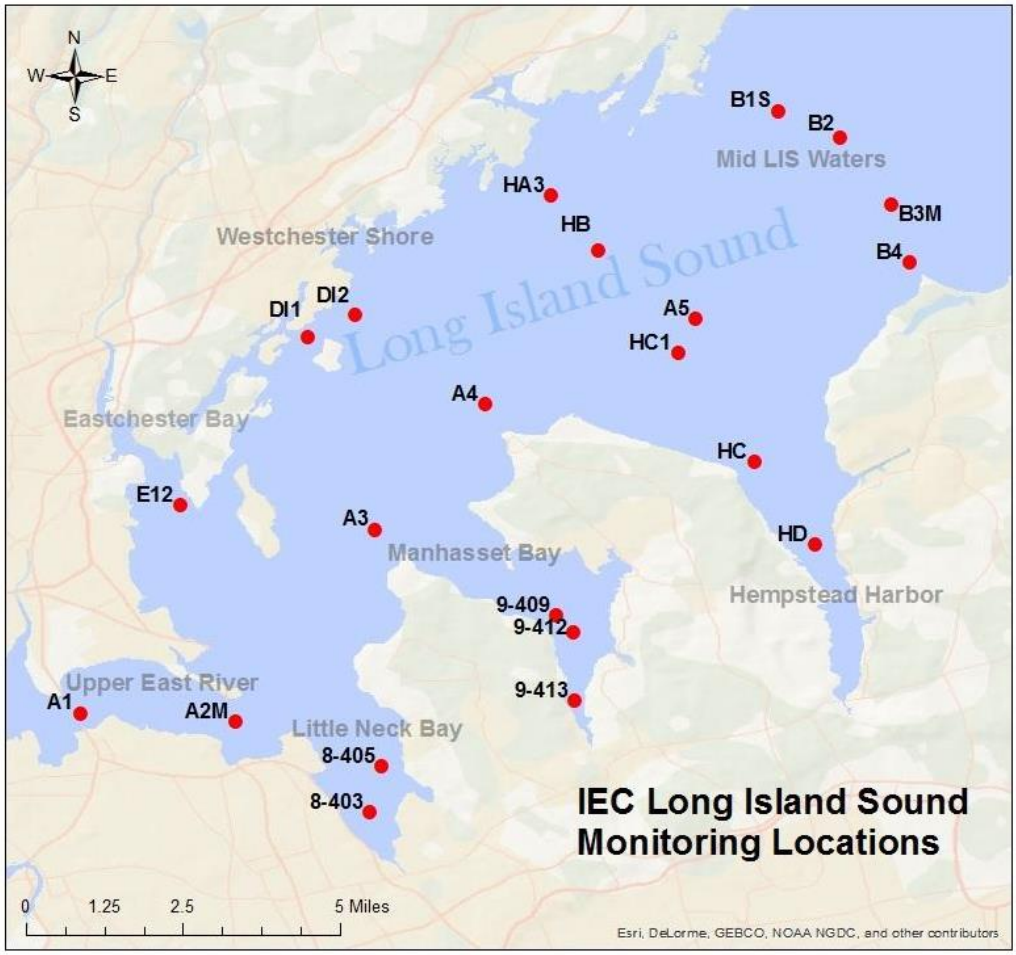
Western Long Island Sound Monitoring
2023 Summer Survey Bi-Weekly Summary
Surveys #11 & #12
Survey Dates: September 5, 2023 & September 12, 2023

Interstate Environmental Commission
NY · NJ · CT



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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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 CO_2 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 CO_2 from the atmosphere and from decay of algal blooms increases in LIS, Total Alkalinity guards against pH changes and coastal acidification.

2023 Summer Schedule		
Date	**Survey Number**	**Parameters**
6/28/2023	1	*In situ* parameters only
7/5/2023	2	*In situ*, nutrients, chlorophyll a, BOD, TSS, DIC, Total Alkalinity
7/12/2023	3	*In situ* parameters only
7/18/2023	4	*In situ*, nutrients, chlorophyll a, BOD, TSS, DIC, Total Alkalinity
7/25/2023	5	*In situ* parameters only
8/3/2023	6	*In situ*, nutrients, chlorophyll a, BOD, TSS, DIC, Total Alkalinity
8/9/2023	7	*In situ* parameters only
8/15/2023	8	*In situ*, nutrients, chlorophyll a, BOD, TSS, DIC, Total Alkalinity
8/22/2023	9	*In situ* parameters only
8/31/2023	10	*In situ*, nutrients, chlorophyll a, BOD, TSS, DIC, Total Alkalinity
9/5/2023	11	*In situ* parameters only
9/12/2023	12	*In situ*, nutrients, chlorophyll a, BOD, TSS, DIC, Total Alkalinity

IEC seasonal intern Jovan Snyder caught a Bluefish in Hempstead Harbor, NY with the guidance of Captain Joby Vinarksi

A pair of Bald Eagles near Manhasset Bay, NY

SURVEY # 11 AT A GLANCE 09/05/2023

Hypoxia (DO < 3.00 mg/L)	**No stations exhibited hypoxia!** 😊
Lowest surface DO concentration	4.74 mg/L (Station A1 in Upper East River)
Lowest bottom DO concentration	4.11 mg/L (Station A4 in Mid-LIS Waters)
Average surface DO concentration	6.91 mg/L
Average bottom DO concentration	4.75 mg/L
Average surface water temperature	23.83 ℃
Average bottom water temperature	23.08 ℃
Average water column ΔT	0.75 ℃
Average surface salinity	25.89 ppt
Average bottom salinity	26.36 ppt
Lowest surface pH	7.28 (Station A2M in Upper East River)
Lowest bottom pH	7.19 (Station 9-413 in Manhasset Bay)
Average surface pH	7.55
Average bottom pH	7.35

Survey #11 Narrative Summary

This survey began at 06:15 and ended at 9:45, with the last high tide at 03:57 and 04:13 at New Rochelle, NY and Kings Point, NY, respectively. The weather was partly cloudy with percent cloud cover ranging from approximately 10 to 80% across all stations. The air temperature ranged from 77-83 °F, wind speed was 3-8 mph, and we experienced calm waters during the survey. The weather station at LaGuardia Airport reported 0.003" precipitation for both the 24- and 48-hour period prior to the start of the survey. No Secchi depth measurements were taken for this survey.

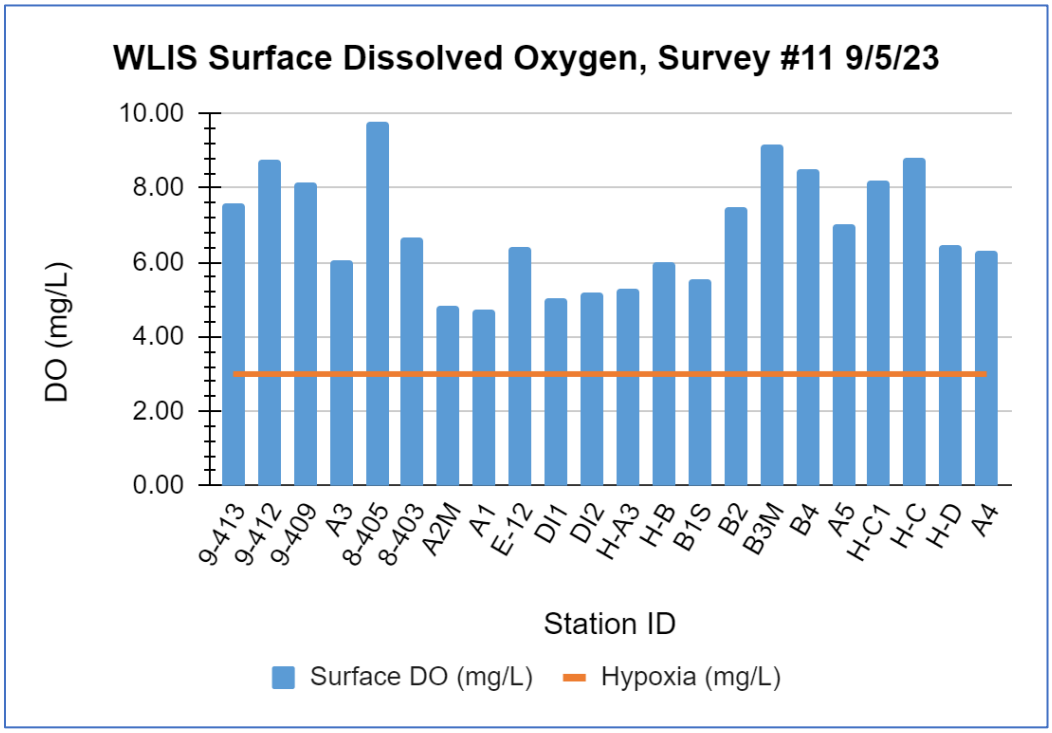
No stations exhibited hypoxia at either surface or bottom depths. In comparison, there were also no hypoxic stations during Survey #11 last year. **Average surface and bottom DO during survey #11 was *higher* this year than last year.** Average Surface DO: 4.74 mg/L in 2023 vs 3.47 mg/L in 2022. Average Bottom DO: 4.11 mg/L in 2023 vs 3.28 mg/L in 2022.

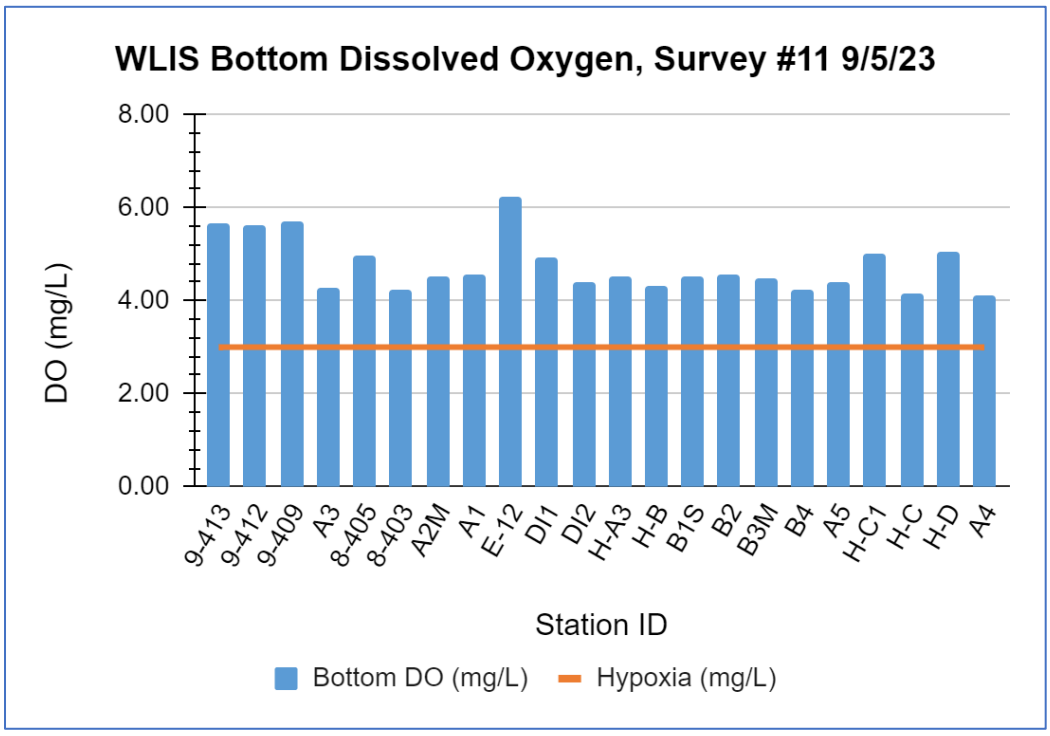
Average temperatures were *relatively similar* during this survey compared to last year. Surface: 23.25 ℃ in 2023 vs 23.90 ℃ in 2022. Bottom: 23.33 ℃ in 2023 vs 23.08 ℃ in 2022. The average change in temperature through the water column was higher compared to last year, where average bottom temperature was higher than average surface temperature: 0.75 ℃ in 2023 vs -0.08 ℃ in 2022.

Average salinity at surface and bottom were *lower* compared to last year: Surface: 25.89 ppt in 2023 vs 27.65 ppt in 2022. Bottom: 26.36 ppt in 2023 vs 27.85 ppt in 2022.

Average pH readings were *relatively similar* during this survey compared to last year. Average Surface pH: 7.55 in 2023 vs 7.40 in 2022. Average bottom pH: 7.35 in 2023 vs 7.37 in 2022. **At both surface and bottom, the**

lowest pH recorded was *higher* than last year. Lowest surface pH: 7.28 in 2023 vs 6.94 in 2022. Lowest bottom pH: 7.19 in 2023 vs 6.96 in 2022.





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

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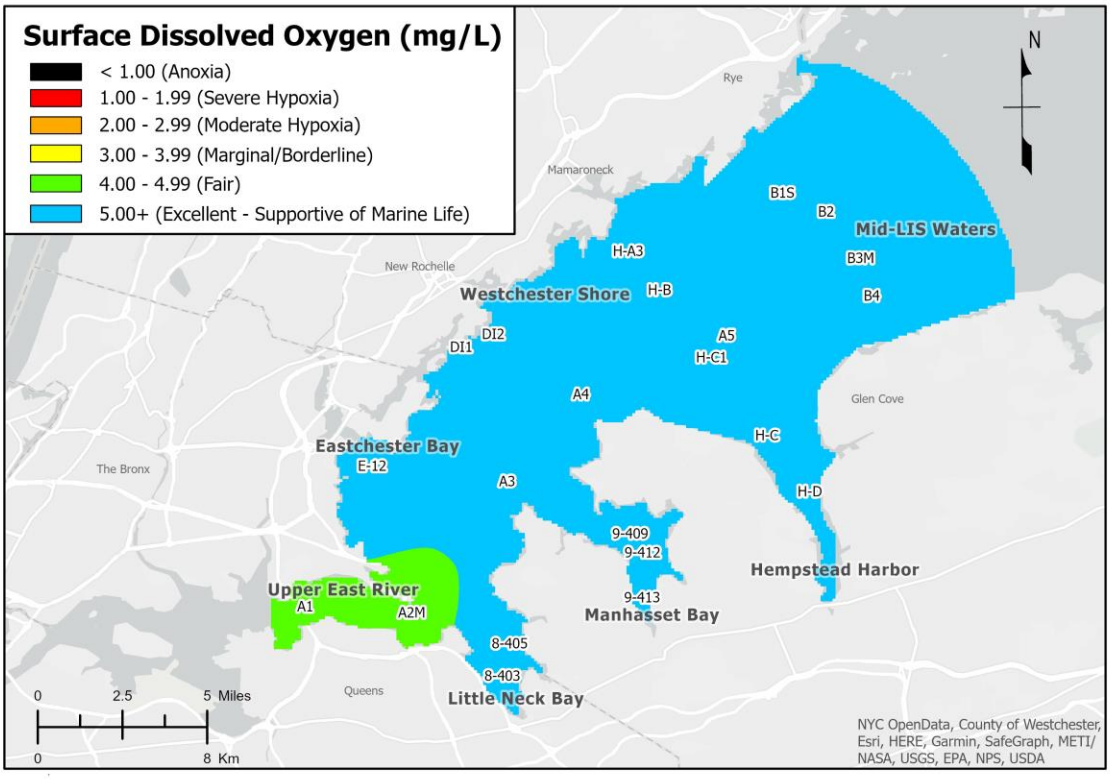
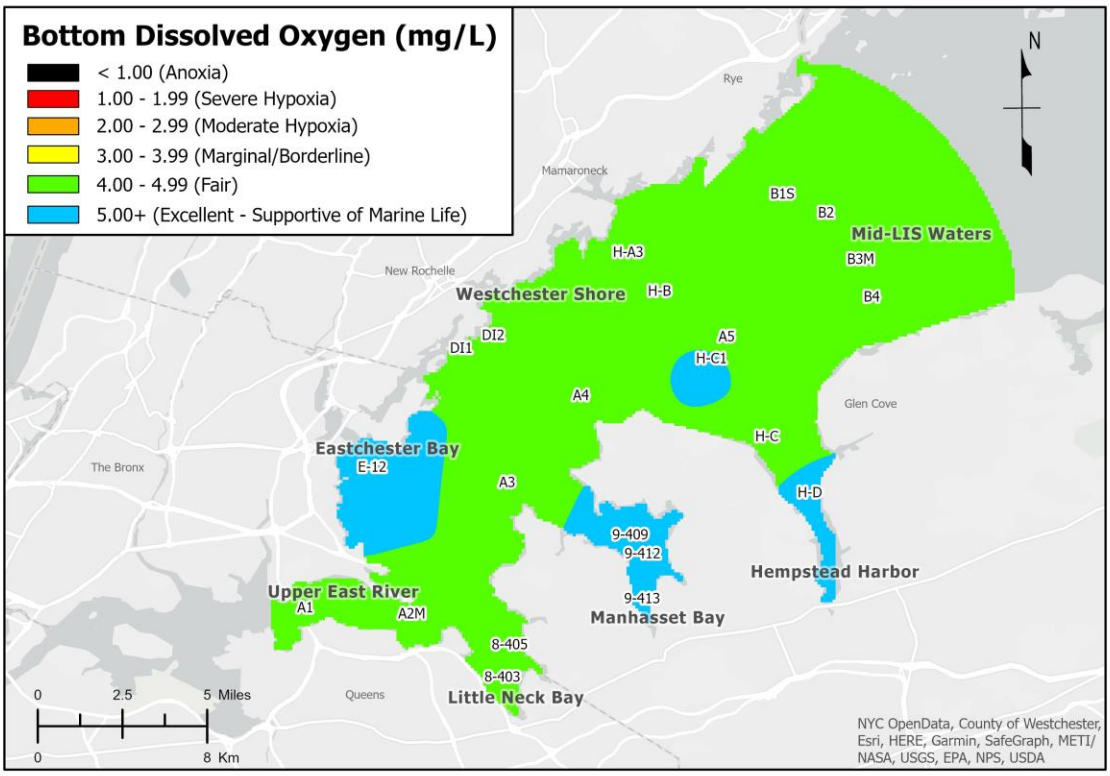
Ambient Water Quality Monitoring of the Western Long Island Sound

Weekly Survey #11: September 5, 2023





IDW Interpolation, Power 10 Map by: Kimarie Yap Map made: 09/28/23

SURVEY # 12 AT A GLANCE 09/12/2023

Hypoxia (DO < 3.00 mg/L)	**14 stations were hypoxic at bottom depth:** Manhasset Bay – 9-409, 9-412, 9-413 Westchester Shoreline – H-A3, H-B Hempstead Harbor – H-C Mid-LIS Waters – A3, A4, A5, B1S, B2, B3M, B4, H-C1
Lowest surface DO concentration	3.35 mg/L (Station 9-413 in Manhasset Bay)
Lowest bottom DO concentration	1.17 mg/L (Station 9-409 in Manhasset Bay)
Average surface DO concentration	6.00 mg/L
Average bottom DO concentration	2.70 mg/L
Average surface water temperature	24.27 ℃
Average bottom water temperature	23.51 ℃
Average water column ΔT	0.75 ℃
Average surface salinity	25.06 ppt
Average bottom salinity	25.89 ppt
Lowest surface pH	7.21 (Station 9-413 in Manhasset Bay)
Lowest bottom pH	7.05 (Station 9-413 in Manhasset Bay)
Average surface pH	7.63
Average bottom pH	7.29

Survey #12 Narrative Summary

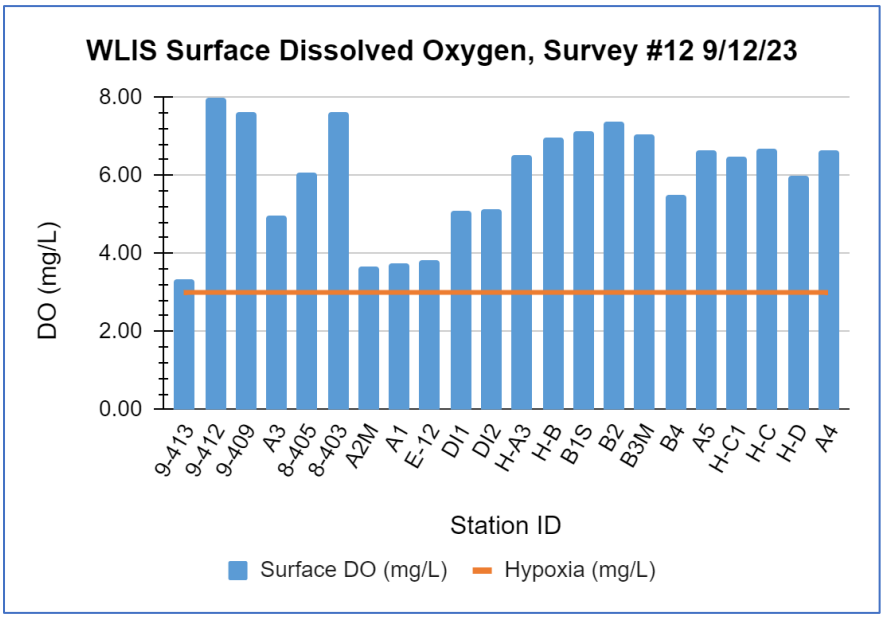
The survey began at 06:21 and ended at 11:04, with the last low tide at 04:43 and 05:01 at New Rochelle, NY and Kings Point, NY, respectively. There were overcast skies and fog, air temperature ranged from 70-73 °F, wind speed was 6-8 mph. The percent cloud cover measured 90-100% across all stations. There was **heavy rainfall in the days leading up to this survey**; the weather station at LaGuardia Airport reported 1.77" and 3.3" of precipitation for 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 7.5 ft in the Mid-LIS waters. **There were many reports of wastewater treatment plant (WWTP) sewage discharges: (1) a WWTP in Mamaroneck, NY reported an estimated 5.26 *million* gallons of partially treated sewage discharged into Long Island Sound which occurred the night before our survey and this is near IEC stations H-A3 and H-B, (2) a WWTP in Glen Cove, NY reported an estimated 520 gallons of partially treated sewage discharged into Glen Cove Creek which occurred the night before and the morning of our survey and this is near IEC stations H-D and H-C.**

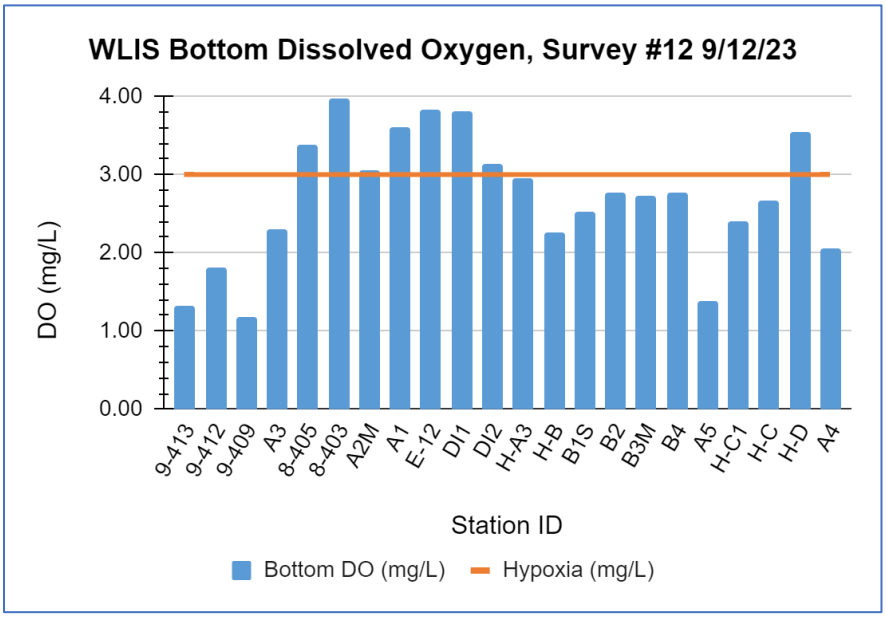
During this survey, *14* stations exhibited hypoxia! 10 stations were moderately hypoxic (DO 2-3 mg/L) and 4 stations were severely hypoxic (1-2 mg/L) at bottom depth. **No stations were hypoxic at surface depth.** This is likely due to the heavy rainfall leading up to this survey, which contribute to elevated urban runoff pollution and nutrient inputs into the Sound that feed hypoxic conditions. In comparison, no stations were hypoxic at bottom or surface depths during survey #12 last year. **Average DO during survey #10 this year was *slightly higher* at surface depth and *significantly lower* at bottom depth compared to last year.** Average Surface DO: 6.00 mg/L in 2023 vs 5.83 mg/L in 2022. Average Bottom DO: **2.70** mg/L in 2023 vs 5.28 mg/L in 2022.

Average temperatures were *higher* during this survey compared to last year. Surface: 24.27 ℃ in 2023 vs 23.04 ℃ in 2022. Bottom: 23.51 ℃ in 2023 vs 23.12 ℃ in 2022. The average change in temperature through the water column was also higher compared to last year: 0.75 ℃ in 2023 vs -0.07 ℃ in 2022.

Average salinity at surface and bottom was *lower* compared to last year: Surface: 25.06 ppt in 2023 vs 27.15 ppt in 2022. Bottom: 25.89 ppt in 2023 vs 27.45 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: 7.29 in 2023 vs 7.48 in 2022. **The lowest pH recorded was *slightly lower* compared to last year at both surface and bottom depths.** Lowest surface pH: 7.21 in 2023 vs 7.35 in 2022. Lowest bottom pH: 7.05 in 2023 vs 7.34 in 2022.





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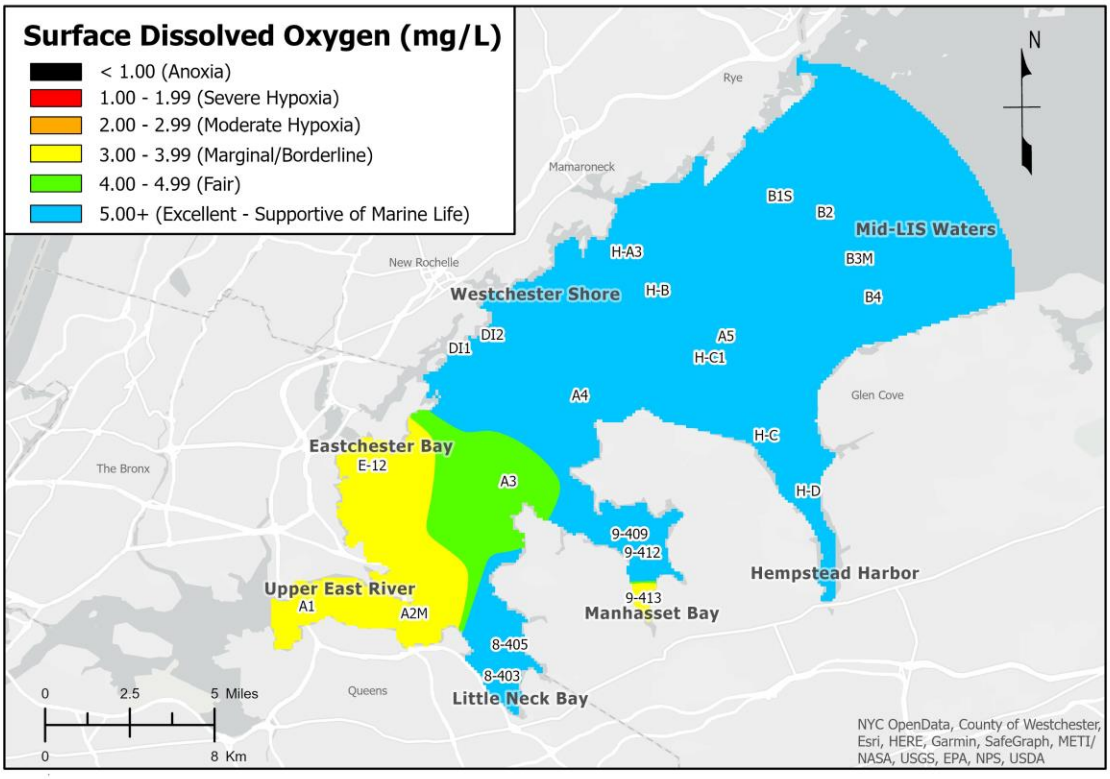
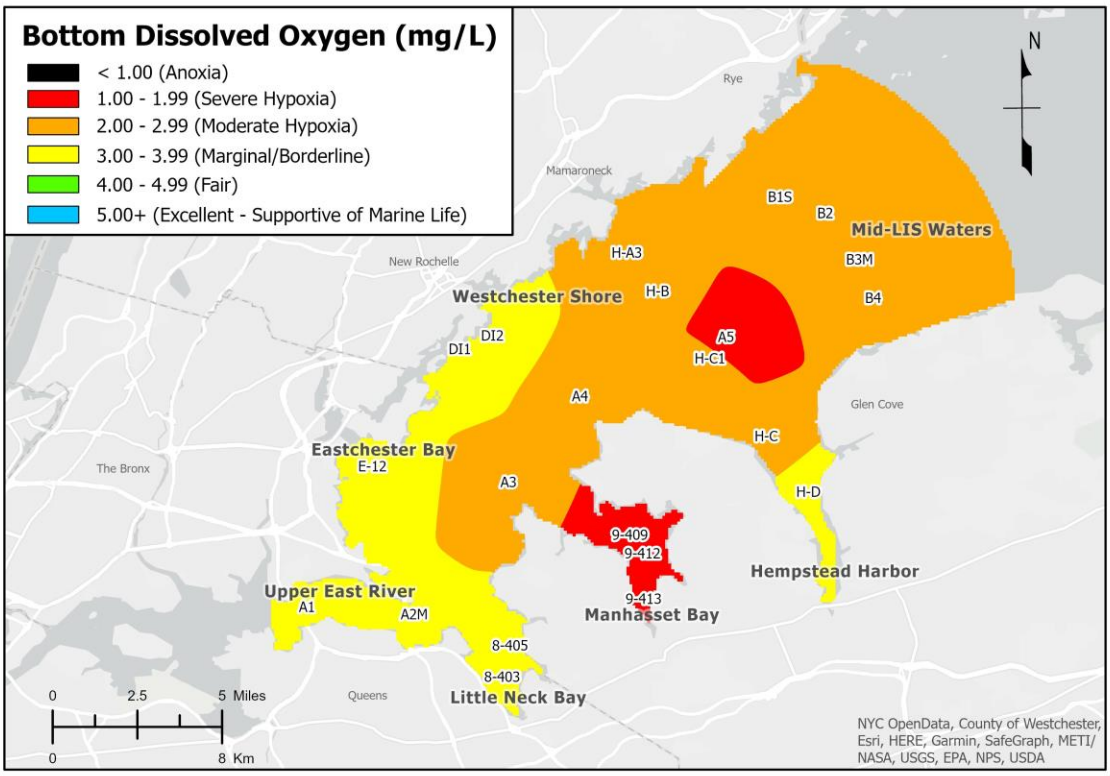
Weekly Survey #12: September 12, 2023





IDW Interpolation, Power 10 | Map by: Kimarie Yap | Map made: 09/28/23