Discussion Paper: Addressing Principal Staff Committee Request to Improve Chesapeake Monitoring Networks

Issue:

An overview was provided to the Principal Staff Committee (PSC) at their March 2, 2021 meeting about the status of, and potential reductions to, the current Chesapeake Bay Program (CBP) monitoring networks. The CBP monitoring programs presented included the nontidal nutrient and sediment network, tidal water-quality monitoring network, submerged aquatic vegetation (SAV), tidal benthic monitoring network, and Citizen Science monitoring. The reduction of stations and data in the CBP monitoring networks is mostly due to inflation in the cost of monitoring over the past 5 years, while funding for the networks has been held constant. The Scientific Technical Assessment and Reporting Team (STAR) listed the condition of the networks as "fair" during the August 2020 SRS quarterly review to the Management Board.

PSC request from March 2:

The PSC recognizes that monitoring is foundational to the CBP's ability to assess progress toward its goals and outcomes and utilizing adaptive-management principles. In response to the status report, they requested information be provided on what is needed to improve the CBP monitoring networks, including: (1) an overview of current status and threats to the networks, and (2) what is needed to address the monitoring networks capacity shortfalls.

Addressing the request:

The last comprehensive assessment of CBP networks was over a decade ago, when the MB oversaw a collaborative effort between the CBP and the Science and Technical Advisory Committee (STAC) termed the Monitoring Realignment, led by the "Monitoring Realignment Action Team" (MRAT), so this PSC request is timely.

The Scientific, Technical Assessment, and Reporting (STAR) team will take the lead to address the PSC request, collaborating with STAC and the partners currently responsible for CBP monitoring networks). The PSC request will be addressed during 2021, with final recommendations in early 2022. The proposed STAR workplan to address the request attached.

The CBP Leadership for addressing the request will include: Peter Tango (USGS, CBP monitoring coordinator), Lee McDonnell (EPA, lead of CBP Science Branch) Scott Phillips (USGS, STAR Co-chair), Breck Sullivan (CRC STAR staffer) and Denice Wardrop (STAC and CRC Director). The lead partners that will play important roles for each network are listed in Appendix 1.

Help needed today from PSC:

The PSC can help in two ways: (1) provide input on the proposed work plan to be sure it meets the needs of the request. and (2) have agency personnel involved with CBP monitoring networks be available to participate.

Proposed Workplan for Opportunities to Enhance CBP Monitoring Networks

Updated Draft May 17, Presented to MB on April 8.

Purpose:

The CBP has multiple monitoring and assessment needs associated with its 10 goals and 31 outcomes. The focus of the PSC request will be on the existing CBP monitoring networks and how data are analyzed to address needs of existing CBP outcomes. The existing CBP monitoring networks to be evaluated include (1) the nontidal nutrient and sediment network, (2) tidal water-quality monitoring network, (3) submerged aquatic vegetation (SAV), (4) tidal benthic monitoring network, and (5) Citizen Science monitoring. Currently, the EPA provides $5M annually, with the partners contributing another $7M, to maintain these existing CBP networks.

While funding is very important, the objective of this evaluation is to not simply ask for more funding to support existing programming. STAR will develop a suite of recommendations including:

- Utility of products already published by agencies and institutions
- Potential for adoption of new monitoring and assessment innovations
- Opportunities for inclusion of additional monitoring partners
- Potential modifications to network objectives and designs
- Identify where additional funding is needed
- Utility of monitoring network to address the EC priorities of DEIJ and Climate Change

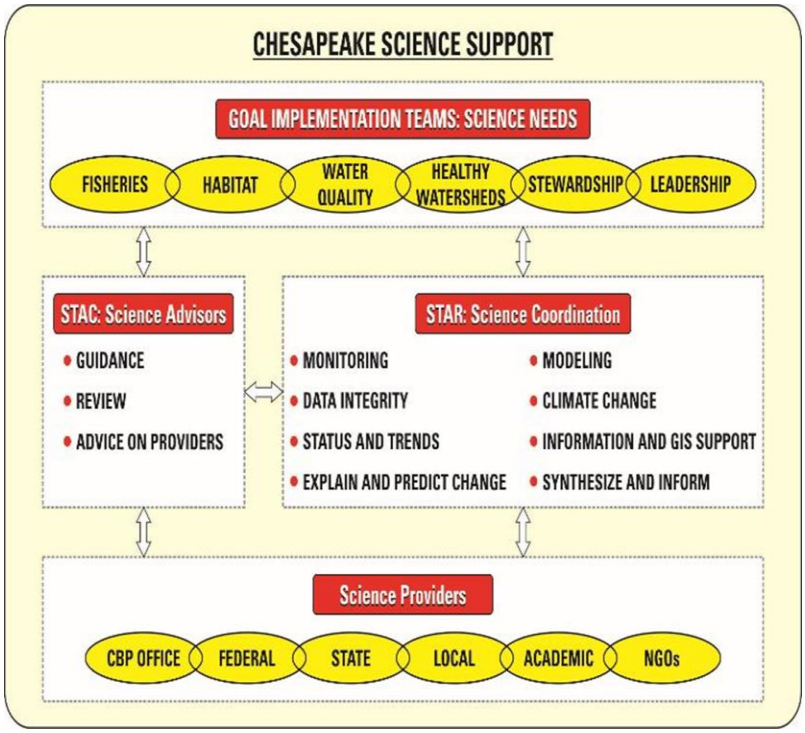

Figure 1: STAR would address the PSC request working with STAC and other monitoring partners.

Approach:

The Scientific, Technical Assessment, and Reporting (STAR) team will take the lead to address the PSC request, collaborating with STAC and the partners currently responsible for CBP

monitoring networks (see Figure 1). A team for each of the CBP networks would develop its recommendations. Appendix A contains some summary information on current status of the networks, primary gaps and needs, and leadership for each team.

For each of the networks the following information would be considered:

(1) What is the status of the network (including number of stations, sampling frequency, funding partners for tidal assessment and nontidal stream flow and water-quality monitoring at stations) and current assessment methodologies as it pertains to its stated purpose?
(2) How have the networks and assessment needs of the CBP partnership changed over time past 5-10 years and what are future threats?
(3) What needs to be done to sustain the current networks (i.e., stop the loss of stations and number of samples due to inflation over the past 5-10 years, address infrastructure challenges, manage the growing and diversifying databases), and what are the future benefits of doing so?
(4) What gaps need to be filled to improve the CBP monitoring networks to address management information and decision-support needs?
(5) How can existing monitoring data and analysis be used to address these gaps?
(6) What are some of the newer and innovative approaches that can be considered to improve the networks to address capacity shortfalls and provide management relevant data analysis products?
(7) What are the opportunities to support and fund the improvement of the networks? What other partners can help expand the monitoring capacity through adoption of existing data collections and analyses beyond the traditional Clean Water Act 117e grant funded monitoring programs?
(8) What are the estimated structural, programmatic and related financial needs associated with recommended network adjustment and improved assessment operations for the next 5-10 years?

Proposed Timeline:

- Develop a work plan for the effort and present to PSC for endorsement at their June 2021 meeting
- Have teams address the questions and develop recommendations for each network (Spring-Summer/Fall 2021)
- Conduct STAC workshop on CBP monitoring network recommendations (by end of 2021)
- Provide recommendations to PSC: Early 2022

Products:

A report to the PSC would contain:

- Individual portfolios with recommendations for each network
- Appendices of supporting material

Appendix A: CBP Networks to be addressed

Nontidal nutrient and sediment monitoring network

- Provides data to address the Standards Attainment and Monitoring Outcome: trends of nutrients and sediment in the watershed directly influencing standards attainment
- Present capacity: 123 stations sampled monthly, most with quarterly storm sampling.
- Current partners and funding: Estimated $6.6 Million annually (MD 803K (2021) NTN + 145K RIM, VA 769K NTN+RIM, PA 0.47M EPA+0.47M Match, WV 0.21M EPA + 0.21M match, USGS 1.17M, USGS 750K Streamflow network, estimated additional varied partner support >$2M) based largely on 117e grant funding and State match + USGS support.
- Gaps/Needs: 1) Small watershed monitoring in agricultural areas. 2) BMP effectiveness monitoring. 3) Climate impact to BMP effectiveness.
- Suggested analyses: 1) identify partner needs if beyond identified gaps, 2) Optimization analysis considering level funding for 5-10 years – stations reduced, 3) Identify sites to invest and address gaps, 4) Identify degree of new technology necessary for new or traditional stations, 5) identify new partners, 6) declare estimated costs associated with network updates.
- Suggested Lead: NTN monitoring team.

Tidal water-quality monitoring network:

- Provides data to address the Standards Attainment and Monitoring Outcome: attainment of water-quality standards.
- Present capacity: 16 water quality cruises for approximately 160 long-term stations across MD, VA, and D.C.; 10 current MD DNR shallow water continuous monitoring stations
- Present partners and funding: Estimated $3.2 Million from 117e grant funding records (MD mainstem $1M, MD tidal tribs **Estimated 1M* total but in contact for actual from DNR, VADEQ mainstem 635K, VADEQ tidal tributaries 404K + 231K)
- Gaps/Needs: 1) develop a 4-D interpolator (or similar tool) to improve the assessments 2) what additional monitoring improvements are needed for the CBP partnership to be able to assess all criteria in tidal waters, 3) develop high frequency hypoxia profiling monitoring plan, 4) greater spatial coverage and/or temporal frequency for kd, chla, SAV, DO, Temperature, salinity measures.
- Suggested analyses 1) identify partner needs if beyond identified gaps, 2) Identify degree of new technology necessary for new or traditional stations, 3) identify new partners or new collaborations
- Suggested Lead: Criteria Assessment Protocol Team as lead, interacting with:
    - Hypoxia Collaborative Team (NOAA, MD DNR, VA DEQ, Peter Tango and Bruce Vogt – focusing on vertical profiles)
    - Fisheries Habitat Action Team (MD DNR, VADEQ, NOAA, Gina Hunt MD DNR, Bruce Vogt NOAA)

  - Bay Oxygen Research Group (Peter Tango, Rebecca Murphy, Modeling Team and ITAT, focusing on Interpolator)

Submerged Aquatic Vegetation (SAV)

- Provides data to address the Standards Attainment and Monitoring Outcome: attainment of water-quality standards (SAV/Clarity); and SAV outcome.
- Present capacity: Baywide annual coverage most years with fixed wing aerial imagery and hand mapped SAV beds
- Present Funding: $700,000 (2020) based on STAC SAV Workshop 2021 report.
- Gaps/Needs: 1) Cost effective image acquisition of appropriate scale, 2) efficient, effective process for acquiring good satellite imagery, 3) AI algorithm image interpretation for Chesapeake Bay tidal waters, 4) repeated within-year imaging, 5) Citizen science support for species ground truthing
- Suggested analyses: 1) Assess RFP options for ending Flight contract for SAV 2) development of effective AI image interpretation algorithms, 3) expand Citizen Science contributions
- Suggested Lead: SAV Workgroup

Benthic Monitoring

- Provides data to address the Standards Attainment and Monitoring Outcome: attainment of aquatic life use criteria supporting water-quality standards attainment listing and delisting decisions.
- Present capacity: The fixed site monitoring program has 53 stations, the probability-based, random strata sampling relies on approximately 200 sites sampled between July 15 and September 30 each year, providing for a Bay-wide regulatory assessment estimating impaired habitat conditions.
- Present Funding: Estimated $445 K per year (based on recent 117e grant reference - recently 212K in MD, 233K in VA)
- Gaps/Needs: 1) What changes should be considered since benthic monitoring is now just summer monitoring
- Suggested analyses: Justification on any recommendation for expanding the tidal benthic monitoring program
- Suggested Leads: Criteria Assessment Protocol WG, with support from:
  - Sustainable Fisheries GIT Fish Habitat Assessment Team
  - Sustainable Fisheries GIT Forage Assessment Team
  - Healthy Habitat GIT Black Duck Workgroup

Citizen Science monitoring

- Provides data to address the Standards Attainment and Monitoring Outcome: attainment of water-quality standards.
- Present capacity: Relationships with monitoring groups evolving, at least 4 Tier 3 (criteria assessment approved) riverkeeper organizations (2020)
- Present Funding: EPA 6-year award approximately $450K per year

- Gaps/Needs: 1) What are opportunities for better integrating roles of citizen monitoring to help tidal network and other GIT monitoring needs 2) Are there citizen groups looking for assistance to reach certain tiers and what resources do they need, 3) what existing data collection protocols provide data supporting 4-D interpolator assessment of water quality estimation
- Suggested analyses: Assess new RFP and set expectations linked with CBP partnership identified gaps of spatial and temporal habitat assessment needs (Strategic Science and Research Framework) (and others?)
- Suggested Leads: Alliance for the Chesapeake, Citizen Science Awardee of the RFA, support from:
    - Data Integrity WG
    - SAV WG

Cross Goal Team Monitoring Opportunities

- Address monitoring needs of other CBP outcomes through current monitoring networks.
- Present Capacity: Non-tidal, Tidal, SAV, Benthic, Citizen Science Monitoring
- Present Funding: Present Funding for monitoring networks listed above
- Gaps/Needs:
    - Climate Resiliency: Use of Bay Water Temperature Tidal Trends for bay-wide water temperature indicator; Data on increased water temperatures and salinity to investigate impacts of climate change on freshwater SAV species
    - Sustainable Fisheries Example: Monitoring vertical water column habitat (DO volume and spatial extent for hypoxia)
    - Vital Habitat Example: Benthic data collection needed because modeling is currently 50% of watershed; Need SAV sentinel sites for long-term climate assessments
    - Other:
- Suggested analyses: 1) Identify beneficial use of existing monitoring data to support additional Goals in the Bay Agreement, 2) Identify beneficial use of new monitoring innovations within the scope of current monitoring networks to support additional Goals in the Bay Agreement 3) Track future monitoring needs through Strategic Science and Research Framework
- Suggested Leads:
    - STAR
    - STAC