

July 2021

HYJUL21 Hypoxia Summary

All stations above 3.0 mg/L

20 Stations with Dissolved Oxygen Concentrations below 5 mg/L

CT DEEP sampled 39 stations during the HYJUL21 survey that was conducted 19-21 July 2021. The lowest dissolved oxygen (DO) recorded during this survey was at Station A4 with a concentration of 3.27 mg/L. The next lowest DO occurred at Station B3 with a concentration of 3.82 mg/L. These numbers are significantly higher than during the HYJUL19 survey when the lowest DO was 2.47 mg/L at Station A4. In HYJUL21, Stations A4 and B3 were the only ones below 4 mg/L; however, a total of 15 stations were below 4.8 mg/L. Preliminary data from this survey and prior 2021 cruises are available in Excel spreadsheet format. CT DEEP data from 1991-present are also available in the UCONN CTDEEP Cruise Data Viewer App: <http://merlin.dms.uconn.edu:9988/webapps/home/> or the UCONN ERDDAP website: http://merlin.dms.uconn.edu:8080/erddap/tabledap/DEEP_WQ.html.

In 2021, 522.7 km² of bottom water had concentrations below 4.8 mg/L (but above 3 mg/L). In 2020, 144 km² of bottom water had concentrations below 3 mg/L and 1477 km² had concentrations below 4.8 mg/L. During the HYJUL19 survey, there were 511.8 km² of bottom water that had DO concentrations less than 4.8 mg/L, and 46.1 km² were less than 3.0 mg/L. Comparatively, in 2018 there were 232.6 km² of bottom water with DO concentrations less than 4.8 mg/L, and no bottom water was less than 3.0 mg/L. Since 1998, DO levels in the bottom waters of Long Island Sound during the HYJUL survey have been above 3.0 mg/L on only four occasions: HYJUL21, HYJUL18, HYJUL14, and HYJUL04 (Table 1). The areal estimates of bottom waters with DO concentrations less than 4.8 mg/L range from 1,477 km² in 2021 to 148.2 km² in 2014. The most severe hypoxic event to occur during a HYJUL survey was in 2000 when approximately 447 km² of bottom water had concentrations below 3.0 mg/L.

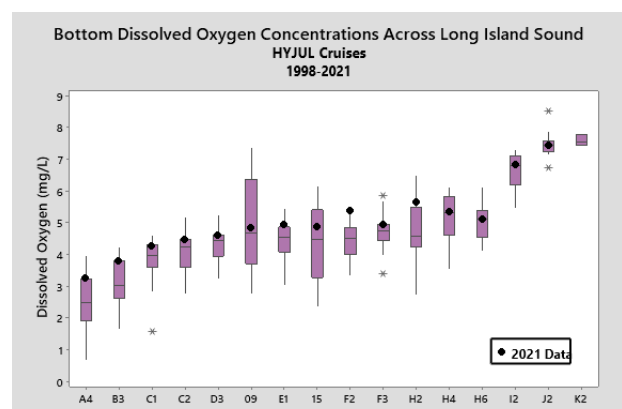
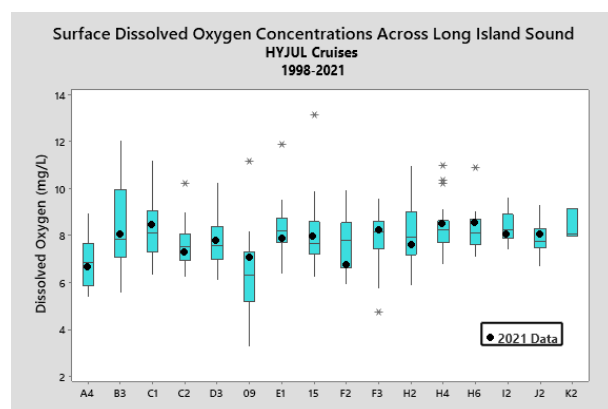
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Long Island Sound Water Quality Monitoring Program

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Dissolved Oxygen

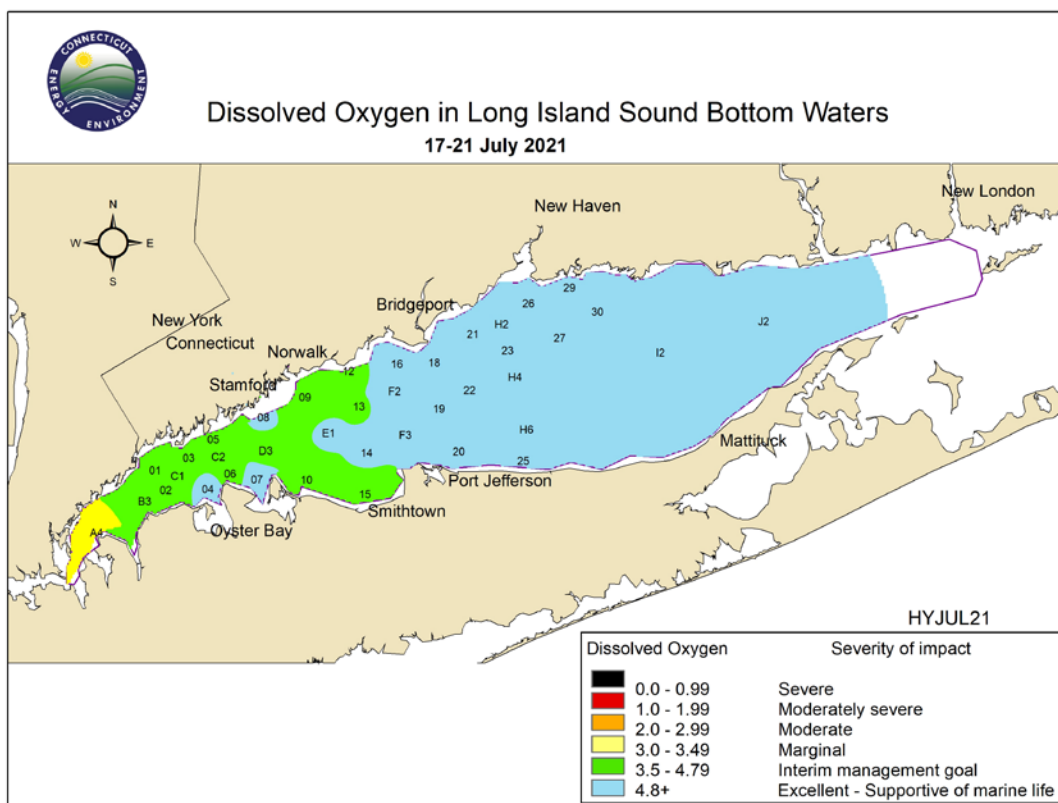


Table 1. Minimum Dissolved Oxygen Concentrations and Areal Estimates for HYJUL Cruises Conducted from 1998-2019 by CT DEEP.

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)
HYJUL98	2.3	15	886.0	86.3
HYJUL99	2.06	A4	1231.8	58.5
HYJUL00	1.27	C1	1342.7	446.9
HYJUL01	2.81	A4	917.1	47.9
HYJUL02	1.8	B3	1702.8	160.2
HYJUL03	2.09	A4	1121.7	175.1
HYJUL04	3.06	A4	1342.1	0
HYJUL05	1.41	A4	1245.5	157.4
HYJUL06	2.83	A4	349.8	66.7
HYJUL07	2.11	A4	823.9	129.9
HYJUL08	0.68	A4	676.5	58.6
HYJUL09	2.43	B3	1030.3	72.8
HYJUL10	1.66	A4	669.3	109.3
HYJUL11	2.5	A4	1110.7	36.2
HYJUL12	1.9	A4	1250.6	126.9
HYJUL13	2.33	C1	671.0	44.8
HYJUL14	3.61	O2	148.2	0
HYJUL15	2.12	A4	554.6	76.2
HYJUL16	2.44	A4	684.4*	49.2
HYJUL17	2.14	O2	1306.2	181.1
HYJUL18	3.70	A4	234.6	0
HYJUL19	2.47	A4	465.7	46.1
HYJUL20	2.09	A4	1476.9	144.4
HYJUL21	3.27	A4	522.7	0

*area underestimated due to CTD battery failure

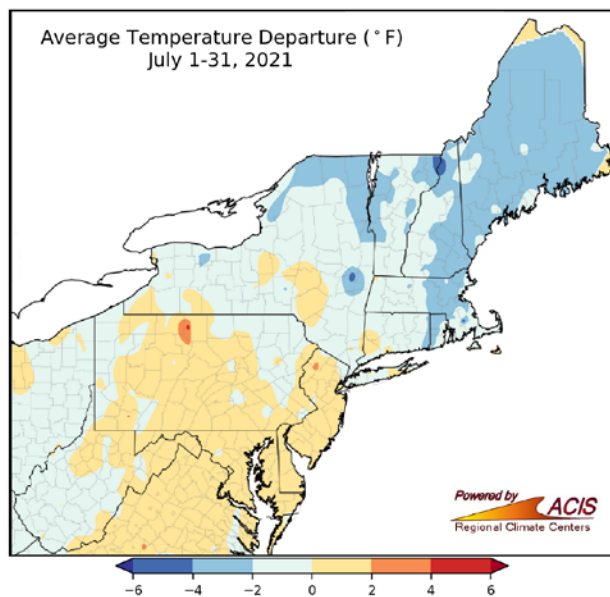
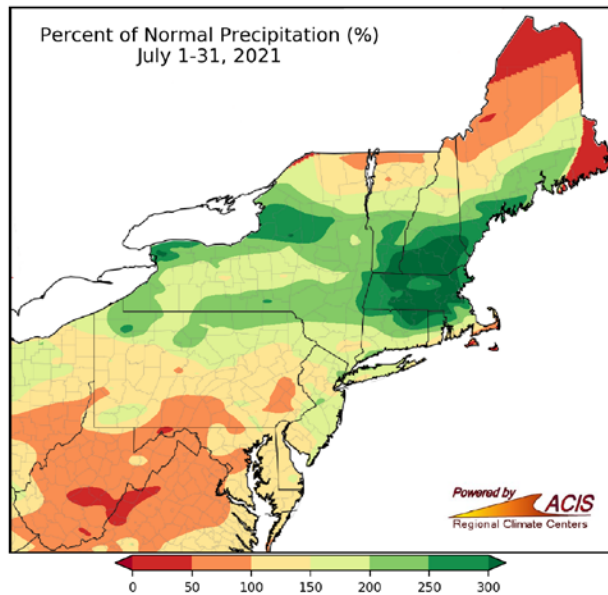
As July comes to a close New York, Connecticut, and Massachusetts experienced approximately 150% to 300% above normal precipitation. In comparison with previous years, this July had cities reaching their all-time wettest months recorded thus far. Taking a closer look at conditions within Connecticut, it was observed that both Bridgeport and Hartford ranked July 2021 as the 20th and 15th wettest to date respectively. Bridgeport received 8.55 inches while Hartford received 10.15 inches of precipitation. The normal values for Bridgeport and Hartford are 3.32 in and 4.17 in respectively. There were 15 days of measurable precipitation in Bridgeport and 19 in Hartford.

The Northeast Regional Climate Center blog for the first half of July noted: *There were only two days during the first half of July without flash flooding or some type of severe weather in the Northeast. On July 1, strong thunderstorm winds and several tornadoes caused damage in southern parts of the region. On July 8, downpours inundated parts of the New York City metro area, flooding several subway stations and roads. Tropical Storm Elsa produced heavy rain, strong winds, and tornadoes in the region from July 8-10. The greatest rainfall totals of over 5 inches were generally found in Connecticut and Maine, resulting in flash flooding.*

Average temperatures were generally about 2°F below normal across CT.

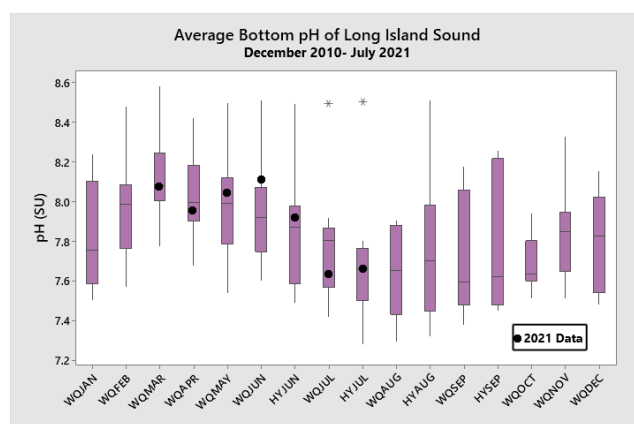
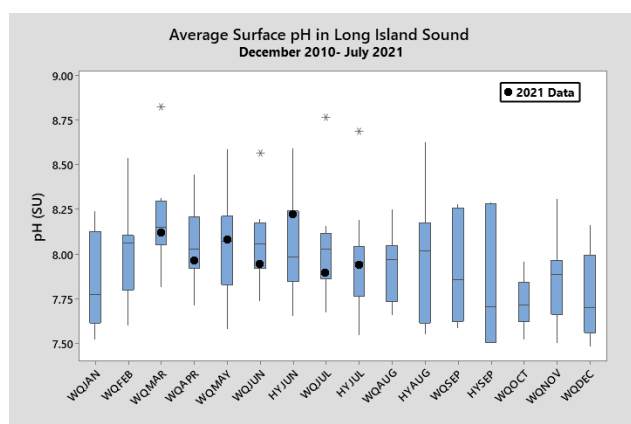
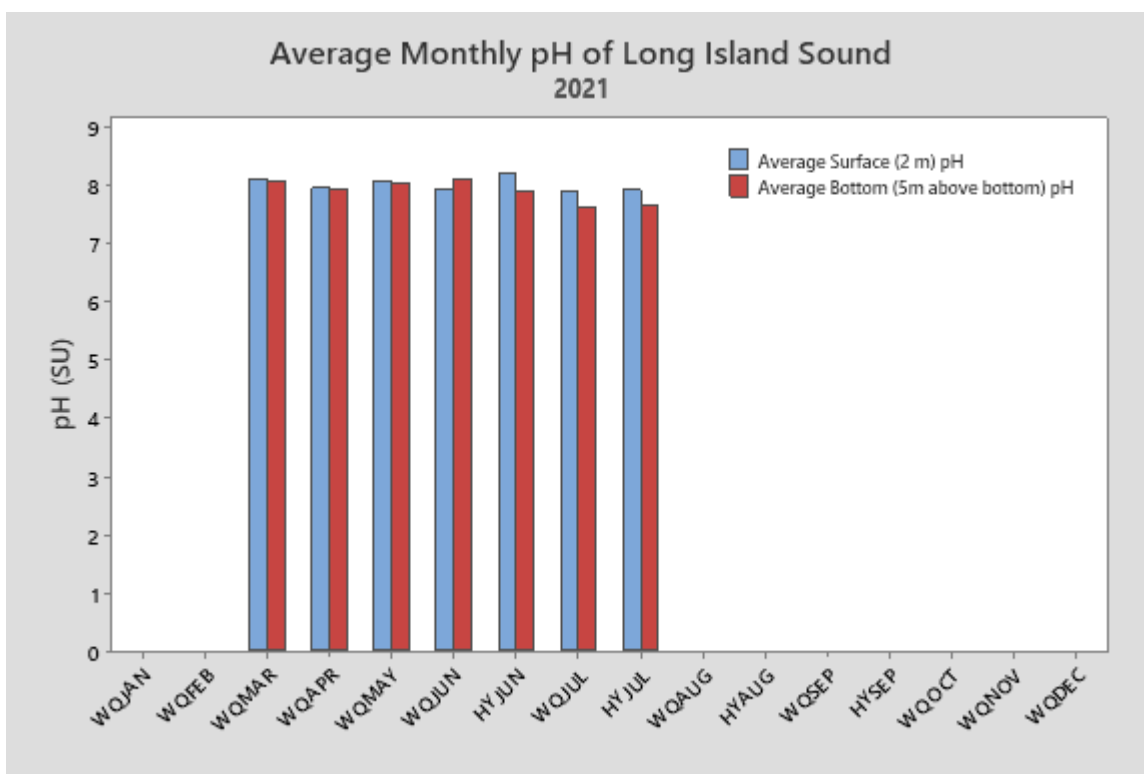
More detailed weather information can be viewed on the Northeast Regional Climate Center's website.

<https://www.nrcc.cornell.edu/services/blog/2021/07/16/index.html>



The average surface and bottom pH from all the stations across LIS during this survey were 7.94 and 7.64 SU, respectively. The lowest bottom pH was 7.45 (Station A4), the highest bottom pH was 7.93 (Station 25), the lowest surface pH was 7.75 (Station 16), and the highest surface pH was 8.05 (Stations 14, H4, and 23).

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

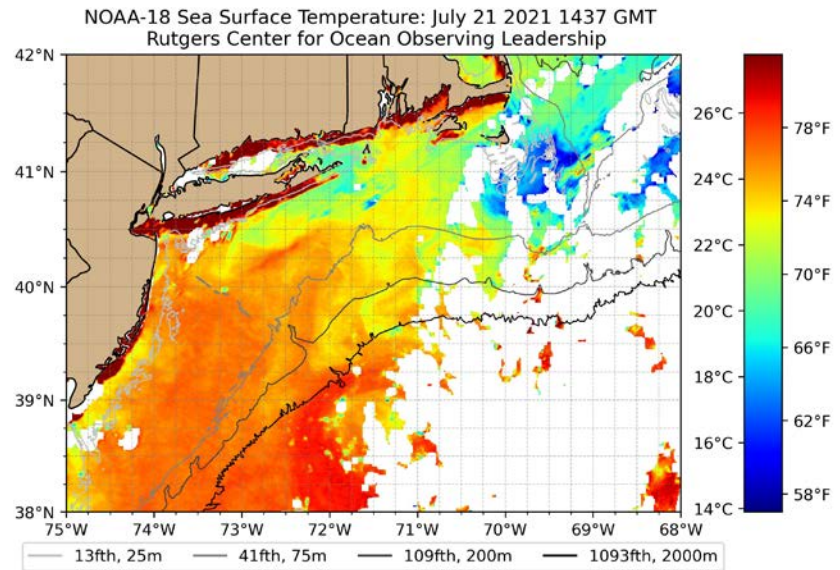


Temperature

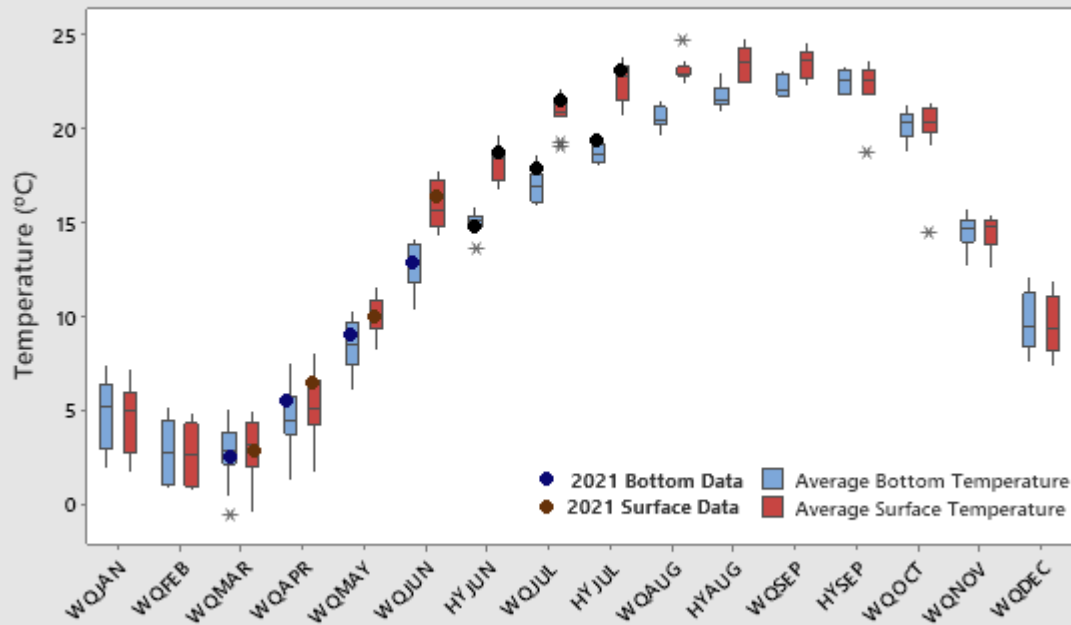
For the HYJUL21 survey, water temperatures averaged 22.99°C for surface waters and 19.26 °C for bottom waters. The surface waters were slightly cooler (-0.76°C) this year than during the HYJUL20 survey whereas the bottom waters were slightly warmer (+0.24°C) than in 2020.

The warmest surface temperature recorded was 24.87°C at Station 21, and the warmest bottom temperature recorded was 23.22°C at Station 25.

The difference between the surface and the bottom waters at each station (ΔT) ranged from 0.52°C (Station 25) to 6.13°C (Station D3) and averaged 3.73 °C.



Average Long Island Sound Water Temperatures 2011-2021

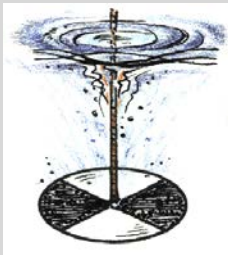


Secchi Disk Depths

Suspended solids, organic matter, phytoplankton, and zooplankton can all reduce water clarity, a measure of how much light penetrates the water column. To assess the water clarity across Long Island Sound, a Secchi disk is lowered into the water at each station until it can no longer be seen.

The Long Island Sound Report Card developed by Save the Sound utilizes the following water clarity depth thresholds based on the Secchi depth:

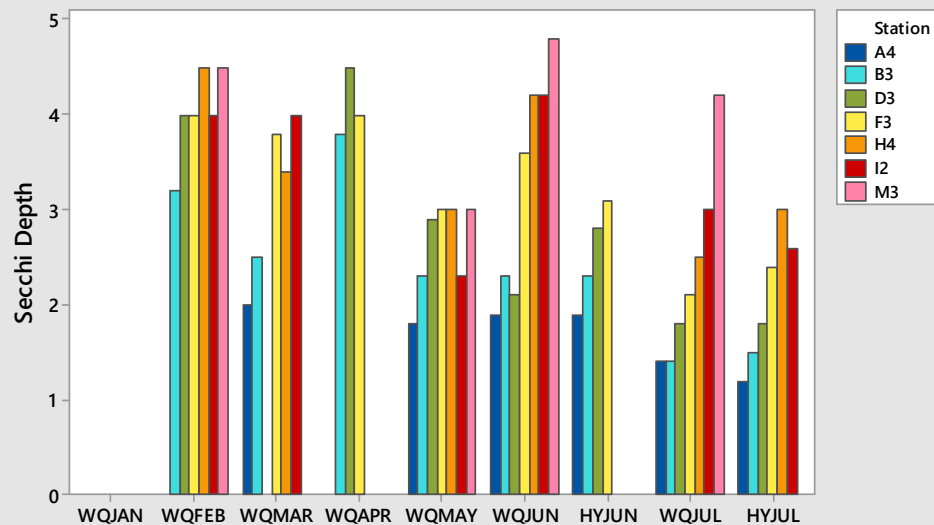
1. >2.28m (90-100)
2. 2.12 to <2.28 (80-89)
3. 1.95 to <2.12 (70-79)
4. 1.8 to <1.95 (60-69)
5. 0 to <1.8 (<60)



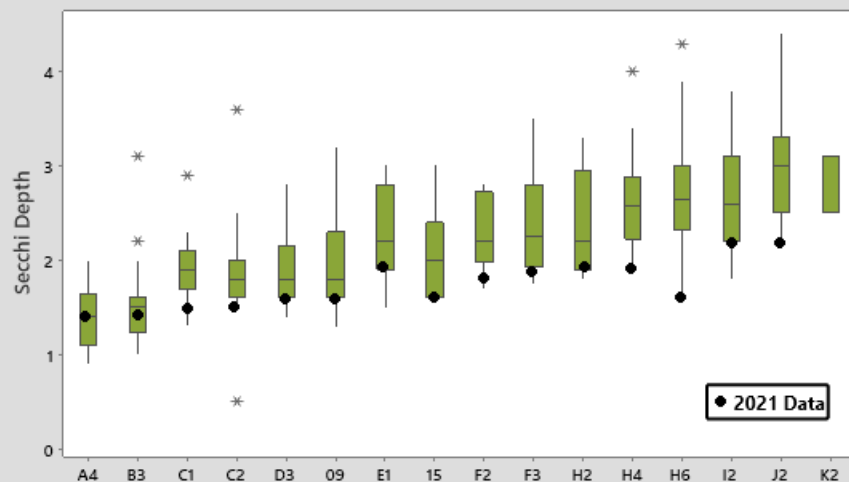
Secchi depths were taken at 39 stations during the HYJUL21 survey; these depths ranged from 1.3 meters (Station 02) to 2.3 meters (Station 27).

In Report Card terms, 1 station was in the A-range (>2.28m), 2 stations were in the B-range (2.12 to <2.28m), 3 stations were in the C-range (1.95 to <2.12m), 7 stations were in the D-range (1.8 to <1.95m), and 21 stations failed (<1.8m).

Secchi Depths Across Long Island Sound
2019 Cruises



Secchi Depths Across Long Island Sound
HYJUL Cruises
1998-2021



Next Survey

The next survey is scheduled for 2-4 August (WQAUG21) aboard the R/V John Dempsey. The schedule for the remainder of 2019 is available on our website.



Connecticut Department of
**ENERGY &
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