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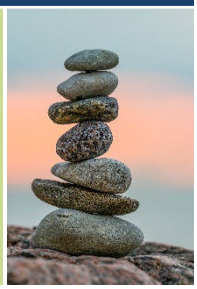
Long Island Sound Water Quality Monitoring Program **July 31, 2023**

July



Dempsey Update

In July, the Dempsey will have the hydraulic and air conditioning upgraded at Essex Boat Works. If you have any questions or want more information on the Dempsey, please contact Matthew Lyman at: matthew.lyman@ct.gov.

2023 Sampling Schedule

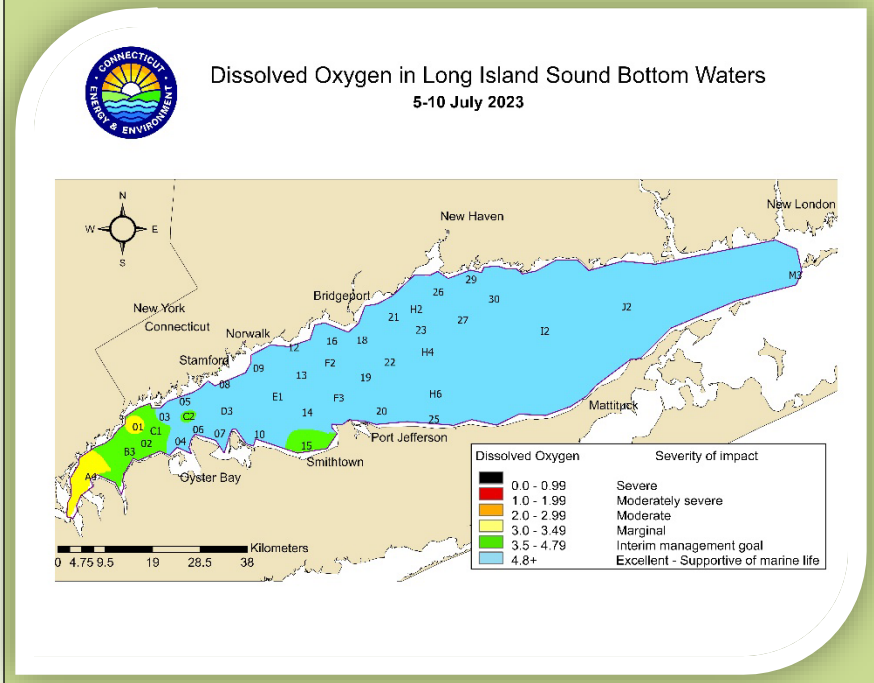
The 2023 Long Island Sound Sampling began on 3 January 2023. All scheduled cruises except for CHFEB23 and WQMAR23 (maintenance issues) were completed as scheduled. The next survey is HYJUL23, scheduled during the week of 17 July. Click the link to learn more about the program and our sampling schedule: Long Island Sound Water Quality and Hypoxia Monitoring Program Overview (ct.gov)

Dissolved Oxygen Summary

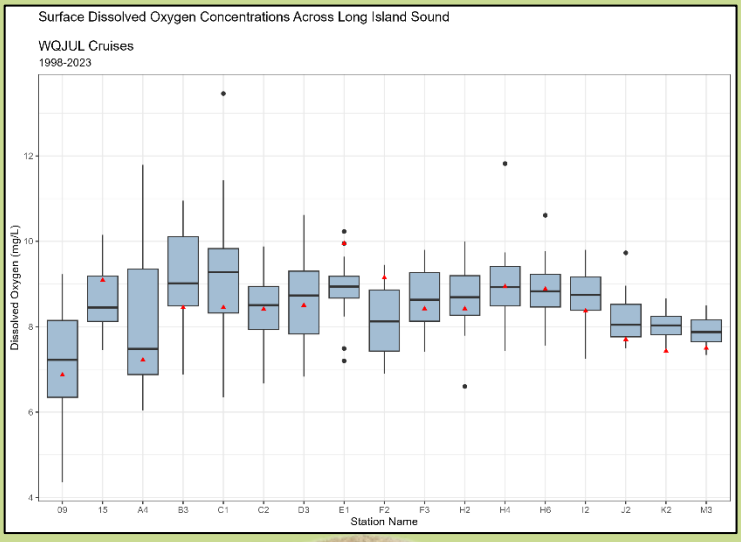
CT DEEP sampled 41 stations during the WQJUL23 survey that was conducted 5-10 July 2023. The lowest dissolved oxygen recorded during this survey was at Station A4 with a concentration of 3.41 mg/L. A total of seven stations sampled during this survey had concentrations below 4.8 mg/L.

In 2023, the DO at Station A4 was slightly lower than in 2022 and higher than in 2021. Bottom water concentrations at Station A4 during the WQJUL surveys range from 1.39 to 4.63 mg/L and the average bottom water DO concentration (1998-2023) is 3.31 mg/L. For 12 of the past 13 years the minimum dissolved oxygen concentration for the WQJUL survey occurred at Station A4 (Table 1).

There were of 208.2 km^2 (80.39 mi2) of bottom water that had dissolved oxygen concentrations less than 4.8 mg/L during the WQJUL23 survey (118.8 km^2 less than in 2022). The areal estimates of bottom waters with DO concentrations less than 4.8 mg/L range from 0 km^2 to 1022.8 km^2 (2010). For 11 of the past 12 years the DO in the bottom waters has not dropped below 3 mg/L during the WQJUL survey. The highest area (139.4 km^2) of bottom waters with concentrations below 3 mg/L during the WQJUL surveys occurred in 2003.



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



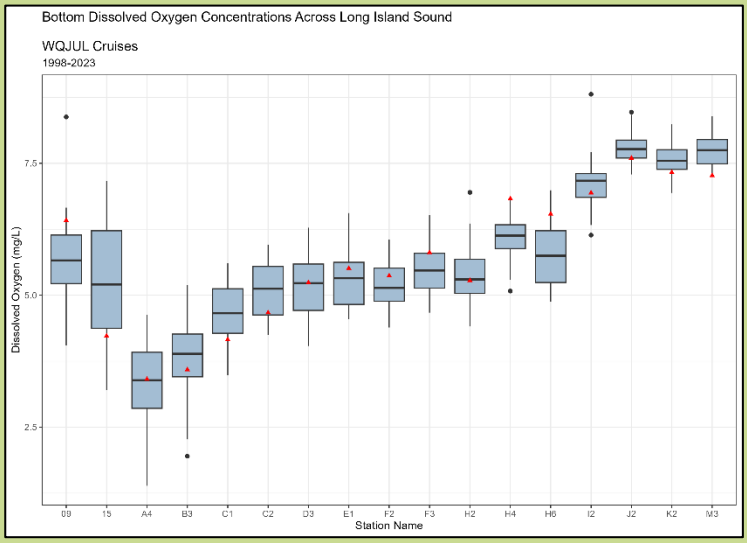


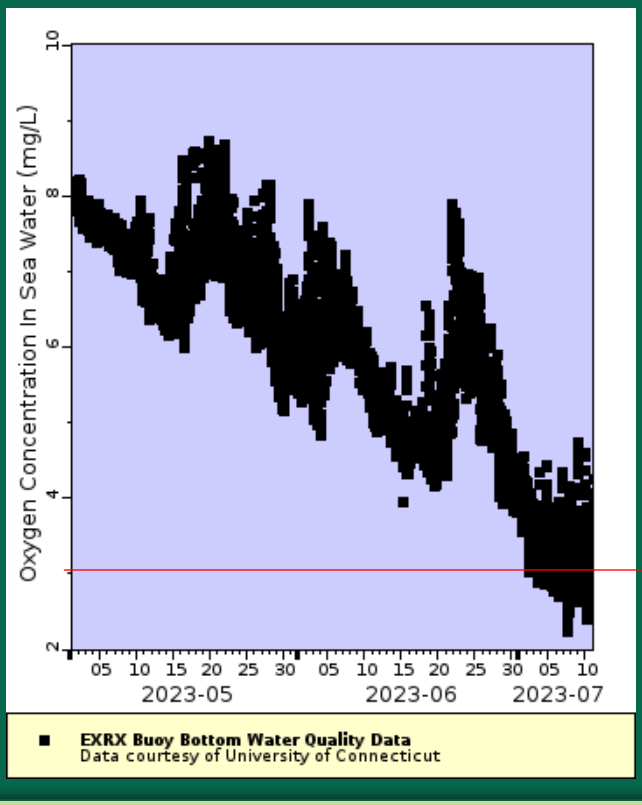
Table 1. Minimum Dissolved Oxygen Concentrations and Areal Estimates for WQJUL Cruises Conducted from 1998-2021 by CT DEEP.

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)
WQJUL98	2.57	02	475	33.4
WQJUL99	2.44	A4	552.3	43.7
WQJUL00	1.36	A4	735.7	114.6
WQJUL01	3.06	A4	760.8	0
WQJUL02	1.39	A4	546.7	139.4
WQJUL03	2.18	15	480.9	122
WQJUL04	3.56	02	166.8	0
WQJUL05	3.21	B3	808.6	0
WQJUL06	2.47	A4	417.9	104.6
WQJUL07	3.5	15	537.1	0
WQJUL08	2.96	B3	312.6	10.1
WQJUL09	3.83	A4	131.2	0
WQJUL10	1.76	A4	1022.8	102.3
WQJUL11	2.88	A4	535.8	64.3
WQJUL12	3.2	A4	134.5	0
WQJUL13	3.56	A4	102.6	0
WQJUL14	3.91	A4	78.4	0
WQJUL15	4.02	A4	106.0	0
WQJUL16	4.26	A4	95.2	0
WQJUL17	3.65	A4	222.6	0
WQJUL18	3.37	A4	189.1	0
WQJUL19	4.23	15	191.5	0
WQJUL20	2.97	A4	301.6	34.5
WQJUL21	3.07	A4	227.5	0
WQJUL22	3.62	A4	327.0	0
WQJUL23	3.41	A4	208.2	0

University of Connecticut
Department of Marine Sciences

NERACOOS
NORTHEASTERN REGIONAL ASSOCIATION of COASTAL OCEAN OBSERVING SYSTEMS

LISICOS -- The Long Island Sound Integrated Coastal Observing System



CT DEEP ship-based surveys only capture dissolved oxygen concentrations at the time when we are on station. The LISICOS Buoys collect continuous data and allow us to see differences in dissolved oxygen concentrations over time.

The graph to the left shows dissolved oxygen concentrations dropped below 3.0 mg/L (red line) and approached 2 mg/L around the time of the CT DEEP WQJUL23 survey on 7/10/23.

The LISISOC Buoy at Execution Rocks (very near CT DEEP Station A4) recorded a minimum DO value of 2.401 on 7/10 (preliminary data) during pre-dawn hours.

Quick Stats from the buoy accessed on 7/27/23 from the LISICOS website indicate there have been 13.67 days with DO below 3.0 mg/L, 9.71 days below 2.0 mg/L, and 4.18 days below 1.0 mg/L. A minimum Do of 0.12 occurred on 7/25/23.

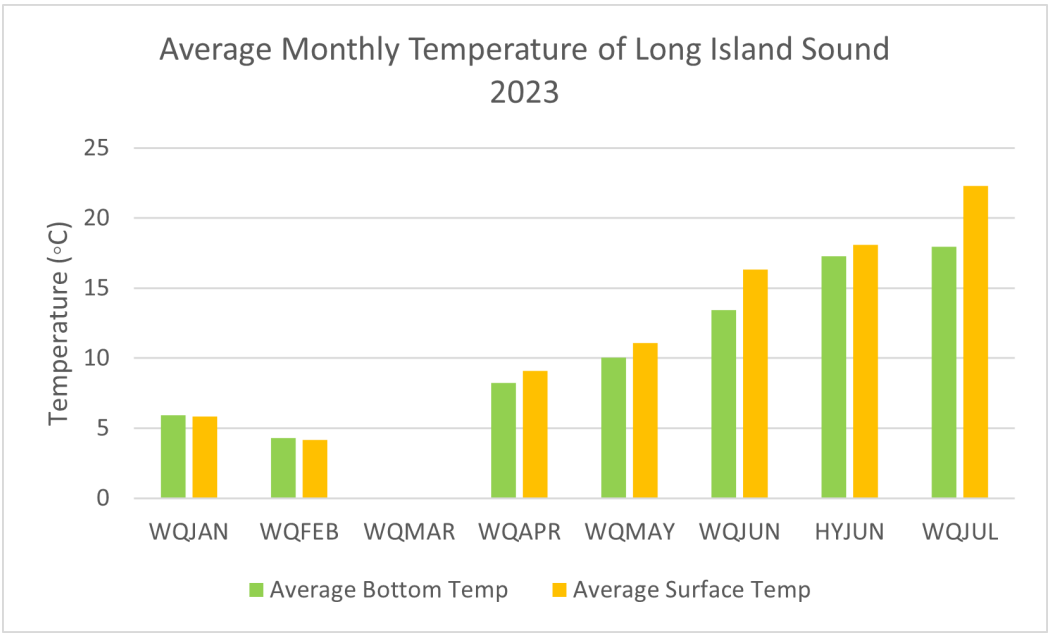
LISICOS Buoy data are also available on the NERACOOS Mariners Dashboard.

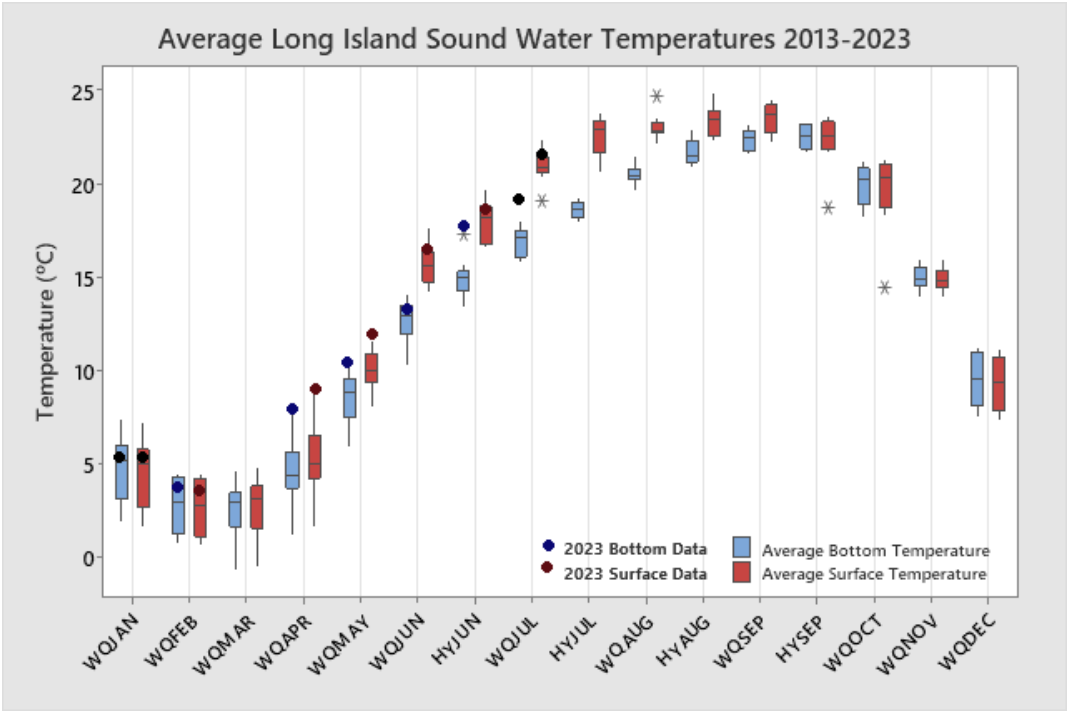
Temperature Data Summary

Bottom and surface water temperatures continue to rise with a 4.22˚C increase of average surface temperatures and a 0.69˚C increase of average bottom temperatures from HYJUN23 to WQJUL23.

The maximum surface water temperature during the WQJUL23 survey occurred at Station F2 (23.89˚C) while the maximum bottom water temperature occurred at Station B3 (19.32˚C).

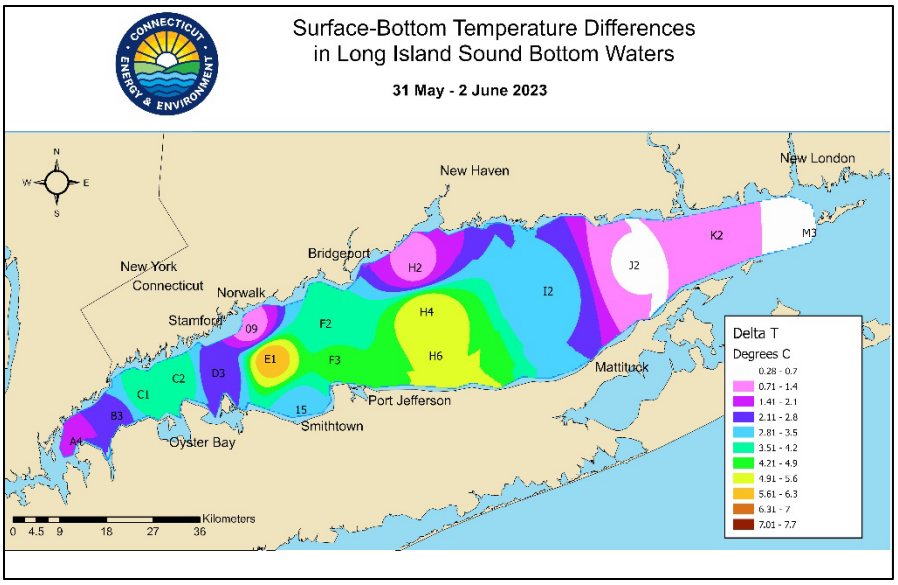
The average surface and bottom water temperature for WQJUL were higher in 2023 than in 2022.

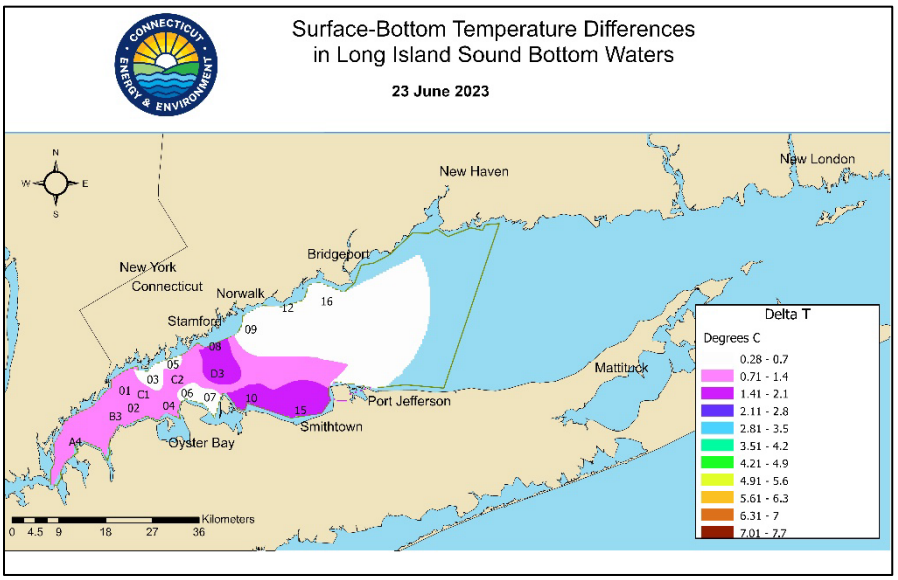


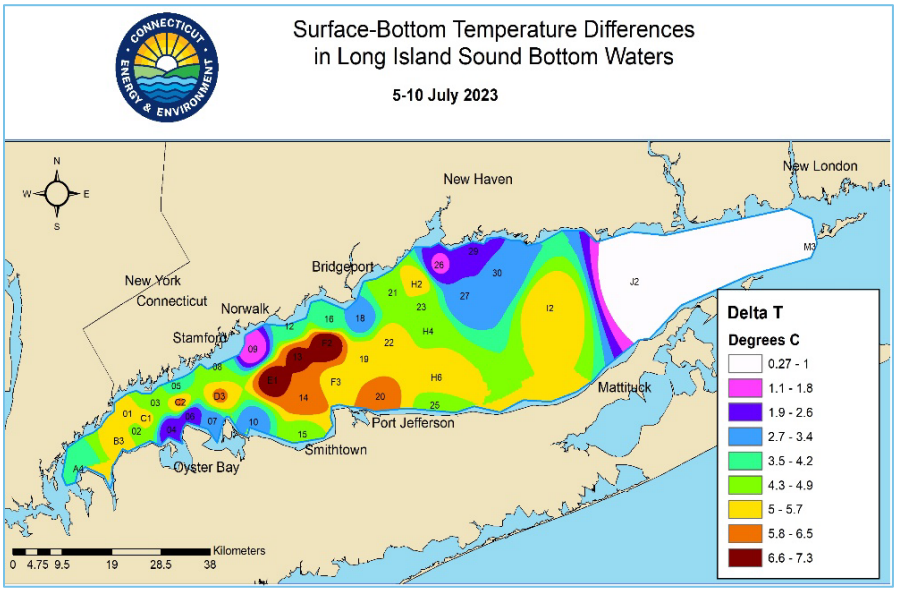


Note: WQMAR23 survey could not be completed due to maintenance

Delta T (ΔT)







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.

These three graphs show how stratification set up in Long Island Sound between June and early July. You can see there was a mixing event that happened around the HYJUN23 survey.

The greatest temperature difference between the surface and bottom waters during the WQJUN23 survey was 5.87°C, measured at Station E1. The smallest temperature difference was 0.34°C at Station M3. ΔT's averaged 2.88° C during the WQJUN23 survey.

The maximum Delta T measured during the HYJUN23 survey was 1.62°C, measured at Station D3. The smallest temperature difference was 0.05°C at Station 16. ΔT's averaged 0.87° C during the HYJUN23 survey.

During the WQJUL23 survey the greatest Delta T was 7.27°C, measured at Station F2. The smallest temperature difference was 0.27°C at Station J2. ΔT's averaged 4.33° C during the WQJUL23 survey.

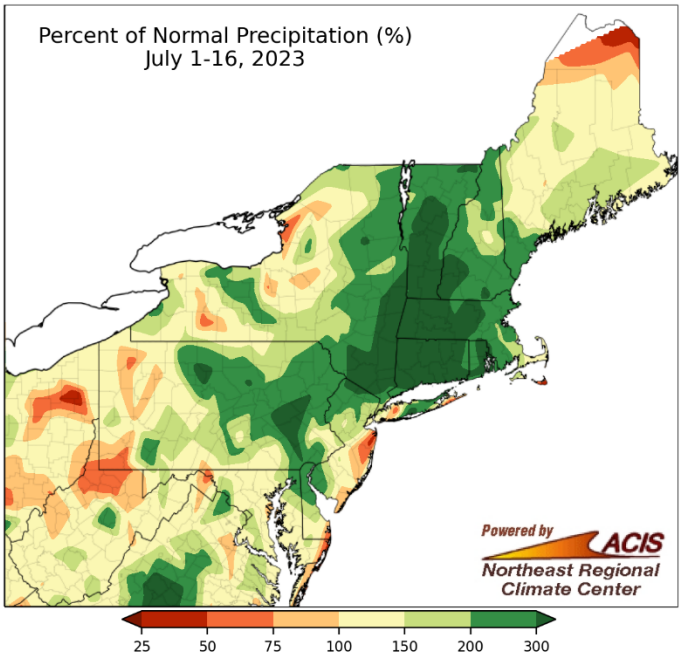
Weather

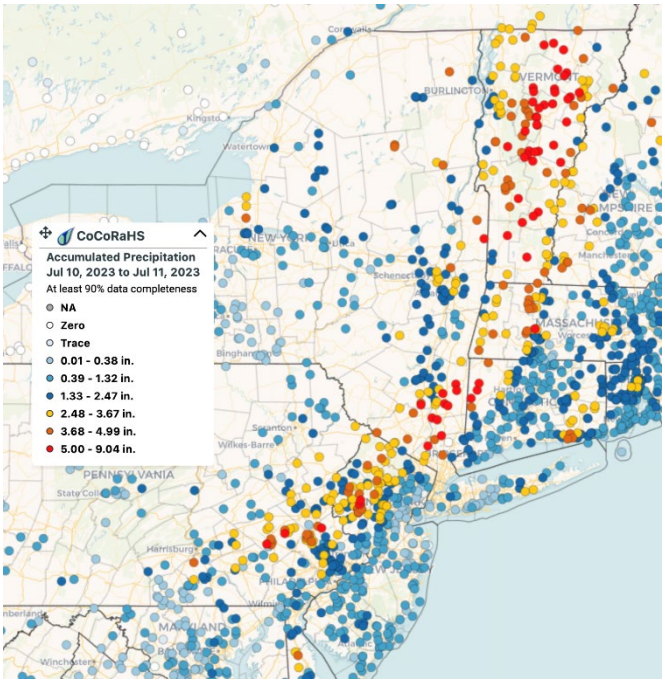
After below average precipitation in June, July got off to an extraordinarily rainy start. Much of the Northeast saw between 200% and 300% of normal rainfall. **In just the first half of the month (July 1st through July 16th), this year is already one of the top 20 wettest July's on record.** The rainfall from July 9th to 11th was considered an extreme rainfall event and caused major flooding in New York's Hudson Valley and in Vermont. Middlesex, VT got 8.03 inches of rain in two days, which qualifies as a 500-year storm event! This flooding has created major damage to infrastructure and is causing an increase in debris in rivers. The Northeast Regional Climate Center says that more frequent and intense rainfall is expected in the future due to climate change. The data recorded is from July 1st through July 16th.

Hartford, CT had 228% normal precipitation receiving 9.51 inches as opposed to a typical 4.17. Hartford, CT was ranked 4th among the 20 wettest sites in the Northeast.

Bridgeport, CT received 5.10 inches of rain which is 153% of a normal 3.32 inches. It ranked as the 19th wettest site in the Northeast.

Islip, NY ranked 7th wettest with 184% of normal precipitation at 6.00 inches. Normal precipitation was 3.26 inches.



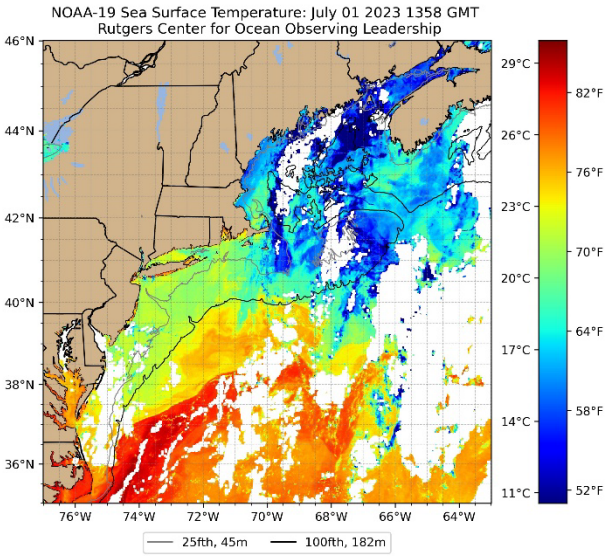


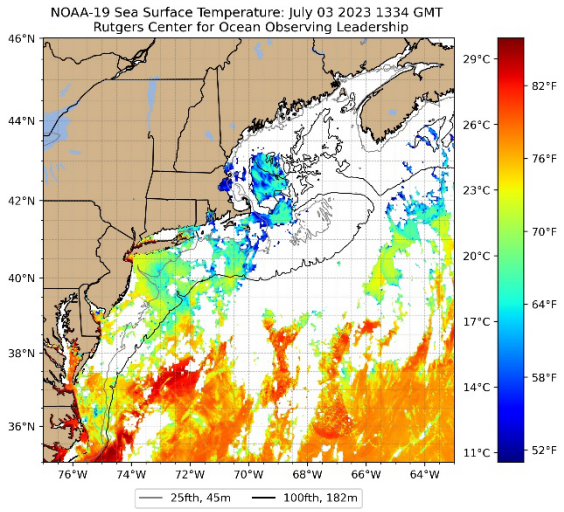
July 10 to 11 rainfall totals from CoCoRaHS. Red dots indicate at least 5 inches of rain. Credit: CoCoRaHS.

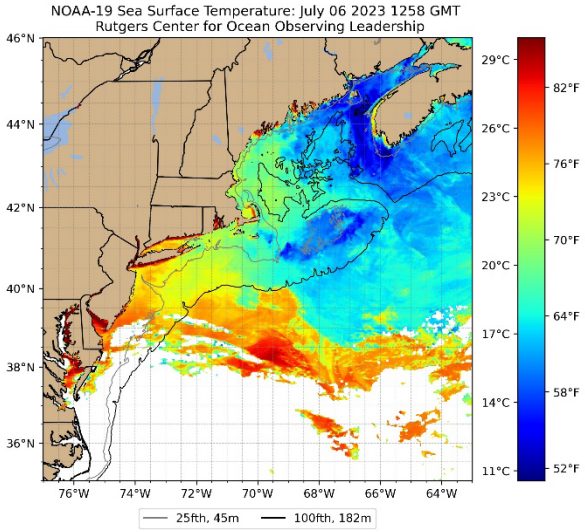
Flooding in Vermont State Capital, Montpelier

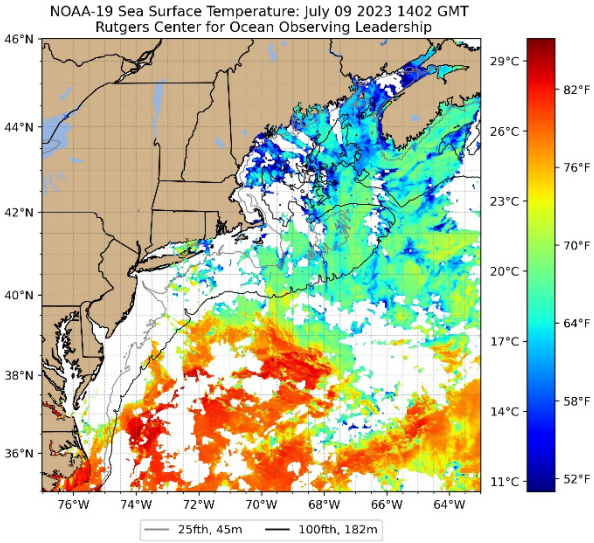
All data and images were from the Northeast Regional Climate Center's website. Please visit http://www.nrcc.cornell.edu/ for more

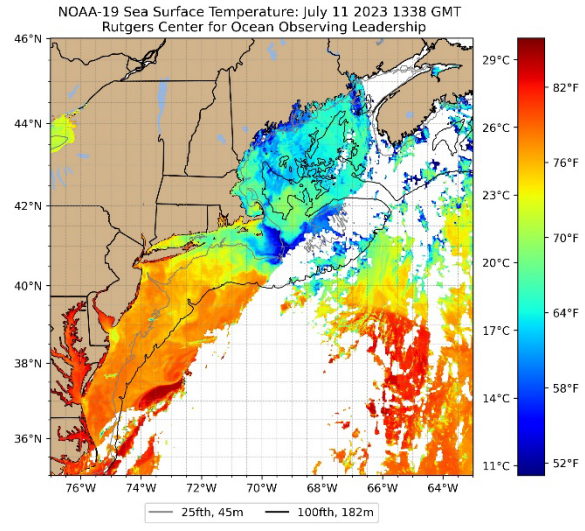
Sea Surface Temperature

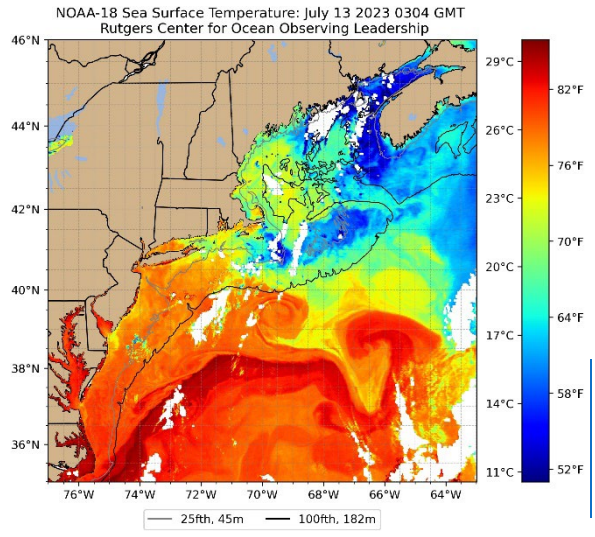












Sea Surface temperature data from Rutgers University IMCU Coastal Ocean Conservation Lab illustrates how currents and fronts impact water temperatures in the Sound and offshore.

In the first image, taken on July 1st, the waters in Long Island Sound are around 20◦C-23◦C (68ºF-73.4ºF).

The five other images (left) show the waters warming in the first half of the month. By July 13th the sea surface temperature in the western part of the sound has reached up to 26◦C (78.8ºF).

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)]

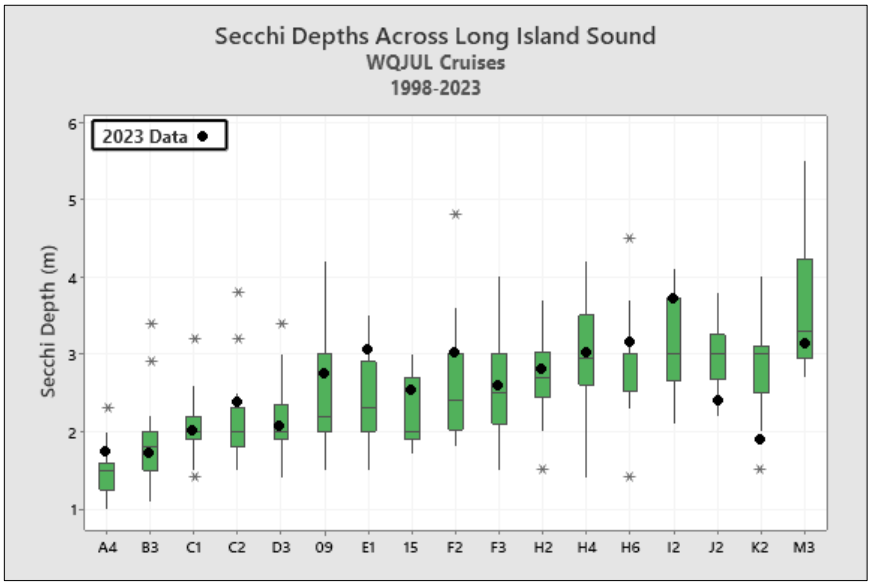
Secchi Disk Depth

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.

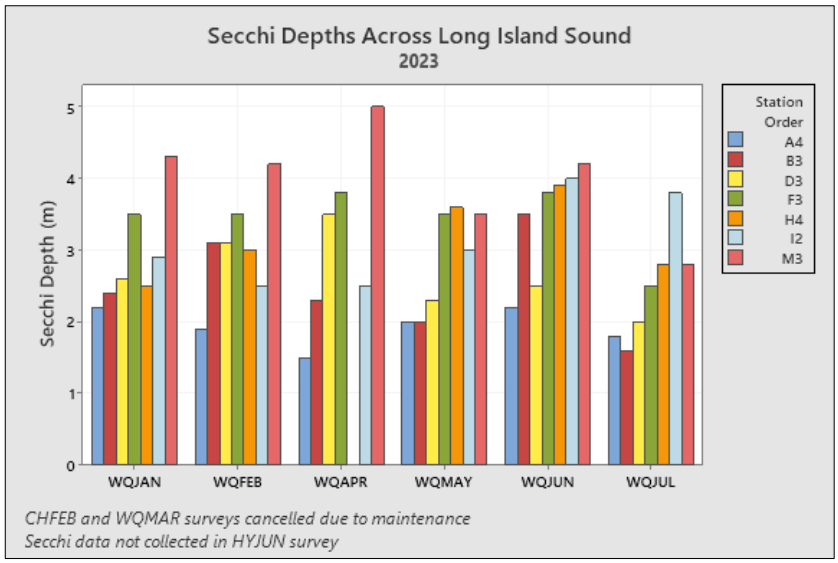
The Long Island Sound Report Card developed by Save the Sound utilizes the following water clarity depths thresholds:

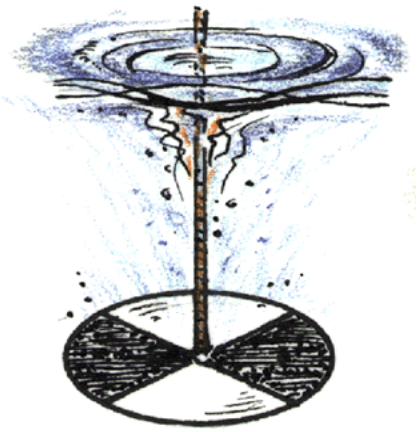
1. >2.28 m (A- to A+; 90-100)
2. 2.12 to <2.28 (B- to B+; 80-89)
3. 1.95 to <2.12 (C- to C+; 70-79)
4. 1.8 to <1.95 (D- to D+; 60-69)
5. 0 to <1.8 (F; <60)

Secchi depths were taken at 17 stations during the WQJUL23 survey; these depths ranged from 1.5 meters (Station K2) to 3.8 meters (Station I2).



In Report Card terms, 11 stations were in the A- range (>2.28m), 1 station was in the B- range (2.12-2.28), 2 stations were in the C- range (1.95-<2.12m), 1 station was in the D- range (1.8 to <1.95m), and 2 stations failed (<1.8m).





Spotlight!
Pathogen Monitoring Network

What Is It?

The Pathogen Monitoring Network is a Long Island Sound Study funded partnership of volunteer monitoring organizations overseen by Harbor Watch, The Interstate Environmental Commission, Maritime Aquarium, and CT DEEP. The program is intended to incorporate community-based and other local monitoring groups to develop a coordinated fecal indicator bacteria (FIB) monitoring network in the Long Island Sound watershed, with a particular focus on areas within Connecticut and New York. The goal is to facilitate the expansion of current FIB monitoring programs and support new monitoring programs to fill data gaps, target resources to high priority waterbodies, and track down pollution sources where data indicate efforts are needed. 2023 marks the first year of sampling for the network. Groups participating in the pilot include Harbor Watch, Clean Up Sounds and Harbors (CUSH), the CT National Estuarine Research Reserve (CT NERR), The Coalition to Save Hempstead Harbor, and Friends of the Bay (Oyster Bay). Waterbodies include Palmer Cove, Duck River/Lieutenant River complex, Norwalk Harbor, Frost Creek, and Dosoris Pond.

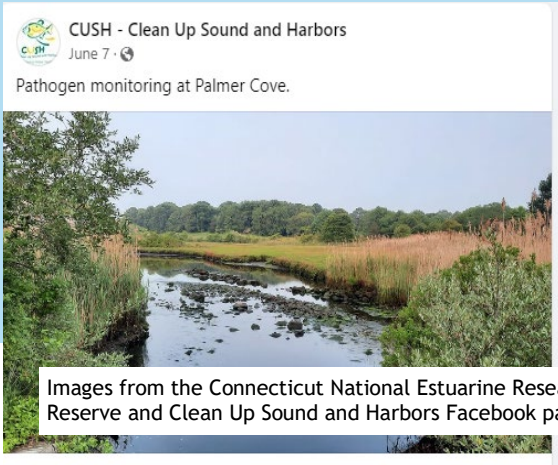
Why Was It Created?

In the Long Island Sound watershed, bacterial contamination from sewage limits safe and equitable public access to water, restricts shellfish harvest acreage, contributes to eutrophication, and is likely to worsen as climate change brings more extreme storm events. Despite the importance of this issue, FIB levels are under-monitored and largely unquantified in large extents of the Connecticut and New York areas of the Long Island Sound watershed. As a result, there are insufficient data to enable state agencies to assess whether the water quality of a specific waterbody supports its intended uses. Public bathing beaches are more regularly monitored by local public health agencies. Many near-shore tributaries and embayment areas also have an intended use of primary or secondary contact recreation and have experienced a recent increase in recreational use. However, unlike public bathing beaches, many of these areas lack sufficient monitoring data to assess water quality. Community-based efforts have the potential to help fill these monitoring gaps.

What Is CT DEEP's Role?

Each organization plays a key role in supporting the network. CT DEEP gathers input from state agencies and municipalities on the CT side of Long Island Side regarding priority waterbodies in need of data, as well as provides guidance to the volunteers on the states' requirements for use of volunteer generated data. On a higher level, CT DEEP conducts annual water quality monitoring to evaluate the physical, chemical, and biological condition of the State's waters. A wide variety and large quantity of information each year is collected, including water chemistry data, water temperature data, bacteria data, biological community data, and tissue contaminant data. With this information, CT DEEP can: Evaluate the effectiveness of pollution control programs, study water quality trends, and determine the impacts of pollution events. CT DEEP provides high-level guidance to the LISS Policy Committee and Management Committee decision-making process based on the data collected.

For more information on CT DEEP's involvement please contact Katie O'Brien Clayton at Katie.obrien-clayton@ct.gov



Images from the Connecticut National Estuarine Research Reserve and Clean Up Sound and Harbors Facebook pages

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For more information on the Long Island Sound Water Quality Monitoring Program please visit:
https://portal.ct.gov/DEEP-LISWater