Innovative Monitoring Approaches Workshop

Background and Need for Workshop

In April 2003, the U.S. Environmental Protection Agency (EPA) published the *Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll a for the Chesapeake Bay and Its Tidal Tributaries* which was the foundation document defining Chesapeake Bay water quality criteria and recommended implementation procedures for monitoring and assessment (U.S. EPA 2003a). In October 2003, EPA published the *Technical Support Document for Identification of Chesapeake Bay Designated Uses and Attainability* which defined the five tidal water designated uses to be protected through the published Bay water quality criteria (U.S. EPA 2003b):

- Migratory fish spawning and nursery habitat;
- Open-water fish and shellfish habitat;
- Deep-water seasonal fish and shellfish habitat;
- Deep-channel seasonal refuge habitat; and
- Shallow-water bay grass habitat.

A total of seven addendum documents have been published by EPA since April 2003. Four addenda were published documenting detailed refinements to the criteria attainment and assessment procedures (U.S. EPA 2004a, 2007a, 2008, 2010) previously published in the original April 2003 Chesapeake Bay water quality criteria document (U.S. EPA 2003a). One addendum published Chesapeake Bay numerical chlorophyll *a* criteria (U.S. EPA 2007b). Three addenda addressed detailed issues involving further delineation of tidal water designated uses (U.S. EPA 2004b, 2005, 2010) building from the original October 2003 tidal water designated uses document (U.S. EPA 2003b). Finally, one addendum documented the 92-segment management scheme (U.S. EPA 2008) after refinements were addressed to the Chesapeake Bay Program analytical segmentation schemes (U.S. EPA 2005) building from the original U.S. EPA 2004 document (U.S. EPA 2004b).

The detailed procedures for assessing attainment of the Chesapeake Bay water quality criteria continued to be advanced through the collective EPA, States and District of Columbia partnership efforts. These partners continue to develop and apply procedures that incorporate the most advanced state-of-the-science, magnitude, frequency, duration, space and time considerations with, as available, biologically-based reference conditions and cumulative frequency distributions. As a rule, the best test of any new method or procedure is putting it to application with partner involvement and stakeholder input. Through the work of its Criteria Assessment Protocols Workgroup (CAP WG), the Chesapeake Bay Program partnership has an established forum for resolving issues, factoring in new scientific findings, and ensuring implementation of consistent bay-wide criteria assessment procedure development and implementation. The CAP WG draws upon the talents and input from state, federal, river basin commission and academic partners as well as local government and municipal stakeholders.

The CAP WG operates within the Chesapeake Bay Program Partnership's Scientific Technical Assessment and Reporting Team's (STAR). A STAR effort is underway to improve the

Chesapeake Bay Program Partnerships Water Quality Monitoring network function and efficiency in water quality standards attainment. The STAR process called Building and Sustaining Integrated Networks (BASINs) is aimed at developing a vision document supporting maintenance of growth of Chesapeake Bay and basin monitoring networks. Chesapeake Bay Science and Technical Advisory Committee (STAC) input is needed in the BASIN process to focus on a tidal water quality assessment issue:

What are some of the best approaches for reducing the uncertainties of measuring water quality standards attainment for dissolved oxygen, water clarity and chlorophyll a *compared to the existing methodology?*

Scope of the Workshop

The BASIN report due out in February 2015 is going to have recommendation on the following:

- Applications of existing or new technology
- Monitoring network design (i.e., sampling locations, sample frequency, parameters)
- Options and opportunities to extend monitoring network funding support and improve temporal and spatial resolution in assessments:
    - Citizen Science/Nontraditional Partners
    - Collaborations with local and regional organizations
- Analytical advances.

The STAC Workshop on "Innovative Monitoring Approaches" will focus on the first two elements of the BASINs report to develop recommendations on 1) innovative applications of new or existing technology, 2) monitoring network design, while also considering the definition of 'attainment' and leveraging the existing and future networks through "hypothesis driven monitoring" design. There are existing reports and documents that address the other two report topics such as the recent STAR workshop report published on "Management Effects on Water Quality" (March 2014).

The STAC Innovative Monitoring Approaches Workshop will consider the following questions:

- How can more recent technologies (e.g. fixed continuous monitoring, AUV's, vertical water quality profilers) be better utilized to assess water quality standards attainment of the suite of Chesapeake Bay water quality criteria?

- Are there monitoring network designs that have, for example, fewer stations that could be sampled more frequently and linked with "intelligent interpolation" to improve water quality standards attainment assessments?

- What approaches could be used to foster greater monitoring efficiencies to improve the information acquired and improved certainty in estimates of attainment relative to the cost of the sampling effort?