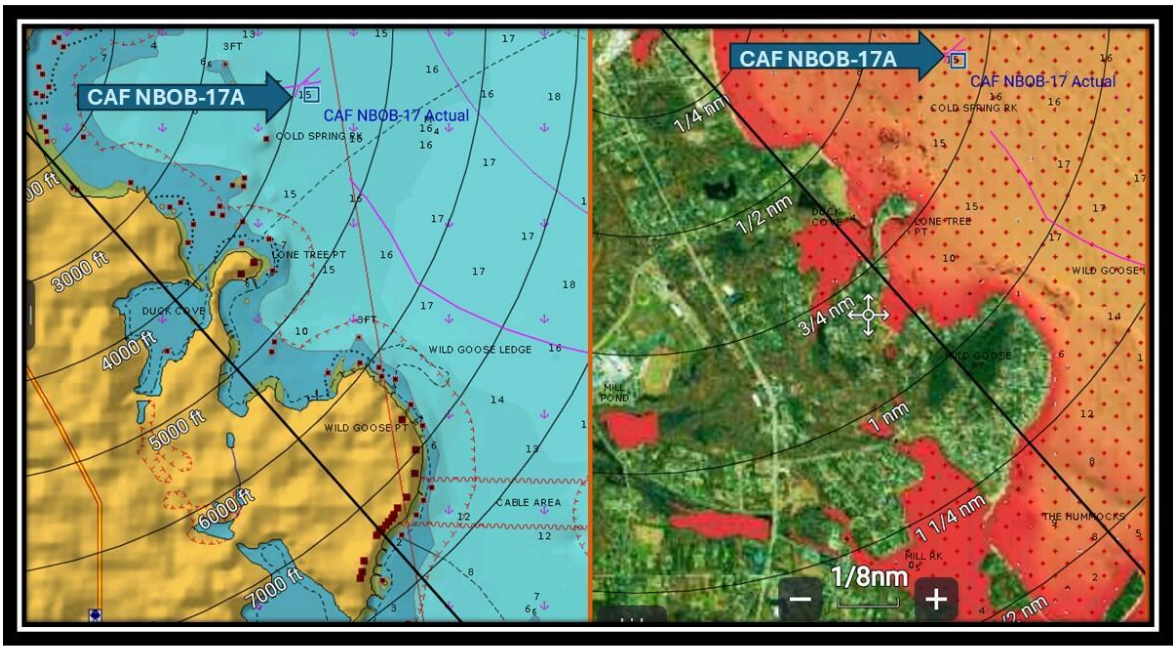
Narragansett Bay - Water Quality Profile 2024 - 2025

Technical Report of the CAF Narragansett Bay, Outer Bay Ecological Research Program



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Cite this report:

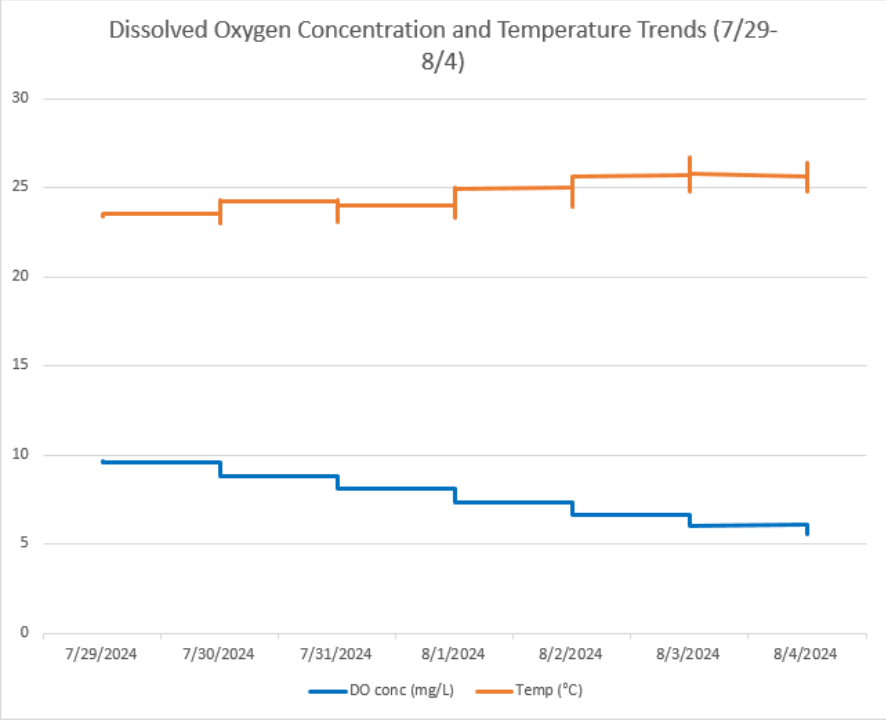
Collins, Kaila 2025. Narragansett Bay - Water Quality Profile 2024 – 2025.
Technical Report of the CAF Narragansett Bay, Outer Bay Ecological Research Program.
Coastal America Foundation Press. ISBN: 979-8-218-83032-8.

Narragansett Bay - Wickford Cove

The water quality of Narragansett Bay, specifically Wickford Cove, was measured from the dates of July 29, 2024, to November 19, 2024. It was recorded at approximately 1 meter below the surface of the water.

Dissolved Oxygen Concentration (mg/L)

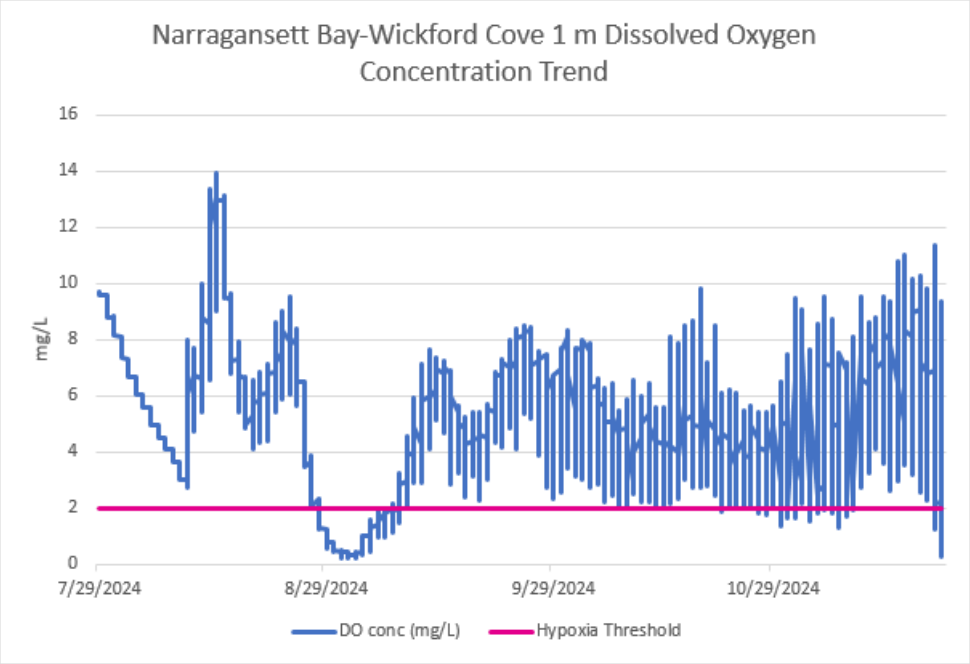
The dissolved oxygen (DO) concentration (mg/L) began relatively high at the end of July at 9.7 mg/L. The DO concentration steadily declined through the end of July and reached 6 mg/L by August 4th. This downward trend is likely due to increased water temperatures during that period, which reduced the amount of oxygen availability in the water (See Figure 1). The month of July had a minimum DO concentration of 8.13 mg/L and a high of 9.7 mg/L. The average DO concentration was 9.0 mg/L.



(Figure 1)

After August 4th, the DO continued to drop to 5.0 mg/L while the temperature of the water began to peak at 26°C. Then, the DO continued to increase up to a high of 13.9 mg/L on August 14th. During mid-August, the DO fluctuated between 3.5-9.0 mg/L. In late August, the DO continued to decline to 2.0-3.0 mg/L. August had a minimum DO concentration 0.22 mg/L and a high DO concentration of 13.9 mg/L, with an overall average of 5.6 mg/L.

In early September, the DO hit a low at 0.2 mg/L. This indicates hypoxic conditions, since the levels have fallen below 2.0 mg/L (Vaquer-Sunyer & Duarte, 2008). The DO concentrations remained below 2.0 mg/L from August 28th until September 7th (See Figure 2). The DO began to rebound up to 7.0 mg/L by mid September. In Late September, there were continued fluctuations between 2.4 mg/L-8.4 mg/L. September had an average of 4.3 mg/L.



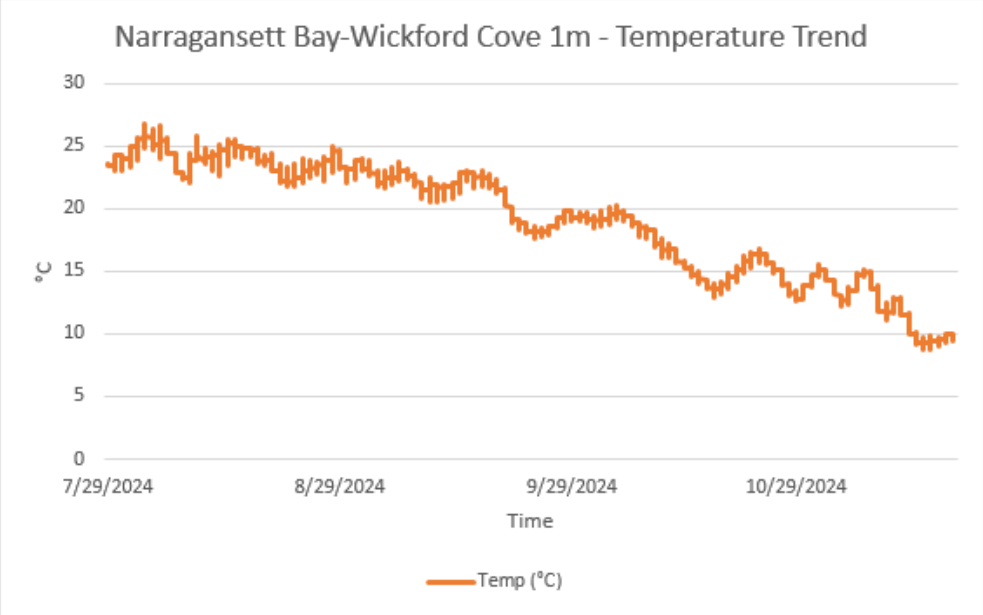
(Figure 2)

In October, the DO levels fluctuated between 1.3 mg/L and 9.8 mg/L and had an average concentration of 4.6 mg/L. As the temperatures began to drop, the DO concentrations continued to recover. By November, the levels averaged 6.0 mg/L with a low of 1.3 mg/L and a high of 11.37 mg/L.

Temperature (°C)

The highest recorded temperature was 26.8°C in August. After the end of August, there was a steady decrease in temperature. The lowest recorded temperature was in November at 5.6°C. (See Figure 3).

In July, there was an average temperature of 23.5°C. There was a minimum temperature of 23.0 °C and a maximum temperature of 24.3°C. In August, there was an average temperature of 23.9°C. There was a minimum temperature of 21.8°C and a maximum temperature of 26.8°C. This is a similar trend to years in the past, where August has the highest recorded water temperature. In September, there was an average temperature of 21.1°C. There was a minimum temperature of 17.7°C and a maximum temperature of 24.1°C. In October, there was an average temperature of 16.2 °C. There was a minimum temperature of 12.6°C and a maximum temperature of 20.3°C. In November, there was an average temperature of 12.1 °C. There was a minimum temperature of 5.6°C and a maximum temperature of 18.8°C. November was the coldest recorded temperature through the months of July-November. The maximum and minimum temperatures recorded were similar to trends in years past.



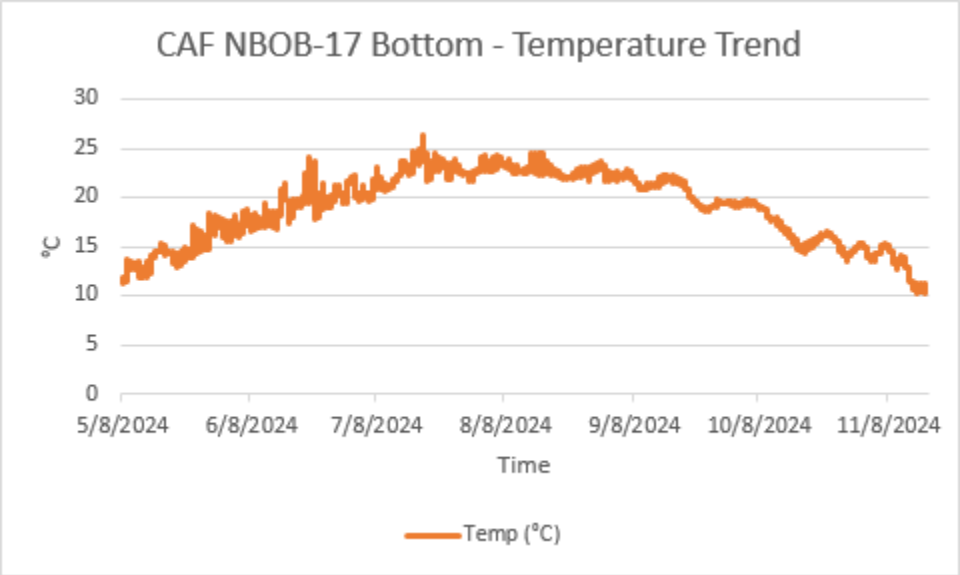
(Figure 3)

Narragansett Bay Mooring CAF-NBOB-17A Bottom

The Narragansett Bay was also monitored from a mooring located at approximately 41.56631 °, -71.43246 °. This mooring began recording on May 8, 2024 and was taken out of the water to complete the recording for the year on November 17, 2024. The mooring collected water quality data from the bottom of Narragansett Bay and also the surface. This portion of the assessment refers to the water quality data taken from the bottom of Narragansett Bay.

Temperature (°C)

The temperature of the CAF-NBOB-17A mooring, located at the bottom of Narragansett Bay, had an average of 18.9 °C from the months of May to November of 2024. The month of May had an average of 14.2 °C, with a maximum temperature of 18.4°C and a minimum temperature of 11.4°C. June had an average temperature of 18.6 °C, with a maximum temperature of 24.0°C and a minimum temperature of 15.6°C. July had an average temperature of 22.2°C, with a maximum temperature of 26.3°C and a minimum temperature of 19.5°C. August had the highest recorded average temperature of 22.8°C, with a maximum temperature of 24.6°C and a minimum of 21.6°C. September had an average temperature of 20.9°C, with a maximum temperature of 23.2°C and a minimum temperature of 18.5°C. October had an average temperature of 16.8°C, with a maximum temperature of 19.9°C and a minimum temperature of 13.5°C. November had the lowest recorded monthly average temperatures of 13.4°C, with a maximum temperature of 15.4°C and a minimum of 10.3°C.



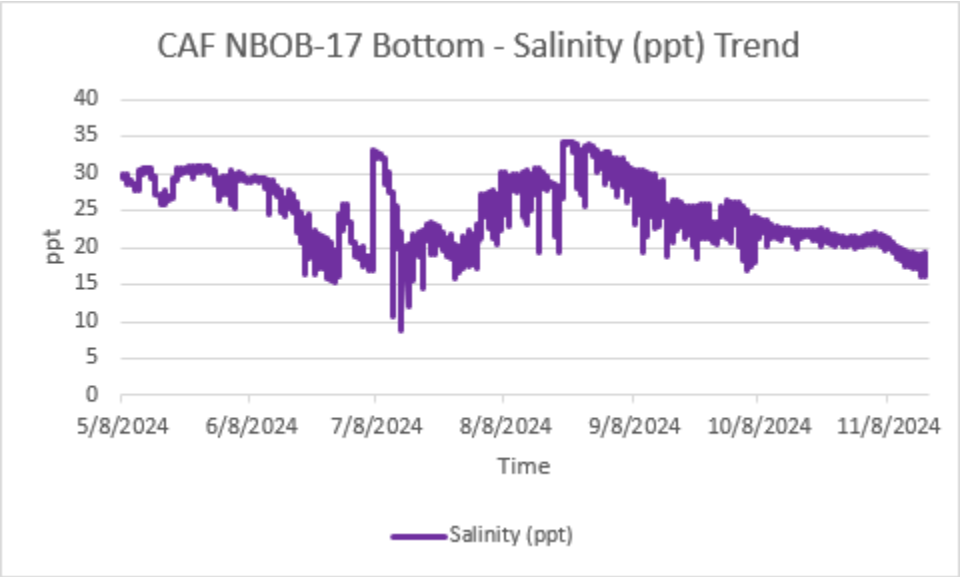
(Figure 4)

Salinity (ppt)

The salinity of Narragansett Bay had a total average from May to November of 25.2 ppt (See Figure 5). The average salinity of the ocean is approximately 35 ppt (Ely, 1988). This makes Narragansett Bay slightly below the ocean's average of salinity. This is due to Narragansett Bay being an estuary (Ely, 1988). The average recorded salinity of Narragansett Bay in the past has been 29-31 ppt, (Ely, 1988). The average recorded in 2024 was slightly below this previous recorded average from May to November (25.2 ppt).

The minimum salinity was recorded at 8.8 ppt on July 14th at 23:30. This was an outlier and this low level of salinity only lasted for a short period of one hour and thirty minutes. (Potentially a biological organism may have taken residence on the sensor, such as a snail, which has occured previously.) The month with the lowest average salinity was November at 19.9 ppt. The highest recorded salinity was 34.3 ppt on August 22nd. The month of August had the highest recorded average salinity at 29.1 ppt.

In May, the average salinity was 29.4 ppt. In June, the average salinity was 25.4 ppt. In July, the average salinity was 22.3 ppt. In August, the average salinity was 29.1 ppt, which was the highest monthly average. In September, the average salinity was 26.8 ppt. In November, the average salinity was 19.9 ppt, which was the lowest monthly average.



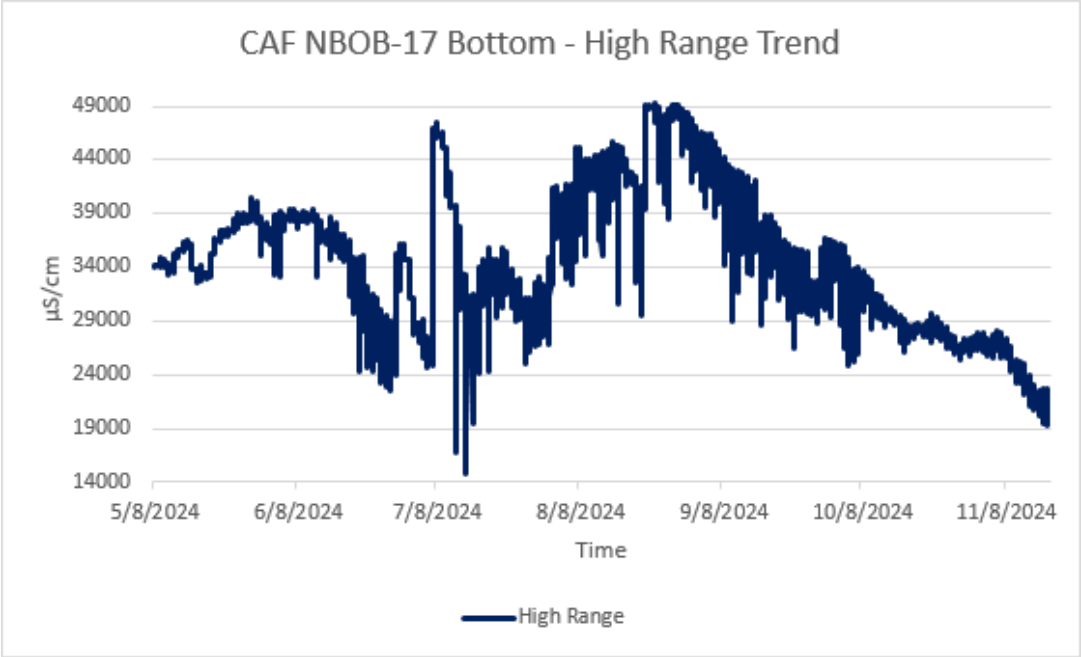
(Figure 5)

High Range (µS/cm)

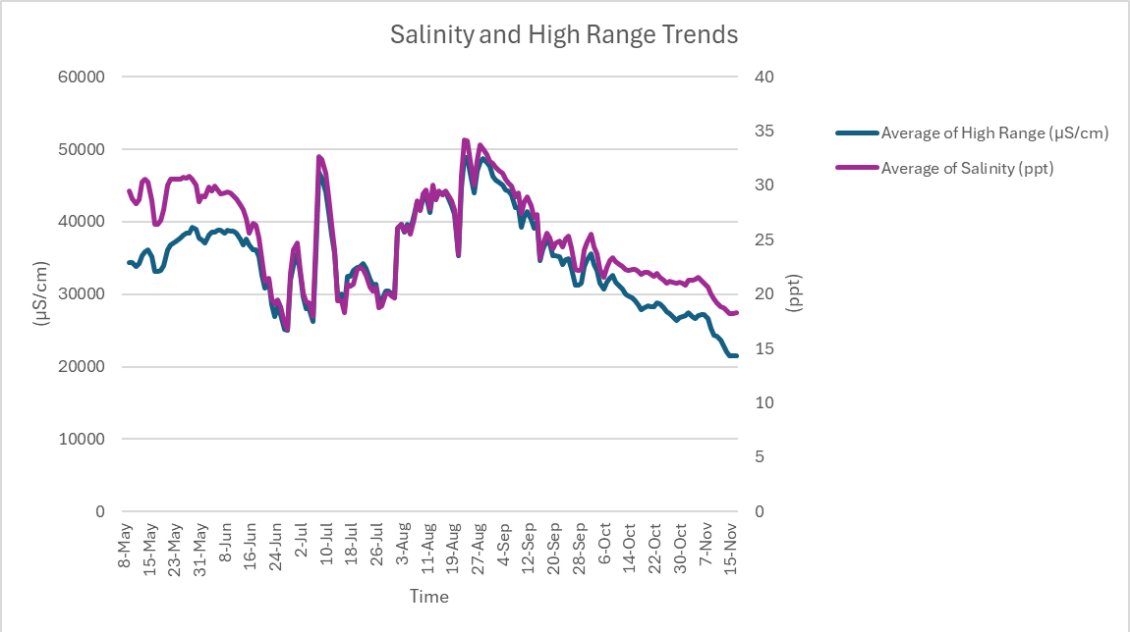
The high range conductivity of Narragansett Bay had an overall average from May to November of 3490.3 µS/cm (See Figure 6). High range conductivity is directly related to salinity in water quality. This is displayed in this data. As salinity decreases, conductivity decreases and vice versa (See Figure 7). The correlation coefficient between high range conductivity and salinity is measured at 0.91, with an R^2 value of 0.84. This indicates a strong association. The minimum high range conductivity was recorded on July 14th at 14824.6 µS/cm. This coincides with the minimum recorded salinity of 8.8 ppt on July 14th. The highest high range conductivity was recorded on August 24th at 49277.9 µS/cm, this also coincides with the highest recorded salinity which was recorded two days before August 24th (August 22nd).

The average high range conductivity in May was 36002.4 µS/cm. The average high range conductivity in June was 34627.4 µS/cm. The average high range conductivity in July was

33331.3 µS/cm. The average high range conductivity in August was 43000.0 µS/cm, which was also the highest monthly average. The average high range conductivity in September was 38518.4 µS/cm. The average high range conductivity in October was 29837.7 µS/cm. The average high range conductivity in November was 24887.7 µS/cm, which was also the lowest monthly average.



(Figure 6)



(Figure 7)

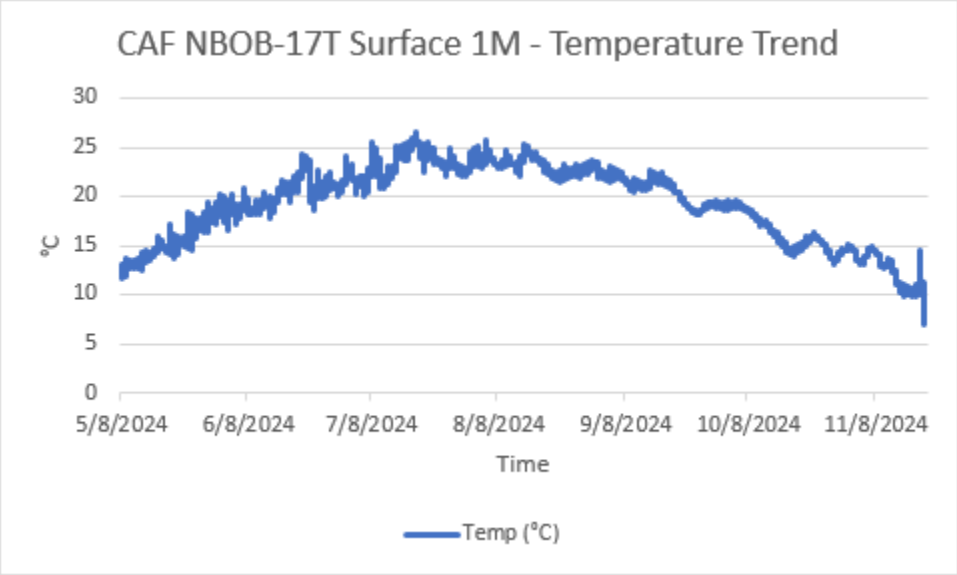
Narragansett Bay Mooring CAF-NBOB-17A Surface

The Narragansett Bay water quality was monitored from a mooring located at approximately 41.56631 °, -71.43246 °. This mooring collected the water quality data located at the bottom of Narragansett Bay and from the surface. This portion of the assessment refers to the water quality data recorded at 1 meter below the surface of Narragansett Bay.

Temperature (°C)

The overall average water temperature of the surface level was 19.3°C recorded from May to November. This is only slightly higher than the bottom of Narragansett Bay's average temperature of 18.9 °C. Similar to the bottom of Narragansett Bay, the month with the highest average temperature was August and the month with the lowest average temperature was November.

In May, the average temperature was 15.2°C, with a maximum temperature of 19.4°C and minimum temperature of 11.7°C. In June, the average temperature was 20.1°C, with a maximum temperature of 24.3°C and a minimum temperature of 16.6°C. In July, the average temperature was 23.1°C, with a maximum temperature of 26.5°C and a minimum temperature of 20.0°C. In August, the average temperature was 23.2°C, with a maximum of 25.8°C and a minimum of 21.5°C. In September, the average temperature was 20.8°C, with a maximum of 23.5°C and a minimum of 18.2°C. In October, the average temperature was 16.4°C, with a maximum of 19.6°C and a minimum of 13.2°C. In November, there was an average temperature of 12.6°C, with a maximum of 15.1°C and a minimum of 7.0°C (See Figure 8).



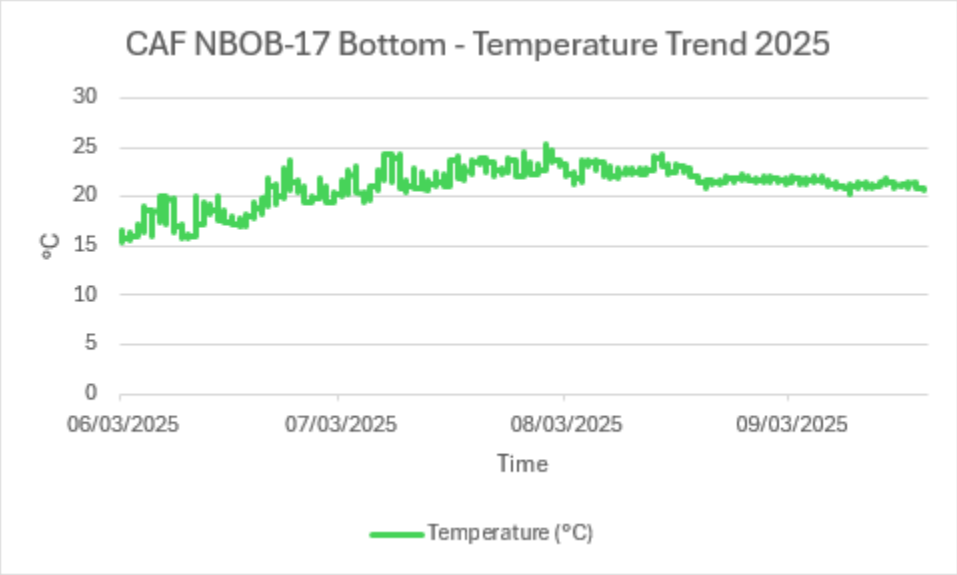
(Figure 8)

Narragansett Bay Mooring CAF-NBOB-17A Bottom 2025

The Narragansett Bay was also monitored from a mooring located at approximately 41.56631 °, -71.43246 °. This mooring began recording on June 3, 2025 and was taken out of the water to complete the recording for the year on September 20, 2025. The mooring collected water quality data from the bottom of Narragansett Bay and also the surface. This portion of the assessment refers to the water quality data taken from the bottom of Narragansett Bay.

Temperature (°C)

The temperature of the CAF-NBOB-17A mooring, located at the bottom of Narragansett Bay, had an average of 21.1°C from the months of June to September of 2025. The month of June had the lowest recorded monthly average of 18.5 °C, with a maximum temperature of 23.7°C and a minimum temperature of 15.3°C. July had an average temperature of 22.0°C, with a maximum temperature of 25.3°C and a minimum temperature of 19.3°C. August had the highest recorded average temperature of 22.4°C, with a maximum temperature of 24.7°C and a minimum of 20.9°C. September had an average temperature of 21.3°C, with a maximum temperature of 22.1°C and a minimum temperature of 20.3°C (See Figure 9).



(Figure 9)

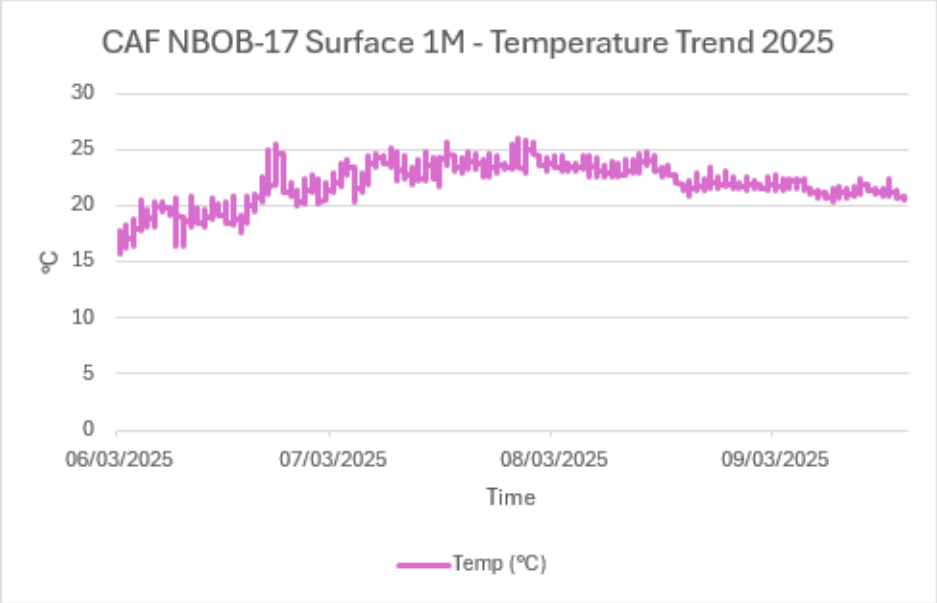
Narragansett Bay Mooring CAF-NBOB-17A Surface 2025

The Narragansett Bay water quality was monitored from a mooring located at approximately 41.56631 °, -71.43246 °. This mooring began recording on June 3, 2025 and was taken out of the water to complete the recording for the year on September 20, 2025. This mooring collected the water quality data located at the bottom of Narragansett Bay and from the surface. This portion of the assessment refers to the water quality data recorded at 1 meter below the surface of Narragansett Bay.

Temperature (°C)

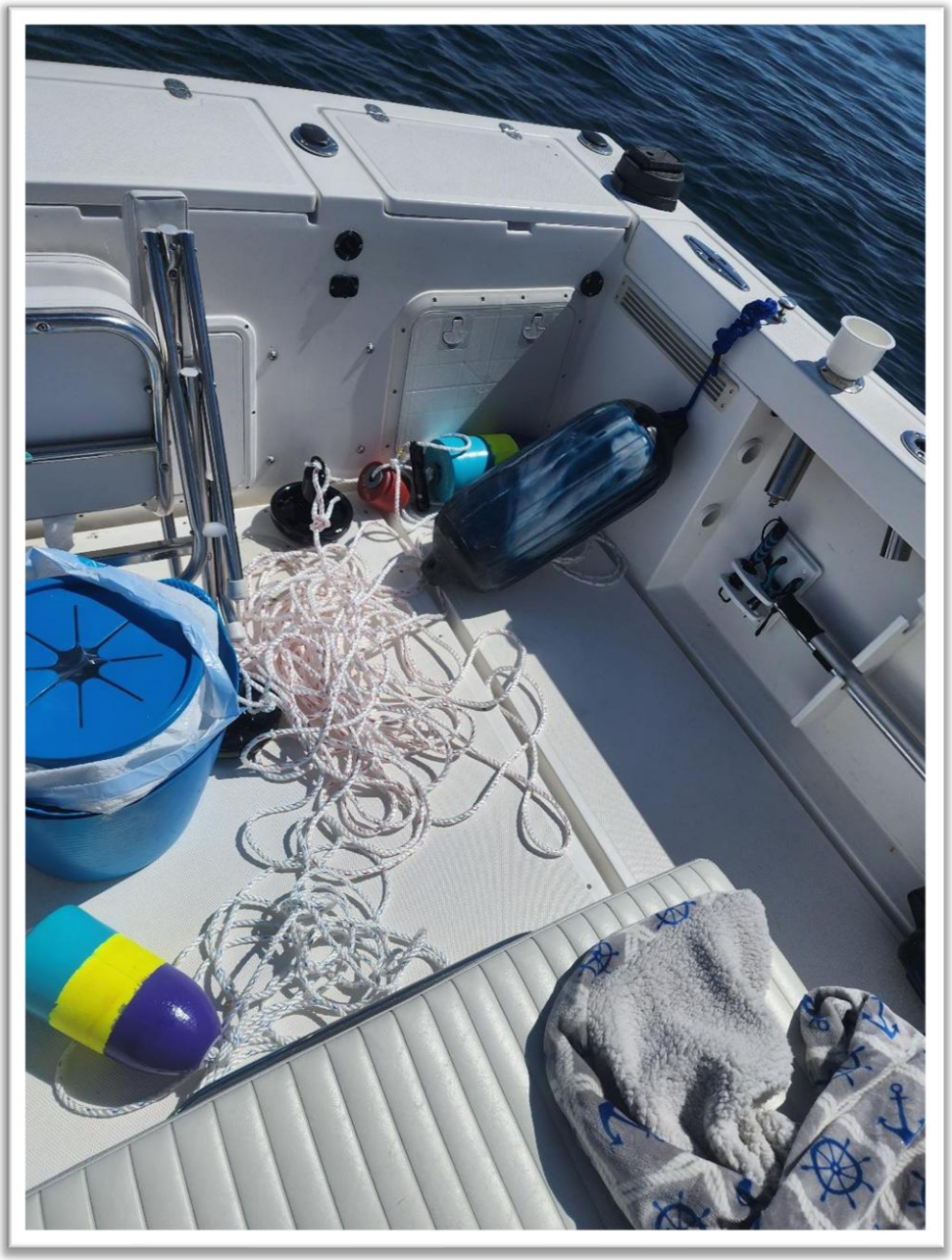
The overall average of the surface level water temperature was 22.0°C recorded from June to September. This is only slightly higher than the bottom of Narragansett Bay's average temperature of 21.1 °C. Similar to the recordings at the bottom of Narragansett Bay, the month with the lowest average temperature recorded at the surface was June. The month with the highest average temperature recorded at the surface was July, which differs from the highest average recorded on the bottom, which was August.

In June, the average temperature was 19.9°C, with a maximum temperature of 25.6°C and a minimum temperature of 15.7°C. In July, the average temperature was 23.4°C, with a maximum temperature of 26.0°C and a minimum temperature of 20.1°C. In August, the average temperature was 22.9°C, with a maximum of 24.8°C and a minimum of 20.9°C. In September, the average temperature was 21.4°C, with a maximum of 22.7°C and a minimum of 20.4°C (See Figure 10).

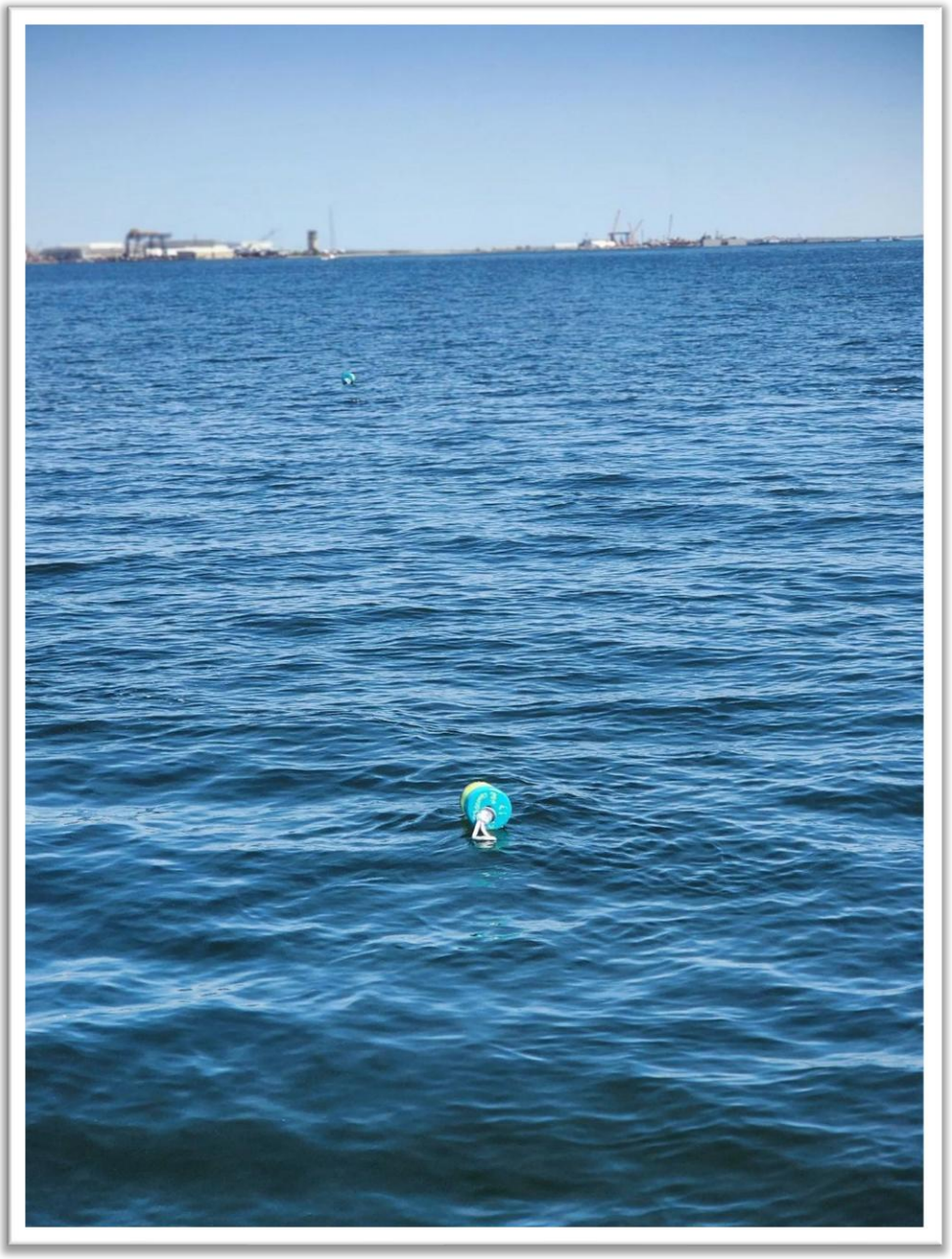


(Figure 10)

Appendix A - Photographs

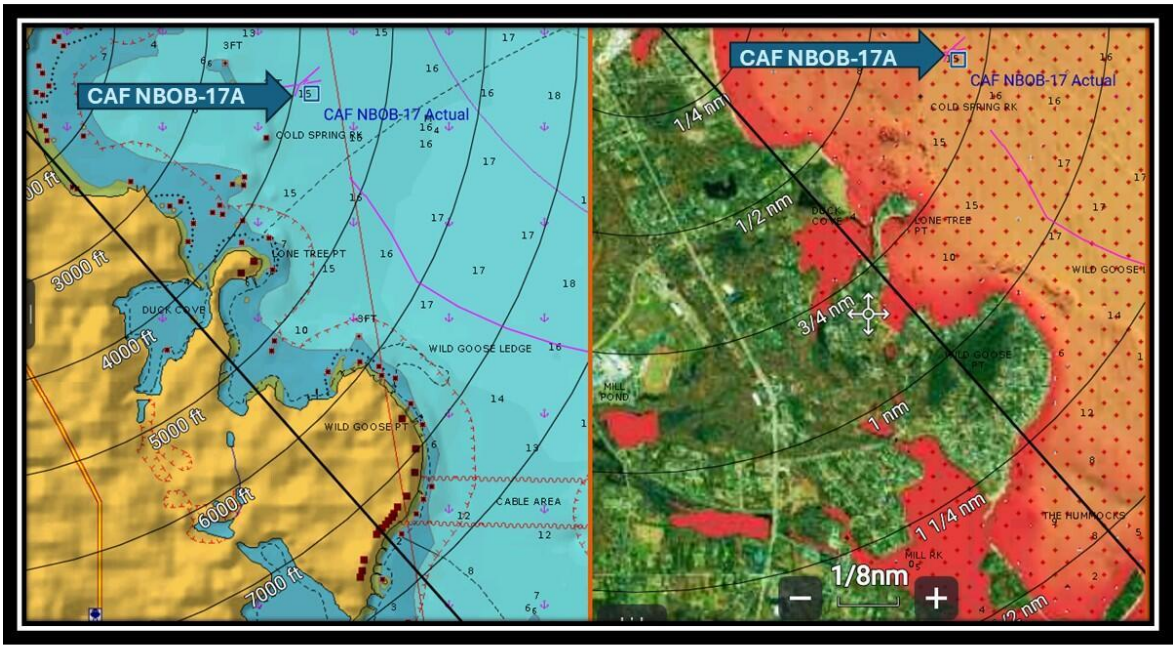


Anchor and buoy support for HOBO® Data Loggers deployed at CAF NBOB-17A.



Buoy deployment at CAF NBOB-17A

Appendix B - Station Map



Station map of CAF NBOB-17A mooring

Appendix C - Data Links

The links to access the data of the water quality for Narragansett Bay, specifically Wickford Cove, Rhode Island 2024 & 2025 are below.

CAF_NBOB-17_bottom NOV 19 2024 KC.xlsx

CAF_NBOB-17T_SURFACE_1MNOV19 2924.xlsx

CAF-NarrBay-Wickford_Cove_1m_0NOV19 2024 KC.xlsx

Raw data download 21NOV24KorDSS Measurement File Export KC.xlsx

NBOB 17 Surface 2025-09-24 10_13_11 EDT (Data EDT)bluetooth - KCr.xlsx

NBOB 17- BOTTOM 2025-09-24 10_13_20 EDT (Data EDT)- bluetooth (1).xlsx

Citations

Vaquer-Sunyer, R., & Duarte, C. M. (2008). Thresholds of hypoxia for marine biodiversity. Proceedings of the National Academy of Sciences, 105(40), 15452–15457. https://doi.org/10.1073/pnas.0803833105

Ely, E. (1988). An Overview of Narragansett Bay. Rhode Island Sea Grant.

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