Expanding our hypoxia monitoring network: Sampling design considerations to support recommendations on monitoring needs

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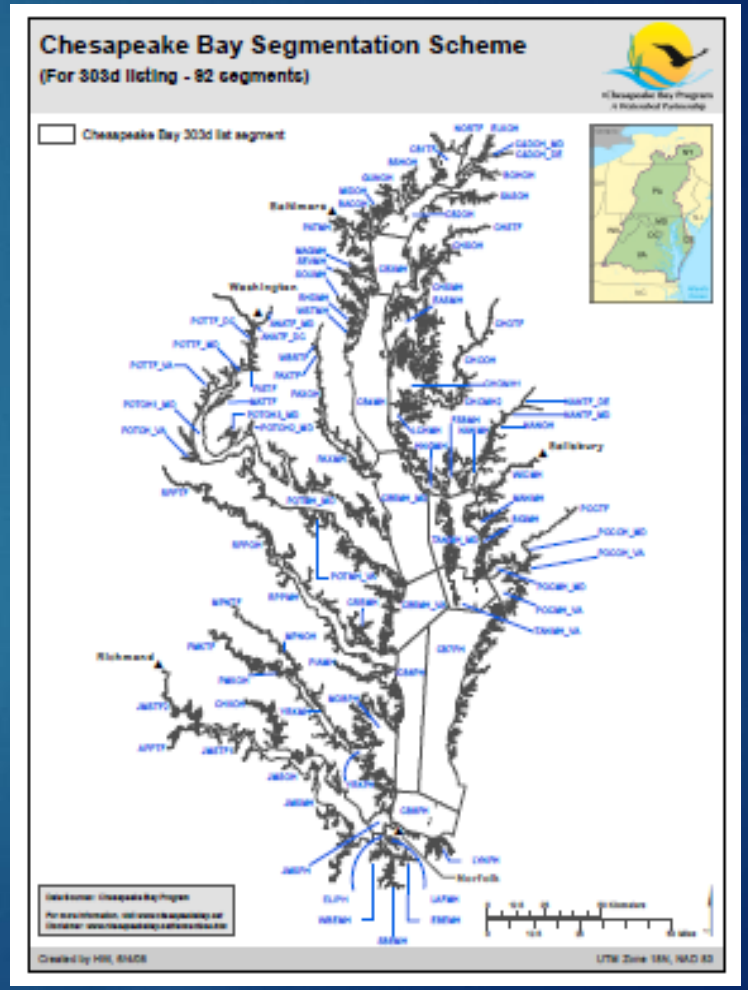
Acknowledgements

- Bruce Vogt
- Jay Lazar
- Kevin Schabow
- Justin Shapiro
- Sean Corson
- Lee McDonnell
- Mark Nardi
- Breck Sullivan
- Amy Goldfischer

The 2021-22 Principal Staff Committee (PSC) Monitoring Review

- ***On March 2, 2021***, the PSC heard from EPA that the water quality monitoring program was characterized as **"Fair"** for addressing water quality criteria attainment assessments.
  - The PSC wanted a review and feedback on what is needed to move the CBP water quality monitoring program from "Fair" to "Good".



- Report – **completed (in final USGS approval days for public release)**
- **Action on recommendations – already happening ☺**

Recommendations on sampling design for the next phase of hypoxia monitoring network development (May 2022 HC)

- **Mainstem bay (3)**
  - if we keep an east-west pair in the mainstem and
  - we have a reference array at another latitude
- **Lower tributaries: Potomac and Rappahannock. (4)**
  - 2 Potomac arrays
  - 2 Rappahannock arrays
- **Mobile, targeted study arrays (4)**
  - 3 new as a suite for evaluating scales of variability
  - 1 existing with MD DNR and their Fishing Bay study area

Recommendations on sampling design for the next phase of hypoxia monitoring network development (Winter 2022 HC)

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This construct formed the basis for the funding requests in the PSC Monitoring Review

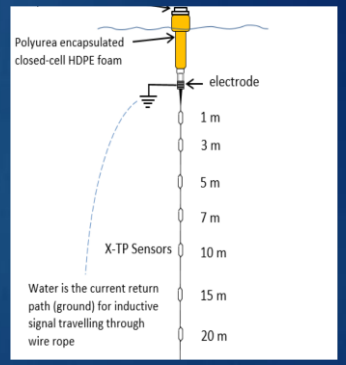
Actions on Monitoring Recommendations:
Cooperative Agreements with EPA and NOAA, EPA and USGS

- **Tidal Bay**
  - ***Summer 2022*: NOAA operated 2 vertical arrays in the Mainstem Chesapeake Bay**
  - ***Funding Approved*** for the purchase of equipment to support 8 additional vertical water quality sensor arrays in the tidal waters of the bay
  - ***Funding Approved*** to support Operations and Maintenance of a 10 array network in the tidal waters of Chesapeake Bay and its tributaries
- **River Input Monitoring**
  - ***Funding Approved*** to support Continuous monitoring stations at all River Input Monitoring stations of the 9 major tributaries
- **Thank you Sean (NOAA), Lee (EPA), Mark Nardi (USGS)** as well as our BORG, Hypoxia Collaborative and NTN WG support teams organizing and aligning workloads and budgets!

Where to place instruments? Sampling design for the network

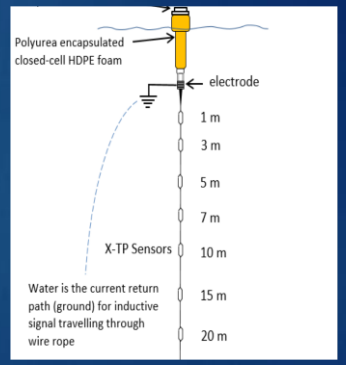
Network design drivers: Key objectives

- Hypoxia monitoring
- Water quality standards attainment – criteria assessment/4D data needs
- Fish habitat assessment



Where to place instruments? Sampling design for the network

- USEPA (2003) recommended level of monitoring to support water quality standards attainment assessments was envisioned to place a vertical continuous water quality monitoring station at all 156 long-term water quality monitoring locations in the bay and its tidal tributaries.



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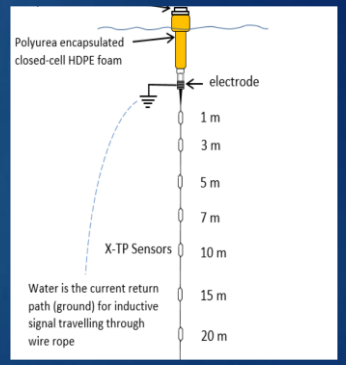


Hmmmmmm…Let's compromise at what's a Good Network and aspire to the Recommended Network ☺

First draft recommendations on sampling design for the next phase of network

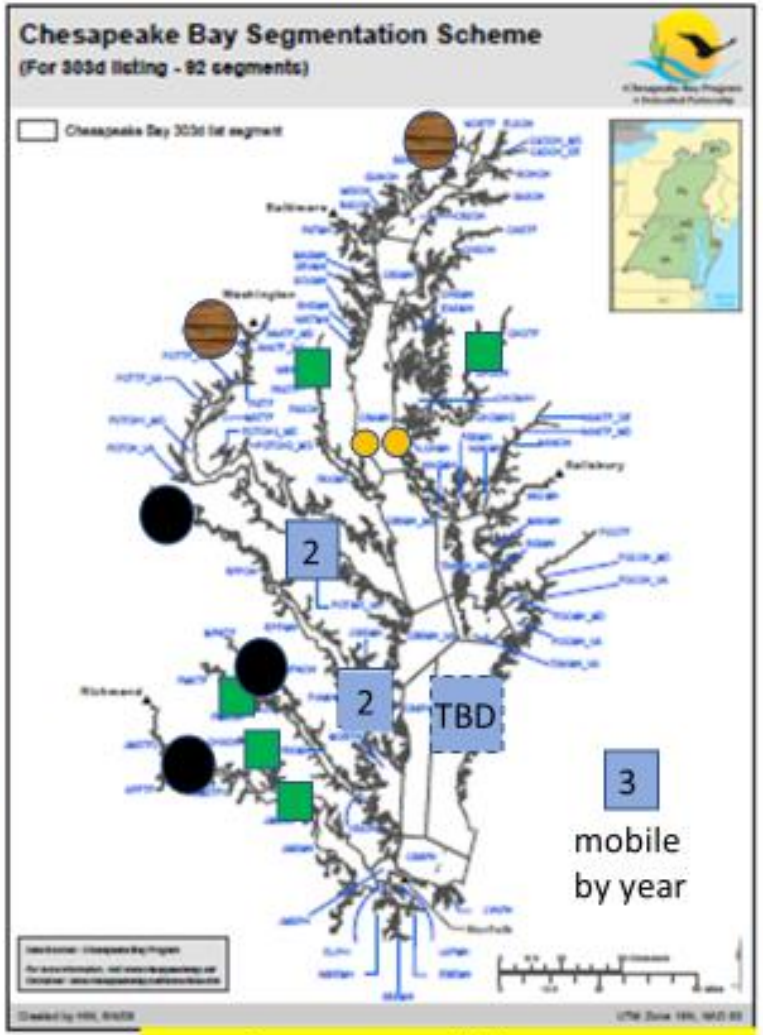
Expanding monitoring and assessment capacity 2021+: High frequency monitoring network

Existing

- NOAA supports 2 vertical sensor arrays
- 3 fully funded river input water quality continuous monitors (VADEQ/USGS)
- 2 river input water quality continuous monitoring sites with support ending, need funding (MD/USGS)

New – proposed and considered for investment

- 2021-22 PSC Monitoring Review proposal for capacity to support unassessed criteria assessment, improved fish habitat assessment, modeling calibration and verification:
  - 8 new tidal water vertical array sites
  - 5 new river input con-mons at tidal/nontidal boundary
  - New 4-D water quality interpolator tool development

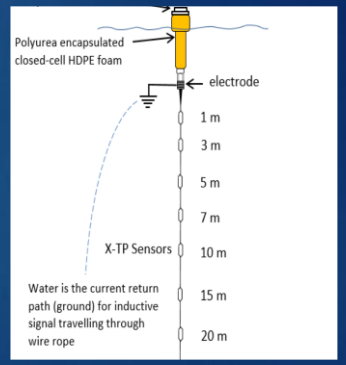


Draft: Hypoxia Collaborative 2022

Where to place instruments?
Upcoming discussions/Potential GIT $.

Details needed as we develop target locations

- Desirable locations/regions - what decision criteria?
  - (e.g., poorly monitored/high uncertainty areas)
- Fixed stations and mobile stations – extend the use of our resources across space
- All year or seasonal
  - (duration of deployment for operations and maintenance planning)
- Vertical resolution at locations
  - (sensor density using a fixed array system)



Some nearterm decisions will need to be made for permit application purposes.

Please stay tuned for consultation discussions