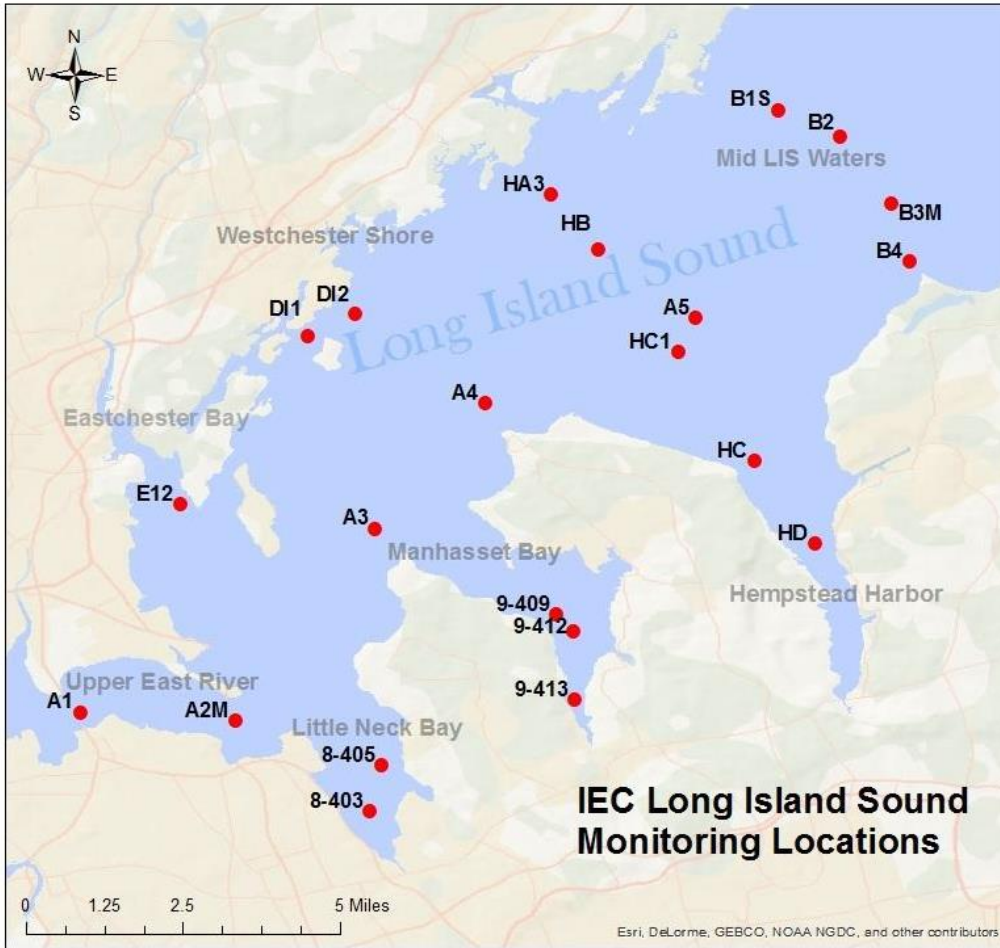




Western Long Island Sound Monitoring 2023 Summer Survey Bi-Weekly Summary Surveys #7 & #8

Survey Dates: August 9, 2023 & August 15, 2023



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

As part of the Long Island Sound Study’s ongoing water quality monitoring program, IEC started its 33rd consecutive summer of weekly ambient monitoring surveys in western Long Island Sound and the upper East River on Wednesday, June 28th, 2023.

Throughout summer 2023, IEC staff will perform 12 weekly surveys to each of 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.

Biweekly surveys will include collection of additional samples for parameters relevant to hypoxia at 11 of the 22 stations (stations listed in

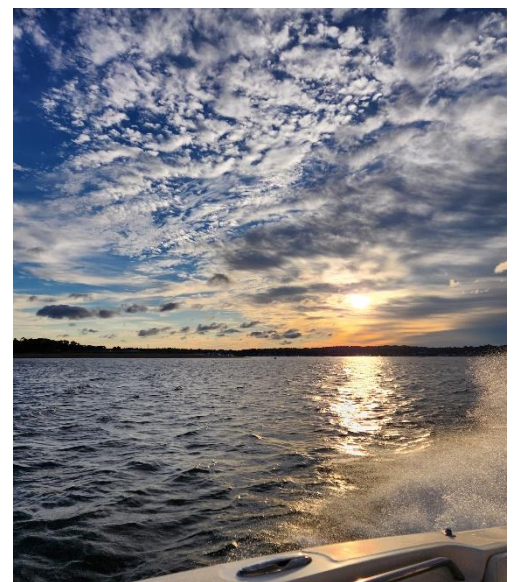
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C/O BioBAT
Brooklyn Army Terminal,
Building A
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Brooklyn, NY 11220

bold on table, upper right). 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 2023 Summer Schedule		
Date	Survey Number	Parameters
6/28/2023	1	<i>In situ</i> parameters only
7/5/2023	2	<i>In situ</i> , nutrients, chlorophyll <i>a</i> , BOD, TSS, DIC, Total Alkalinity
7/12/2023	3	<i>In situ</i> parameters only
7/18/2023	4	<i>In situ</i> , nutrients, chlorophyll <i>a</i> , BOD, TSS, DIC, Total Alkalinity
7/25/2023	5	<i>In situ</i> parameters only
8/3/2023	6	<i>In situ</i> , nutrients, chlorophyll <i>a</i> , BOD, TSS, DIC, Total Alkalinity
8/9/2023	7	<i>In situ</i> parameters only
8/15/2023	8	<i>In situ</i> , nutrients, chlorophyll <i>a</i> , BOD, TSS, DIC, Total Alkalinity
8/22/2023	9	<i>In situ</i> parameters only
8/31/2023	10	<i>In situ</i> , nutrients, chlorophyll <i>a</i> , BOD, TSS, DIC, Total Alkalinity
9/5/2023	11	<i>In situ</i> parameters only
9/12/2023	12	<i>In situ</i> , nutrients, chlorophyll <i>a</i> , BOD, TSS, DIC, Total Alkalinity



Sunrise in Manhasset Bay, NY



Large water splashes during a “bluefish blitz” in Hempstead Harbor, NY. Schools of bluefish attack bunker fish near the surface, churning the water. They feed voraciously on their prey, eating almost anything they can catch and swallow. Birds like seagulls (left) like to take advantage of this and feed on the bunker being pushed to the surface.

SURVEY # 7 AT A GLANCE 08/09/2023

Hypoxia (DO < 3.00 mg/L)	4 stations were hypoxic at bottom depth: Mid-LIS Waters – A3, B1S, B2 Westchester Shoreline – H-B
Lowest surface DO concentration	4.23 mg/L (Station DI1 at Westchester Shoreline)
Lowest bottom DO concentration	2.57 mg/L (Station H-B at Westchester Shoreline)
Average surface DO concentration	5.62 mg/L
Average bottom DO concentration	4.65 mg/L
Average surface water temperature	22.39 °C
Average bottom water temperature	22.14 °C
Average water column ΔT	0.24 °C
Average surface salinity	26.15 ppt
Average bottom salinity	26.31 ppt
Lowest surface pH	7.32 (Station 9-413 in Manhasset Bay)
Lowest bottom pH	7.23 (Station 9-413 in Manhasset Bay)
Average surface pH	7.52
Average bottom pH	7.45

Survey #7 Narrative Summary

This survey began at 06:17 and ended at 10:02, with the last high tide at 06:34 and 06:50 at New Rochelle, NY and Kings Point, NY, respectively. The weather was partly cloudy with percent cloud cover ranging from approximately 20 to 40% across all stations. The air temperature ranged from 71-77 °F, wind speed was 14-26 mph, and we experienced rough waters during the survey with wave heights up to 2 ft tall. The weather station at LaGuardia Airport reported 0.003” and 0.908” of precipitation for the 24- and 48-hour period prior to the start of the survey, respectively. Secchi disk measurements were relatively high and ranged from 4.0 ft in Manhasset Bay to 8.0 ft in the Mid-LIS waters.

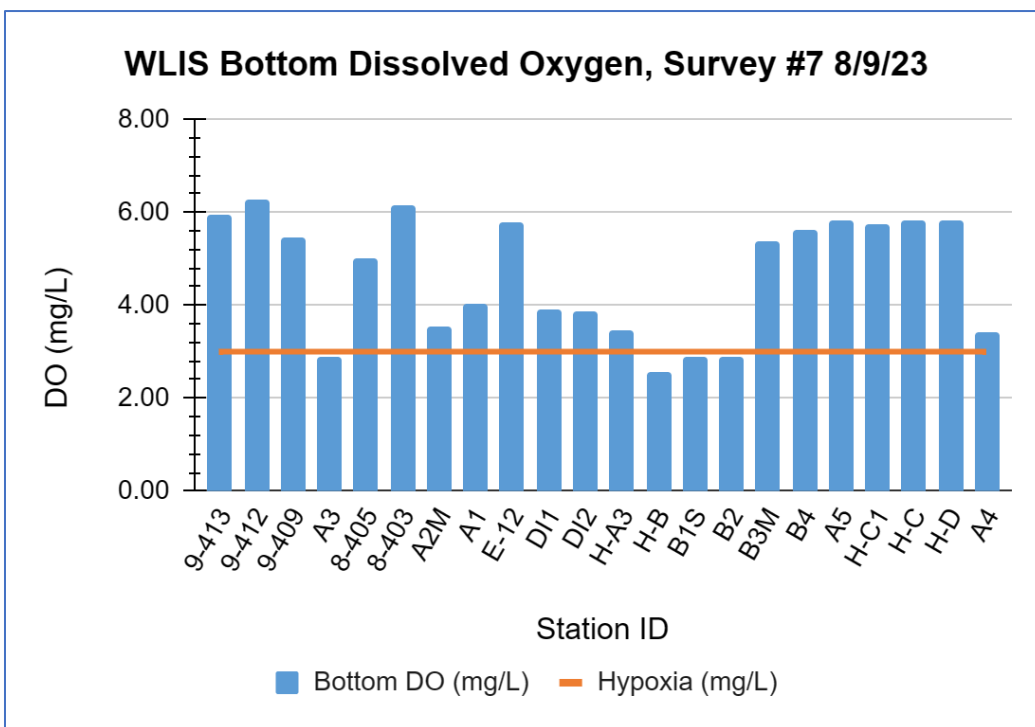
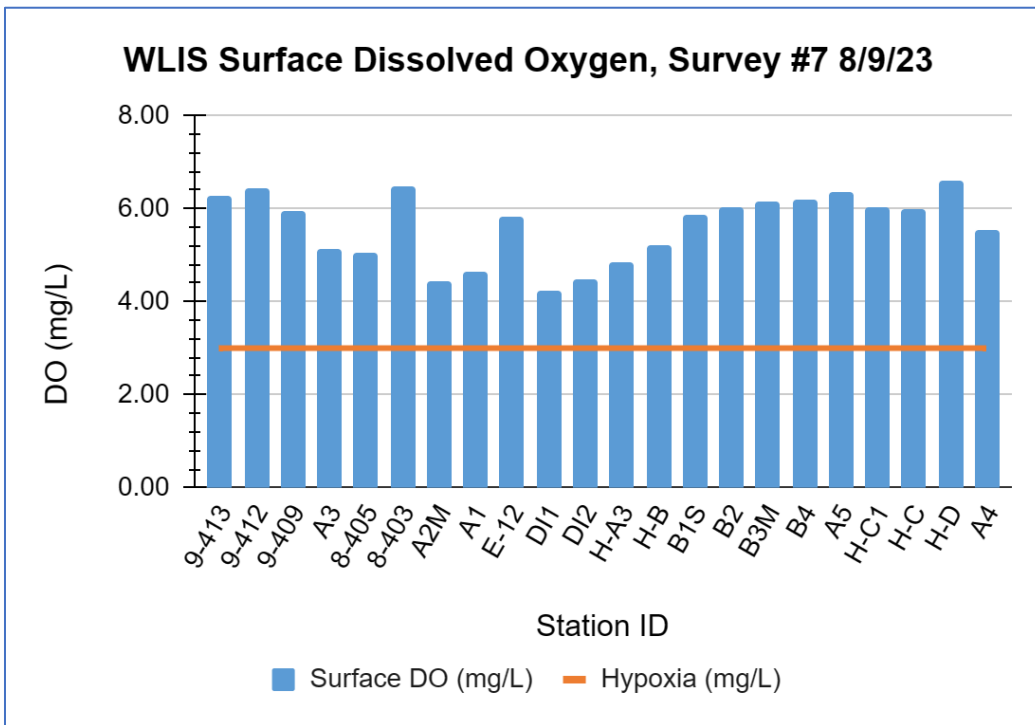
During this survey, 4 stations exhibited moderate hypoxia (2-3 mg/L DO) at bottom depth. No stations were hypoxic at surface depth. This is likely due to the rough waters churning up the water and causing substantial oxygen being mixed in throughout the water column. This may also explain the small difference in surface and bottom water temperatures. **Average surface and bottom DO during survey #7 was higher this year than last year.** Average Surface DO: 4.93 mg/L in 2023 vs 5.62 mg/L in 2022. Average Bottom DO: 3.05 mg/L in 2023 vs 4.65 mg/L in 2022.

Average temperatures were lower during this survey compared to last year. Surface: 23.03 °C in 2023 vs 22.39 °C in 2022. Bottom: 22.16 °C in 2023 vs 22.14 °C in 2022. The average change in temperature through the water column also decreased from last year: 0.88 °C in 2023 vs 0.24 °C in 2022.

Average salinity at surface and bottom were lower compared to last year: Surface: 27.45 ppt in 2023 vs 26.15

ppt in 2022. Bottom: 27.66 ppt in 2023 vs 26.31 ppt in 2022.

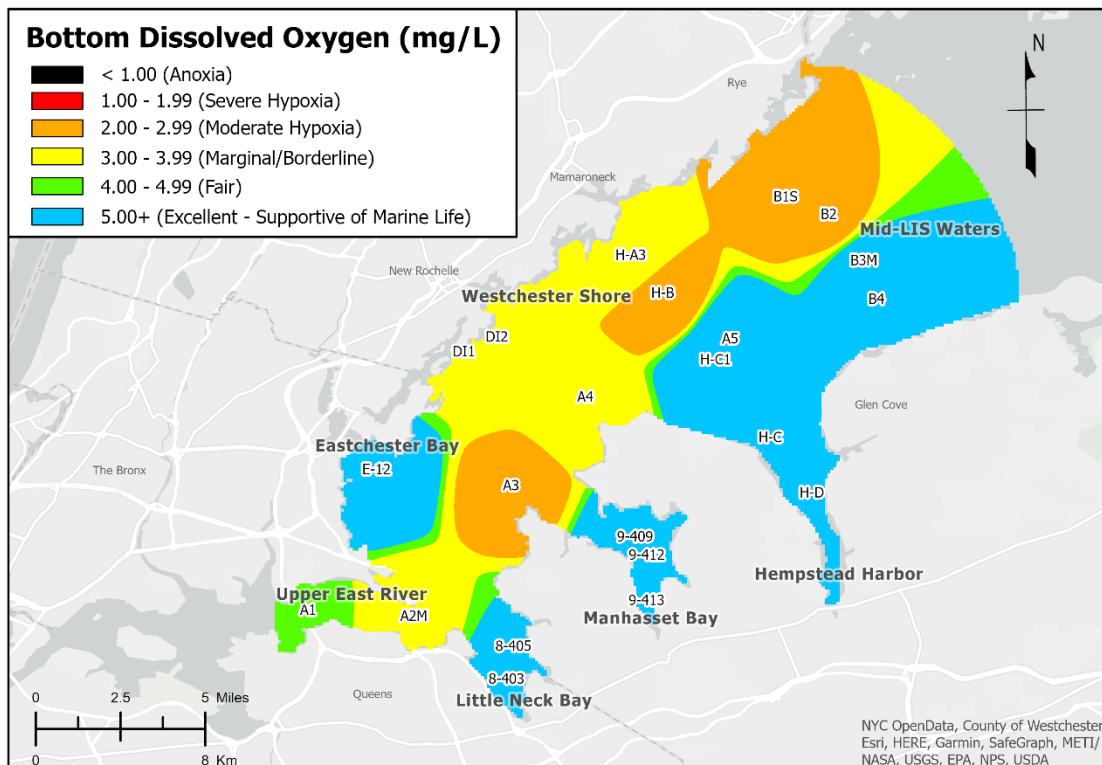
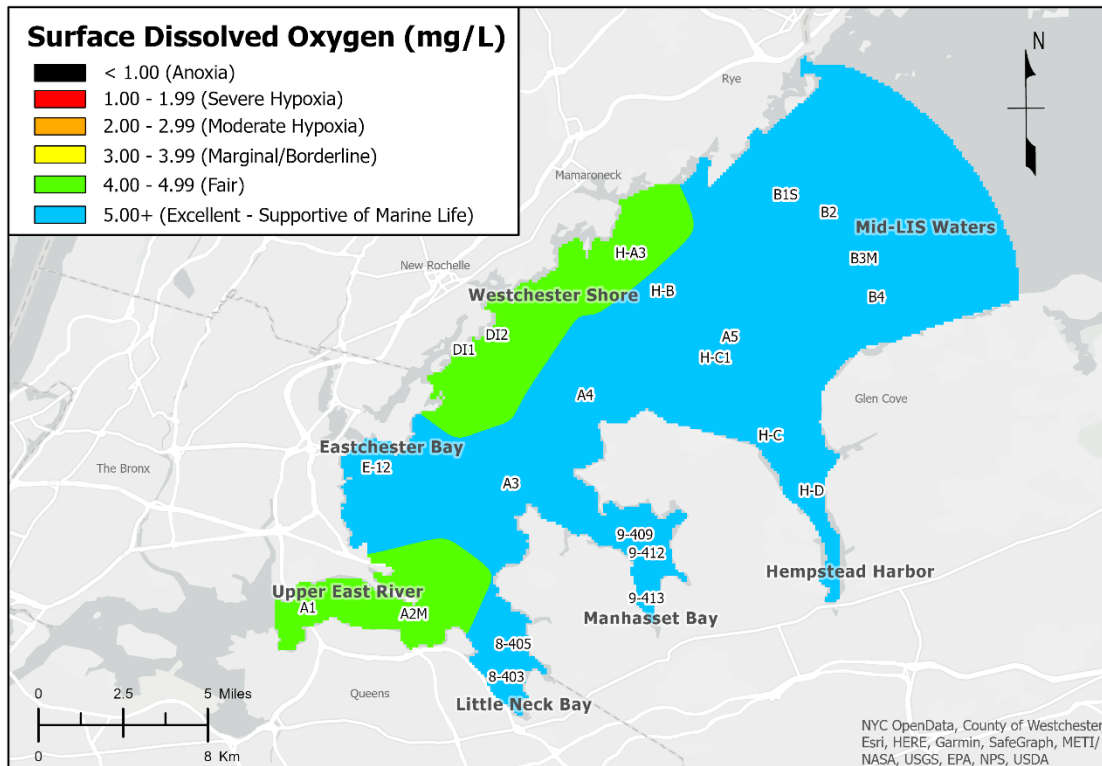
Average pH readings didn't change significantly this year compared to last year. Average Surface pH: 7.52 in 2023 vs 7.52 in 2022. Average bottom pH: 7.35 in 2023 vs 7.45 in 2022. **At both surface and bottom, the lowest pH recorded was *higher* than last year.** Lowest surface pH: 7.02 in 2023 vs 7.32 in 2022. Lowest bottom pH: 7.05 in 2023 vs 7.23 in 2022.



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 #7: August 9, 2023



IDW Interpolation, Power 10

Map by: Kimarie Yap

Map made: 09/15/23

SURVEY # 8 AT A GLANCE 08/15/2023

Hypoxia (DO < 3.00 mg/L)	11 stations were hypoxic at bottom depth: Upper East River – A2M Mid-LIS Waters – A3, A4, A5, B2, B3M, B4, H-C1 Westchester Shoreline – H-B Hempstead Harbor – H-C, H-D
Lowest surface DO concentration	4.37 mg/L (Station A2M in Upper East River)
Lowest bottom DO concentration	1.37 mg/L (Station B4 in Mid-LIS Waters)
Average surface DO concentration	6.17 mg/L
Average bottom DO concentration	3.59 mg/L
Average surface water temperature	23.50 °C
Average bottom water temperature	22.55 °C
Average water column ΔT	0.95 °C
Average surface salinity	25.76 ppt
Average bottom salinity	26.40 ppt
Lowest surface pH	7.16 (Station 9-413 in Manhasset Bay)
Lowest bottom pH	7.01 (Station 9-413 in Manhasset Bay)
Average surface pH	7.63
Average bottom pH	7.37

Survey #8 Narrative Summary

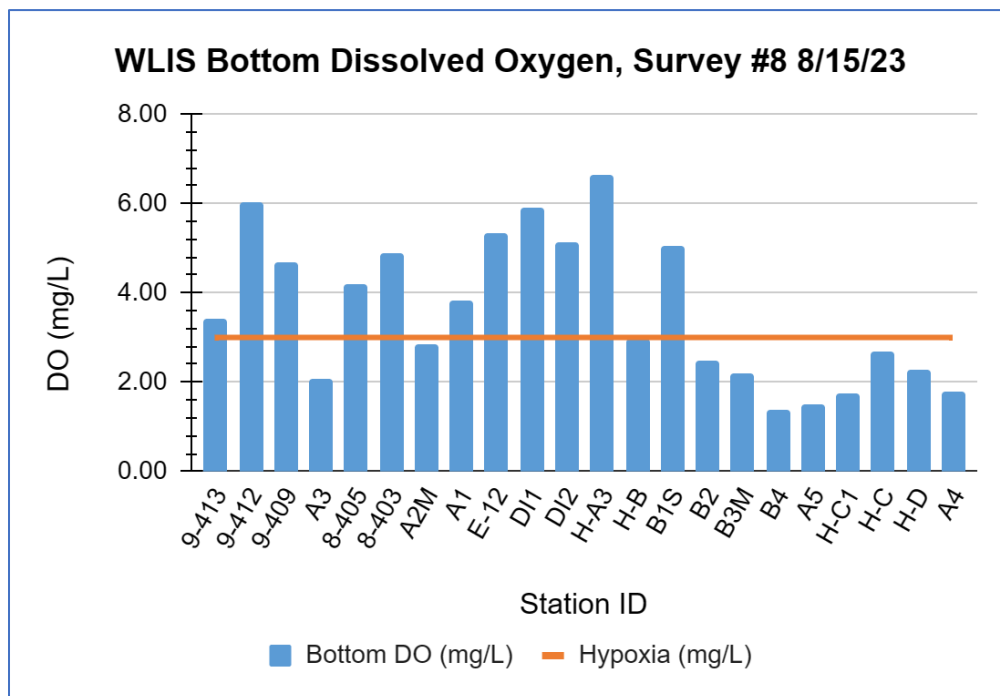
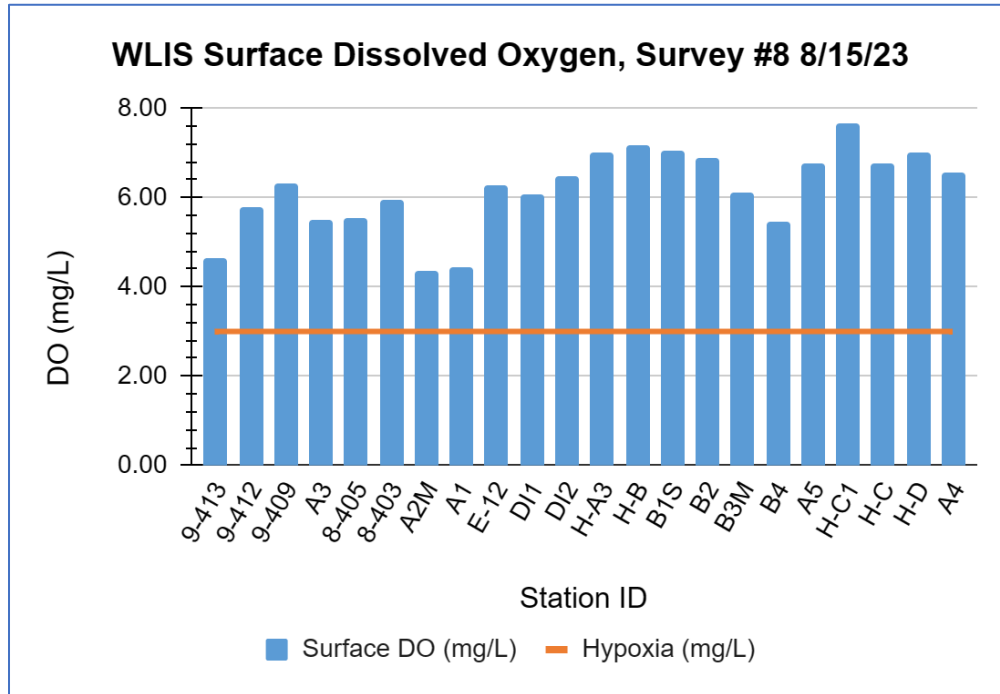
Due to early morning thunderstorms, the survey began later than usual at 08:24 and ended at 13:58, with the last low tide at 05:54 and 06:12 at New Rochelle, NY and Kings Point, NY, respectively. The weather was overcast skies, foggy, average air temperature was 77 °F, wind speed averaged 8-18 mph. We experienced rough waters with wave heights about 2 ft tall. The percent cloud cover measured 100% across all stations. The weather station at LaGuardia Airport reported 1.544" of precipitation for both the 24- and 48-hour period prior to the start of the survey, respectively. Secchi disk measurements ranged from 3.0 ft in Manhasset Bay to 8.0 ft in the Mid-LIS waters.

During this survey, 11 stations exhibited hypoxia at bottom depth: 7 were moderately hypoxic (2-3 mg/L DO), 4 were severely hypoxic (1-2 mg/L DO). **No stations were hypoxic at surface depth. Average DO during survey #8 was higher this year than last year at both bottom and surface compared to last year.** Average Surface DO: 4.37 mg/L in 2023 vs 1.90 mg/L in 2022. Average Bottom DO: 1.37 mg/L in 2023 vs 0.98 mg/L in 2022.

Average temperatures were slightly higher during this survey compared to last year. Surface: 23.50 °C in 2023 vs 23.03 °C in 2022. Bottom: 22.55 °C in 2023 vs 22.16 °C in 2022. The average change in temperature through the water column decreased from last year: 0.95 °C in 2023 vs 0.88 °C in 2022.

Average salinity at surface and bottom *decreased* compared to last year: Surface: 25.76 ppt in 2023 vs 27.45 ppt in 2022. Bottom: 26.40 ppt in 2023 vs 27.66 ppt in 2022.

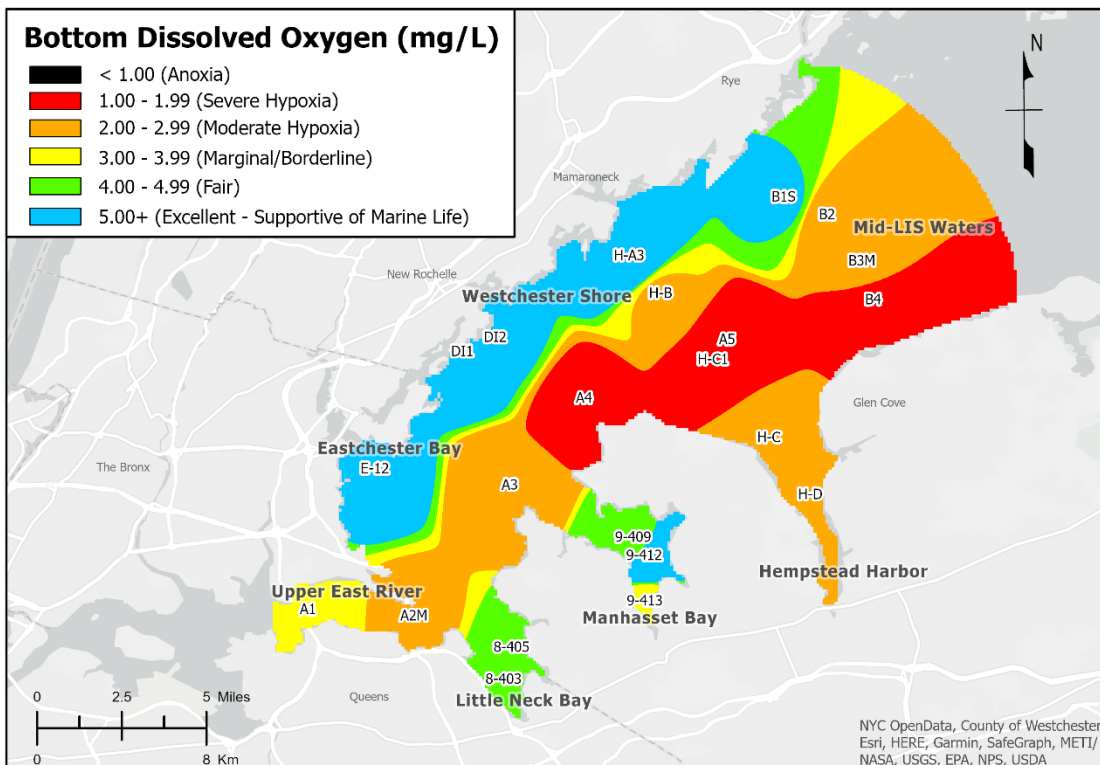
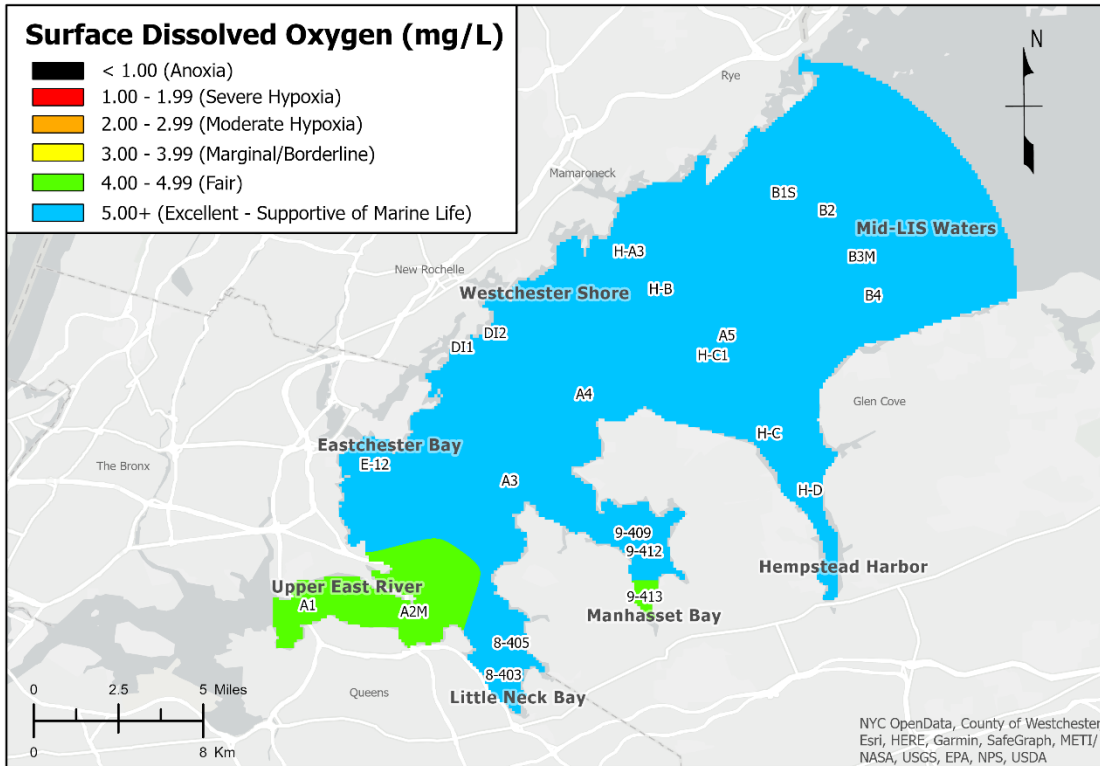
Average pH readings did not change significantly this year compared to last year. Average Surface pH: 7.63 in 2023 vs 7.52 in 2022. Average bottom pH: 7.37 in 2023 vs 7.35 in 2022. **At surface, the lowest pH recorded was slightly higher compared to last year, while it decreased slightly at the bottom.** Lowest surface pH: 7.16 in 2023 vs 7.02 in 2022. Lowest bottom pH: 7.01 in 2023 vs 7.05 in 2022.



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 #8: August 15, 2023



IDW Interpolation, Power 10

Map by: Kimarie Yap

Map made: 09/15/23