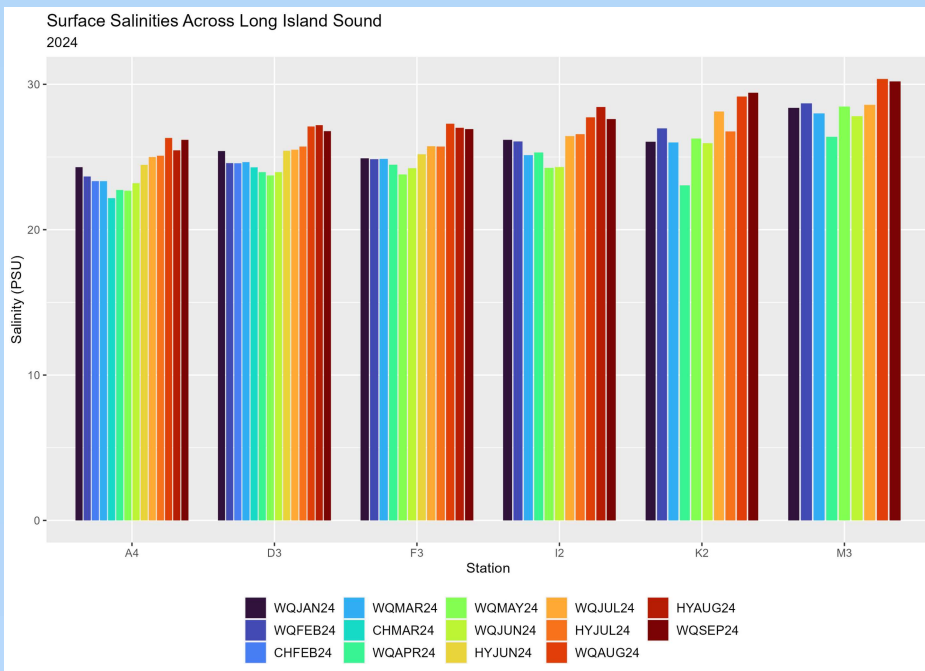


Salinity



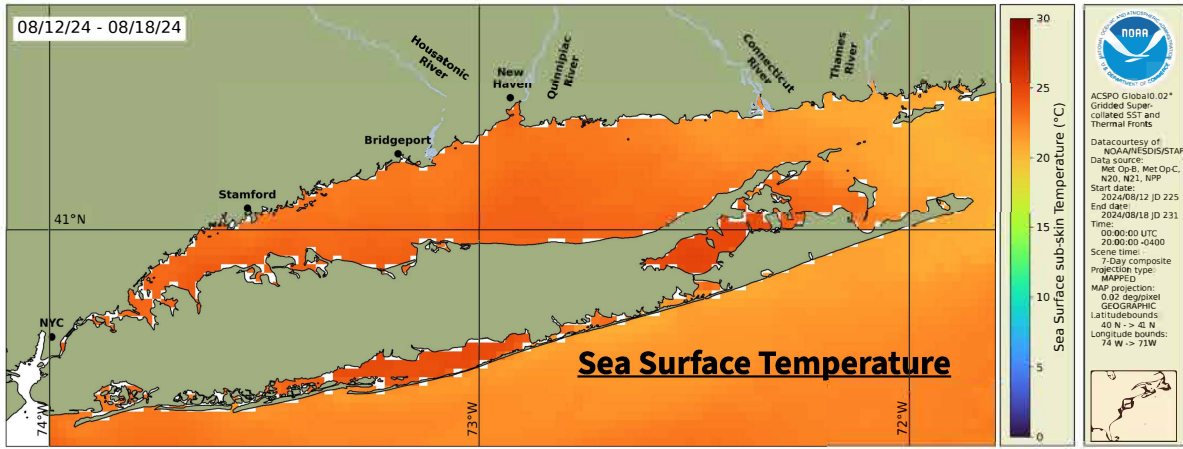
Surface salinities across Long Island Sound generally decrease slightly from January through May due to snow melt and spring rains. The less dense freshwater will float on top of the denser saltwater contributing to stratification and impacting hypoxia. Additionally, nutrients carried by runoff fuel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

Surface salinity values during the HYAUG24 survey were slightly below the 2009-2024 average for Stations A4 while D3 was slightly above average. Bottom salinity values were very close to but slightly below 2009-2024 averages for Stations A4 slightly above average at D3. (See table below).

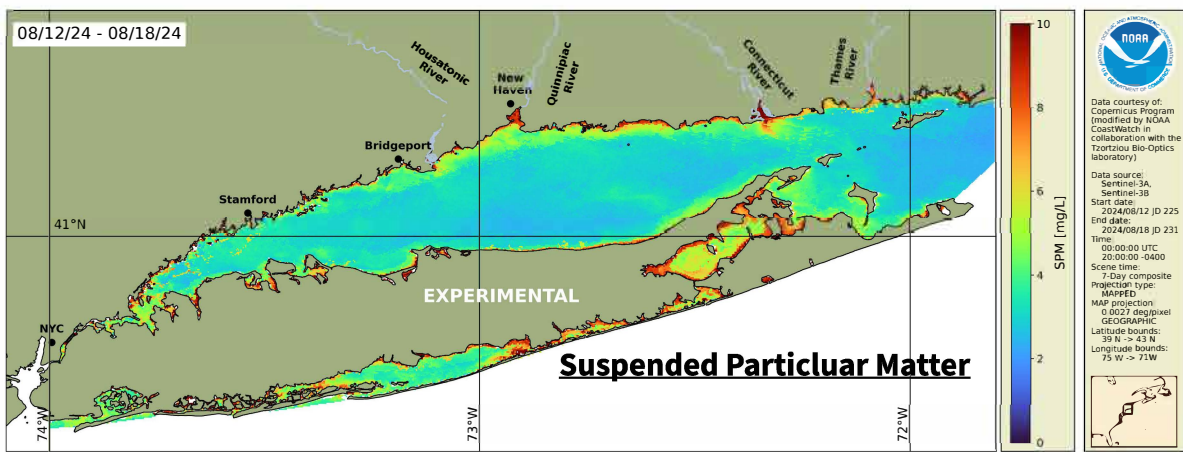


	A4	D3
2024 Surface	25.46	27.19
2009-2024 Average Surface	26.35	27.06
2024 Bottom	26.83	27.96
2009-2024 Average Bottom	27.02	27.77

Remote Sensing

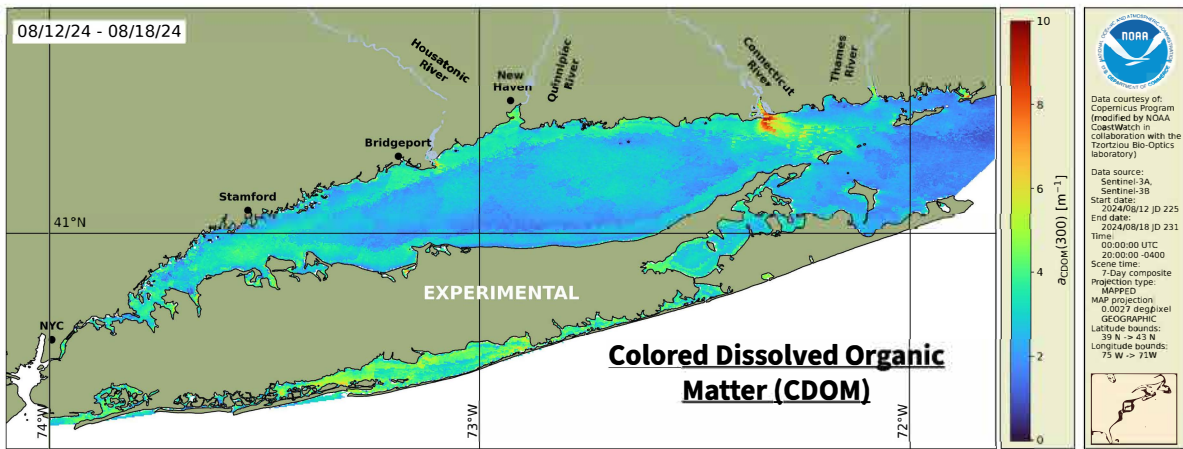


LIS researchers have leveraged satellite algorithms alongside the collection of optical, biogeochemical, and ecological data to monitor Long Island Sound and track critical environmental indicators such as surface temperature, suspended particulate matter, chlorophyll-a concentrations, ocean color, and colored dissolved organic matter. Utilizing satellite imagery at resolutions ranging from 1 km to as precise as 10–30 meters, we collaborate with [NOAA CoastWatch](#) to transform these satellite observations into practical, actionable insights for environmental management.

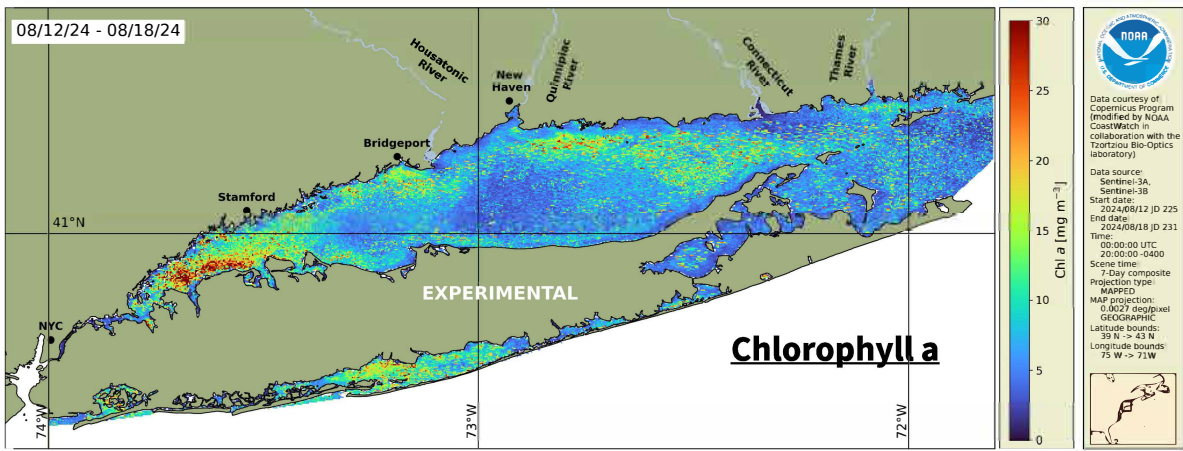


Sea Surface temperatures are higher in the Central and Western parts of the Sound in comparison to the Eastern portion ranging between 18-25°C.

Suspended Particulate Matter is more concentrated toward the Coastline of both Connecticut and in Long Island New York ranging from 5mg/L to about 9mg/L with the highest concentrations forming at the mouth of the Quinnipiac River, Connecticut River, and Thames River, most likely from stormwater and industrial activities. Lower concentrations can be found ranging from about 2-5 mg/L in the Central open waters of the Sound.

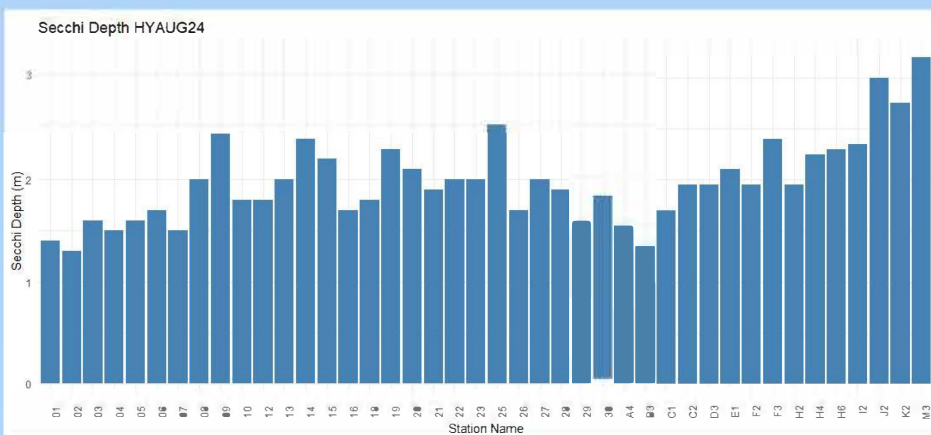


Colored Dissolved Organic Matter (CDOM) concentrations appear to be more elevated closer to NYC, Stamford, Bridgeport near the mouth of the Housatonic River, New Haven, and the mouths of the Connecticut and Thames River. The highest concentrations occurred at the mouth of the Connecticut River.



Chlorophyll a concentration are dispersed fairly evenly throughout the Sound, however the highest concentrations of chlorophyll a and significant phytoplankton growth appear in the Western portion of the Sound from Stamford West toward NYC. The Eastern Sound shows lower chlorophyll a levels reflecting lower nutrient input and greater water mixing from the Atlantic Ocean.

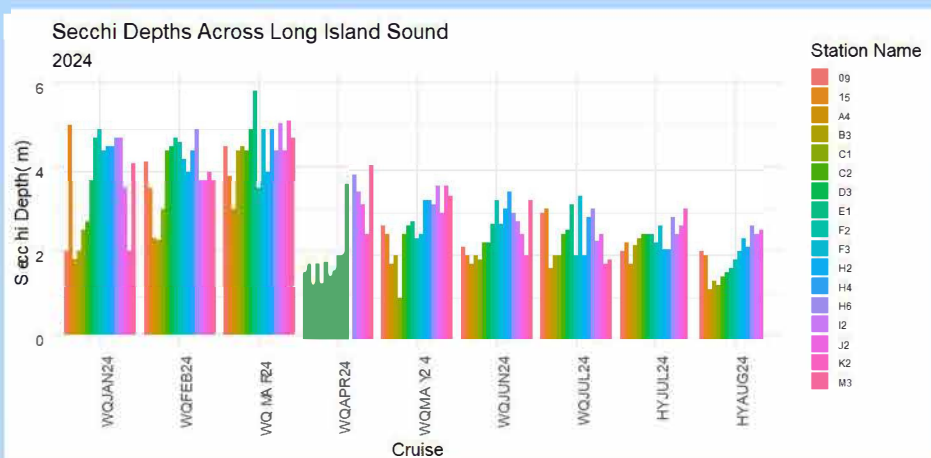
Secchi Depths



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.

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)



Secchi depths were taken at 39 stations during HYAUG24 as K2 and M3 were not sampled during this survey. The depths recorded ranged from 1.1 meters (Station 02) to 2.7 meters (Station H6).

In report card terms, 6 stations were in the A range, (>2.28m), 3 stations were in the B range (2.12m to <2.28m), 8 stations were in the C range (1.95 to <2.12), and 7 stations were in the D range (1.8 to <1.95). Eighteen (18) stations failed (<1.8).

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

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