Chesapeake Bay Program
SCIENTIFIC AND TECHNICAL ADVISORY COMMITTEE
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Hon. Terry McAuliffe, Chair
Chesapeake Bay Partnership Executive Council

Dear Governor McAuliffe and Distinguished Members of the Executive Council,

The Scientific and Technical Advisory Committee (STAC) welcomes the opportunity to provide you with scientific guidance in your efforts to restore and sustain the water quality and living resources of the Chesapeake Bay. We have 38 independent scientists from throughout the watershed with expertise in agriculture, economics, social science, watershed processes, nutrient dynamics, and terrestrial and aquatic ecosystems. Last year, the volunteer hours that STAC members contributed to support the partnership were valued at over $205,000. Those efforts including planning and contributing to independent peer reviews and scientific and technical workshops to support Chesapeake Bay Partnership activities. In 2015, two STAC Reviews and seven STAC Workshops were completed, with others currently underway.

We hope to build on the partnerships with legislators and other Bay partners that we have recently developed. Past Chair Kirk Havens worked effectively with the Virginia legislature and the Chesapeake Bay Commission to bring the science of microplastics into Virginia legislative process. Virginia's efforts and progress was undoubtedly an important factor in motivating passage of federal legislation to ban some microplastics from the waste stream. Further, on the advice of STAC, the Mid-Atlantic Regional Council on the Ocean (MARCO) developed an action plan to improve coordination and information sharing to better manage our regions' ocean ecosystems and living resources.

With this letter, we would like to highlight three major themes that deserve attention in the year ahead: 1) contaminants of emerging concern; 2) science needs for adaptive management; and 3) applying systems approaches to identify strategic actions. These themes are a subset of the full scope of STAC interests and efforts, as partially reflected by the attached list of recent and upcoming activities.

Theme 1. Contaminants of emerging concern: endocrine disrupters and microplastics

Intersex and other conditions in fish induced by endocrine disrupters have been called the 'canaries in the coal mine' by some. Many in our scientific community are concerned that effects on fish reproduction could be a warning sign of potentially significant future problems such as changes in fish abundance or health. To date, we have insufficient information to assess this threat, which the science suggests has multiple causes and may include pharmaceuticals and

other endocrine disrupting compounds (EDC) in waste streams and land runoff. We would like to see further investment in developing the science to understand sources of endocrine disrupters and their effects on the entire aquatic food web. The related issue of microplastics also needs further attention to identify opportunities for cost-effectively controlling sources that were not addressed by recent legislation.

Theme 2. Enabling adaptive management through continued investment in monitoring

The mid-point assessment is going to be the first opportunity to show some successes of management, such as increased submerged aquatic vegetation (SAV) in some regions, and respond to disappointments, such as localized increases in algae and rising hypoxia at some places and times of year. Telling the success stories, explaining degradation, cost-effectively targeting actions, and adapting management will not be possible if governments do not support necessary data collection and analyses. The Bay SAV survey is just one example where a valuable long-term data set could be discontinued due to a lack of future funding. Monitoring is costly, but the Bay is a highly variable system and long-term, spatially representative datasets are needed to detect responses and trends.

These 3. Applying systems thinking to promote innovation and cost effectiveness

Scientists are increasingly integrating models of social, economic and ecological systems in order to design cost-effective management strategies. As one example, modelers have shown that reducing nitrogen deposited from the air can be highly cost-effective and generate substantial co-benefits of human health improvements. That example illustrates how integrative models can reveal and select among innovative, alternative management approaches.

One advantage to such approaches is that human activities in the watershed can be better connected to ecological responses and effects on human well-being. For example, field measurements and modeling have suggested that some agricultural nutrient management practices are having the unintended consequence of increasing runoff of bioavailable soluble phosphorus. This soluble phosphorus, when it occurs in low salinity water, has the potential to increase algal blooms and decrease water clarity, despite reductions in nitrogen and particulate phosphorus.

Integrated models are also useful for evaluating environmental financing strategies. For example, water quality trading markets can reduce costs of achieving the TMDL, but legal, policy and social conditions must be established that enable market actors to fulfill their roles as innovators. A model that connects policies and market behavior can reveal whether proposed policies support markets or whether alternative approaches may be needed for reaching goals.

In summary, meaningful Bay restoration will be promoted by looking carefully at emerging concerns from contaminants and nutrient species that significantly impact biota and people. Monitoring and analysis will be critical to determining whether actions are effective and sufficient over the long term at offsetting effects of growth, land management changes, and

climate change. Finally, a systems approach can promote successful management by revealing co-benefits, unintended consequences and generally demonstrating how to establish the social, economic and ecosystem conditions that support specific strategies.

As always, STAC is available to bring together subject area experts to brief you and your staff on any of these or other Bay-related topics.

Sincerely yours,

Lisa Wainger
Chair, Chesapeake Bay Program's Scientific and Technical Advisory Committee

Summary of this year's STAC activities and anticipated next year efforts

Completed in FY16

Reviews (2)

- Technical Review of Microbeads/Microplastics in the Chesapeake Bay
- 2015 Chesapeake Bay Criteria Addendum

Workshops (7)

- Conowingo Reservoir and It's Infill Influence on Chesapeake Bay Water Quality
- Linking Wetland Workplan Goals to Enhance Capacity, Increase Implementation
- Accessing Uncertainty in the Chesapeake Bay Program Modeling System
- Cracking the WIP: Designing an Optimization Engine to Guide Efficient Bay Implementation
- The Development of Climate Projections for Use in Chesapeake Bay Program Assessments
- Integrating and Leveraging Monitoring Networks to Support the Assessment of Outcomes in the New Bay Agreement
- Comparison of Shallow Water Models for Use in Supporting Chesapeake Bay Management Decision-making

Ongoing and Future Activities

Reviews (8)

- Evaluating Boat Wake Wave Impacts on Shoreline Erosion and Potential Policy Solutions
- Proposed revised James River Chlorophyll *a* Water Quality Criteria
- Chesapeake Bay Scenario Builder/Nutrient Input Approach
- Phase 6 Chesapeake Bay Watershed Model
- Application of WRTDS to watershed Water Quality (WQ) trend analysis and explanations and General Additive Models (GAMs) to estuarine WQ trend analysis and explanations
- Chesapeake Bay Water Quality/Sediment Transport Model (WQSTM)
- Approach being taken to factor climate change considerations into the 2017 Chesapeake Bay TMDL Midpoint Assessment
- Phase 6 Land Use Forecasting Methodology

Workshops (5)

- An Analytical Framework for Aligning Chesapeake Bay Program Monitoring Efforts to Support Climate Change
- Chesapeake Bay Program Modeling Beyond 2018: A Proactive Visioning Workshop
- Legacy Sediment, Riparian Corridors, and Total Maximum Daily Loads
- Quantifying Ecosystem Services and Co-Benefits of Nutrient and Sediment Reducing Best Management Practices (BMPs)
- Understanding and Explaining 30+ Years of Water Clarity Trends in the Bay's Tidal Waters