



**NOAA**  
**FISHERIES**



# Chesapeake Bay Water-Column Hypoxia Monitoring Update

Chesapeake Bay Program STAR  
March 23, 2023  
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# Developing a Real-time Hypoxia Monitoring System

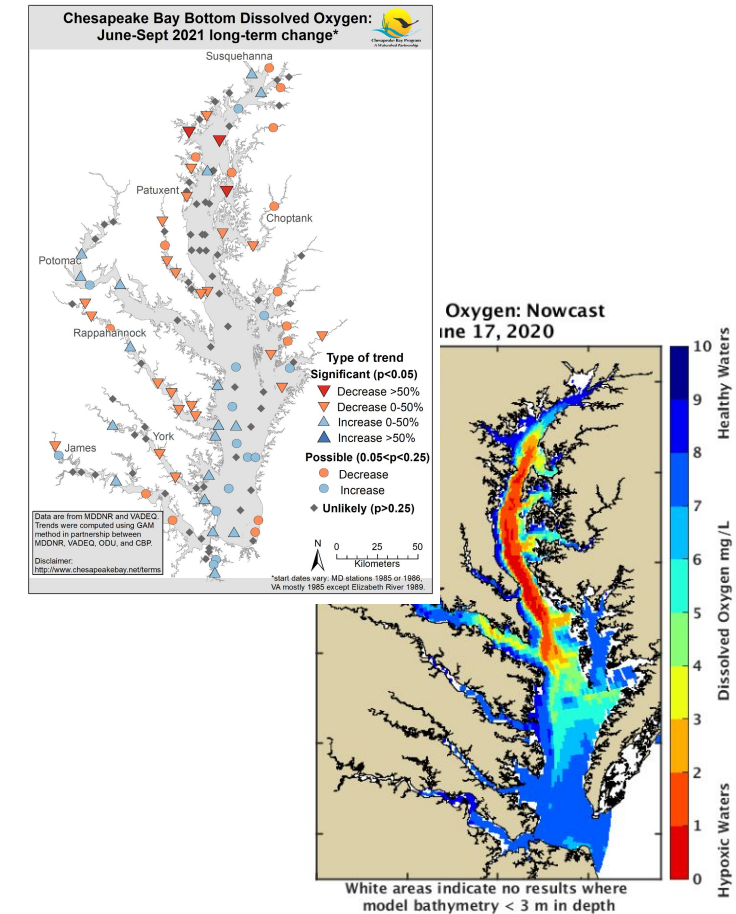
- What: Develop a 10 station monitoring network across mainstem and tributaries
- Why: Improve Assessment of water quality and fish habitat
- Who: EPA, NOAA, Chesapeake Bay Program Hypoxia Collaborative
- Where: Phased deployment in targeted locations
- How: EPA funding, maintained and operated by NOAA; data used by modelers and scientists



<https://www.chesapeakebay.net/who/group/hypoxia-collaborative-team>

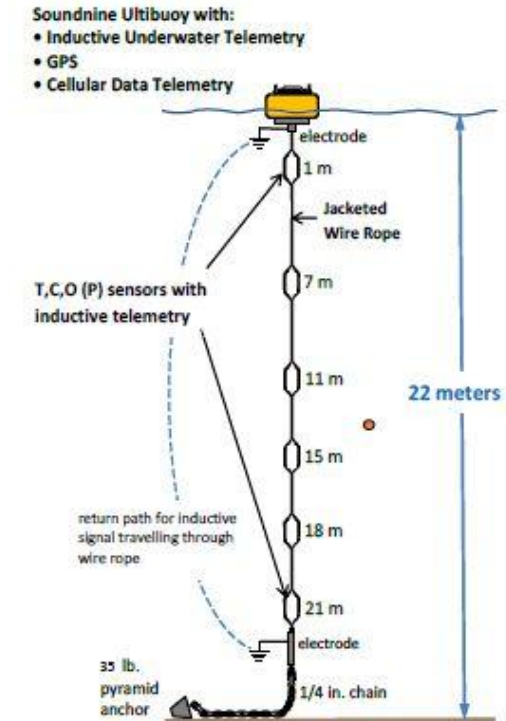
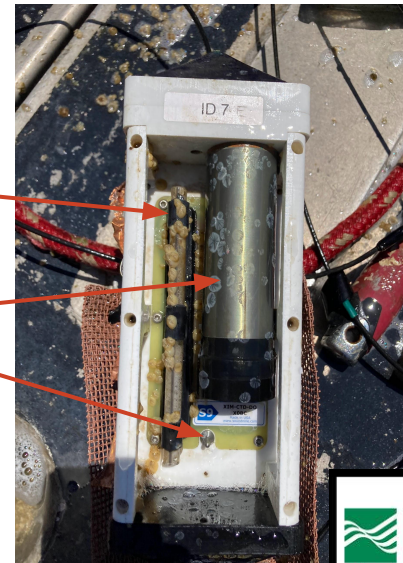
# Expected Outcomes

- Increase understanding of temporal and spatial variability of dissolved oxygen in deep and shallow water
- Improve validation for the models used in annual hypoxia reporting
- Establish sampling design and monitoring needed to assess TMDL water quality attainment criteria
- Provide data to develop improved habitat suitability models for multiple species (Striped bass, forage, blue crab)



# System Hardware

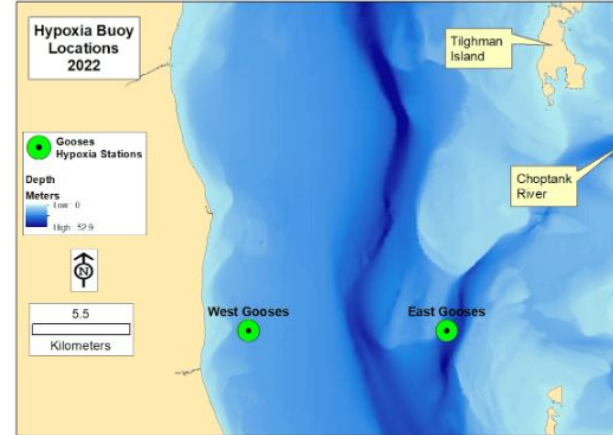
- A station consists of
  - buoy/controller/cellular modem
  - some number of sensors on an inductive wire
  - mooring
- XIM-CTD-DO Sensor
  - conductivity cell
  - temperature sensor
  - pressure sensor
  - dissolved Oxygen sensor
  - barnacles not included





# 2022 Summer Deployment

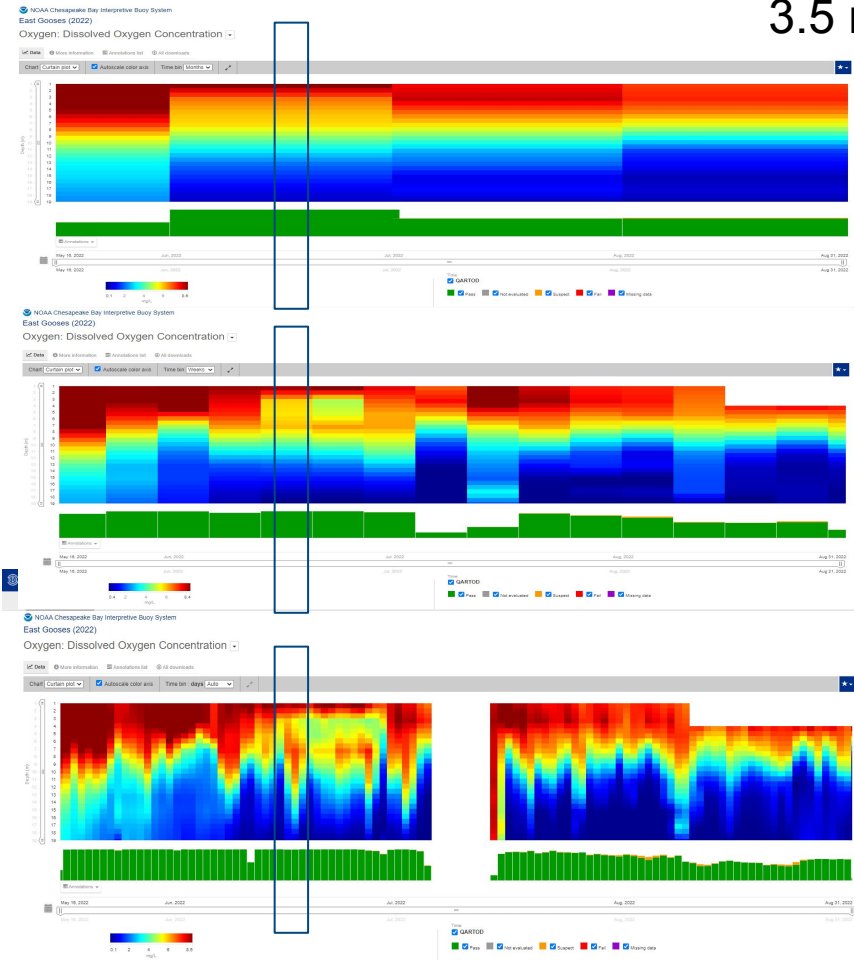
- 3 ½ Months of Data collected on 2 Stations
  - East Gooses preliminary data shared with CBP
- Lessons on seasonal biofouling
  - April showers bring May (& June) barnacles?
    - Mild vs Severe fouling
  - Mitigation
    - More frequent visits
    - More sensors to swap
- Quality Control-Flagging
  - Validation casts & tank
  - IOOS QARTOD



# What's the Difference ?

Monthly (top left), Weekly (middle left), Daily (bottom left), 10 min (middle right)

3.5 months (left plots) vs 5 days (right plot)



NOAA Chesapeake Bay Interpretive Buoy System  
East Gooses (2022)

Oxygen: Dissolved Oxygen Concentration

Chart: Curtain plot

Autoscale color axis

Time bin: all Auto

Annotations list

All downloads

Time: Jun 13, 2022 01:00

Time: Tue 14

Time: Wed 15

Time: Thu 16

Time: Fri 17

Time: Jun 17, 2022 20:00

Time: May 18, 2022

Time: Jun 2022

Time: Jul 2022

Time: Aug 2022

Time: Aug 31, 2022

Time: 0.2 2 4 6 7.7 mg/L

Time: QARTOD

Time: Pass

Time: Not evaluated

Time: Suspect

Time: Fail

Time: Missing data

Time: ~2 mg/L threshold

Time: ~2 mg/L threshold

Time: ~2 mg/L threshold

Time: ~2 mg/L threshold

Time: ~2 mg/L threshold

Time: ~2 mg/L threshold

Time: ~2 mg/L threshold

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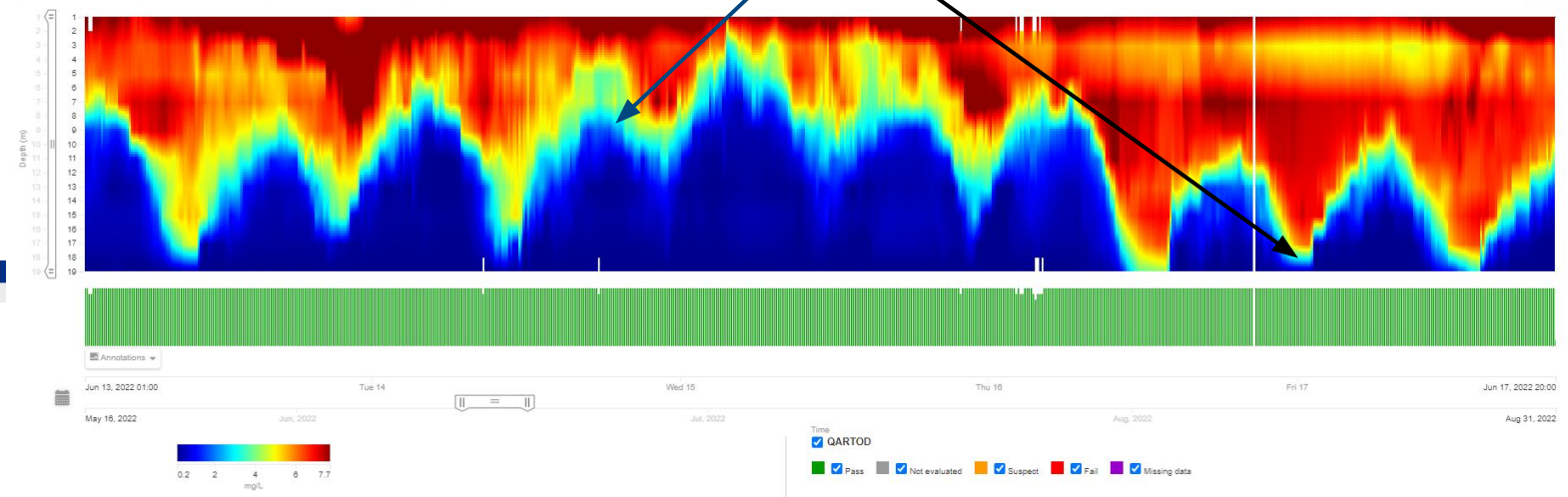
Time: ~2 mg/L threshold

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~2 mg/L threshold



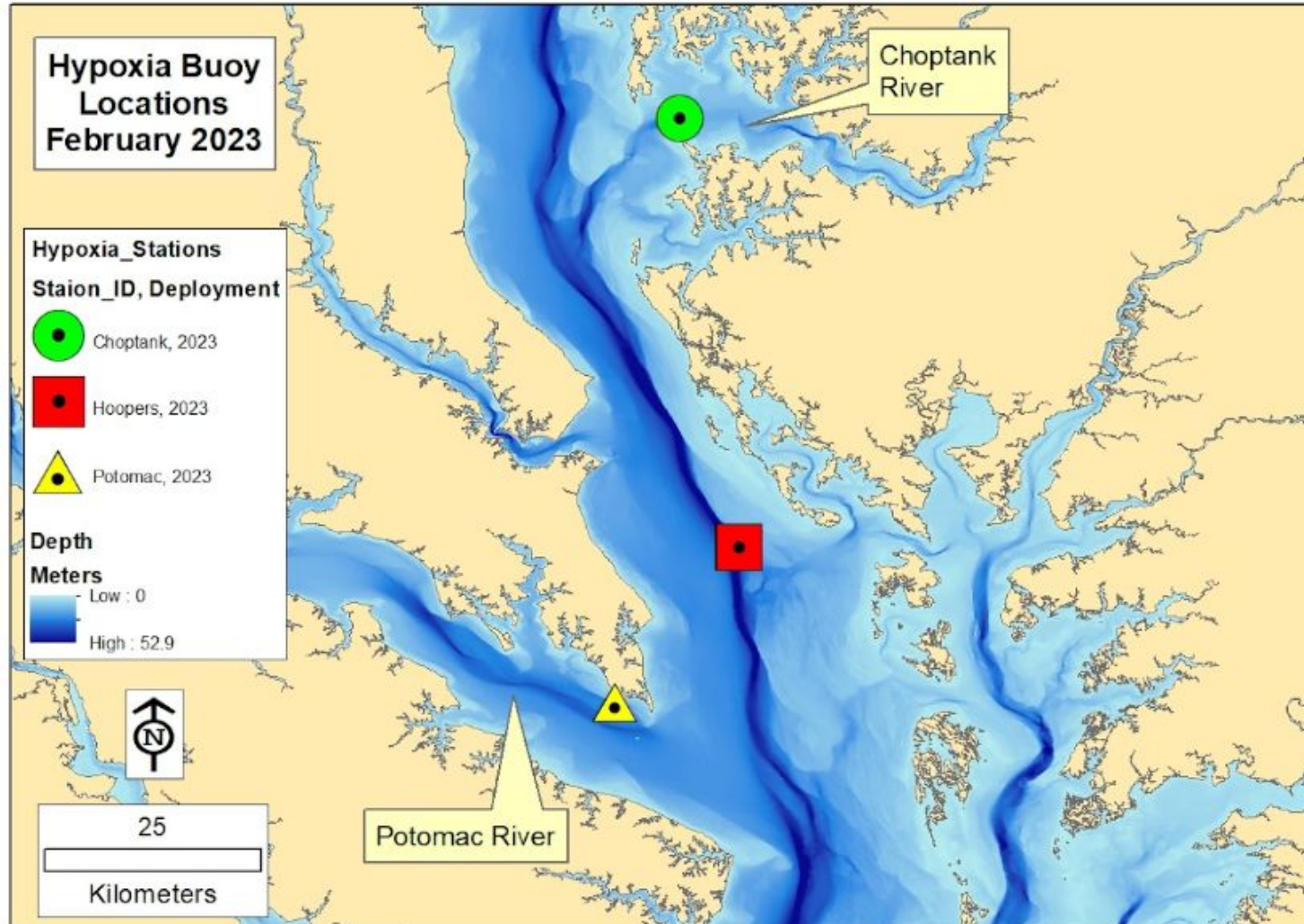
# 2023 Targets

- Understand 2022 dataset contributions to Hypoxic condition reporting
  - How does continuous data (increased temporal resolution) change what we think we know about Hypoxic conditions?
  - Consider how these data can tie into fisheries specific projects
- Produce final 2022 datasets for CB 4.3 E&W
- April deployment of 3 stations
  - Start with 3-4 sensors per station
  - Increase vertical resolution as equipment is delivered
- Manage O&M
  - Stay ahead of biofouling
  - Increase staffing





# Implementation Plan- Phased



- 3 Monitoring Stations in spring 2023
  - ~20m depth adjacent to deep channel (1 of ~3 eventually)
  - ~10m depth tracking DO migration into Lower Choptank (1 of 2)
  - ~10m depth observing Variability in Lower Potomac (1 of 2-3)
- 5-7 Stations in 2024
  - Build off of existing network
  - & knowledge gained
- 10 Stations in 2025
  - TBD



# Next Frontier

- We anticipate these New Platforms will support the Next Generation of Water Quality and Habitat Modeling
- What ways do you see these new platforms informing your Goal Team outcomes, STAR Workgroups and/or the Strategic Science and Research Framework?

# Questions?