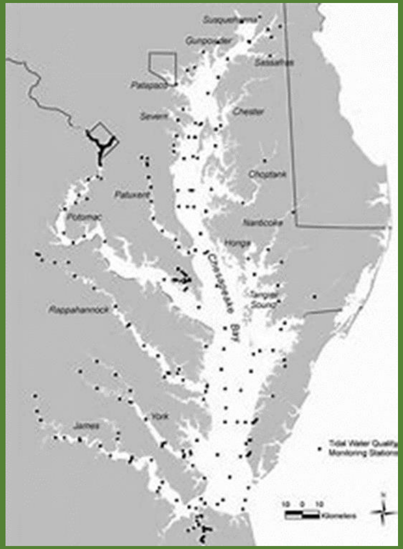
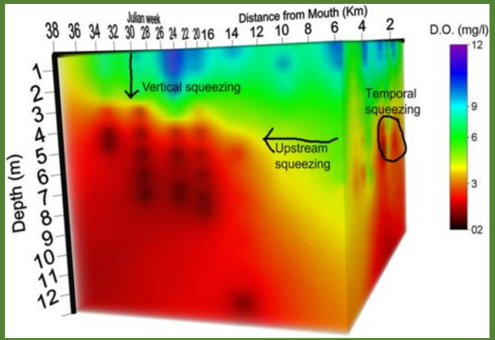
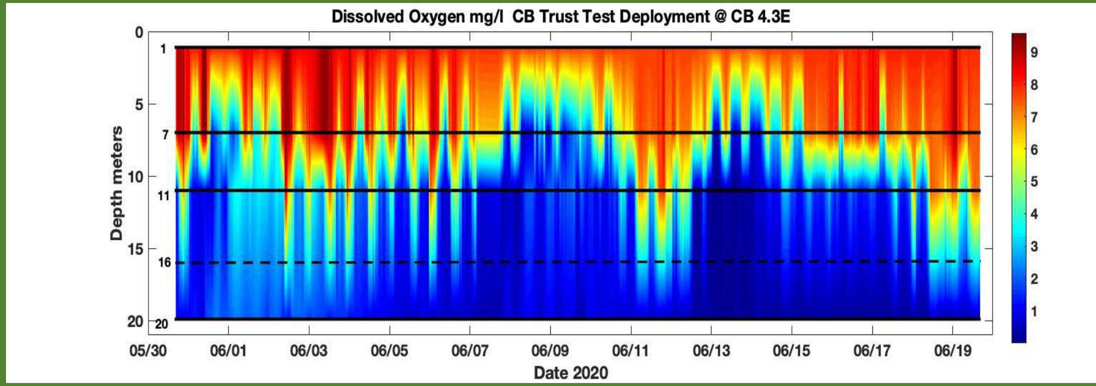
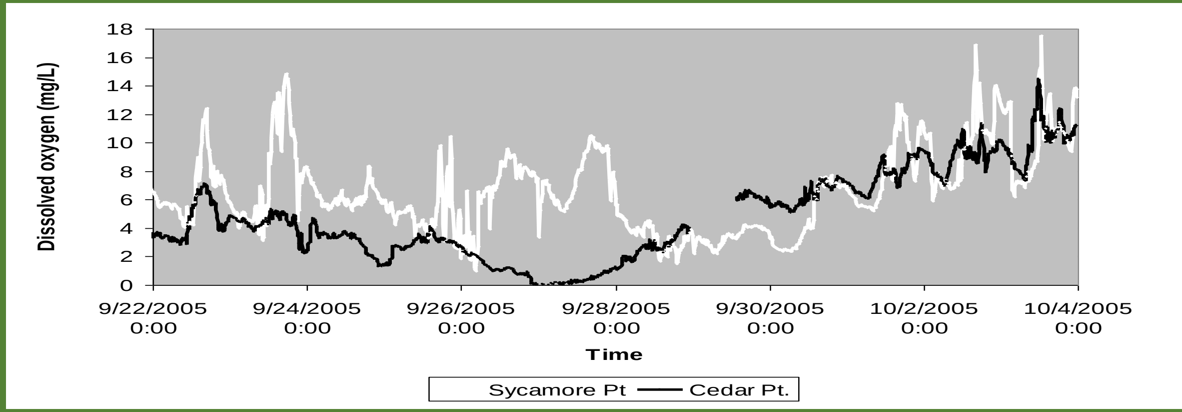


Data to help feed the interpolator
Round 2 notes
Evolving sampling design considerations

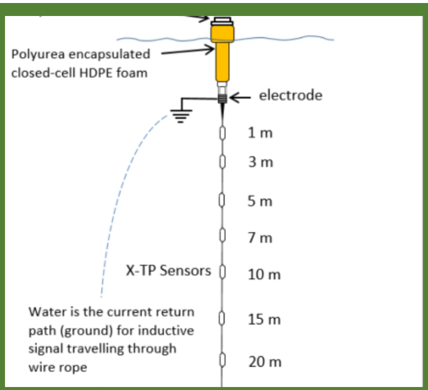




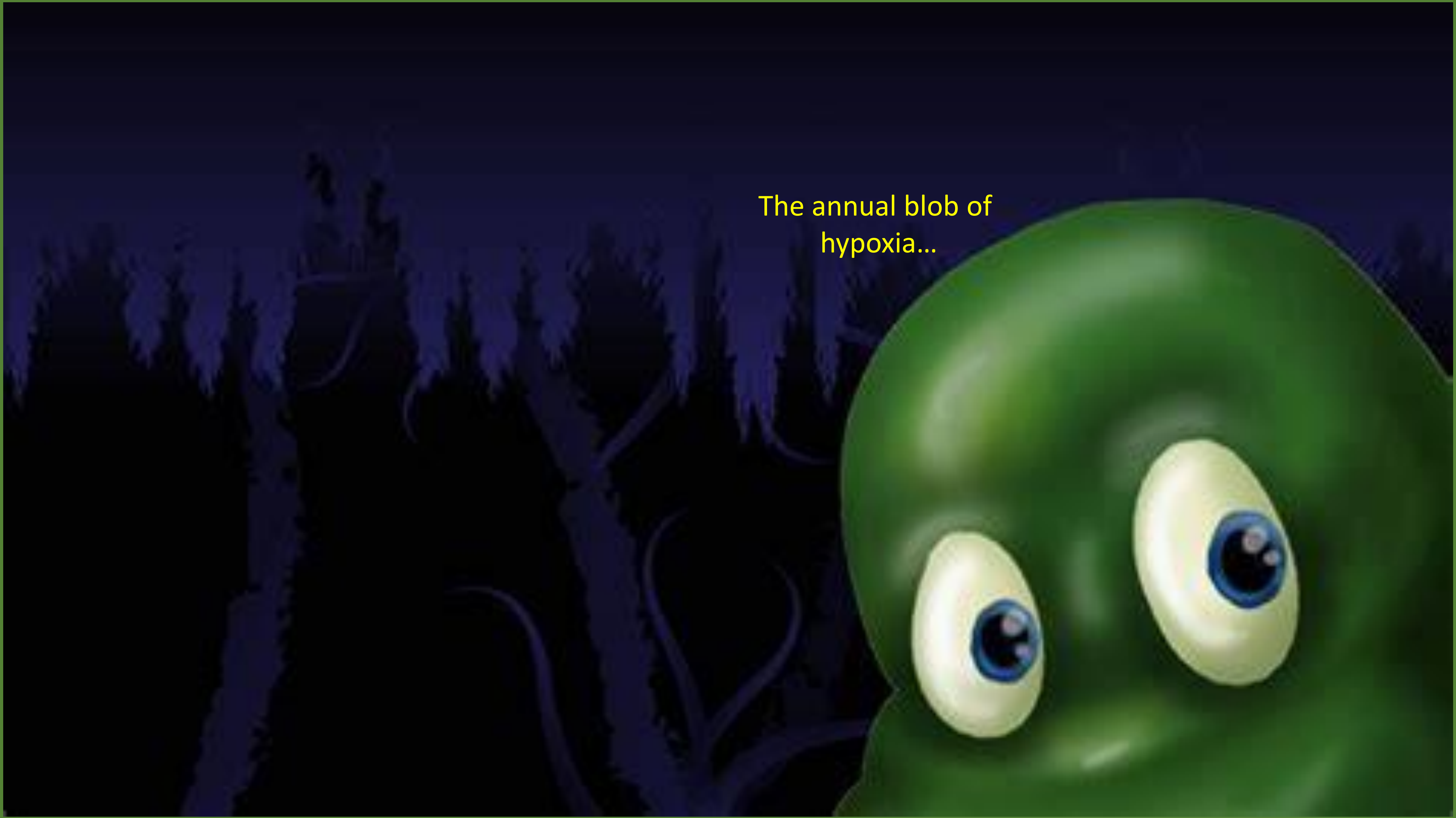


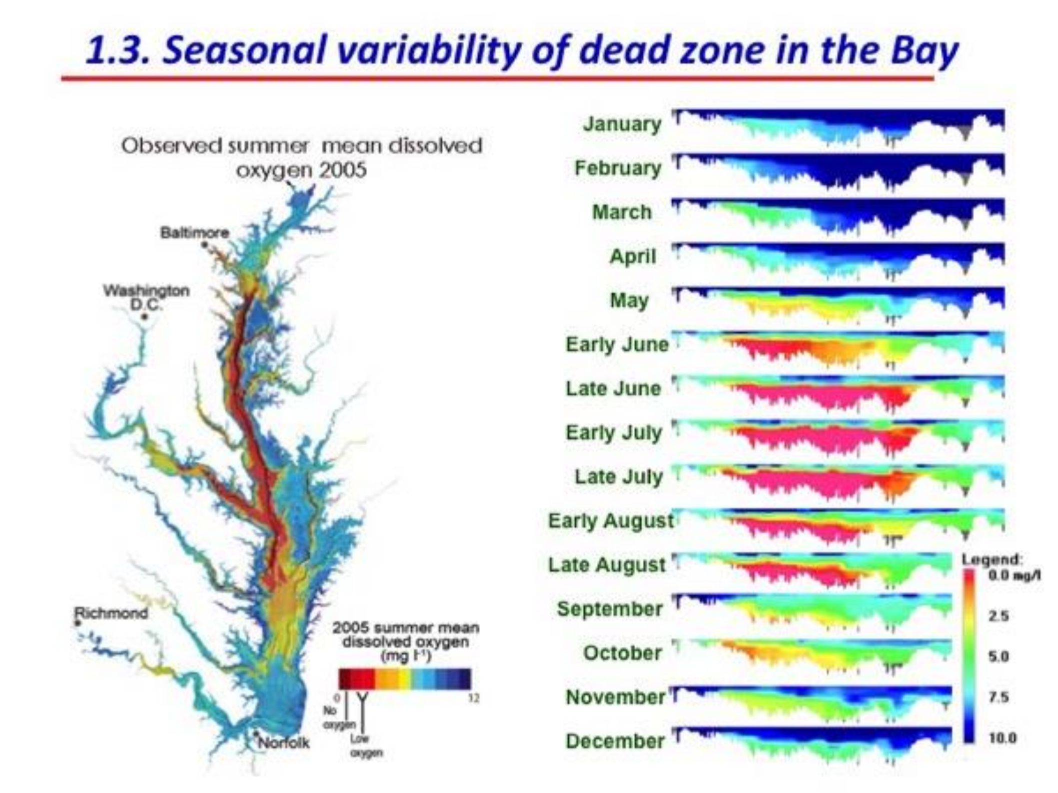
Peter Tango
USGS@CBPO

6-17-2021
4D-BORG

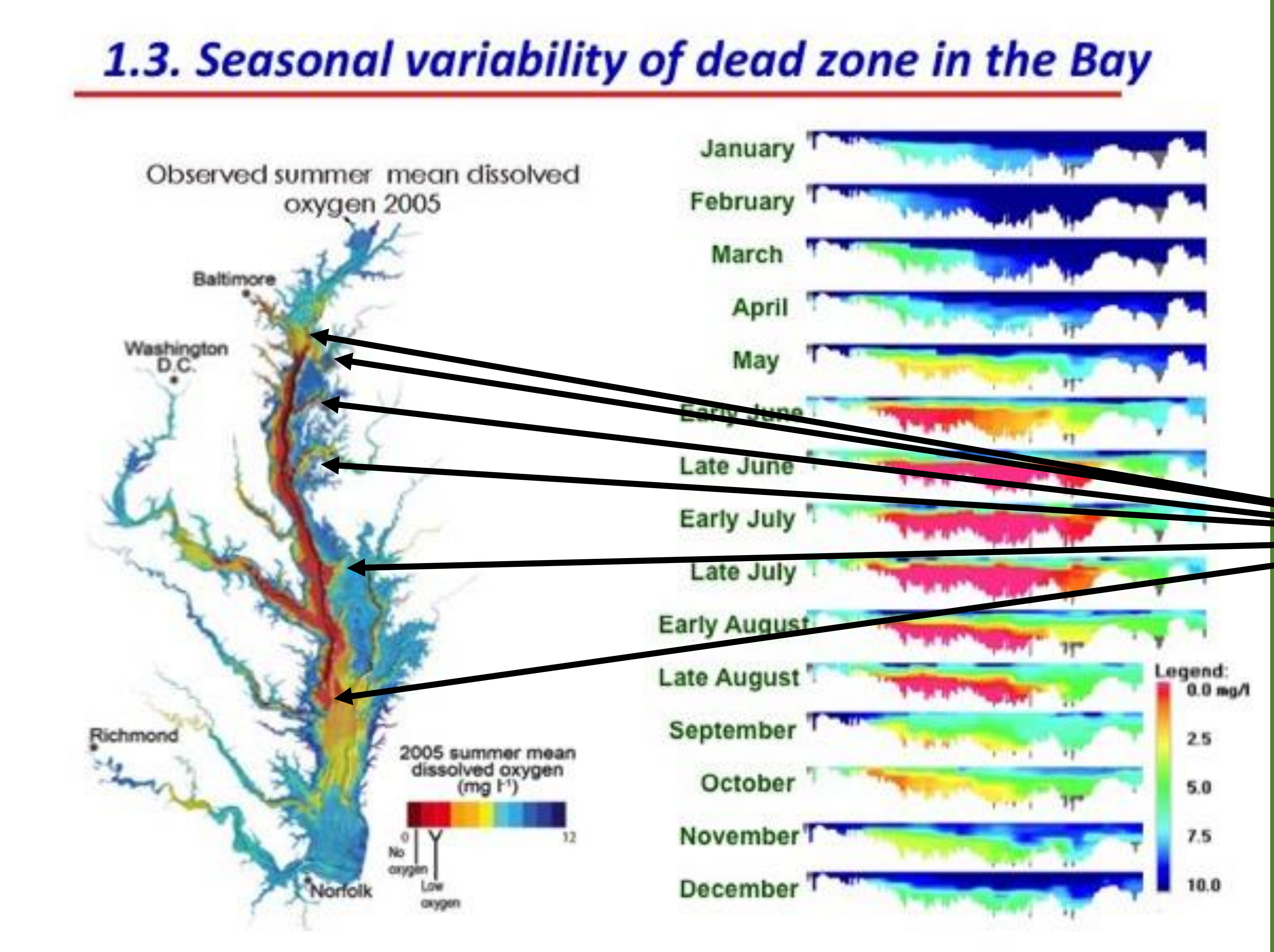



STEVE
McQUEEN
THE
BLOB
INDESCRIBABLE...
INDESTRUCTIBLE!
NOTHING CAN STOP IT!
ANETA
CORSEAUT
EARL
ROWE
COLONIAL
AIR CONDITIONED


The annual blob of
hypoxia…



The annual blob of hypoxia



Criteria assessment
is concerned with more
than the the amount of
Habitat In a particular
Condition.

Boundary locations
for habitat
in space and time
are particularly
Important.

The shape of the blob
is important.

Approach – Data support

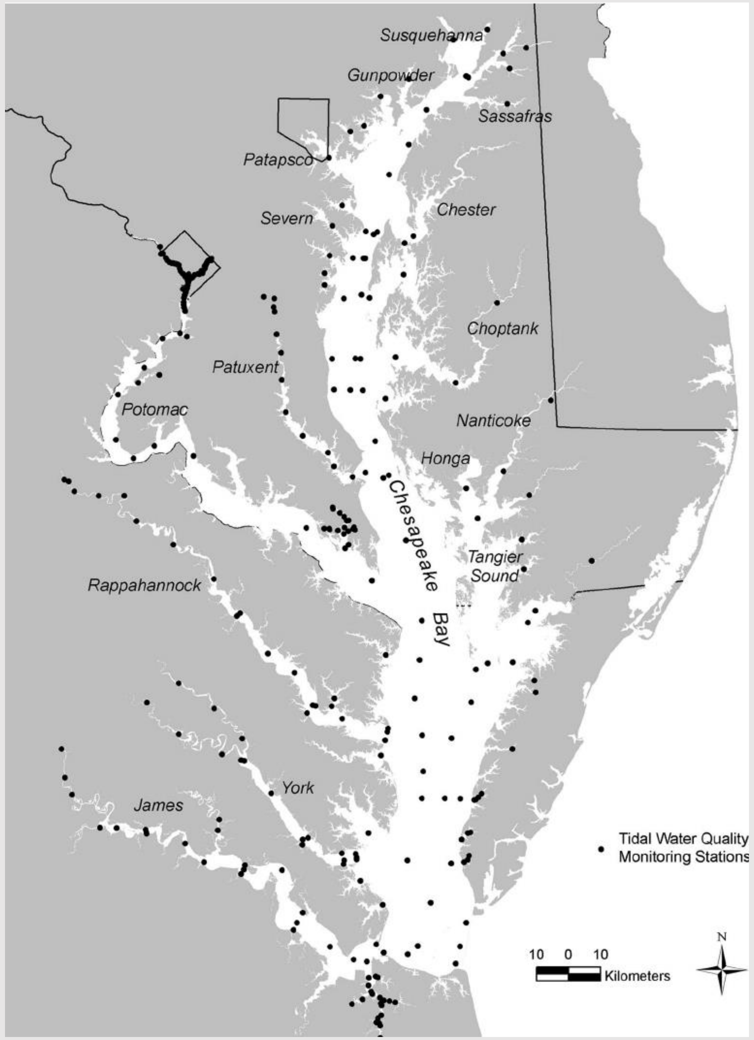
4D estimator components

Long term temporal patterns

Smoothly varying change from observations aided by deterministic relationships with continuously available information (flow, wind, temperature, dynamic model output, etc)

Key data example: Long-term fixed network

Data support



...

Approach – Data support

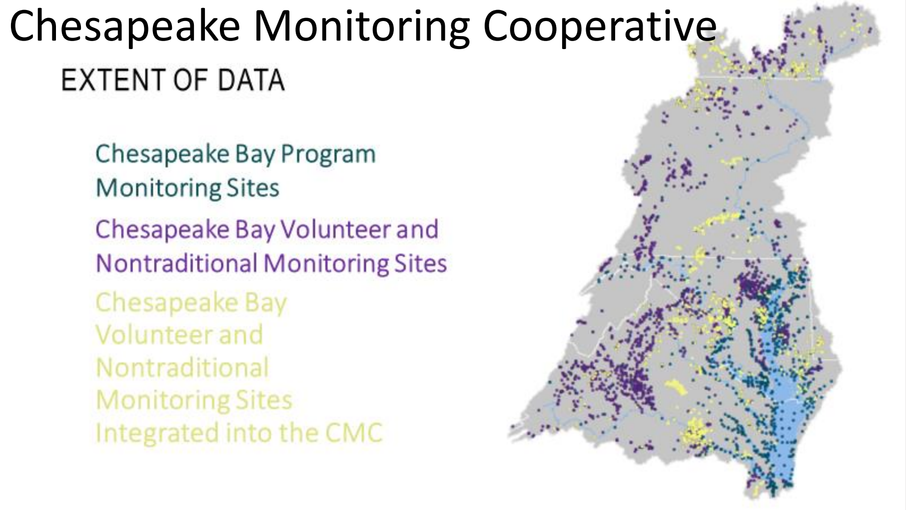
4D estimator components

Long term temporal patterns

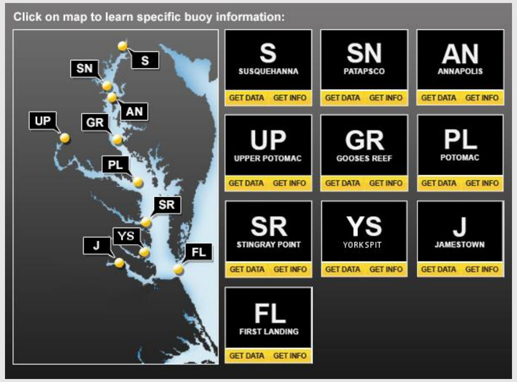
Smoothly varying change from observations aided by deterministic relationships with continuously available information (flow, wind, temperature, dynamic model output, etc)

Key data example: Long-term fixed network, and more?

Other data support



NOAA Interpretive Buoy – surface data



Long term WQ data from Fisheries Surveys?

Approach – Data support

4D estimator components

Long term temporal patterns

Smoothly varying change from observations aided by deterministic relationships with continuously available information (flow, wind, temperature, dynamic model output, etc)

Key data example: Long-term fixed network, and more?

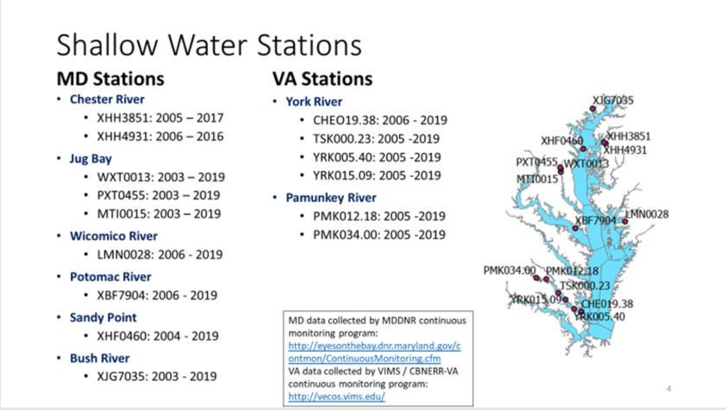
Short term temporal variability

Daily & tidal cycling, temporal autocorrelation, etc

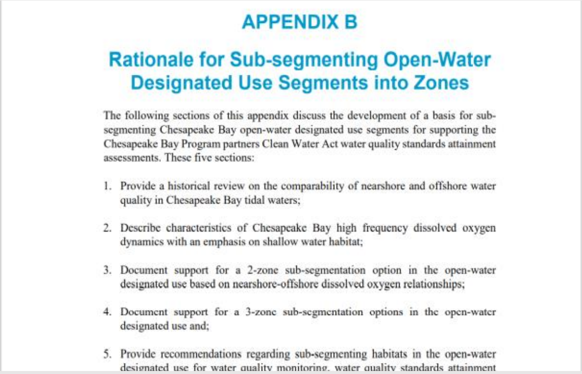
Key data example: Conmon

Other data support

Some ConMons have long time series



Sampling design representativeness (USEPA 2017)



APPENDIX B

Rationale for Sub-segmenting Open-Water Designated Use Segments into Zones

The following sections of this appendix discuss the development of a basis for sub-segmenting Chesapeake Bay open-water designated use segments for supporting the Chesapeake Bay Program partners Clean Water Act water quality standards attainment assessments. These five sections:

1. Provide a historical review on the comparability of nearshore and offshore water quality in Chesapeake Bay tidal waters;
2. Describe characteristics of Chesapeake Bay high frequency dissolved oxygen dynamics with an emphasis on shallow water habitat;
3. Document support for a 2-zone sub-segmentation option in the open-water designated use based on nearshore-offshore dissolved oxygen relationships;
4. Document support for a 3-zone sub-segmentation options in the open-water designated use and;
5. Provide recommendations regarding sub-segmenting habitats in the open-water designated use for water quality monitoring, water quality standards attainment

Resource saving considerations

Approach – Data support

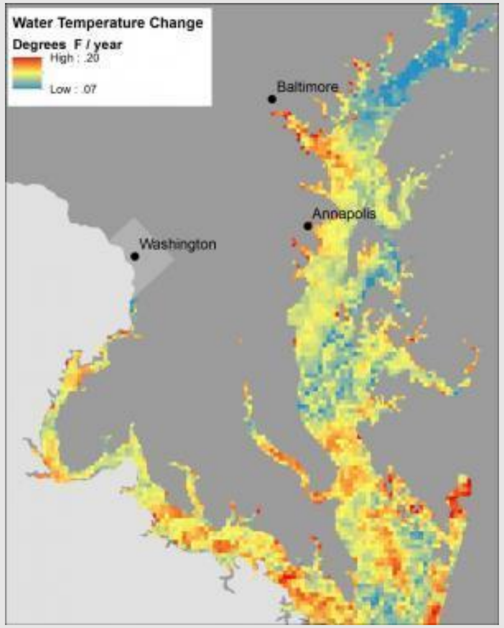
4D estimator components

Spatial structure

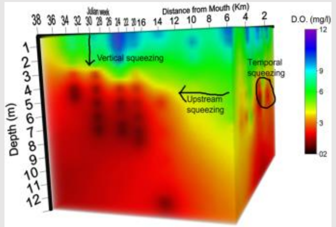
Spatial autocorrelation; anisotropy in depth direction; deterministic relationships to other spatial data (bathymetry, satellite images, etc)

Key data example: Dataflow

Data support



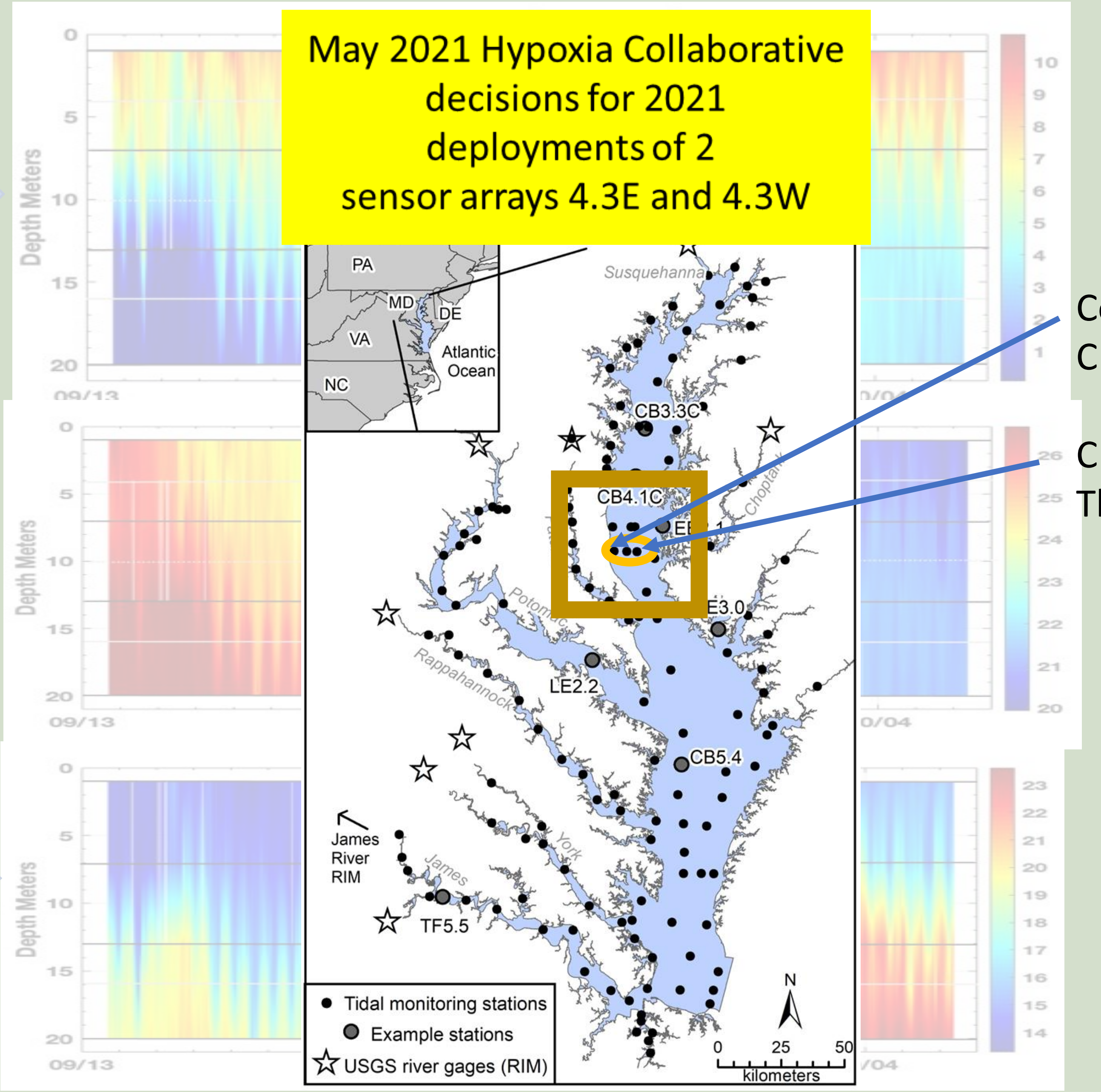
Satellite based data sets
E.g. temperature



Can we revisit Navy work with AUVs for habitat assessment?

2021. More DO, Temp, Salinity : Short term now, but long-term vision.

- Dissolved oxygen – water at this station becomes oxygenated
- Temperature stratification is lost and becomes isothermal
- Salinity stratification declines before oxygen rich high salinity water moves into the bottom waters



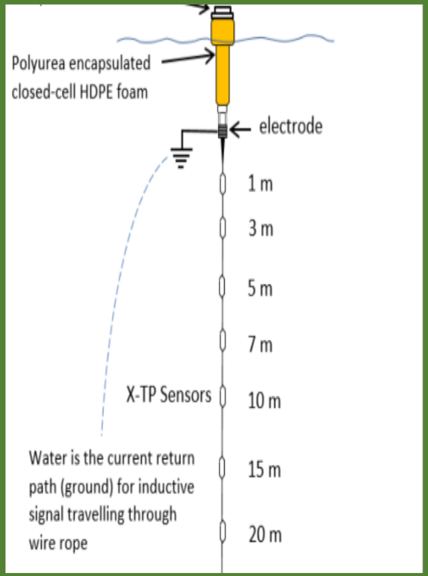
Coming soon!
CB4.3E – new!

CB4.3W
The 2020 site

D. Wilson 2020. CBT GIT-funded pilot project data

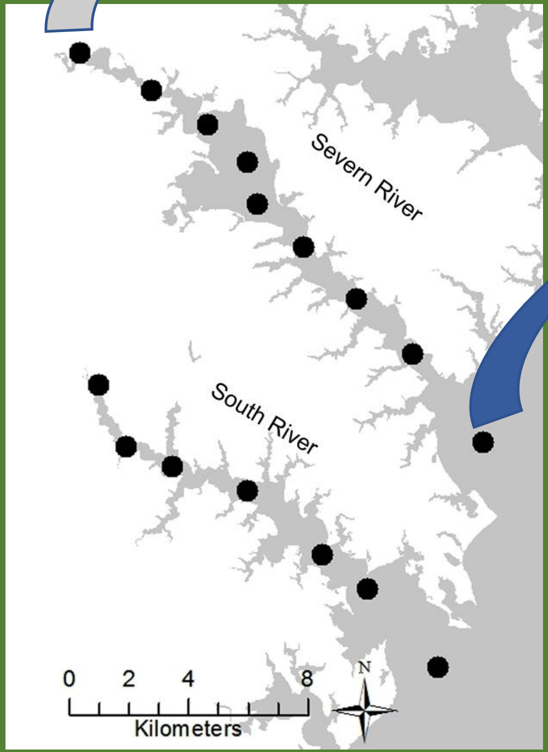
Future discussion

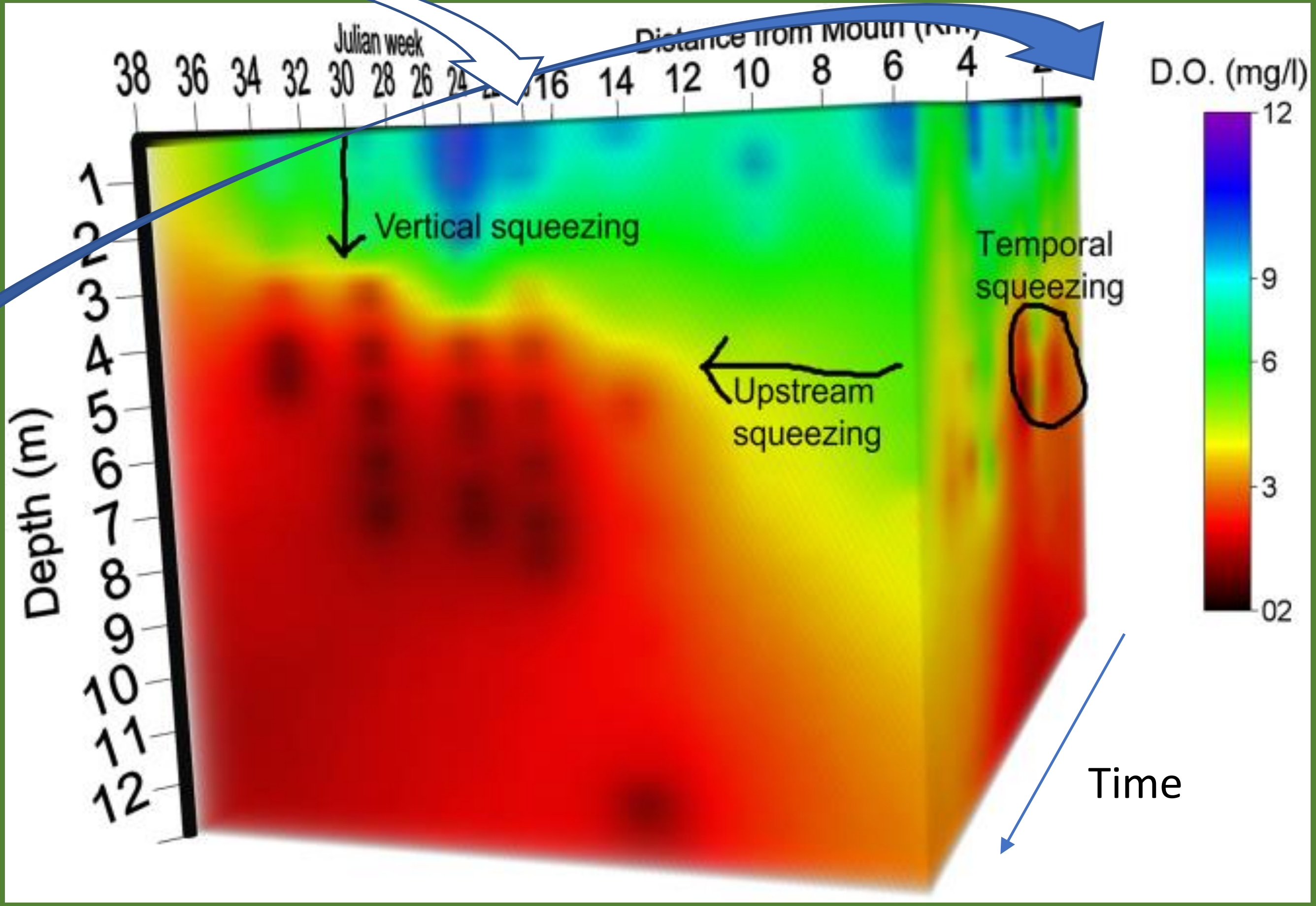
- If we need to better track the boundary locations of the hypoxia in the mainstem and lower Potomac at minimum, what additional sampling investments are required?
    - Can we be informed by history , bathymetry, physics on perimeter placement of stations bottom conmons or vertical profilers or both?
- EPA documentation coupled with other publications have segmented estuarine waters into 3 habitats. Can we use our shallow water resources to distribute sensors in representative habitats for the purpose of supporting baywide DO tracking?
    - Offshore, nearshore and nearshore embayments (USEPA 2017, EPA Washington State examples as guidance and support)
- Fixed site monitoring for anything new, rotational monitoring strategies or both?
- Can we revisit any updates on work by the Navy with AUVs to inform our options?



Thank you

Perhaps we can harness some nontraditional data: Community Science, weekly measures.





Severn River time series. Muller and Muller, Heliyon, 2016.

Approach – Data support

4D estimator components

Long term temporal patterns

Smoothly varying change from observations aided by deterministic relationships with continuously available information (flow, wind, temperature, dynamic model output, etc)

Key data example: Long-term fixed network

✚

Spatial structure

Spatial autocorrelation; anisotropy in depth direction; deterministic relationships to other spatial data (bathymetry, satellite images, etc)

Key data example: Dataflow

✚

Short term temporal variability

Daily & tidal cycling, temporal autocorrelation, etc

Key data example: Conmon

"4d" Spatial & temporal estimates of DO