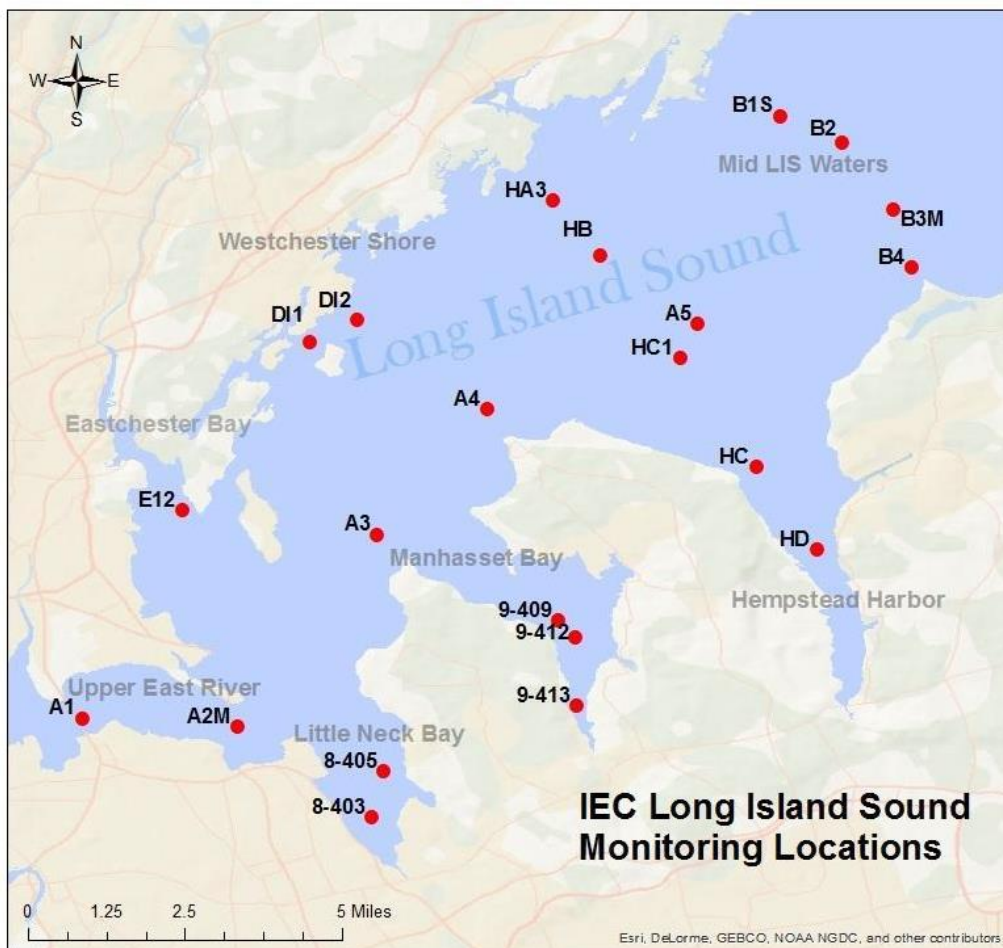




Western Long Island Sound Monitoring 2024 Summer Survey Bi-Weekly Summary Surveys #3 & #4 Survey Dates: July 9, 2024 & July 16, 2024



STATION	LATITUDE DD	LONGITUDE DD
E-12	40.8487	-73.8045
A1	40.8013	-73.8268
A2M	40.7992	-73.7913
8-403	40.7778	-73.7608
8-405	40.7888	-73.7582
A3	40.8433	-73.7590
9-409	40.8240	-73.7175
9-412	40.8200	-73.7135
9-413	40.8041	-73.7133
A4	40.8725	-73.7343
A5	40.8923	-73.6853
B1S	40.9403	-73.6667
B2	40.9343	-73.6520
B3M	40.9187	-73.6403
B4	40.9054	-73.6360
DI1	40.8883	-73.7748
DI2	40.8930	-73.7642
H-A3	40.9207	-73.7187
H-B	40.9080	-73.7090
H-C	40.8590	-73.6717
H-C1	40.8853	-73.6903
H-D	40.8402	-73.6572

Table 1. List of IEC sites and coordinates.

As a part of the Long Island Sound Study’s ongoing water quality monitoring program, IEC started its 34th consecutive summer of weekly ambient monitoring surveys in western Long Island Sound and the upper East River on Tuesday, June 25th, 2024.

Throughout the summer of 2024, IEC staff will perform 12 weekly surveys at each of the 22 stations in the far western Long Island Sound to assess seasonal hypoxic conditions. Hypoxia occurs when dissolved oxygen (“DO”) concentrations become low. Marine organisms need oxygen to live and low oxygen concentrations can have serious consequences for a marine ecosystem.

The 12 surveys include weekly *in situ* measurements of water temperature, salinity, dissolved oxygen, pH, turbidity, and Secchi disk depth. Measurements at each station are taken half a meter below the surface, at mid-depth, and half a meter above the bottom.

Interstate Environmental
Commission
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Brooklyn, NY 11220

Biweekly surveys will include collection of additional samples for parameters relevant to hypoxia at 11 of the 22 stations (stations listed in **bold** in Table 1). These samples will be analyzed for nutrients, Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), and chlorophyll *a*, in addition to the suite of *in situ* parameters listed above.

Nutrient parameters that will be analyzed include Ammonia, Nitrate+Nitrite, Particulate Nitrogen, Orthophosphate/DIP, Total Dissolved Phosphorus, Particulate Phosphorus, Dissolved Organic Carbon, Particulate Carbon, Dissolved Silica, and Biogenic Silica.

In October 2022, IEC also began collecting dissolved inorganic carbon (DIC) and Total Alkalinity samples to monitor coastal acidification. In aquatic ecosystems, **DIC** acts as a source of carbon for photosynthesis and has a function in controlling the pH. Increasing levels of anthropogenic CO₂ gas emissions are leading to coastal acidification, which can pose a significant threat to marine life, including calcifying organisms like corals and shellfish that make hard shells and skeletons by combining calcium and carbonate from seawater. **Total Alkalinity** is the capacity of water to resist (buffer against) a change in pH when acidity is added. As CO₂ from the atmosphere and from decay of algal blooms increases in LIS, Total Alkalinity guards against pH changes and coastal acidification.

Proposed 2024 Summer Schedule		
Date	Survey Number	Parameters
06/25/2024	1	<i>In situ</i> , nutrients, chlorophyll a, BOD, TSS
07/02/2024	2	<i>In situ</i> parameters only
07/09/2024	3	<i>In situ</i> , nutrients, chlorophyll a, BOD, TSS
07/16/2024	4	<i>In situ</i> parameters only
07/23/2024	5	<i>In situ</i> , nutrients, chlorophyll a, BOD, TSS
07/30/2024	6	<i>In situ</i> parameters only
08/06/2024	7	<i>In situ</i> , nutrients, chlorophyll a, BOD, TSS
08/13/2024	8	<i>In situ</i> parameters only
08/20/2024	9	<i>In situ</i> , nutrients, chlorophyll a, BOD, TSS
08/27/2024	10	<i>In situ</i> parameters only
09/05/2024	11	<i>In situ</i> , nutrients, chlorophyll a, BOD, TSS
09/12/2024	12	<i>In situ</i> parameters only



Fog settling over Co-Op City near Station E-12 during Survey #3



A pair of ospreys in their nest by Station DI1 during Survey #3

SURVEY #3 AT A GLANCE 07/09/2024

Hypoxia (DO < 3.00 mg/L)	1 station exhibited hypoxia at surface depth: Manhasset Bay – 9-13 2 stations exhibited hypoxia at bottom depth: Manhasset Bay – 9-413 Hempstead Harbor – H-D
Lowest surface DO concentration	2.96 mg/L (Station 9-413 in Manhasset Bay)
Lowest bottom DO concentration	2.96 mg/L (Station 9-413 in Manhasset Bay)
Average surface DO concentration	7.23 mg/L
Average bottom DO concentration	4.21 mg/L
Average surface water temperature	23.17 °C
Average bottom water temperature	19.62 °C
Average water column ΔT (Surface-Bottom)	3.55 °C
Average surface salinity	24.93 ppt
Average bottom salinity	25.40 ppt
Lowest surface pH	6.98 (Station 9-413 in Manhasset Bay)
Lowest bottom pH	6.98 (Station 9-413 in Manhasset Bay)
Average surface pH	7.68
Average bottom pH	7.34

Survey #3 Narrative Summary

This survey began at 06:24 and ended at 10:38, with the most recent low tide at 8:44 and 09:02 at New Rochelle, NY and Kings Point, NY, respectively. The weather conditions were cloudy and foggy with cloud coverage ranging from 40 to 100% during the survey. The average air temperature was 81 °F. The weather station at LaGuardia Airport reported 0.00” of precipitation for both the 24- and 48-hour period prior to the start of the survey. Secchi disk measurements ranged from 1.5 ft in Manhasset Bay to 10.0 ft in the Mid-LIS waters.

One station exhibited hypoxia at surface depth and two stations exhibited hypoxia at bottom depth. In comparison, during Survey #3 in 2023, there were three stations that exhibited hypoxia at bottom depth and zero at surface depth. **Average surface DO concentrations were *lower* compared to last year, while average bottom DO concentrations were *higher* than last year.** Average Surface DO: 7.23 mg/L in 2024 vs 8.12 mg/L in 2023. Average Bottom DO: 4.21 mg/L in 2024 vs 3.66 mg/L in 2023.

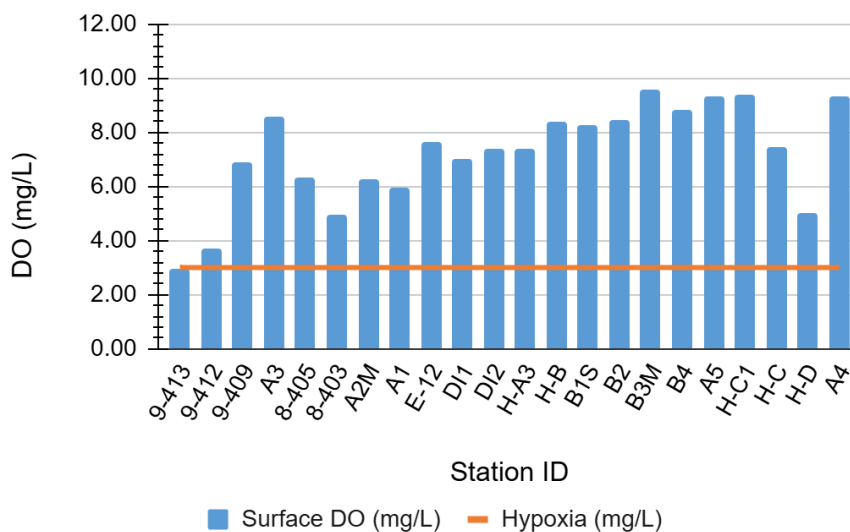
Average temperatures were *lower* during this survey compared to last year. Average Surface Temperature: 23.17 °C in 2024 vs 23.65 °C in 2023. Average Bottom Temperature: 19.62 °C in 2024 vs 20.64 °C in 2023. **On the other hand, the average change in temperature throughout the water column has *increased* compared to**

last year. Average Temperature Change: 3.55 °C in 2024 vs 3.01 °C in 2023.

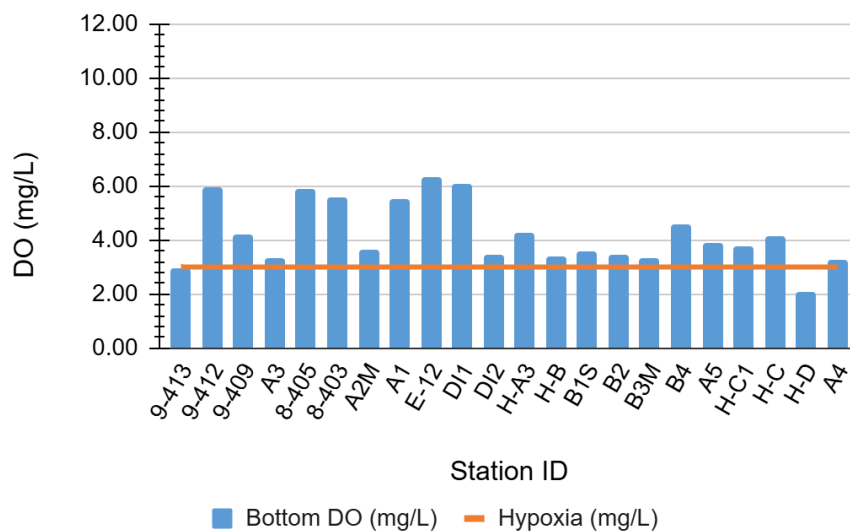
Average salinity at surface and bottom *also decreased* compared to last year. Average Surface Salinity: 24.93 ppt in 2024 vs 25.56 ppt in 2023. Average Bottom Salinity: 25.40 ppt in 2024 vs 26.20 ppt in 2023.

Average surface and bottom pH *decreased* compared to last year, as well as the minimum pH at both depths. Average Surface pH: 7.68 in 2024 vs 7.90 in 2023. Average Bottom pH: 7.34 in 2024 vs 7.40 in 2023. In Manhasset Bay, 9-413 continued to have the lowest bottom pH, which decreased from 7.19 in 2023 to 6.98 in 2024, while the lowest surface pH recorded during Survey #3 changed from A1 with a pH of 7.34 in 2023 to 9-413 with a pH of 6.98 in 2024.

WLIS Surface Dissolved Oxygen, Survey #3 07/09/24



WLIS Bottom Dissolved Oxygen, Survey #3 07/09/24

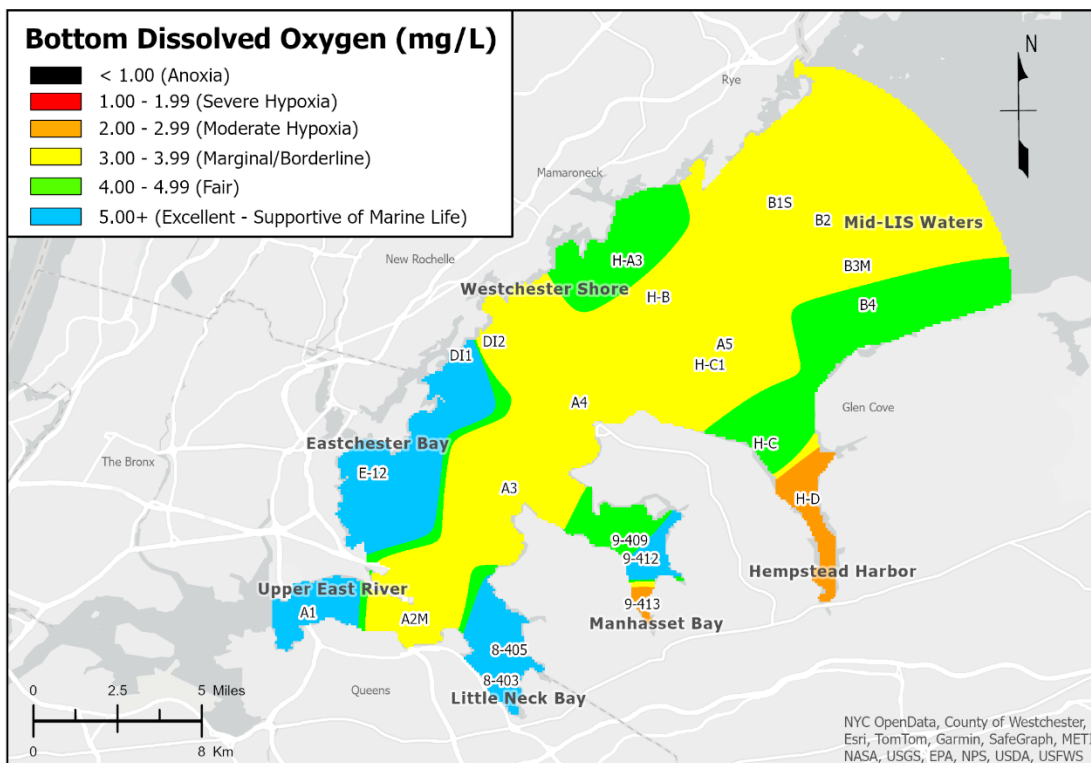
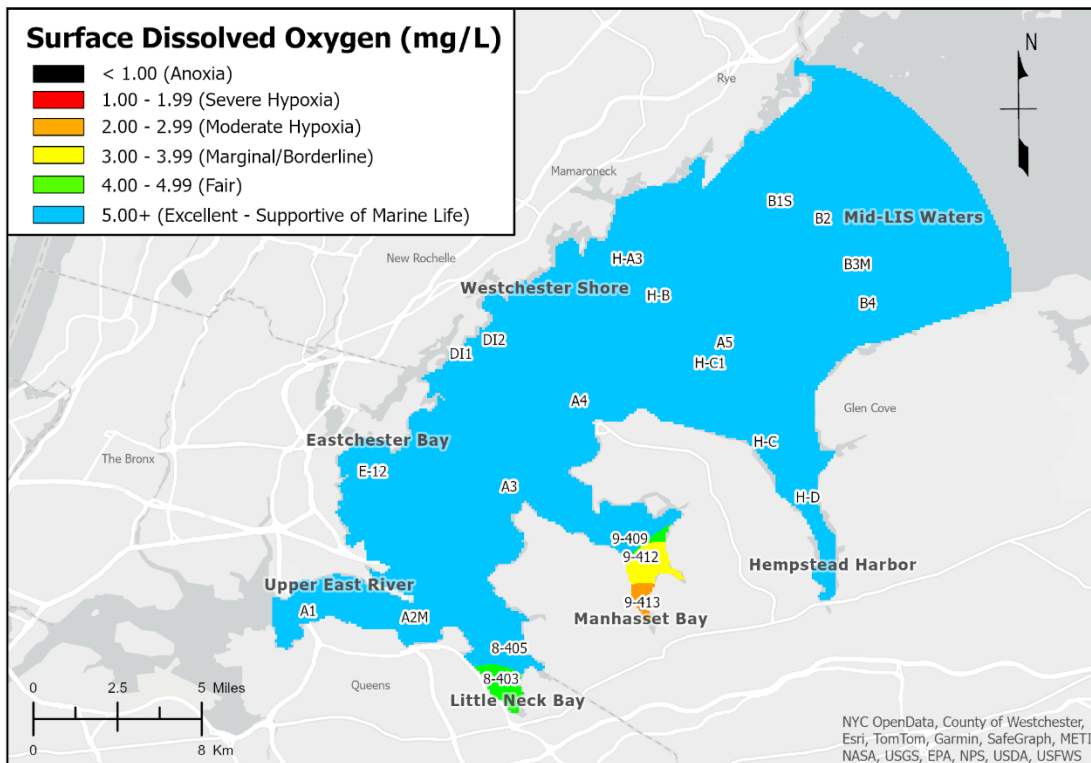


The Long Island Sound Study defines hypoxia as DO values which are below a concentration of 3.00 mg/L.

Interstate Environmental Commission

Ambient Water Quality Monitoring of the Western Long Island Sound

Weekly Survey #3: July 9, 2024



IDW Interpolation, Power 10

Map by: Jovan Snyder

Map made: 07/18/2024

SURVEY #4 AT A GLANCE 07/16/2024

Hypoxia (DO < 3.00 mg/L)	<p>No stations exhibited hypoxia at surface depth</p> <p>12 stations exhibited hypoxia at bottom depth: Manhasset Bay – 9-413, 9-412, 9-409 Upper East River – A2M Westchester Shoreline – DI1, DI2 Mid-LIS Waters – A3, A4, B4, H-C1 Hempstead Harbor – H-C, H-D</p>
Lowest surface DO concentration	3.43 mg/L (Station 8-403 in Little Neck Bay)
Lowest bottom DO concentration	0.71 mg/L (Station H-C in Hempstead Harbor)
Average surface DO concentration	6.97 mg/L
Average bottom DO concentration	2.61 mg/L
Average surface water temperature	23.05 °C
Average bottom water temperature	18.84 °C
Average water column ΔT	4.21 °C
Average surface salinity	25.13 ppt
Average bottom salinity	26.12 ppt
Lowest surface pH	7.16 (Station 9-413 in Manhasset Bay)
Lowest bottom pH	6.90 (Station 9-413 in Manhasset Bay)
Average surface pH	7.66
Average bottom pH	7.23

Survey #4 Narrative Summary

The survey began at 06:31 and ended at 10:57, with the most recent high tide at 07:33 and 07:49 at New Rochelle, NY and Kings Point, NY, respectively. The skies were sunny with mostly low cloud coverage ranging from 0 to 50% throughout the survey. The average air temperature was 84 °F. The weather station at LaGuardia Airport reported 0.00” and 0.18” of precipitation for the 24- and 48-hour period, respectively, prior to the start of the survey. Secchi disk measurements ranged from 2.0 ft in Eastchester Bay to 6.5 ft in the Mid-LIS waters.

No stations were hypoxic at surface depth and 12 stations exhibited hypoxia at bottom depth. In comparison, during Survey #4 in 2023, there were 11 stations that exhibited hypoxia at bottom depth and one at surface depth. **Average surface DO concentrations were higher than last year, while average bottom DO concentrations were lower.** Average Surface DO: 6.97 mg/L in 2024 vs 6.25 mg/L in 2023. Average Bottom DO: 2.61 mg/L in 2024 vs 2.98 mg/L in 2023. **The lowest surface DO concentration was higher this year compared to last year, while the lowest bottom DO concentration was lower.** Minimum Surface DO: 3.43 mg/L in 2024

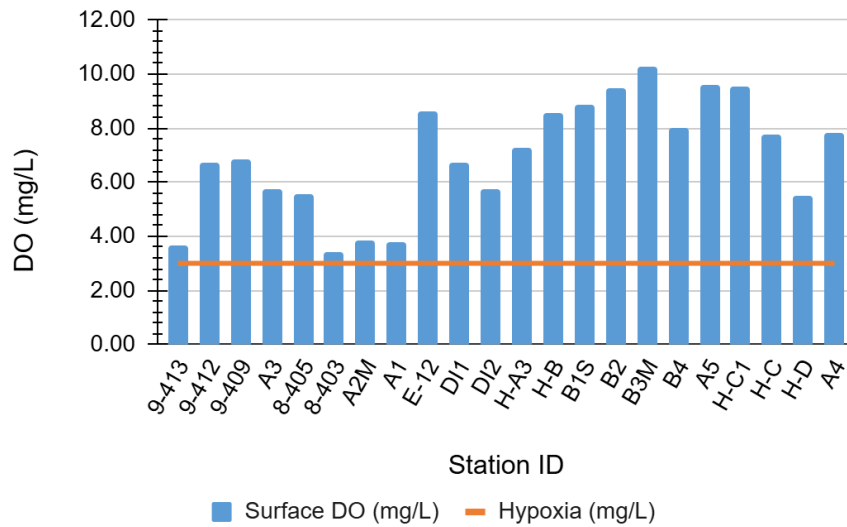
vs 1.30 mg/L in 2023. Minimum Bottom DO: 0.71 mg/L in 2024 vs 1.41 mg/L in 2023.

Average temperatures were lower during this survey compared to last year. Average Surface Temperature: 23.05 °C in 2024 vs 23.69 °C in 2023. Bottom: 18.84 °C in 2024 vs 21.25 °C in 2023. **On the other hand, the average change in temperature from surface to bottom depths throughout the water column increased compared to last year.** Average Temperature Change: 4.21 °C in 2024 vs 2.45 °C in 2023.

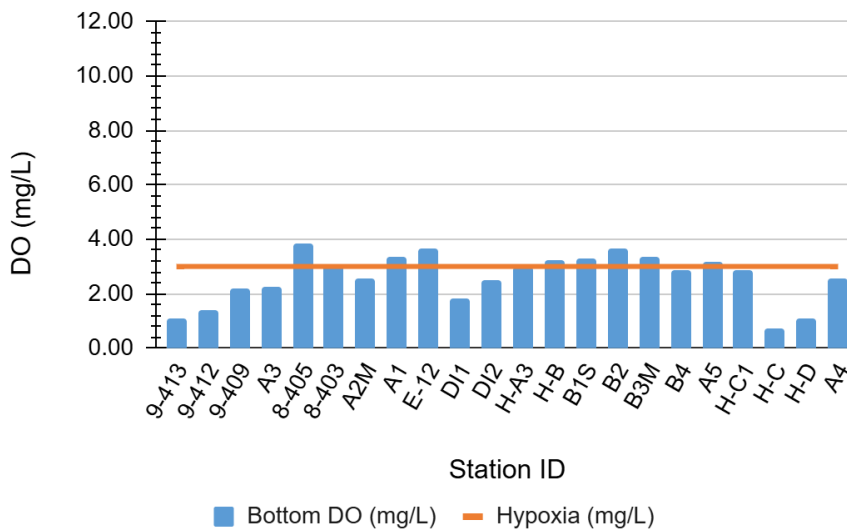
Average surface and bottom salinity increased compared to last year. Average Surface Salinity: 25.13 ppt in 2024 vs 25.02 ppt in 2023. Average Bottom Salinity: 26.12 ppt in 2024 vs 26.09 ppt in 2023.

Average surface pH remained the same compared to last year and the average bottom pH decreased. Average Surface pH: 7.66 in 2024 vs 7.66 in 2023. Average Bottom pH: 7.23 in 2024 vs 7.34 in 2023. **The lowest surface pH increased compared to last year, while the lowest bottom pH decreased.** Lowest surface pH: 7.16 in 2024 vs 6.98 in 2023. Lowest bottom pH: 6.90 in 2024 vs 6.98 in 2023.

WLIS Surface Dissolved Oxygen, Survey #4 07/16/24



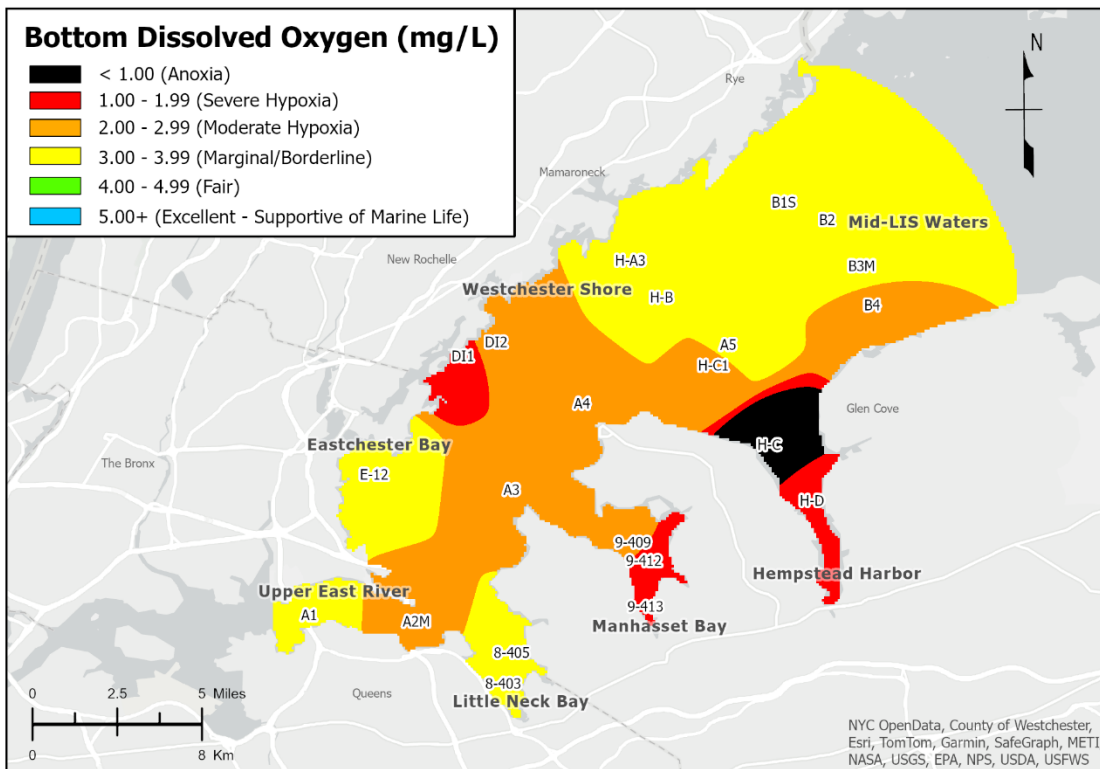
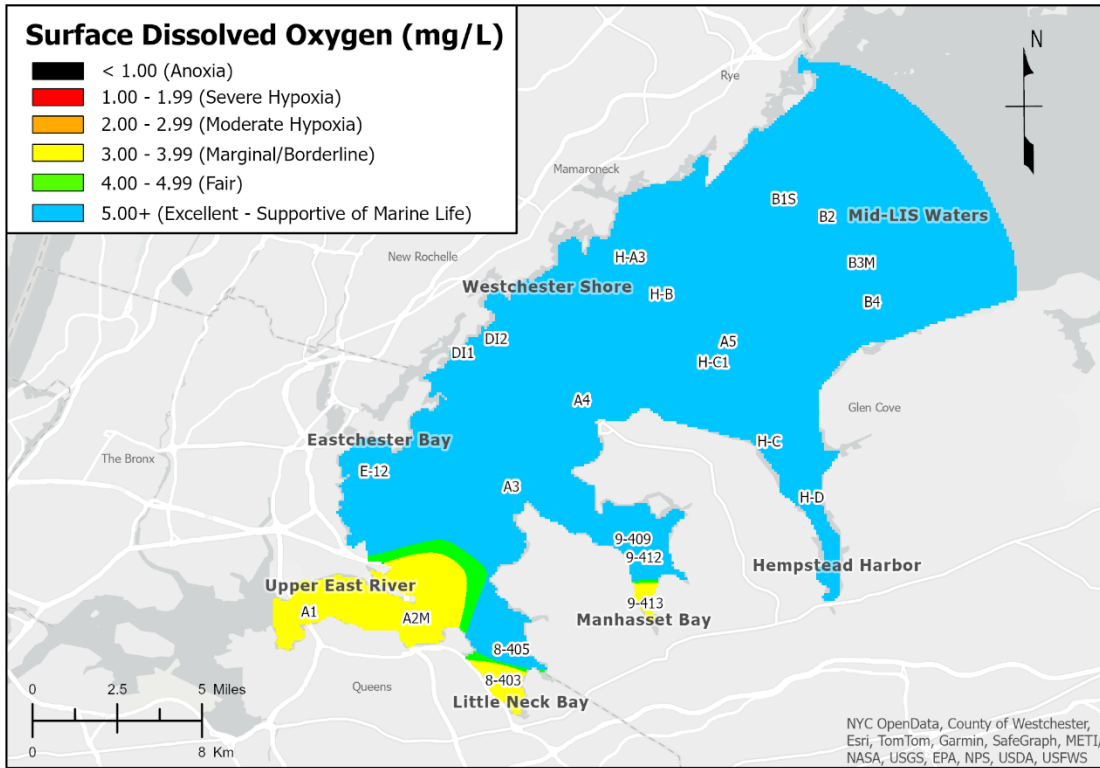
WLIS Bottom Dissolved Oxygen, Survey #4 07/16/24



The Long Island Sound Study defines hypoxia as DO values which are below a concentration of 3.00 mg/L.

Interstate Environmental Commission Ambient Water Quality Monitoring of the Western Long Island Sound

Weekly Survey #4: July 16, 2024



IDW Interpolation, Power 10

Map by: Jovan Snyder

Map made: 07/18/2024