Monitoring for Estuary Response and Water Quality Standards Attainment

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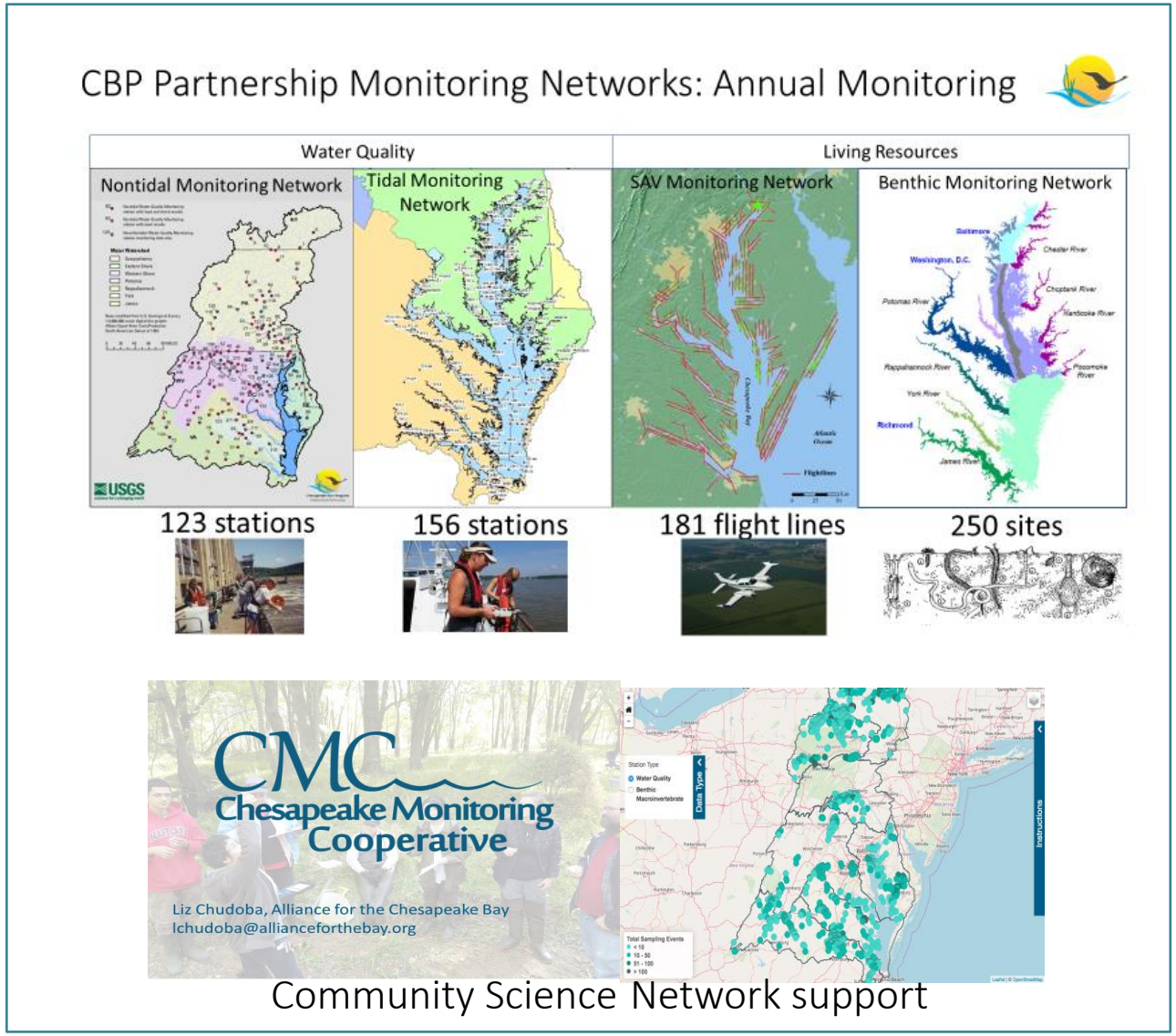
Water Quality Goal Implementation Team meeting

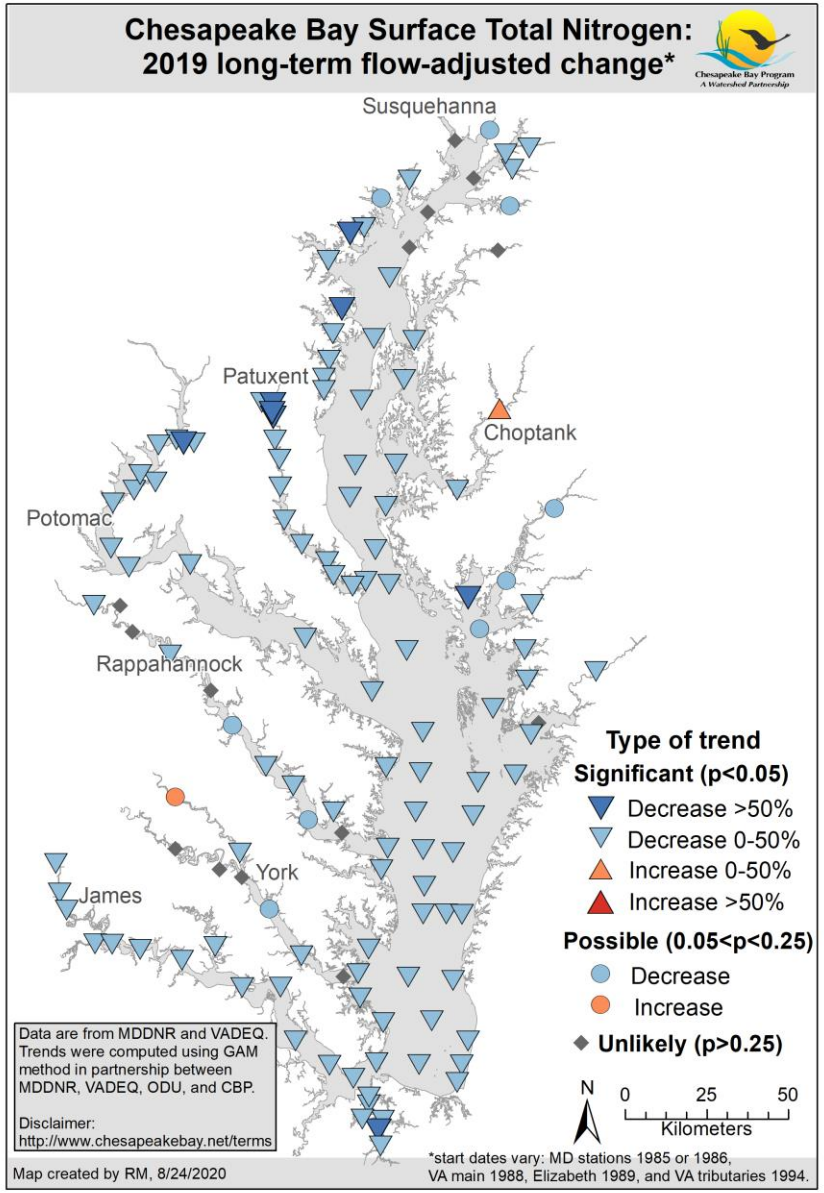
Monitoring networks supporting assessments of watershed loads to the Bay, tidal trends, and water quality standards attainment

CBP networks: Data sources

* Nontidal nutrients and sediment
* Tidal water quality
* SAV acreage
* Tidal benthic organisms
* Community (Citizen) monitoring



Nutrient trends in the estuary



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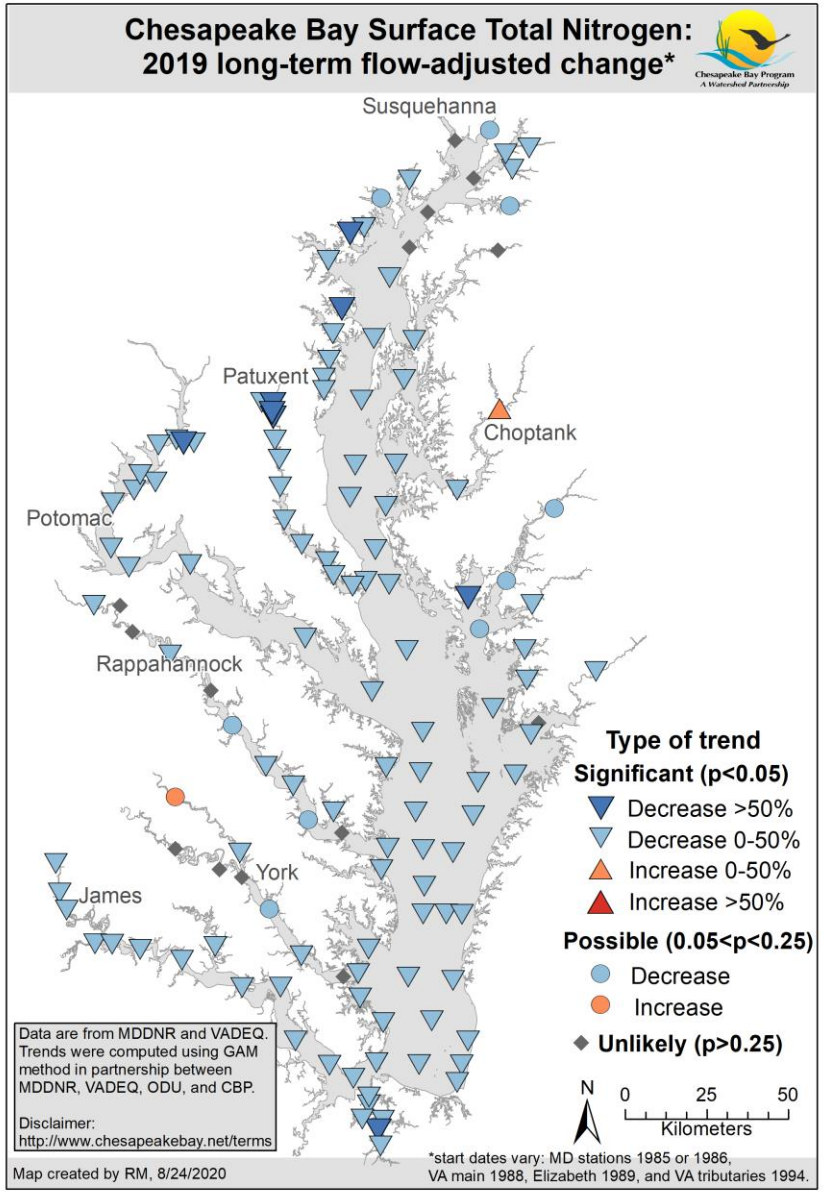


Additional information that is available:

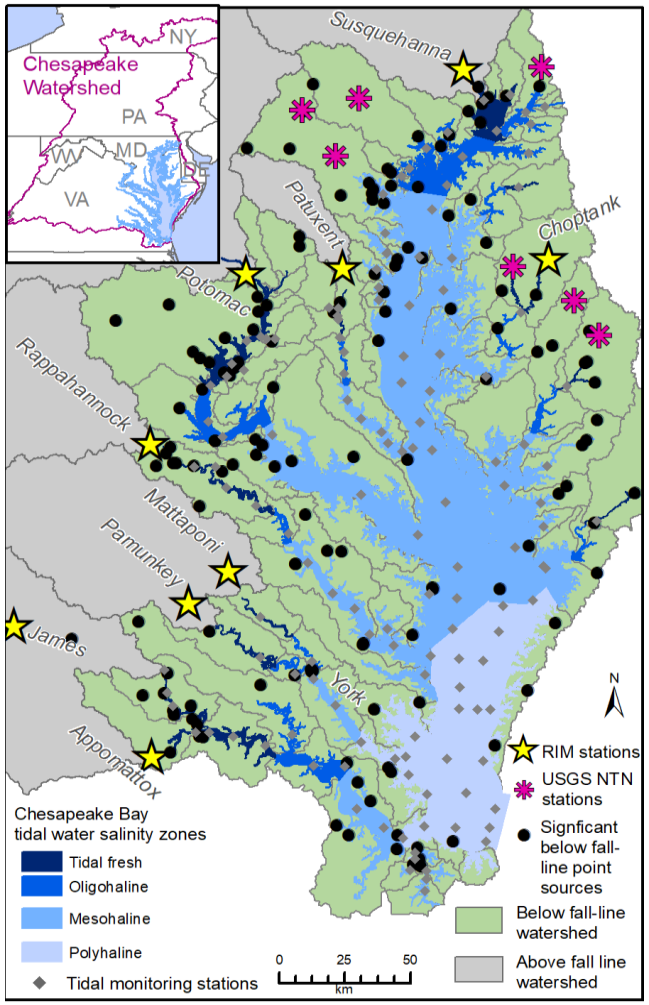
Long- and short-term N and P trends: with and without the influence of flow

Other water quality trends: for chlorophyll *a*, oxygen, clarity, water temperature, etc

Location specific details: in 13 different tributary summary documents (more in next presentation).

Linking watershed loads to trends in the estuary

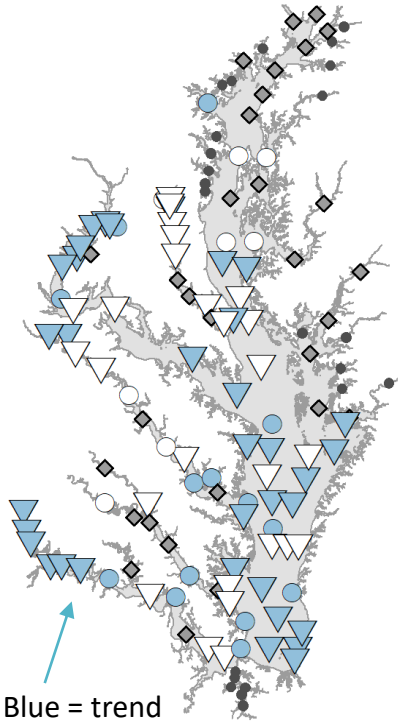
Question: *Can the nutrient trends be explained by riverine ★ ✸ and BFL point loads ● ?*



Answer: *Yes, they can*

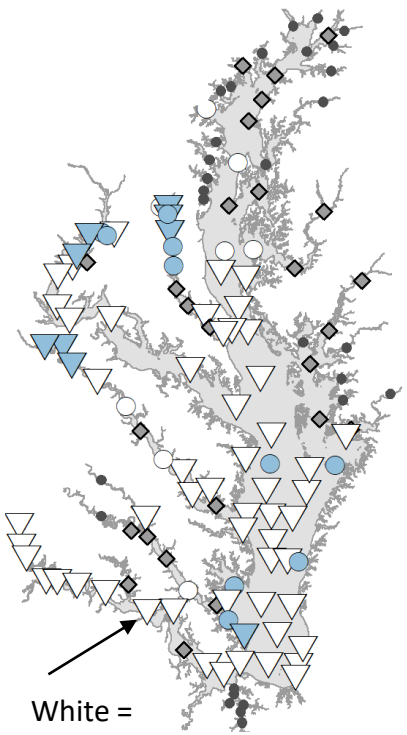
Surface TN Results

River loads explain 41%



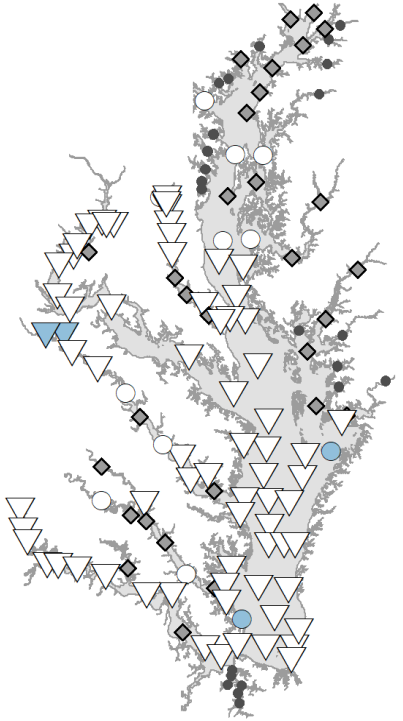
Blue = trend is not explained by load

BFL Pt loads explain 77%



White = trend is explained by load

Together explain 95%



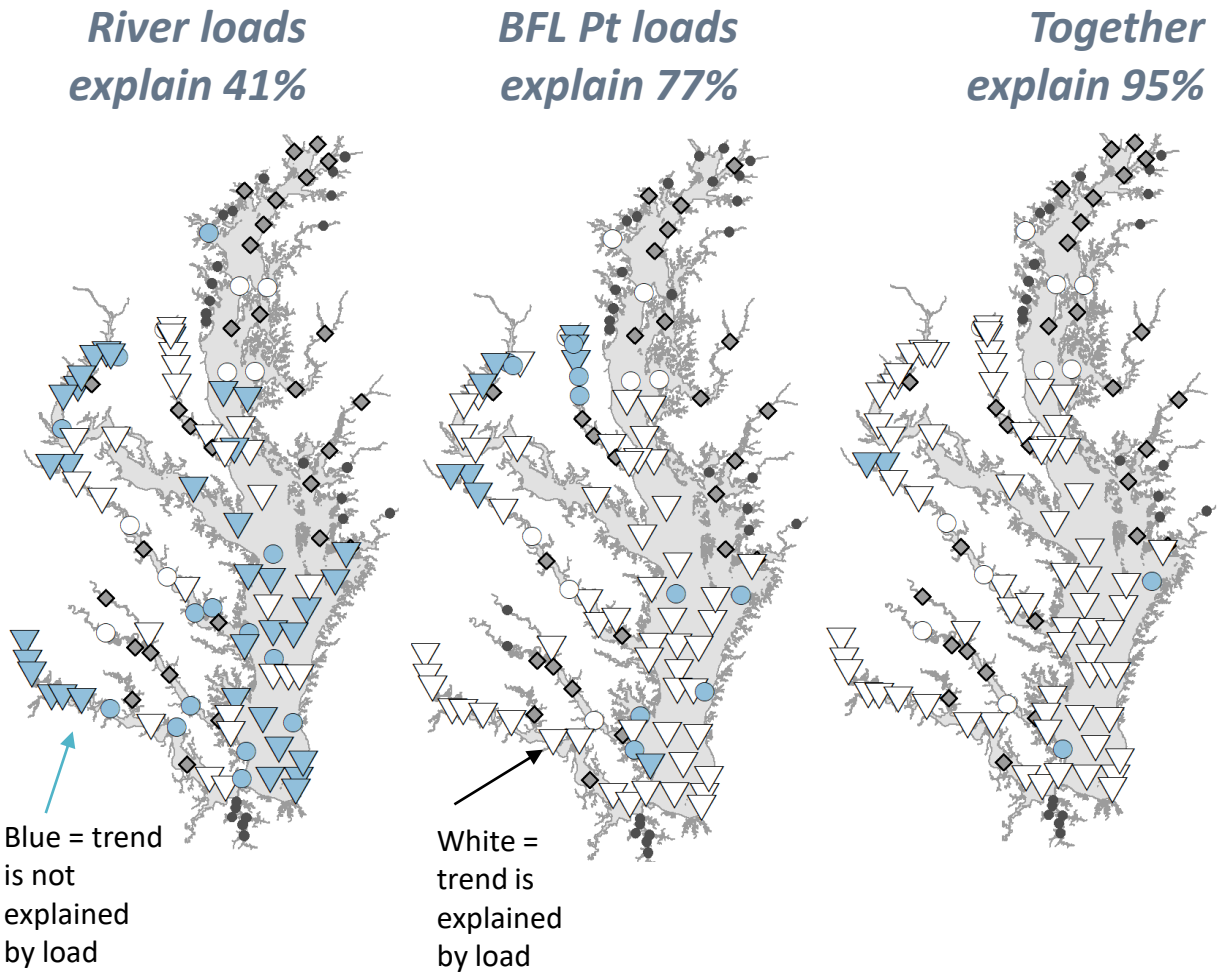
Linking loads to trends in the estuary

Additional information that is available:

Results for TP: and comparison between the nutrients

Watershed-to-estuary spatial links: showing which watershed loads explain which estuary trends

Surface TN Results



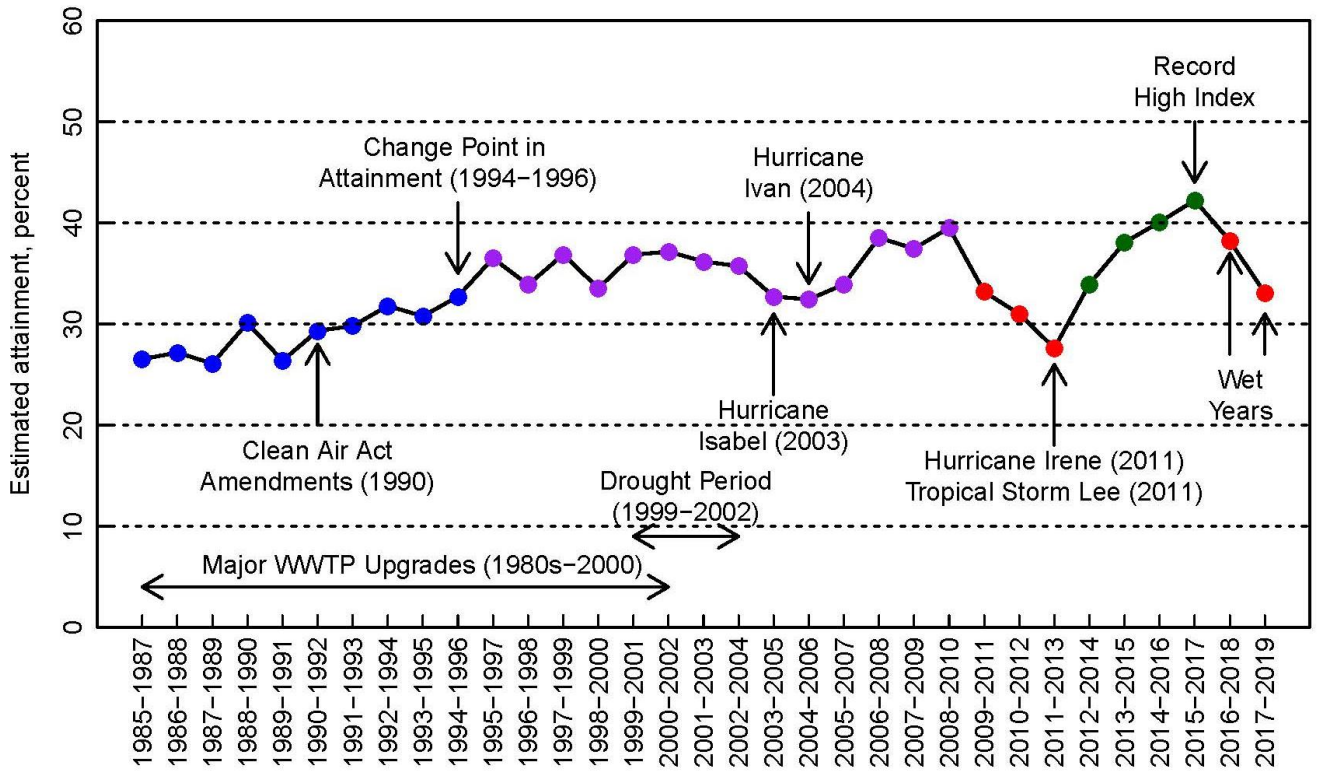
Water quality standards attainment indicator

Question:

What's the current status and long-term trend of Chesapeake Bay in terms of WQS attainment?

Answer:

- Reached its peak (42%) in 2015-2017 but dropped to 33% in 2017-2019.
- It is responsive to extreme weather events but can quickly recover afterwards.
- The indicator has a positive long-term trend ($p < 0.05$) in 1985-2019.



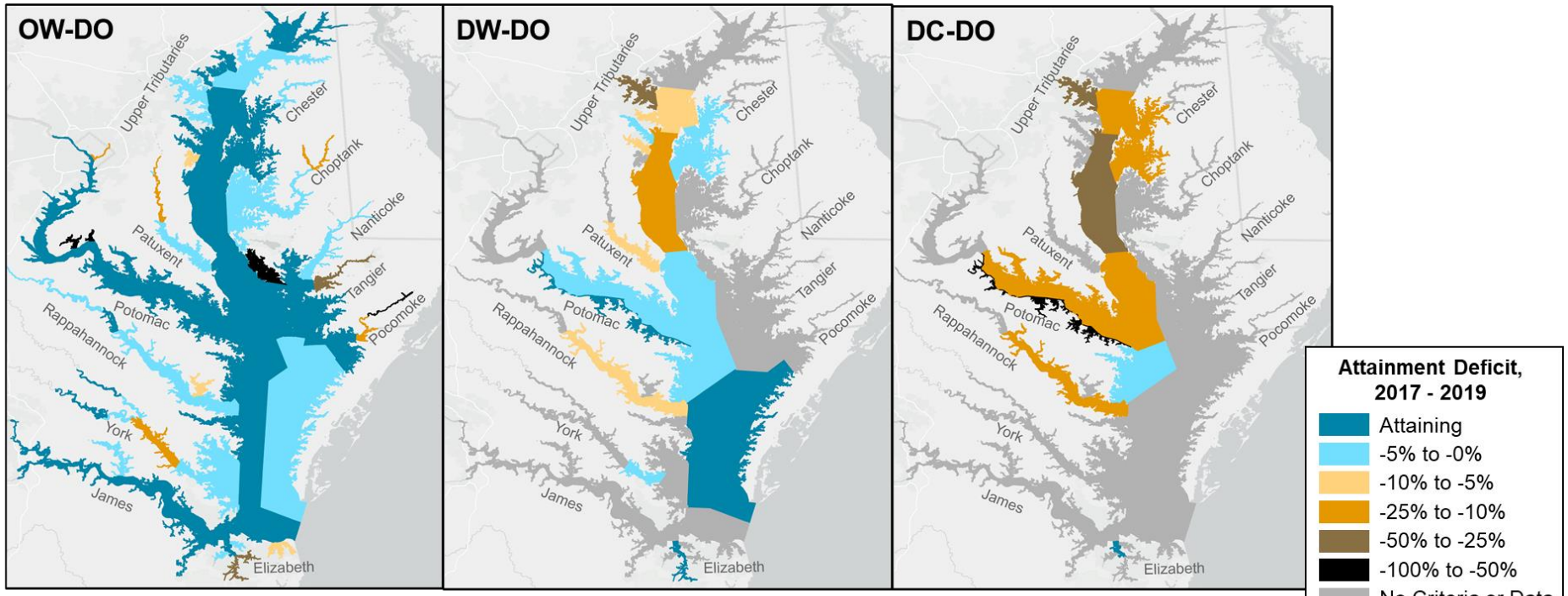
Water quality standards attainment deficit

Question:

Can additional information be extracted from the attainment assessment for specific regions?

Answer:

- Yes. We can quantify the attainment deficit for varying levels of spatial units: tidal segments, designated uses, tidal tributary systems, etc.



***Above**: The 2017 – 2019 attainment deficit for Chesapeake Bay DO criterion in open water, deep water, and deep channel designated uses.*

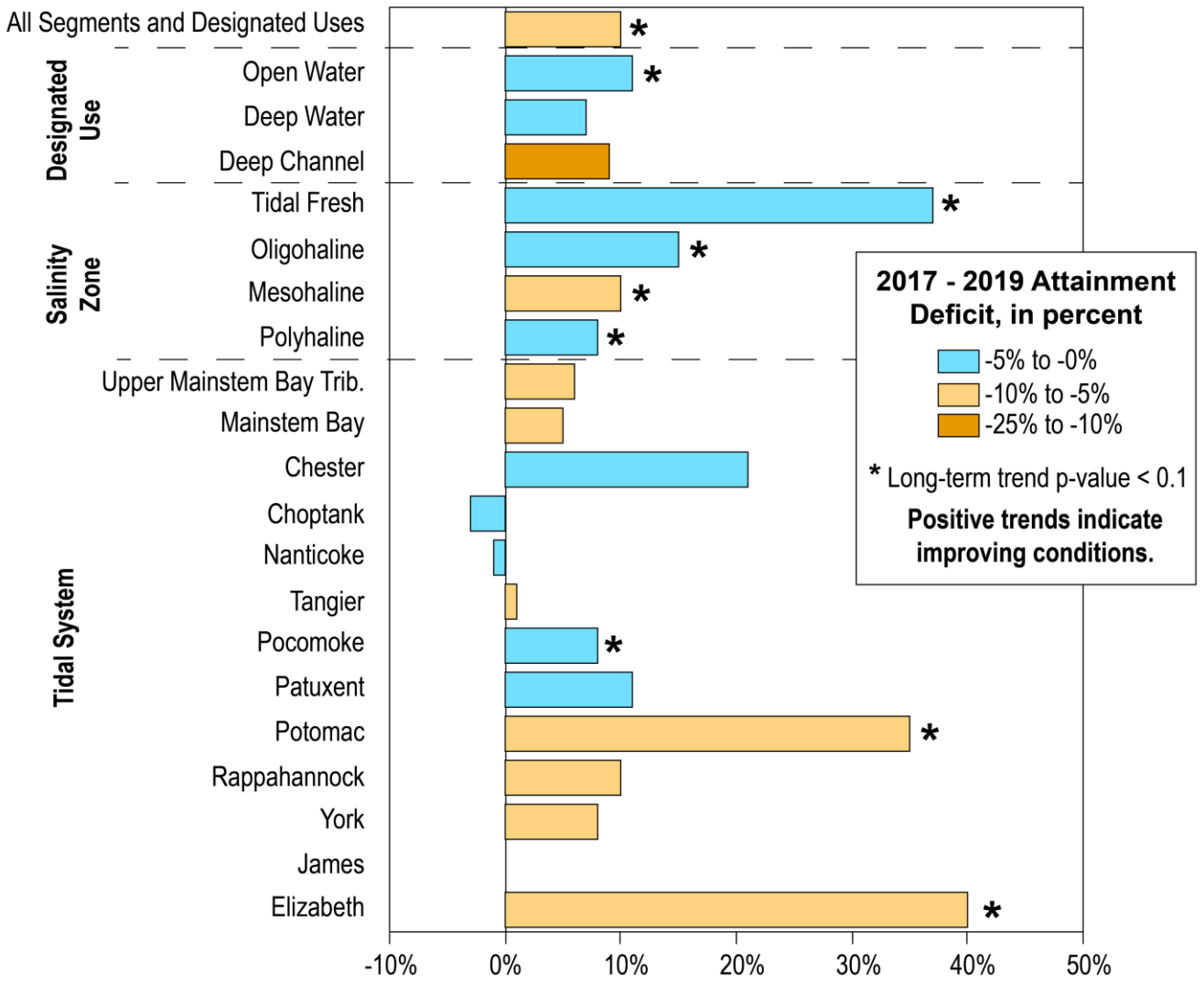
Water quality standards attainment deficit

Question:

Can additional information be extracted from the attainment assessment for specific regions?

Answer:

- The non-binary nature of attainment deficit allows it to better compare spatial conditions and assess temporal trends.



Trend from 1985-1987 to 2017-2019, expressed as %

R Shiny APP for the WQS attainment assessment results

Question:

How can we access these results?

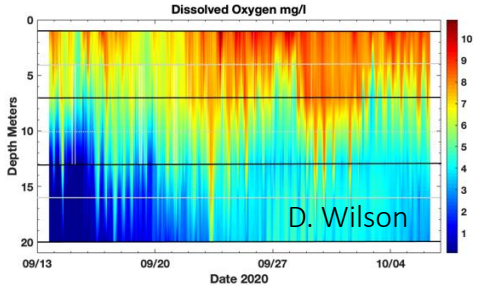
Answer:

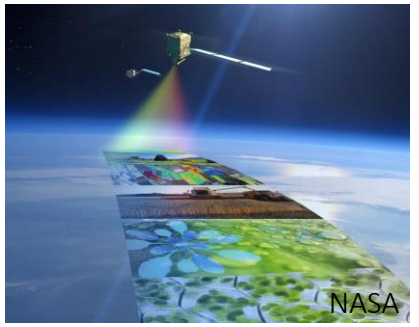
- An interactive R Shiny App is under development to make these results available as maps, time series plots, tables, and text summaries.
- These can be generated based on user selections of inputs.

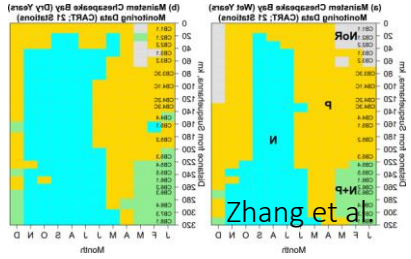
WQS Attainment Indicator or Deficit
different assessment periods
different designated uses
Different tidal segments
different WQS criterion
different tidal systems
different states
long-term and short-term trends

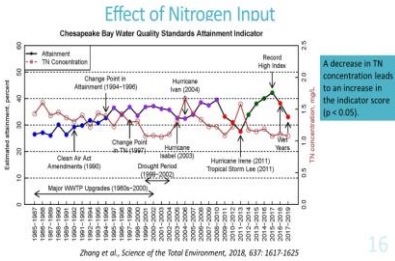
Targeted improvements in monitoring and analysis in the estuary: What's coming?

- Incorporation of Community-based (Citizen) Science data for the next WQS attainment assessment (2018-2020)
- Deployment of more continuous high-temporal frequency vertical monitoring of DO, Salinity, Temperature
- Satellite-based resource assessments (e.g., SAV)
- Funding proposal on nutrient limitation calibration/verification monitoring
- Analysis linking patterns in the water quality indicator with loads and other factors
- Development of new spatial interpolator (4D) to aid in the evaluation all Bay water quality criteria









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