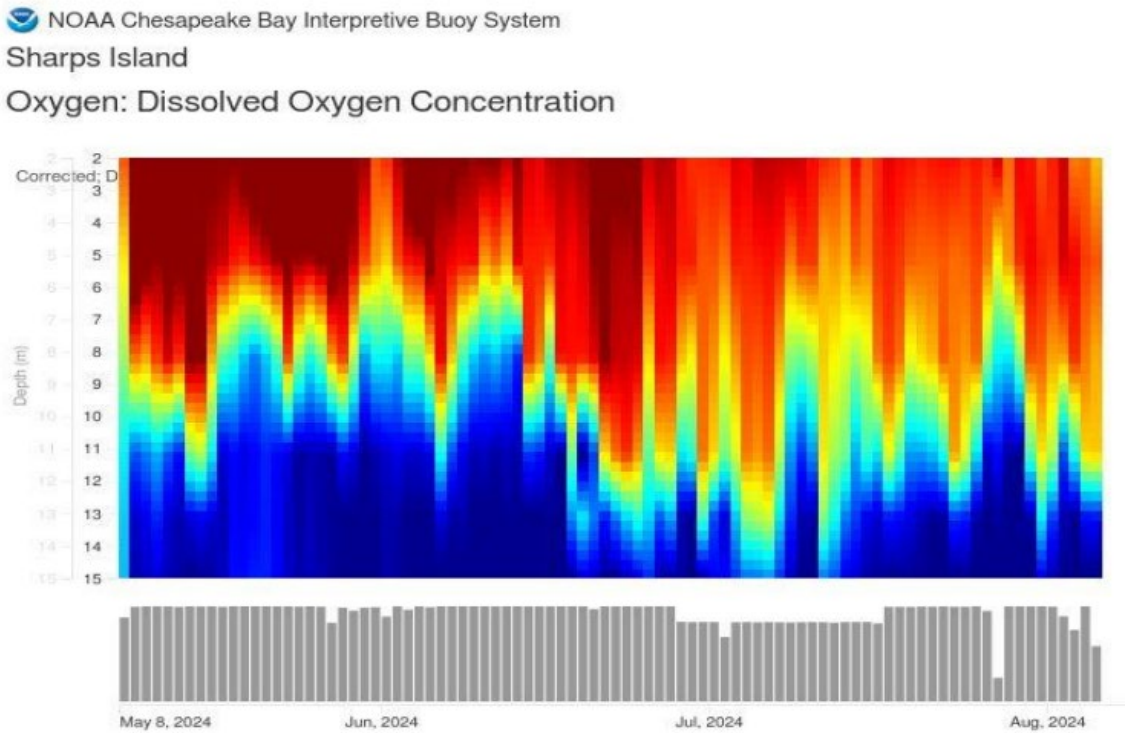
Goals and Outcomes of the Hypoxia Collaborative: Past and Future Directions

Peter Tango

Hypoxia Collaborative Meeting

April 28, 2026



Hypoxia Collaborative Team

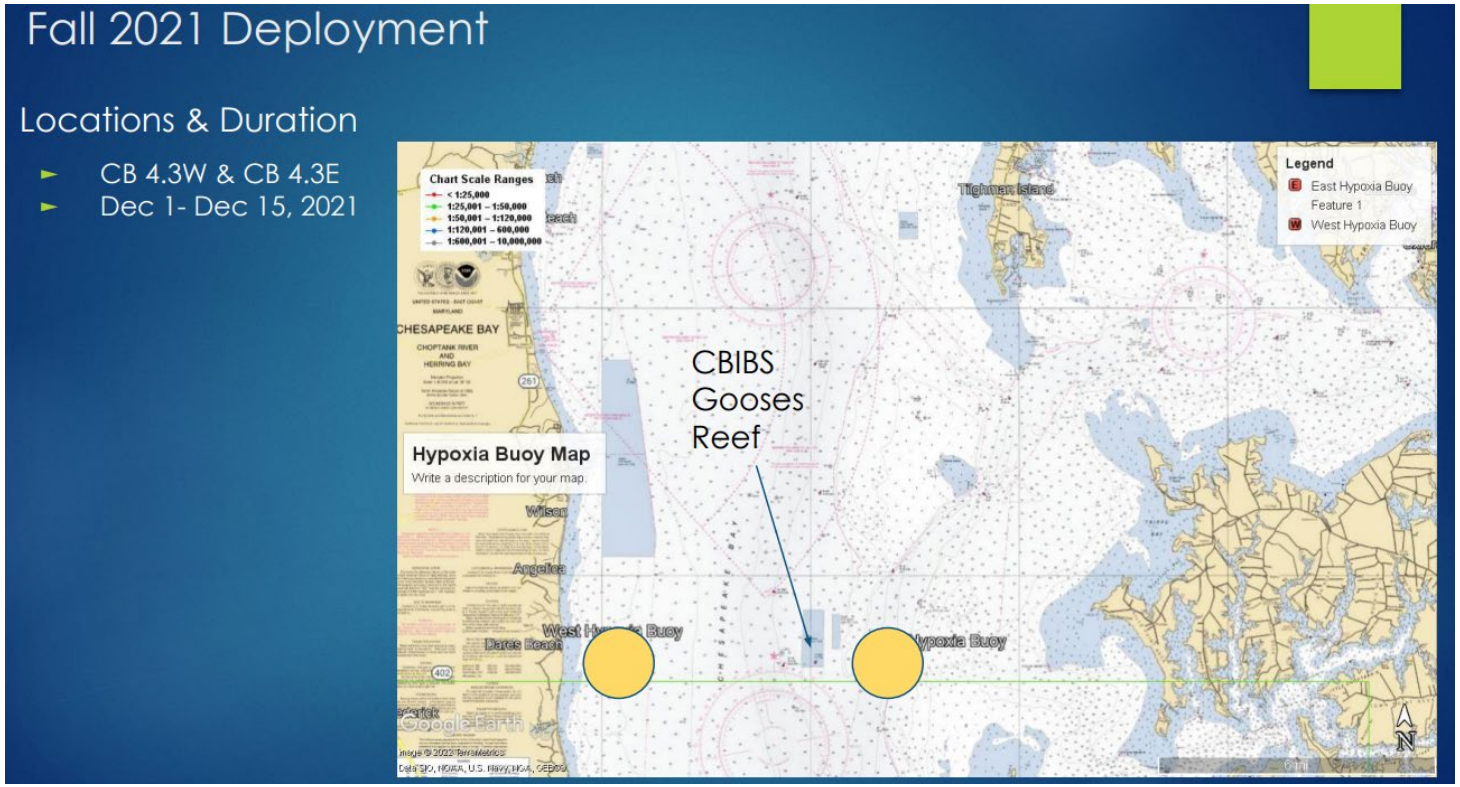
The Hypoxia Collaborative Team advises the design and implementation of a Chesapeake Bay-wide high-frequency hypoxia profiling network to improve the monitoring and assessment of the Bay.

Management applications of the hypoxia monitoring network include WQ criteria assessment and condition of fish habitat.

- The team will focus on developing a sampling design
- defining agency roles and responsibilities,
- documenting operational costs,
- recommending QA/QC protocols,
- prioritizing near term data products and management applications, and
- designing an analytical framework and model integration.

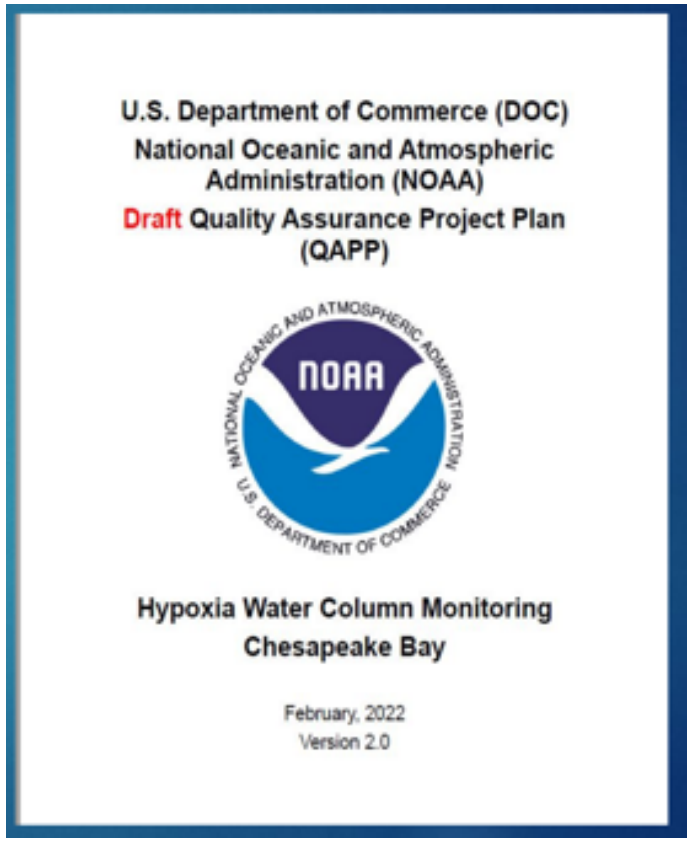
Team activities

- 2021-2025 has deployed instruments in select, recommended segments and preferred seasons.
- The period has been developmental in terms of understanding operations, maintenance, capacity limits, and annual costs



Team developments: QA/QC

- 2021-2025 has deployed instruments in select, recommended segments and preferred seasons.
- The period has been developmental in terms of **understanding operations, maintenance**, capacity limits, and annual costs

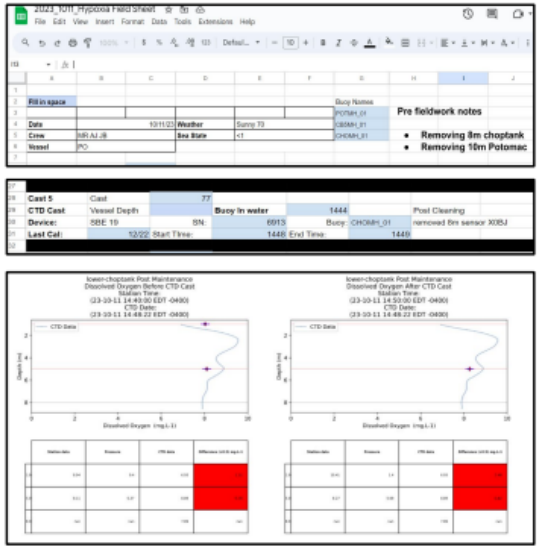


Codified understanding in QA/QC plan development

QUALITY CONTROL

Daily Dashboard Inspection

Bi-Weekly Maintenance Visit

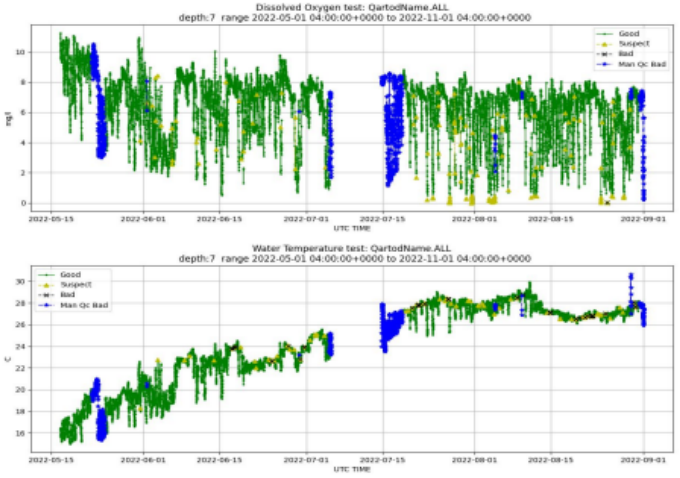


Monthly Overview of Visits

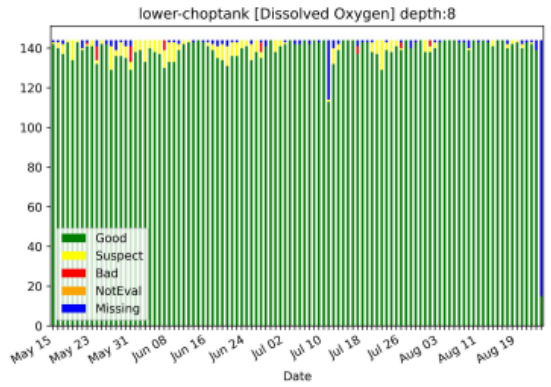
09/20/2023	Mid-Bay				Lower Choptank			Potomac		
Depth	5	9	13	17	1	5	8	3	7	10
Temperature	O	X	O	O	Y	Y	Y	O	X	O
Dissolved O2	O	X	O	O	O	O	O	O	X	O
Conductivty	X	X	X	X	Y	X	Y	X	X	X
Sailinty	X	X	X	X	Y	Y	O	X	X	X

10/11/2023	Mid-Bay				Lower Choptank			Potomac		
Depth	5	9	13	17	1	5	8	3	7	10
Temperature	O	X	O	O	O	O	X	O	X	X
Dissolved O2	O	X	Y	O	Y	Y	X	O	X	X
Conductivty	X	X	X	X	X	X	X	O	X	X
Sailinty	X	X	X	X	X	X	X	Y	X	X

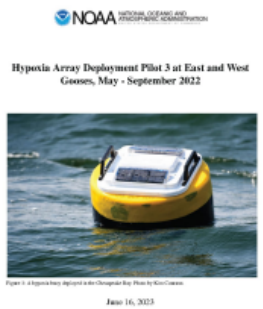
Seasonal Measurements (QC Flagging plots)



Seasonal Performance Review



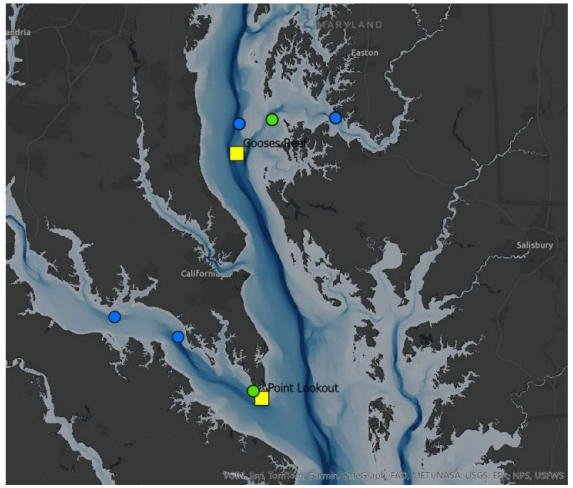
Annual Report



Field understanding: Annual capacity

- 2021-2025 has deployed instruments in select, recommended segments and preferred seasons.
- The period has been developmental in terms of understanding operations, maintenance, **capacity limits**, and annual costs

2024 Stations



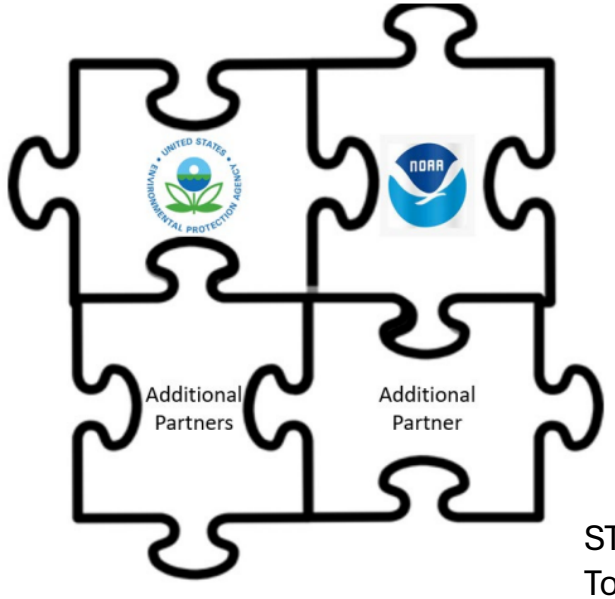
System Locations

- Choptank
  - 3 distinct segments
  - 3-6 sensors per station
  - 2nd year at Lower Choptank (green dot)
- Potomac
  - 1 segment
  - 4-5 sensors per station
  - 2nd year at Lower Potomac (green dot)
  - Herring Creek (middle station) is down as of last Friday
- CBIBS (yellow)

Multiple geographies is a significant challenge
For a single agency with existing resources

Capacity expansion evolving with partnerships

- 2021-2025 has deployed instruments in select, recommended segments and preferred seasons.
- The period has been developmental in terms of understanding operations, maintenance, **capacity limits**, and annual costs



STAR Monitoring Report To PSC 2022

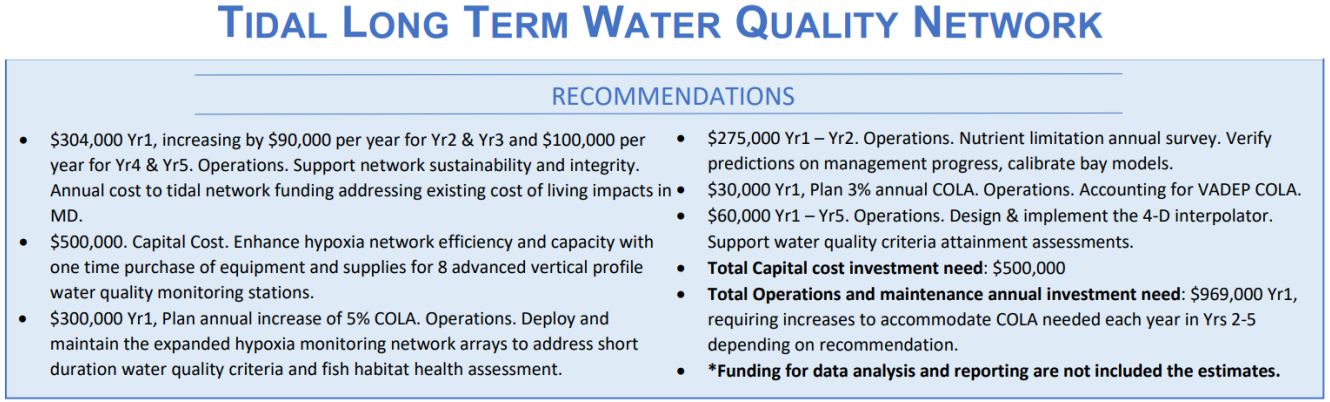
Figure 4.12 Environmental Protection Agency (EPA) and National Oceanic and Atmospheric Administration (NOAA) have expressed interest in collaborating to enhance tidal monitoring for dissolved oxygen and fish-habitat assessment in the estuary.

Multiple geographies is a significant challenge
For a single agency with existing resources

Partnerships with agencies and institutions
sought and engaged for expansion of annual operations

Annual costs expected and tested

- 2021-2025 has deployed instruments in select, recommended segments and preferred seasons.
- The period has been developmental in terms of understanding operations, maintenance, capacity limits, and **annual costs**



TIDAL LONG TERM WATER QUALITY NETWORK

RECOMMENDATIONS

- $304,000 Yr1, increasing by $90,000 per year for Yr2 & Yr3 and $100,000 per year for Yr4 & Yr5. Operations. Support network sustainability and integrity. Annual cost to tidal network funding addressing existing cost of living impacts in MD.
- $500,000. Capital Cost. Enhance hypoxia network efficiency and capacity with one time purchase of equipment and supplies for 8 advanced vertical profile water quality monitoring stations.
- $300,000 Yr1, Plan annual increase of 5% COLA. Operations. Deploy and maintain the expanded hypoxia monitoring network arrays to address short duration water quality criteria and fish habitat health assessment.
- $275,000 Yr1 – Yr2. Operations. Nutrient limitation annual survey. Verify predictions on management progress, calibrate bay models.
- $30,000 Yr1, Plan 3% annual COLA. Operations. Accounting for VADEP COLA.
- $60,000 Yr1 – Yr5. Operations. Design & implement the 4-D interpolator. Support water quality criteria attainment assessments.
- **Total Capital cost investment need**: $500,000
- **Total Operations and maintenance annual investment need**: $969,000 Yr1, requiring increases to accommodate COLA needed each year in Yrs 2-5 depending on recommendation.
- ***Funding for data analysis and reporting are not included the estimates.**

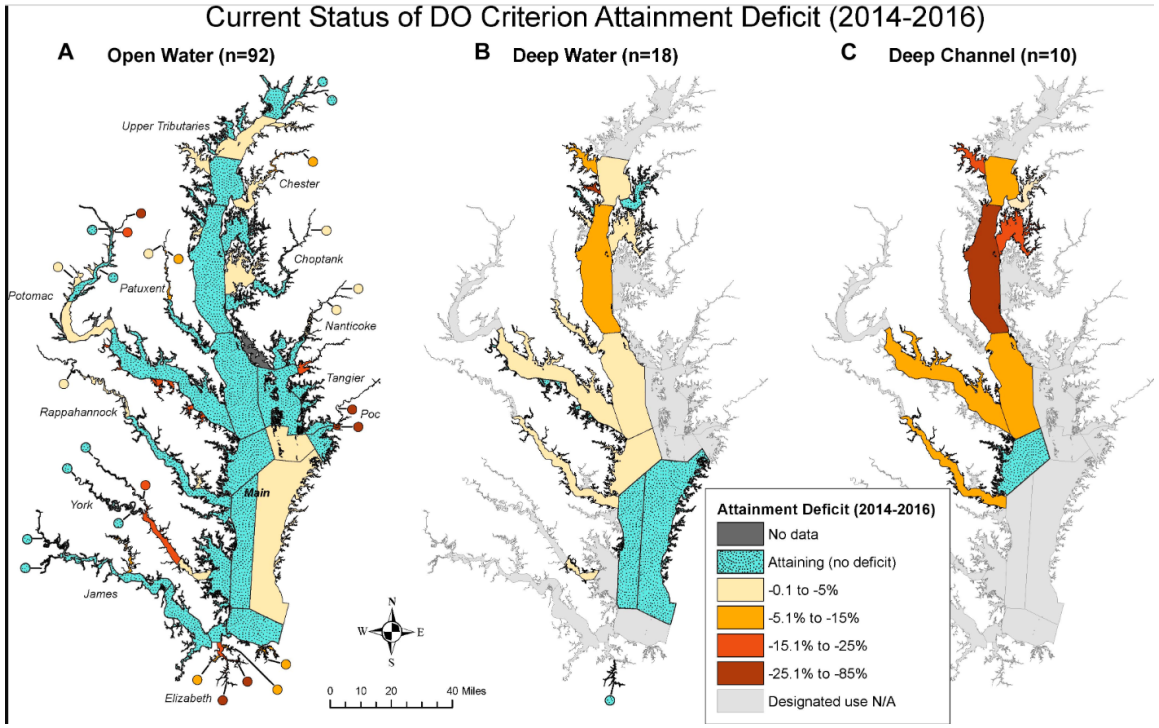
Annual costs estimated in 2022 at about $1M
For 10 array network operation

Citation:
Chesapeake Bay Program. 2022. Enhancing the Chesapeake Bay Program Monitoring Networks - A Report to the Principals' Staff Committee. 103 pages.

Developing a sampling design

Needs – **SEGMENT selections**

- Water quality Criteria assessment needs segment commitments in 3-year blocks.
  - 6 year planning horizon with CBP under new Management Strategy Development
    - **May 2026-August 2026: CAP WG input needed, coordination with NOAA and partners needed.**
  - 1-3 Year Work Plan developments to feed Management Strategy development
- Modeling community request to sustain reference site (CB4.3 has been a target)
  - Is this a long-term target for maintaining the location?
- Additional habitat assessments: TBD



Developing a sampling design

- Needs – **SITE** selections
  - Insights fostered by 2025 GIT funded project underway by UMCES “Hypoxia Collaborative: Sampling Strategy and Design for Chesapeake Bay Habitat Assessment. 4/1/25-10/15/26”
  - Supports 4D WQ tool development and assessments underway
  - A bit more breathing room in time than May-August 2026 as this is a workplan detail
- Modeling community request to sustain reference site annually (CB4.3 has been a target)
- Additional habitat assessments: TBD

Summary

- Investments to sustain arrays continues
- Capacity going forward to benefit from partnerships for expansion
- Operations, maintenance, costs assessments led to QA/QC documentation, processes and capacity understanding

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- Investments to sustain arrays continues
- Capacity going forward to benefit from partnerships for expansion
- Operations, maintenance, costs assessments led to QA/QC documentation, processes and capacity understanding
- Immediate needs on basic sampling design for segment selection with 3 year block commitments to inform 2026 CBP Management Strategies development with under new agreement timelines; work plans on site details are lagged a little.
- Modeling community site needs at minimum captured in repeat deployments of CB4.3
- Habitat assessment applications – TBD on areas different from water quality criteria