

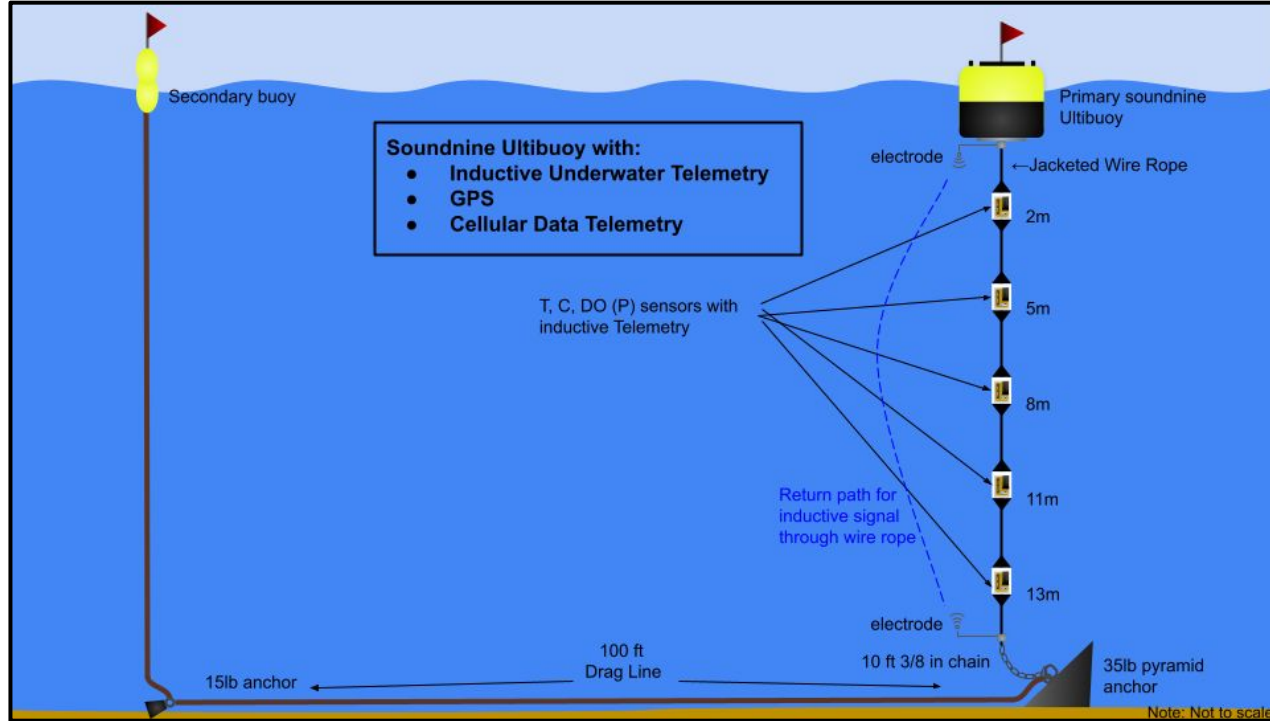
Water Column Monitoring

2025 Review & 2026 Plan



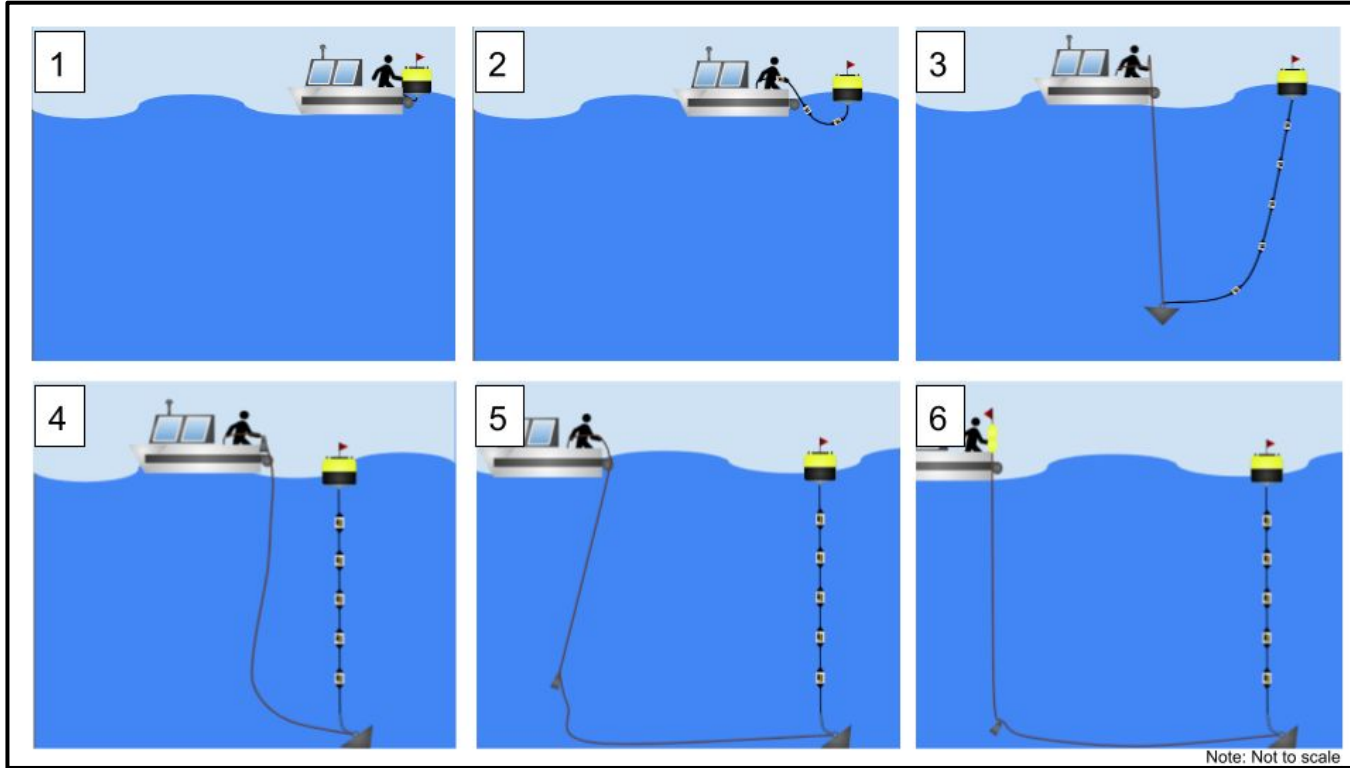
CBP Hypoxia Collaborative
April 28, 2026

Hypoxia Buoy Water Column Monitoring System Configuration

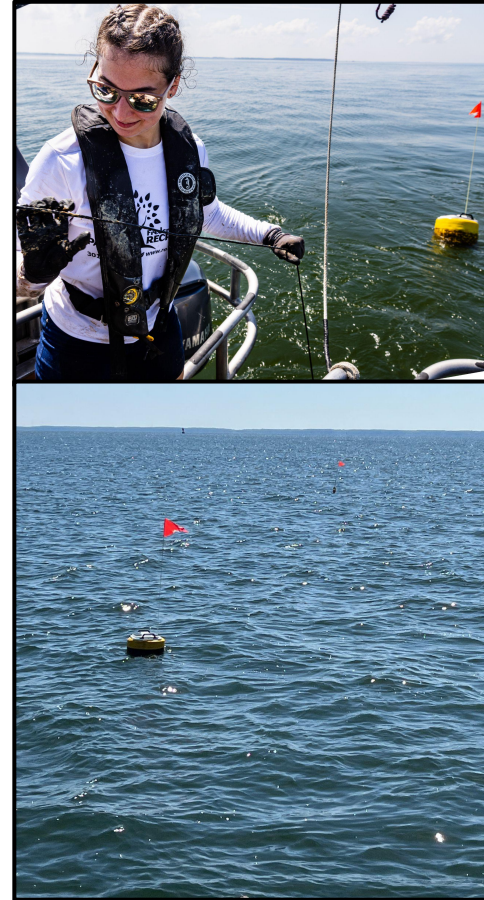


Hypoxia buoy system schematic diagram showing the layout of a system in the water column. The diagram shows an example of the sensor's distribution along the cable, measuring parameters in the water column. Parameters consist of temperature ($^{\circ}\text{C}$), conductivity (S m^{-1}), dissolved oxygen concentration (mg L^{-1}), and pressure (db). Figure not to scale.

Hypoxia Buoy Deployment- Updated Protocol



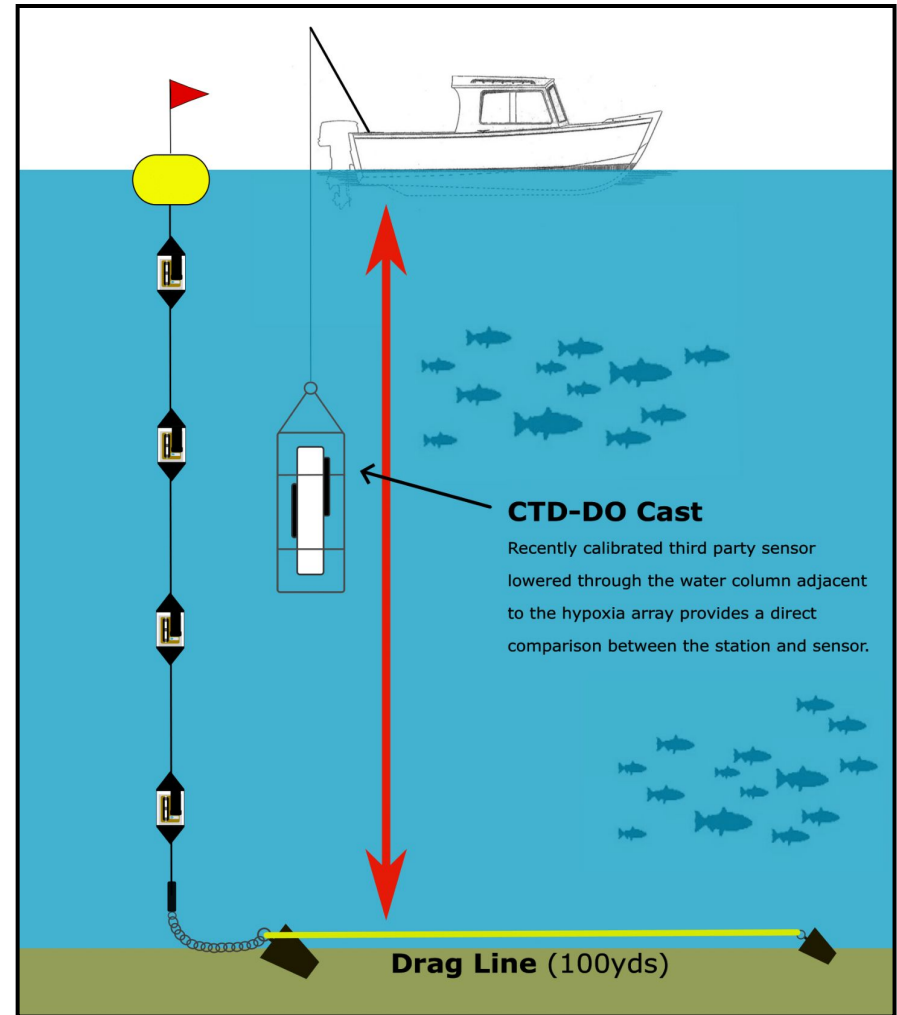
Above, figure of the buoy deployment process. To the right, photo examples of NCBO staff deploying a hypoxia buoy and how the system sits in the water once deployed.



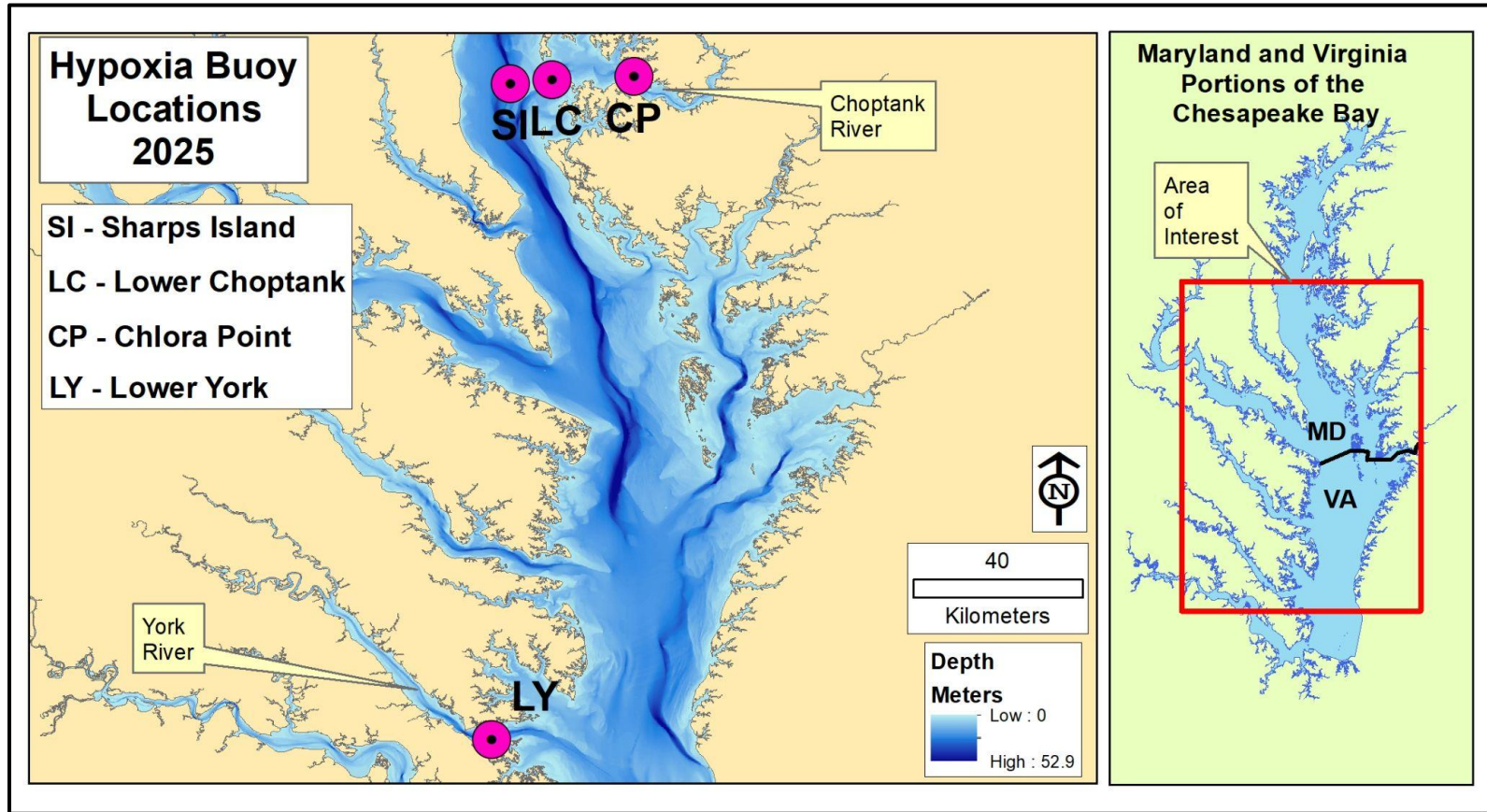
Water Quality Validation

Buoy maintenance involves visiting monitoring stations every few weeks to recover, inspect, clean, and redeploy water quality sensors so they continue collecting accurate data. Sensors are checked for biofouling, replaced if needed, and protected with copper screens to reduce biological growth.

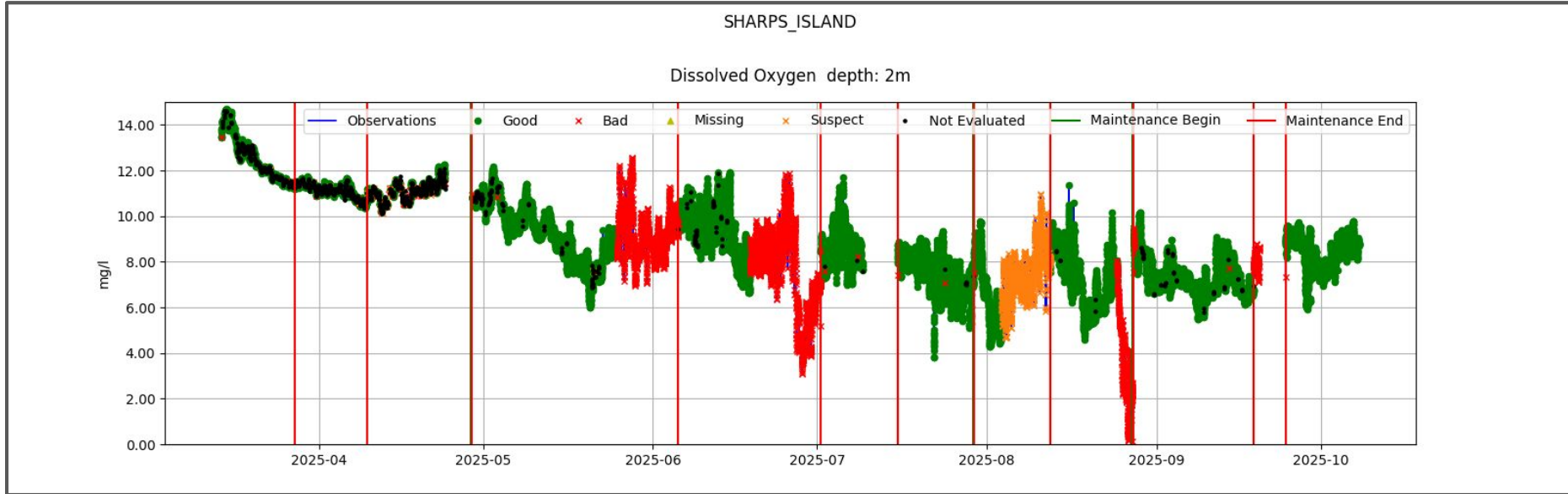
A CTD-DO cast (Conductivity, Temperature, Depth, with Dissolved Oxygen) is a vertical water column profile taken before and after maintenance to measure conditions like salinity, temperature, and oxygen levels. These casts help validate buoy sensor accuracy and support NOAA's quality assurance process.



2025 Hypoxia Buoy Locations

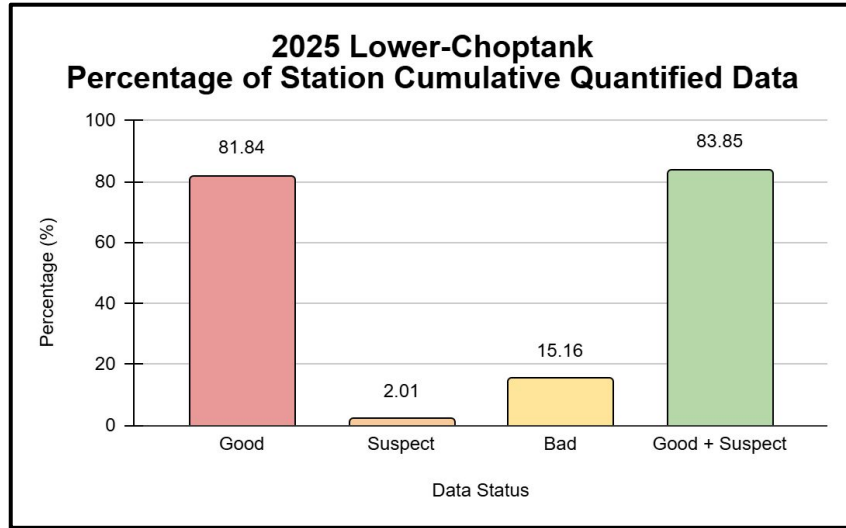


2025 Data Quality Example

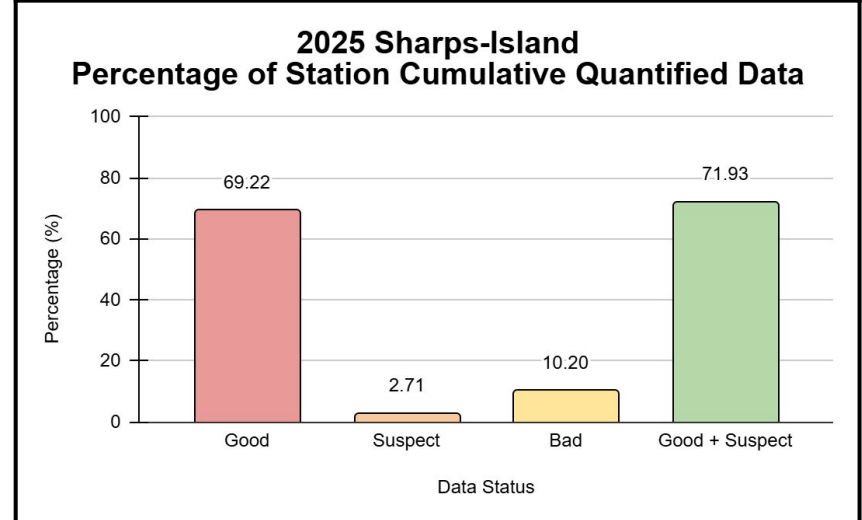
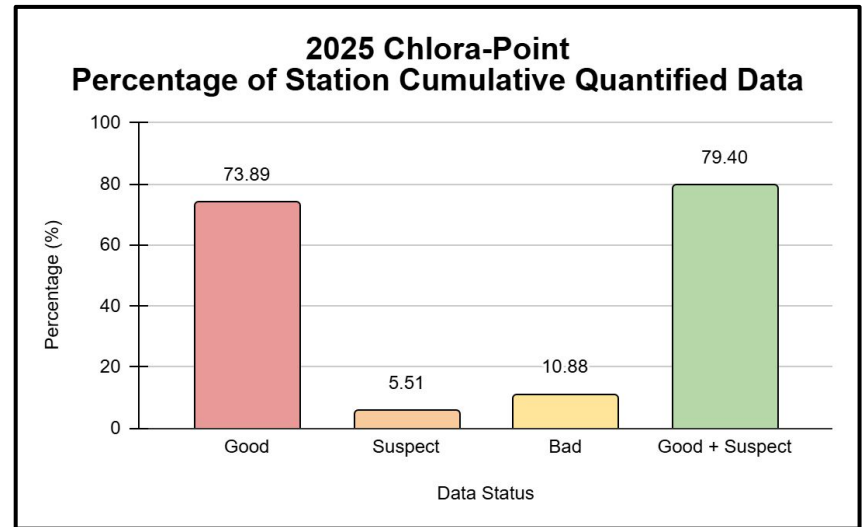


Dissolved oxygen measurements (mg L^{-1}) recorded at 2 meters depth at the Sharps Island Hypoxia Buoy from March 15 to October 9, 2025.

2025 Overall Data Quality

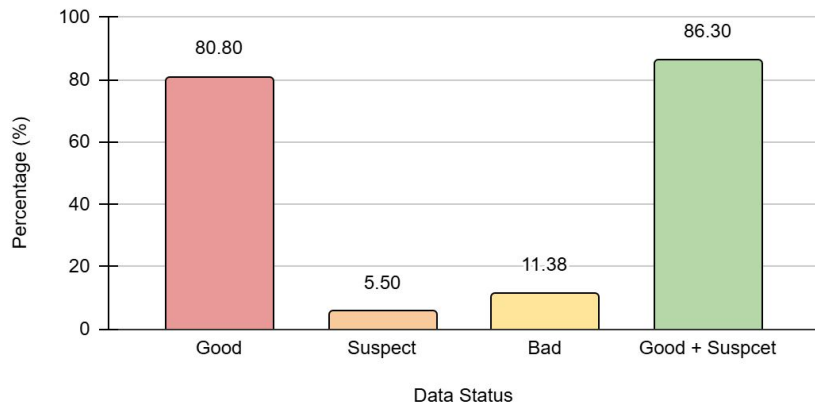


Percentage breakdown of overall 2025 data quality by **station**, including good, bad, suspect, and combined good + suspect data. This includes Temperature, Conductivity, Salinity, Dissolved Oxygen, and Corrected Dissolved Oxygen.



Peak Season Data Quality (June 1- Aug 31)

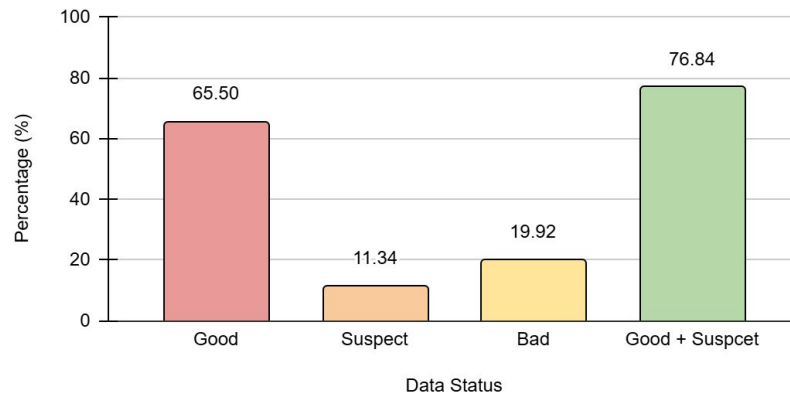
2025 Percentage of Station Cumulative Quantified Data



2024 Percentage of Station Cumulative Quantified Data



2023 Percentage of Station Cumulative Quantified Data

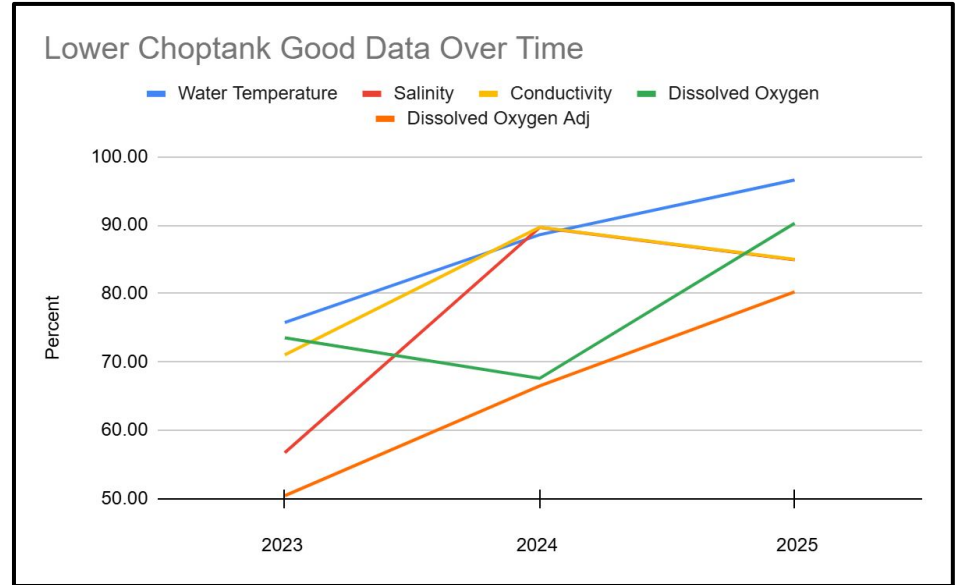


2023 to 2025 quality control metrics **year by year (June to August)**, including good, bad, suspect, and combined good + suspect data. This includes Temperature, Conductivity, Salinity, Dissolved Oxygen, and Corrected Dissolved Oxygen.

Lower Choptank Station: Three-Year Percent Good Data Summary (Peak Hypoxia Season June 1 to August 30)

Overall, the three-year Lower Choptank summary shows improved data quality across parameters from 2023 to 2025.

- Water temperature and DO adjusted showed the most consistent improvement, with water temperature increasing to over 95% while DO adjusted rose from ~50% to 80%.
- Conductivity and salinity improved through 2024 before slightly declining in 2025 - conductivity increased from ~71% to 90% before dropping to about 85% in 2025, while salinity in 2025 was 57%, then matched conductivity in the following two years.
- Dissolved oxygen (DO) showed more variability, decreasing slightly from 73% to 68% before improving to 90% in 2025.



2023-2025 year-by-year quality control metrics (June-August) showing percent good data for Temperature, Conductivity, Salinity, Dissolved Oxygen, and Corrected Dissolved Oxygen at the Lower Choptank Buoy.

2026 Planned Locations

Sharps Island (sentinel)

- 15m- 6 sensors- year 3

Chlora Point

- 8m- 3 sensors- year 3

Piankatank River

- 5m- 3 sensors- year 1
- VANERRS maintenance partner

Rhode River

- 2m- sensor study site
- CBO vessel location

Anywhere else?

- Anyone else?

