Chesapeake Bay Water-Column Hypoxia Monitoring Update

Chesapeake Bay Program Winter Fisheries Goal Implementation Team Meeting
March 1, 2023 (Day 1)
Bruce Vogt and Jay Lazar

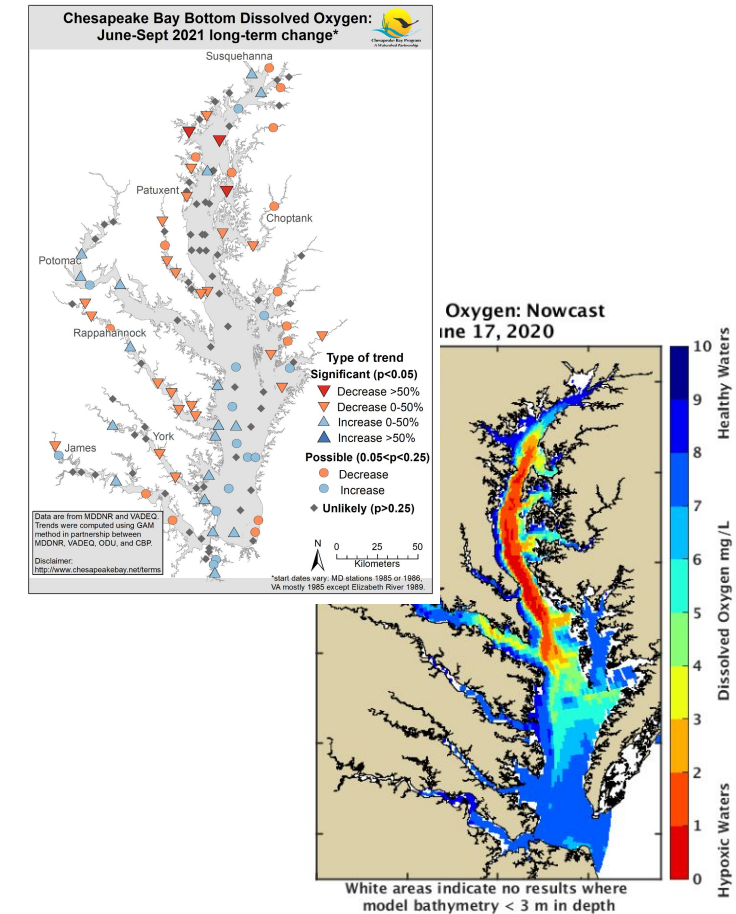# Developing a Real-time Hypoxia Monitoring System

- 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

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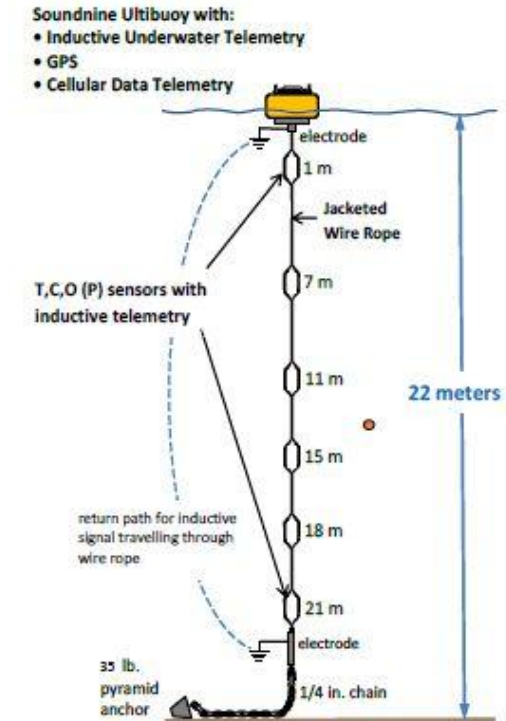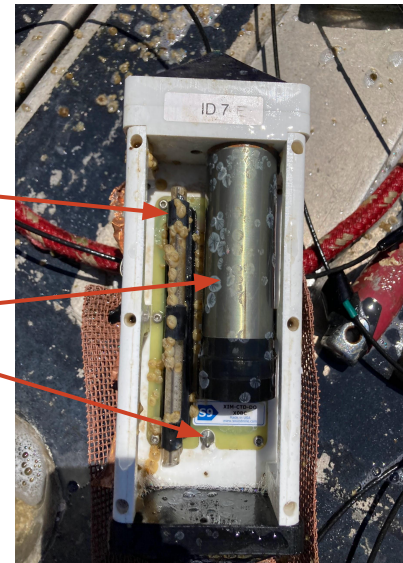
Expected Outcomes

- 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)

Chesapeake Bay Bottom Dissolved Oxygen: June-Sept 2021 long-term change*

Oxygen: Nowcast June 17, 2020

White areas indicate no results where model bathymetry < 3 m in depth

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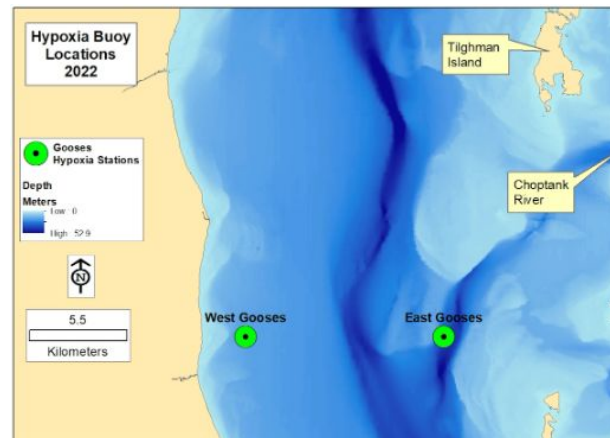
Profiler 101

- 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

Soundnine Ultibuoy with:
- Inductive Underwater Telemetry
- GPS
- Cellular Data Telemetry

electrode
1 m
Jacketed Wire Rope

T,C,O (P) sensors with inductive telemetry

7 m

11 m

15 m

return path for inductive signal travelling through wire rope

18 m

22 meters

21 m
electrode

35 lb. pyramid anchor

1/4 in. chain

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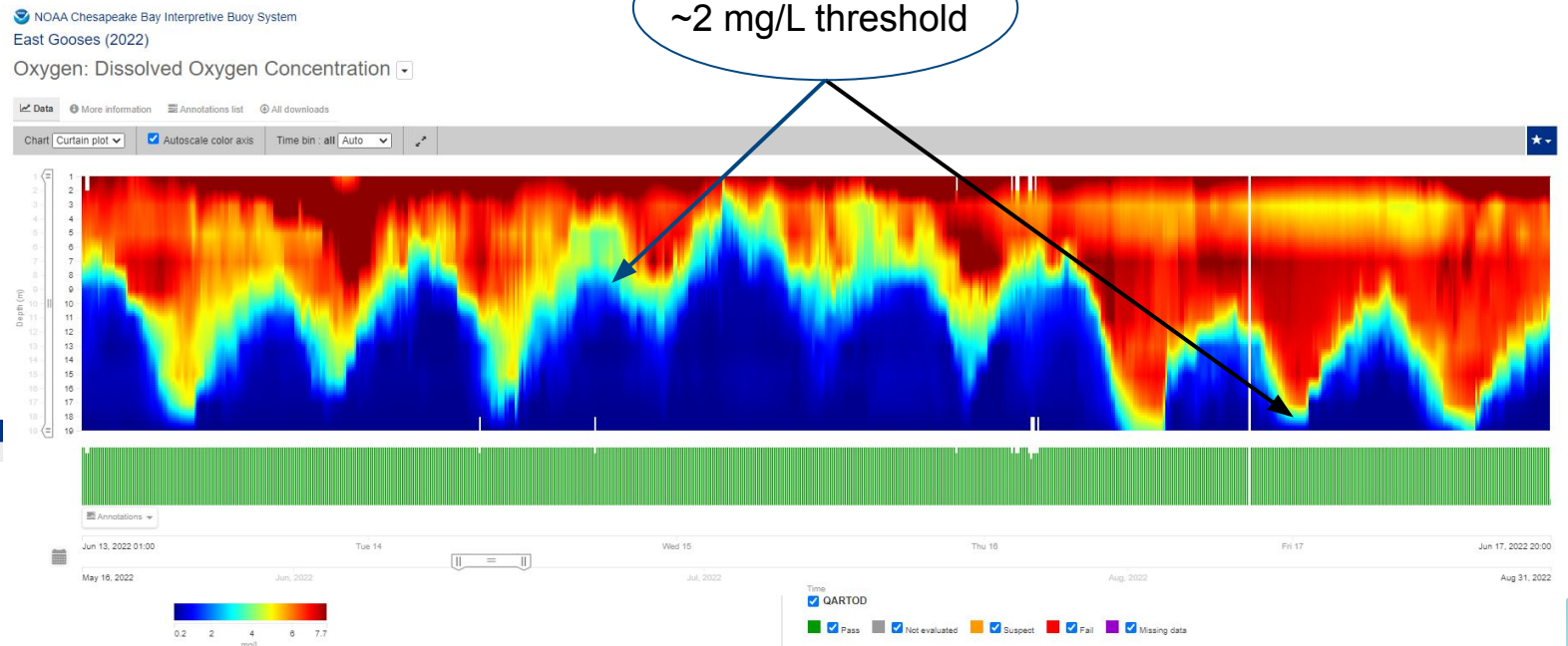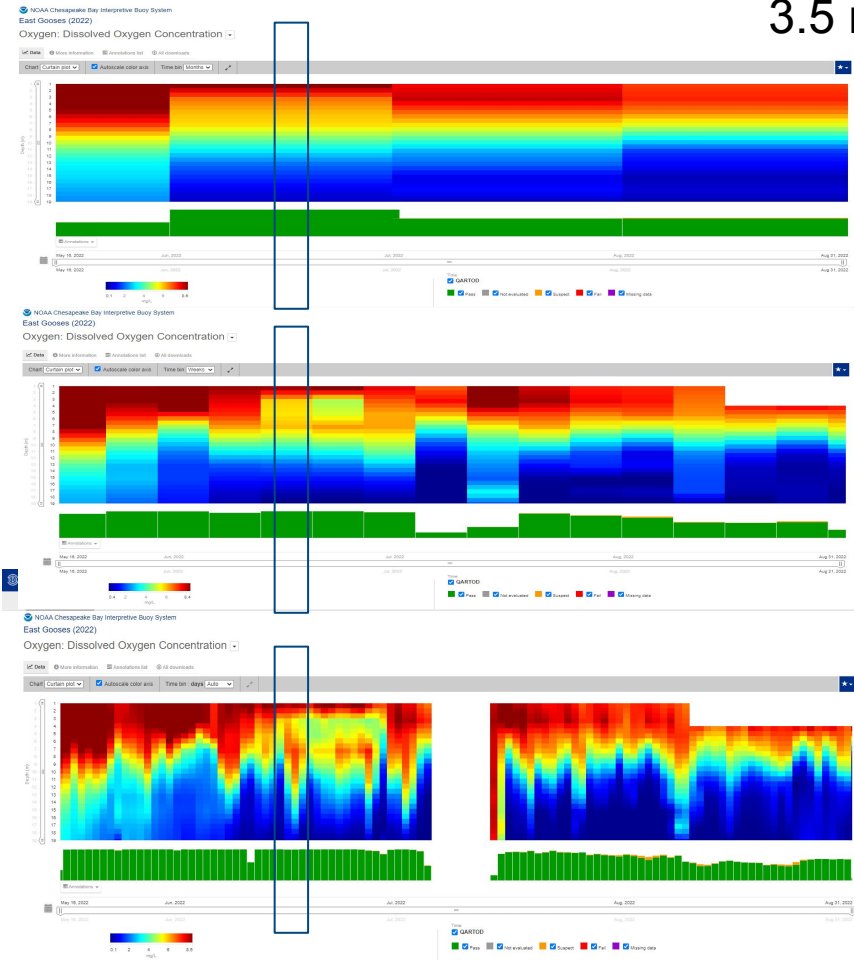NOAA FISHERIES

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

Hypoxia Buoy Locations 2022

Tilghman Island

Choptank River

Gooses Hypoxia Stations

Depth Meters
Low 0
High 52.9

5.5 Kilometers

West Gooses   East Gooses

ID 7

Chesapeake Bay Water-Column Hypoxia Monitoring Quality Assurance Project Plan (QAPP)

February 2023
Version 1.0

Submitted 2/27/2023

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What's the Difference ?

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

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

~2 mg/L threshold

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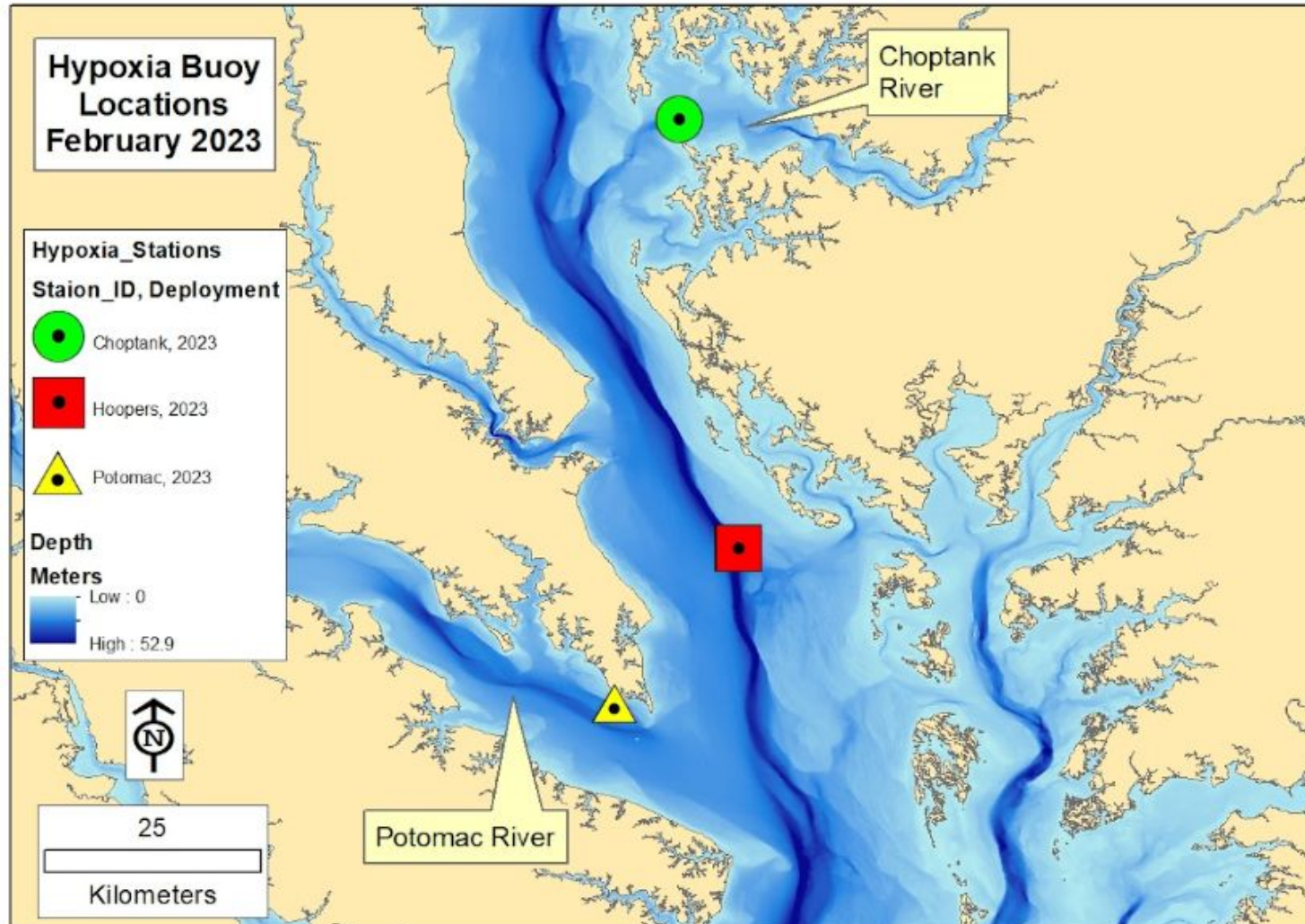
2023 Targets

- 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
  - Central to primary deep channel (1 of ~3)
  - Track DO migration into Lower Choptank (1 of 2)
  - Observe 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

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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 fishery science and ecosystem management?

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Questions?