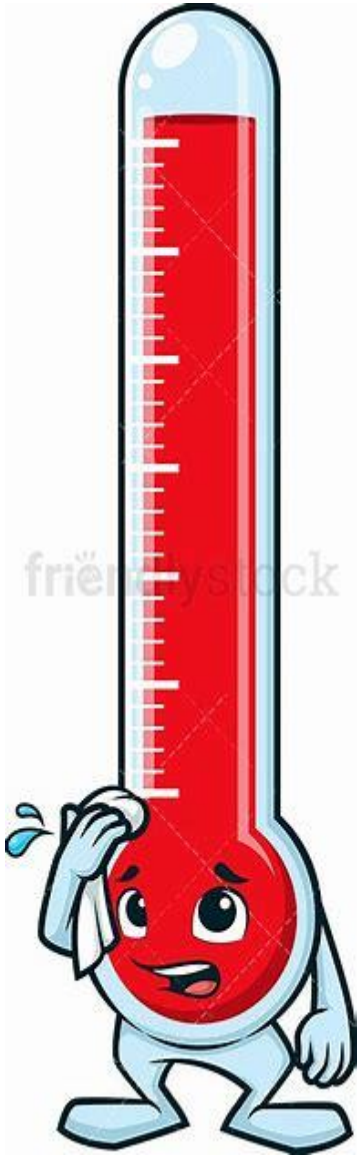
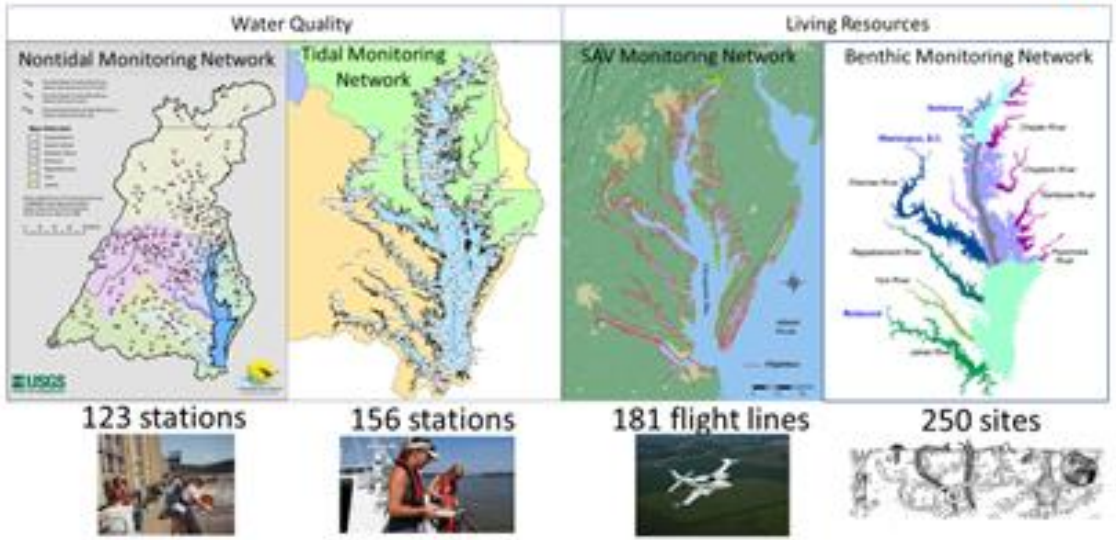
Needs for Enhancing Monitoring Networks for Tidal Bay Water Temperature Change Impacts (#10)

Synthesis Element Leads: Peter Tango (USGS); Support Staff: Breck Sullivan (CRC) and Scott Phillips (USGS)



Core Monitoring Networks in Chesapeake Bay

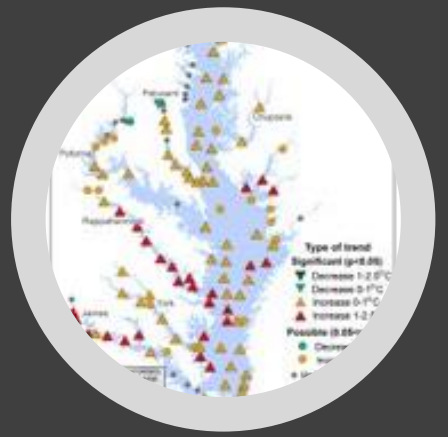
CBP Partnership Monitoring Networks: Annual Monitoring

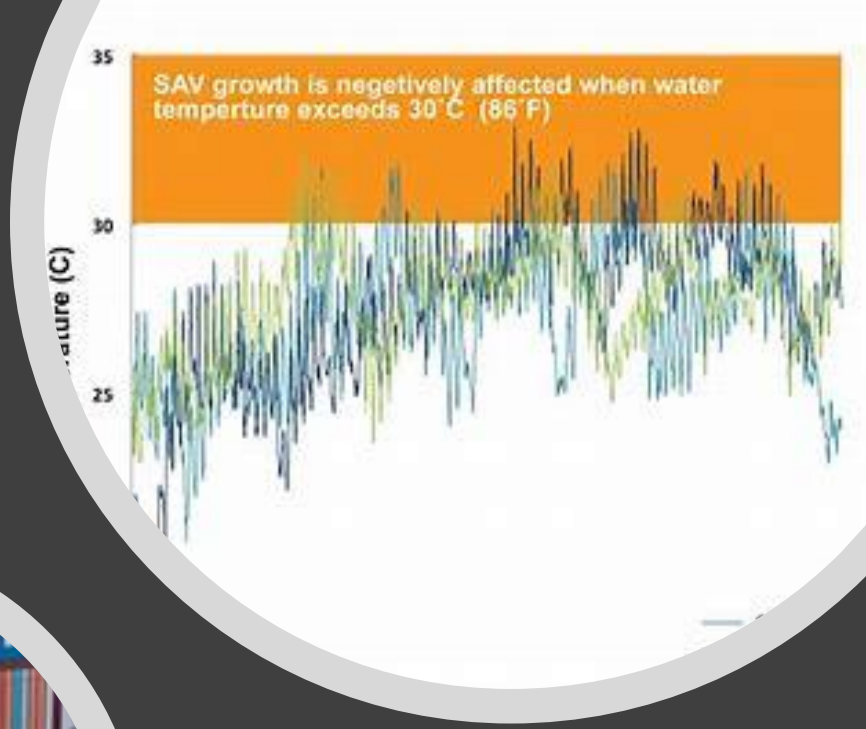


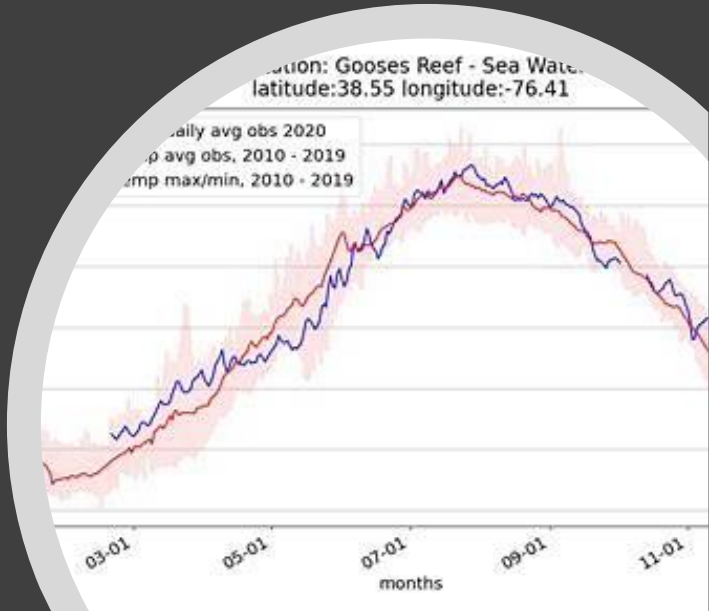
Network support

Our water temperature monitoring data analysis provides insights on:

- Spatial status of present conditions
- Magnitude of the measures
- Frequency of events (e.g., heat waves)
- Duration of events (e.g., continuous measures above thresholds)
- Trends in time



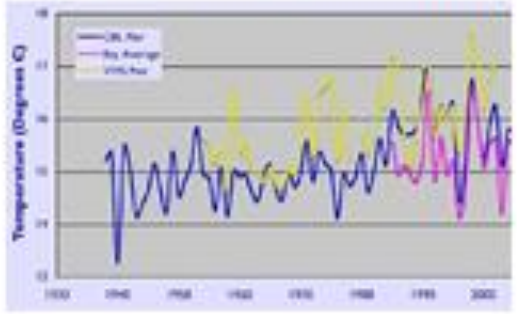


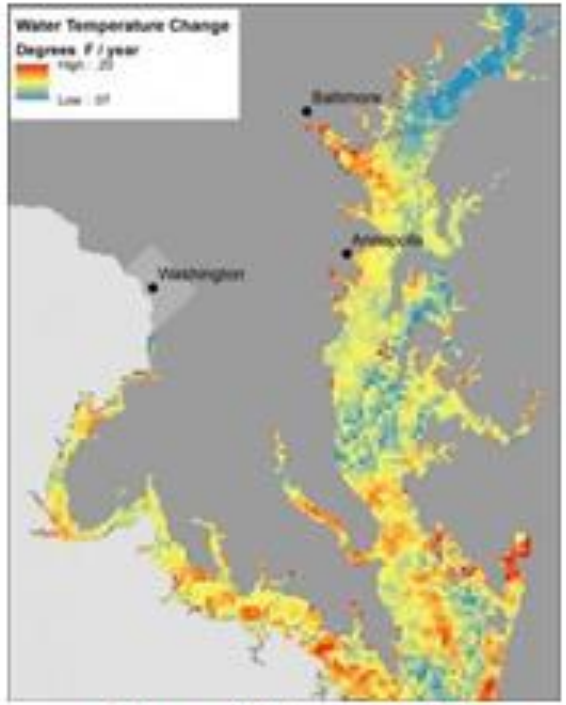


Shifting baselines: Temperature

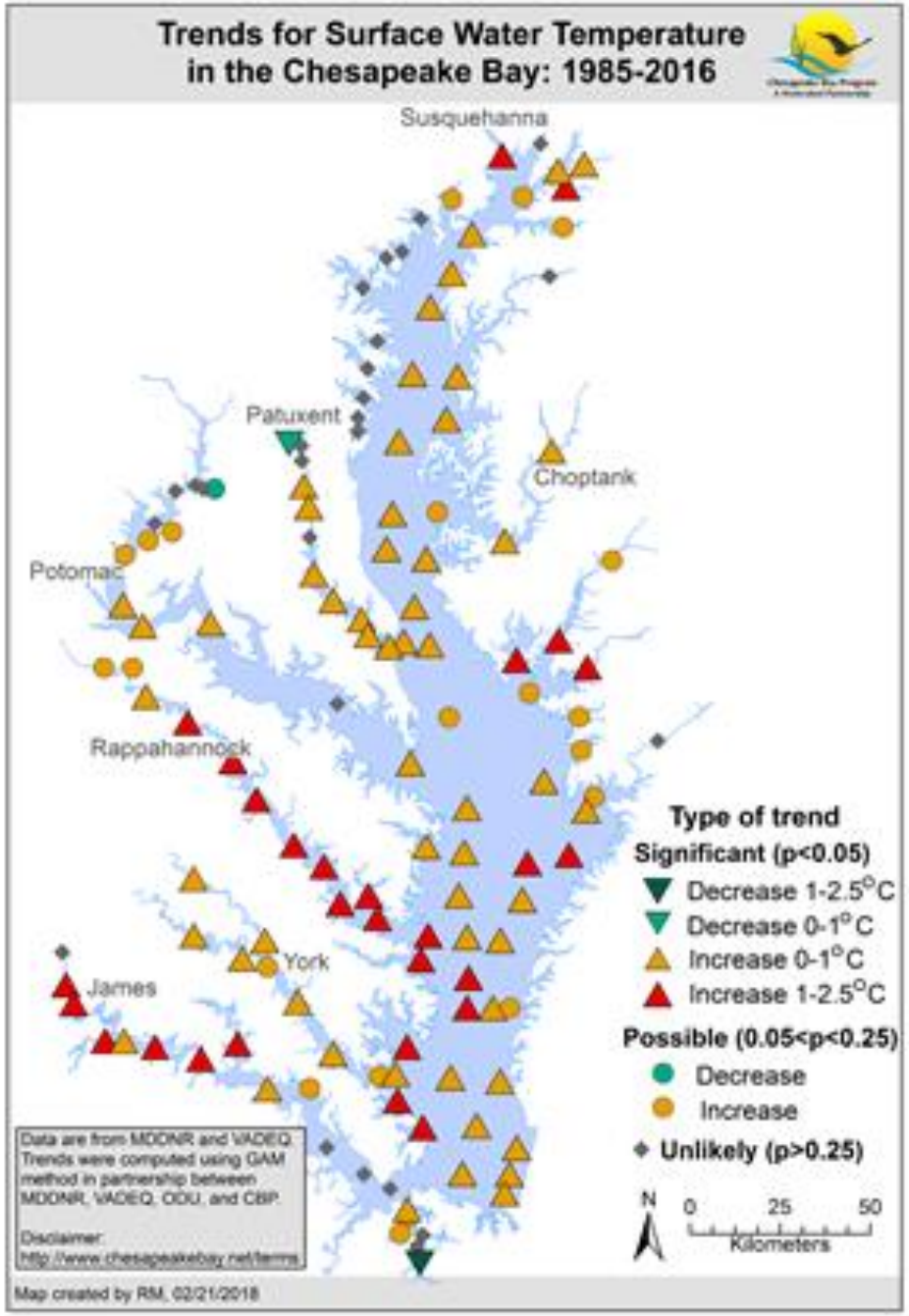
- Bay temperatures rising

Local scale: CBL and VIMS pier

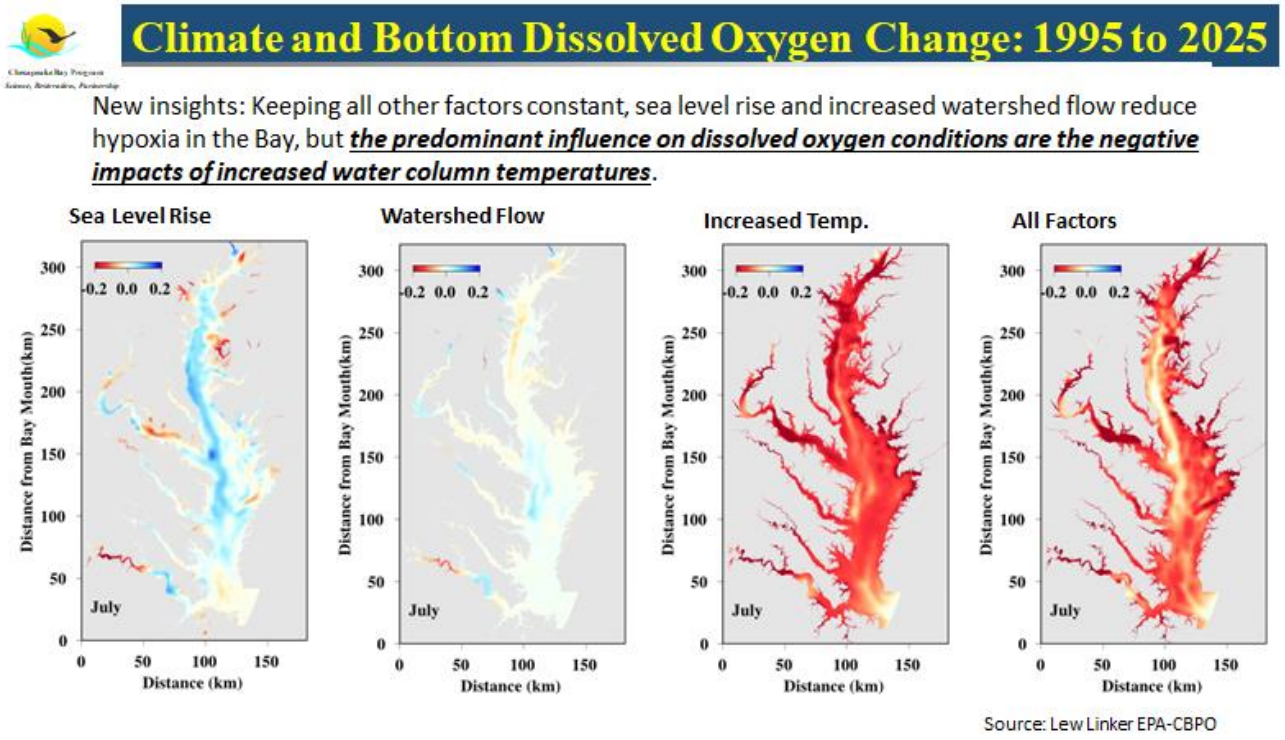




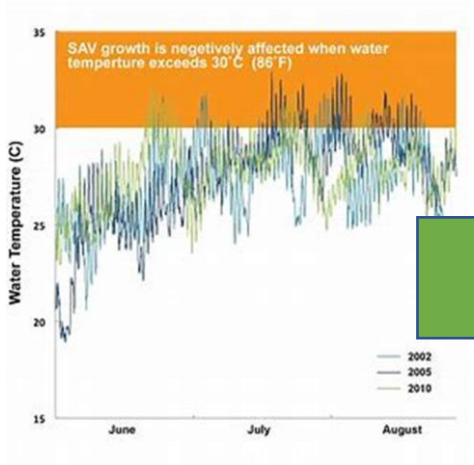
Ding and Elmore. UMCES.
Remote Sensing in the Environment



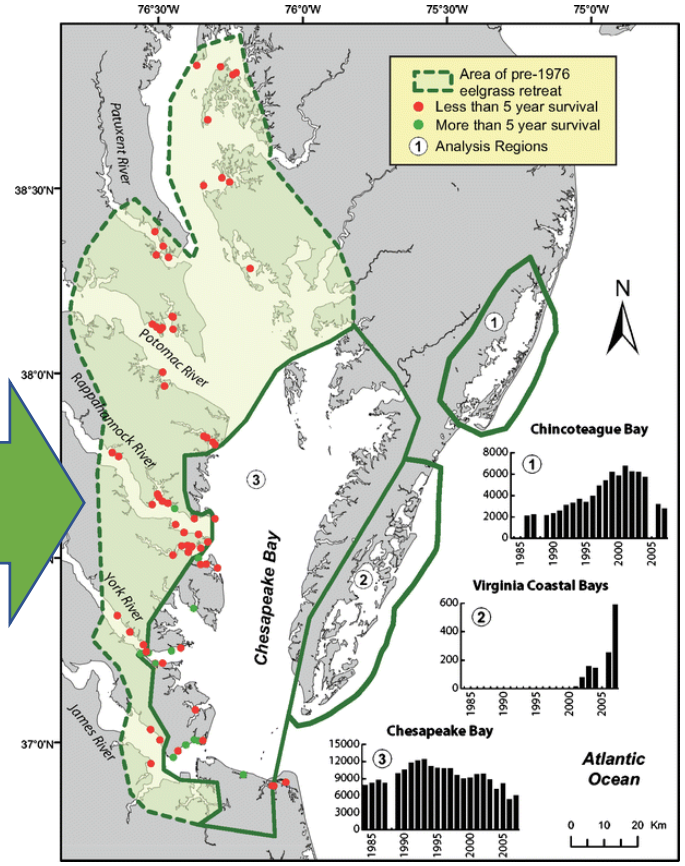
Our existing investments in diverse data resources provide support for management relevant insights through outstanding analyses efforts



Temperature rise is a primary driver affecting hypoxia

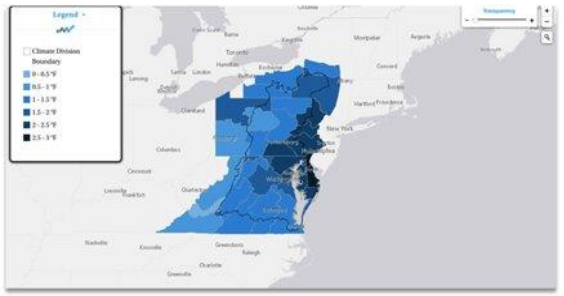


Eelgrass temperature sensitivity thresholds



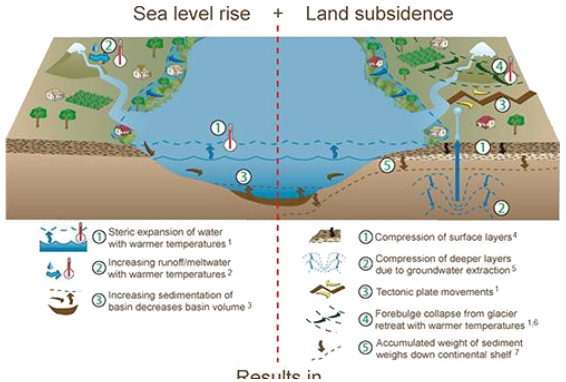
Orth et al.

Eelgrass distribution decline



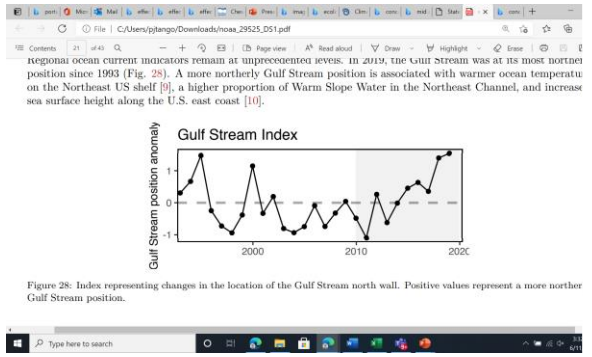
Regional and Global Air temperature rise

Can you manage heat island effects and runoff temperatures for resilience against temperature rise?



Ocean warming affects Sea Level rise

Can you manage wetland degradation, migration as a to keep pace with change?



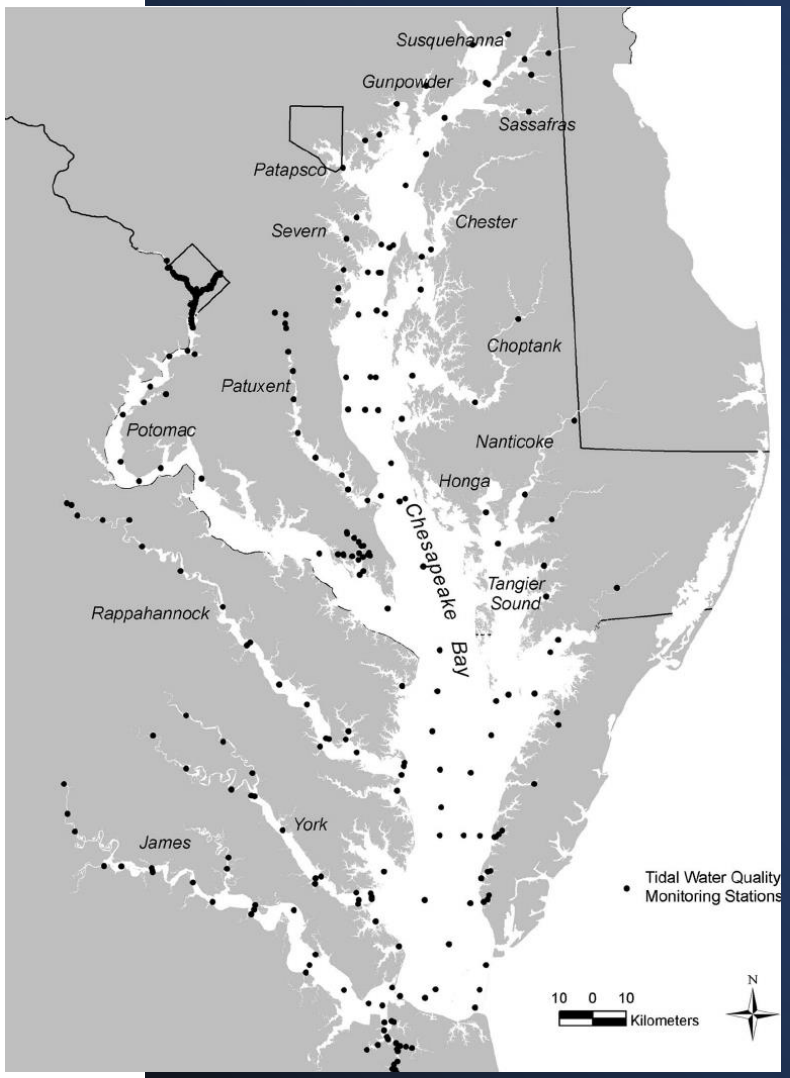
Coastal and Ocean habitat changing

Fish and shellfish migrations and distributions associated with the bay are a culturally and commercially important issue of interest and management challenge under effects from rising temperatures

Beyond the tidal Chesapeake Bay
Regionally important, connected impacts

Frequent Options for Enhanced Monitoring while working with our existing networks:

- **Increase frequency of measures** in time, retain spatial distribution of sites
- **Increase density of measures in space,** retain temporal frequency
- **Increase frequency and density of measures in space and time using existing monitoring methods**
- **Increase diversity of data sources used in analyses**
  - Satellite-based data
  - Citizen science-derived data collections
- **Adopt new technology to support new analyses**
  - DATAFLOW
  - Fixed site ConMon
  - Vertical water quality profilers
  - Drone, Aerial, Satellite
- **Develop and apply new assessment tools**
  - 4D water quality estimator to support improved habitat assessment



Question 1:

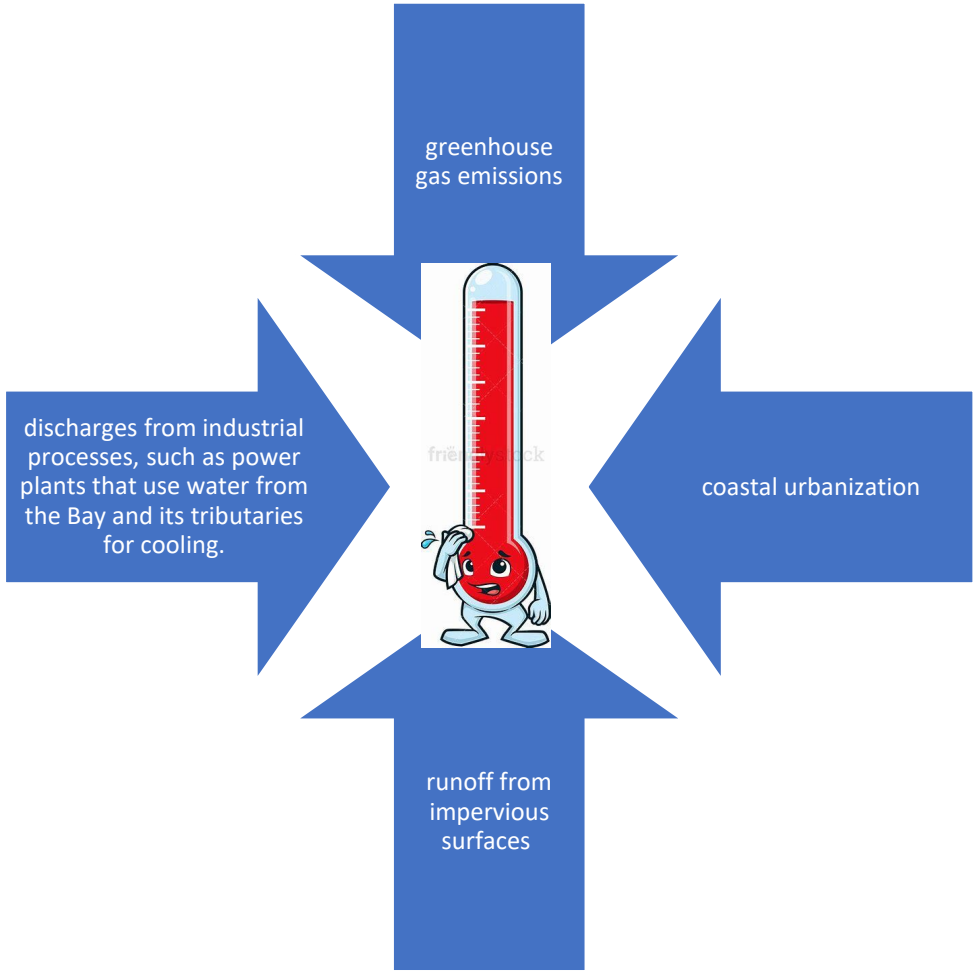
For your decision-support purposes, do you need more temperature data than the existing networks and programming provides?

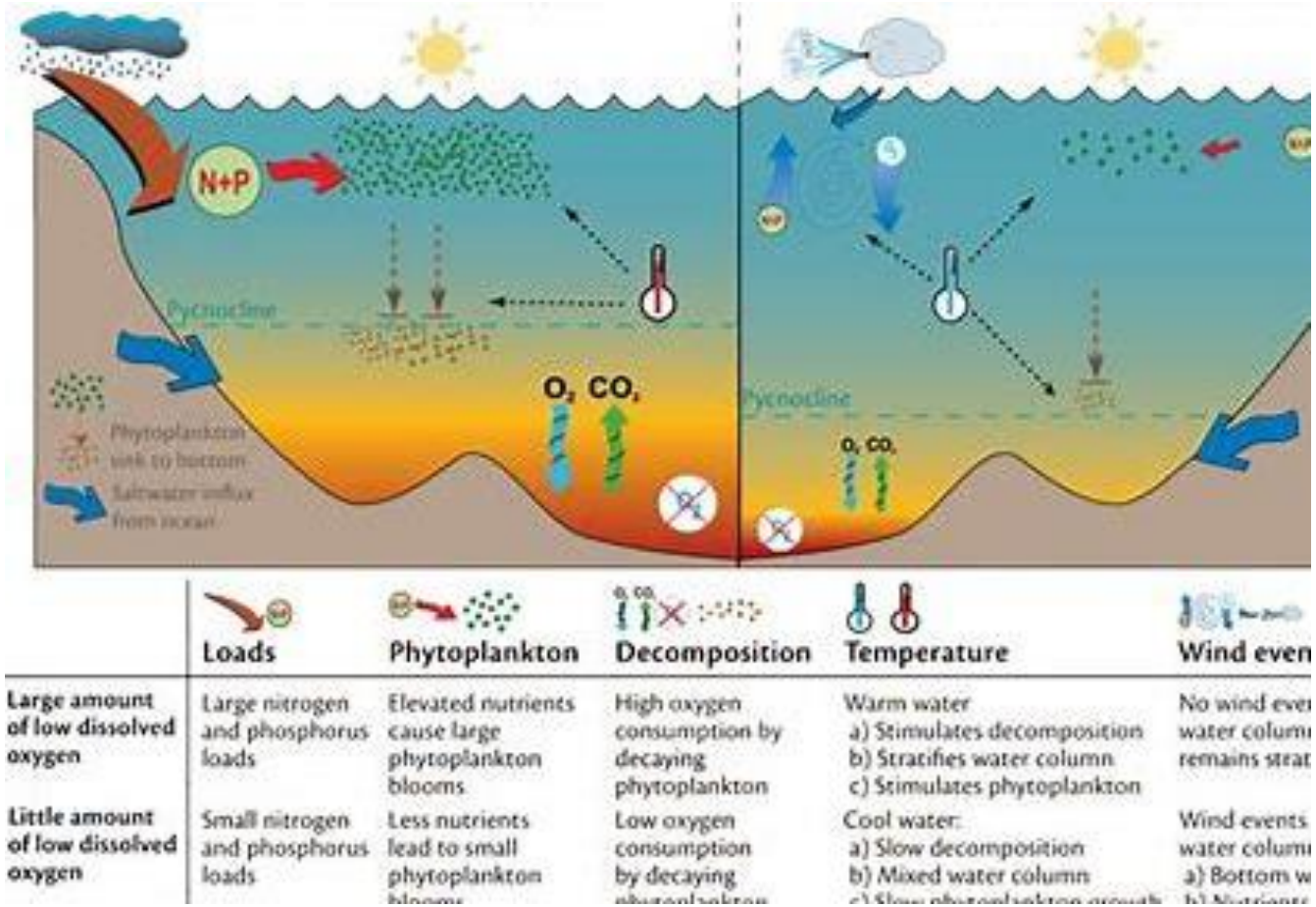
What, where and why?

Question 2:

Do you need more data resources or do you need better tools for analysis and reporting using the diversity of existing data collections ?

Track drivers of water temperature change that we can manage with BMPs?

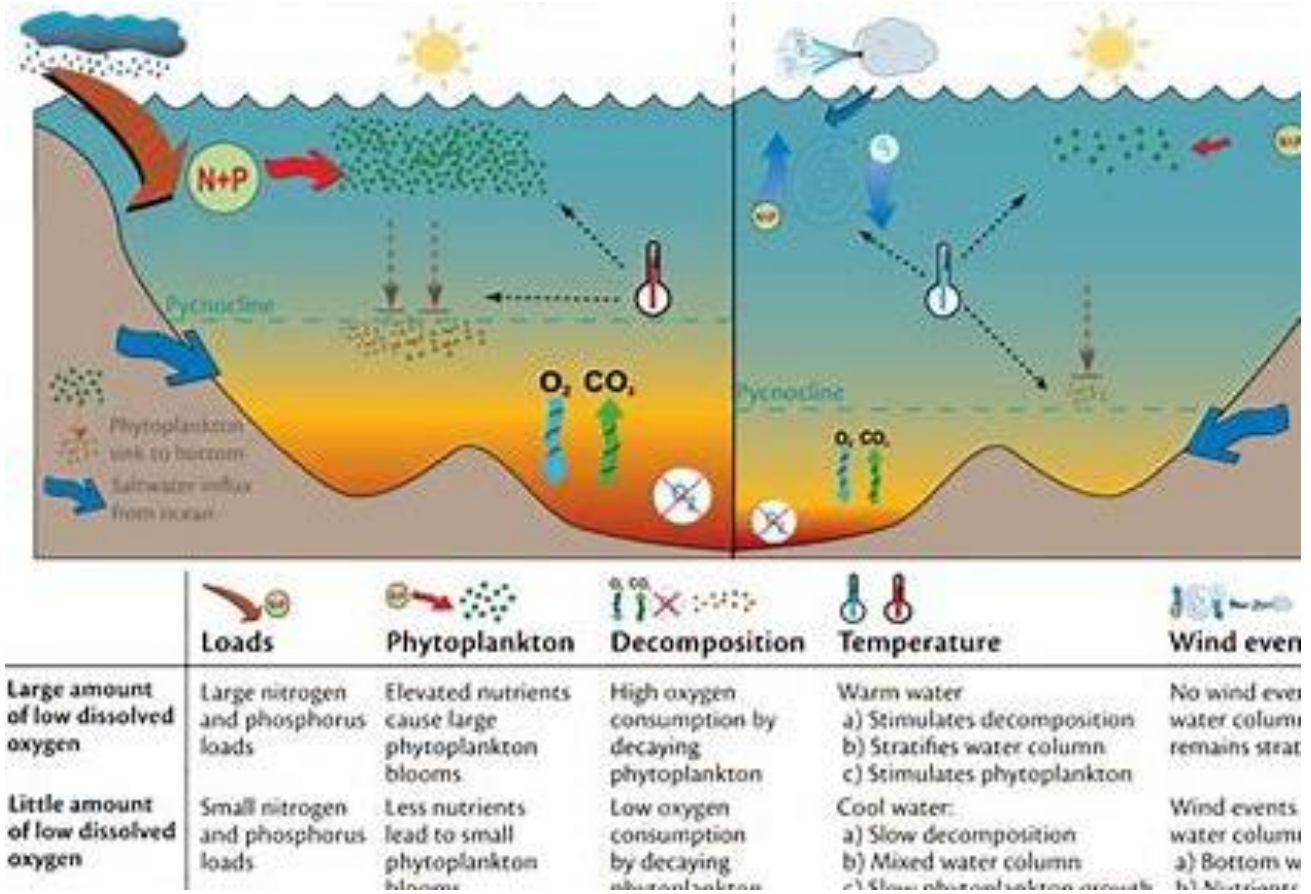




	Loads	Phytoplankton	Decomposition	Temperature	Wind even
Large amount of low dissolved oxygen	Large nitrogen and phosphorus loads	Elevated nutrients cause large phytoplankton blooms	High oxygen consumption by decaying phytoplankton	Warm water a) Stimulates decomposition b) Stratifies water column c) Stimulates phytoplankton	No wind ever water colum remains strat
Little amount of low dissolved oxygen	Small nitrogen and phosphorus loads	Less nutrients lead to small phytoplankton	Low oxygen consumption by decaying	Cool water: a) Slow decomposition b) Mixed water column	Wind events water colum a) Bottom w

Track resource impacts in response to temperature change and management actions?

- Algal productivity
- Hypoxia
- Seagrass distributions
- Fish distributions
- Bird distributions
- Wetland migration
- Forest retreat
- Etc.



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Question 3: If you are investing in enhanced information gathering, where do you need the most relevant monitoring information?

DRIVERS OF TEMPERATURE CHANGE

ENHANCED TRACKING OF TEMPERATURE

RESPONSE OF IMPACTED RESOURCES

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Thank you ☺