



**Chesapeake Bay Program's (CBP)
Scientific and Technical Advisory Committee (STAC)
September 10-11, 2019 Quarterly Meeting Minutes
The DoubleTree Hotel Annapolis- Annapolis, MD**

Tuesday, September 10 Minutes

Attendance (W: Webinar):

Members: Brian Benham, JK Bohlke, Kathy Boomer, Charles Bott, Chris Brosch, Anthony Buda, Bill Dennison, Zach Easton, Alix Fink (W), Lara Fowler (W), Deidre Gibson, Kirk Havens, Carl Hershner, Tom Ihde, Thomas Johnson, Elliot Kellner, Chancee Lundy, Andy Miller, Mark Monaco, Leah Palm-Forster, Kenny Rose, Michael Runge, Larry Sanford, Leonard Shabman, Adel Shirmohammadi, Eric Smith, Jay Stauffer, Kurt Stephenson (W), Jeremy Testa, Tess Thompson, Lisa Wainger, Denice Wardrop, Gene Yagow, Weixing Zhu (W)

Guests: Scott Glaberman, Caitlyn Johnstone, Brooke Landry, Lewis Linker, Bob Murphy, Gary Shenk, Peter Tango

Administration: Bill Ball, Megan Cole, Melissa Fagan, Annabelle Harvey

Call to Order – *Brian Benham (VT)*

Brian Benham (VT) called the meeting to order at 9:30 am. Benham introduced new STAC Staff, Meg Cole (CRC), as well as 5 new at-large STAC members, Jay Stauffer (Penn State), Leah Palm-Forster (Univ. of Delaware), Leonard Shabman (Resources for the Future), Jeremy Testa (UMCES-CBL), and Deidre Gibson (Hampton University). Further, Benham announced Kathy Boomer (FFAR) as STAC Vice Chair.

Benham requested a motion to approve the June 2019 STAC Quarterly Meeting Minutes and the July 2019 Executive Board Meeting minutes; both were approved. Next, Annabelle Harvey (CRC) presented the following proposed 2020 quarterly meeting dates: March 10-11, June 9-10, September 15-16, and December 8-9. Members are to contact STAC Staff with any conflicts with the proposed dates and final dates will be announced in December.

Harvey updated membership on the December 2019 quarterly meeting date change to December 18-19 2019 based on STAC member feedback. The upcoming slate of FY2019 workshop dates were also introduced: BMP Targeting workshop on November 12-13 2019 in Fairfax Virginia, SAV Monitoring workshop first session on October 15-16 2019 at VIMS, Freshwater Mussels on March 5-6, 2020 at the Chesapeake Bay Foundation in Annapolis Maryland, and Soil Health workshop on January 23-24 2020 at WVU Erikson Alumni Center in West Virginia. Benham reviewed current STAC science synthesis projects for newer STAC members, elaborating on the difference in funding sources between synthesis efforts and traditional STAC workshops.

Lara Fowler (PSU) suggested STAC reach out to other partner watersheds dealing with similar issues as the Chesapeake Bay. Fowler is currently on sabbatical to work on Baltic restoration and requested a Denmark 2021 mailing list be sent to the group.

DECISION: Benham announced Kathy Boomer (FFAR) as STACE Vice Chair.

DECISION: Benham requested a motion to approve the July 2019 EB meeting minutes and the June 2019 Quarterly Meeting Minutes. Result: Motion carried.

Recap of STAC June Quarterly Meeting – Brian Benham (VT)

Benham recapped important takeaways from the June meeting. The bulk of the two-day meeting was devoted to the “Scientific Gap Analysis” (SGA). The SGA activity was discussed generally first as a group, and then in more detail within predetermined workgroups: watershed, living resources, and estuarine workgroups.

In preparation for the 2019 Executive Council meeting, The Chesapeake Bay Cabinet met on June 11 and Lisa Wainger (UMCES) attended as a representative of STAC. Wainger stated that Governor Hogan was open to feedback from CBP advisory groups and has previously strategized to remove barriers to implementation raised by other CBP advisory committees. STAC began to draft the Advisory Committee letter with comments on current science synthesis efforts, co-benefits and best management practices (BMPs), and the SGA activity moving forward.

Updates from the CBP Executive Council (EC) – Brian Benham (VT), Annabelle Harvey (CRC)

Benham and Harvey provided a recap of the annual EC meeting held on September 5th at the Oxon Hill Manor in Fort Washington, MD. Benham suggested that the private luncheon before the public CBP EC meeting may be a beneficial place for STAC to speak with representatives from the Local Government Advisory Committee (LGAC) and the Citizen’s Advisory Committee (CAC). By collaborating with the other two CBP committees, STAC may coordinate its message prior to the EC meeting for a better overall communication strategy. Miller added the Principal Staff Committee as another opportunity for cross-discussion between CBP committees.

STAC Scientific Gap Analysis (SGA): Workgroup Introduction

– Zach Easton (VT), Bill Dennison (UMCES), and Kenny Rose (UMCES)

Before the workgroup introductions, Benham reported-out on a discussion the SGA Steering Committee (SC), Chesapeake Bay Program Director Dana Aunkst (EPA), Kurt Stephenson (VT) and Gary Shenk (CBP) had about messaging and tone in respect to the effort’s title. It has been decided that to communicate the purpose of the project effectively, the official title will be changed to highlight confidence over uncertainty. Though the official project title will change, the project goal of assessing system response to management actions continues to be the same.

Zach Easton (VT) introduced initial efforts of the watershed group by reporting on comments received from about half of the group’s participants. Group feedback suggested a need for increased guidance on the practicality of Total Maximum Daily Load (TMDL) targets as a means for assessing management and restoration efforts. Comments indicated additional factors such as volume and temperature of freshwater discharge may be meaningful to water quality efforts, as supported by a recent study showing little change in Bay nonpoint source (NPS) loads over the time period of 1992-2012 despite BMP targeting. Possible causes for this could be legacy nutrients, nutrient mass balances issues, atmospheric deposition, BMP effectiveness, etc. Stephenson added there may be an unaccounted lag-time between when BMPs are installed and when their effectiveness is fully realized. Additionally, Easton commented climate change and evapotranspiration (ET) incur further uncertainty, as do socioeconomic and behavioral issues. Moving forward with the SGA effort, STAC members suggested

referring to former STAC reports and workshops for a plan on assessing strategies for achieving the bay TMDL.

Bill Dennison (UMCES) presented for the estuarine workgroup. To frame the group's inquiry moving forward, four outstanding questions were gathered from previous STAC reports to assess Chesapeake Bay ecological responses: 1) What are the tipping points and thresholds describing different system responses? 2) What are the ramifications of climate change for Chesapeake Bay responses? 3) Can we integrate modeling programs to better understand system responses? 4) Why is water clarity changing in the Chesapeake Bay? Dennison suggested STAC synthesize what is known about the effect tipping points have on degradation and restoration pathways so that the SGA may highlight existing gaps and outstanding questions to better scientific understanding. Degradation and restoration trajectories are based mostly on the ability of light and oxygen to reach the benthos layer, evidenced in current submerged aquatic vegetation (SAV) recovery efforts in the bay. As the Chesapeake Bay is shallow with gentle hydrography, it is important to note small changes in light and oxygen penetration may have larger ramifications on water quality and its greater food web through tipping points and feedbacks.

Lastly, Kenny Rose (UMCES) reported out for the living resources workgroup. From a living resources perspective, Rose stated this effort should not be labeled as an assessment. Instead, focusing on dominating factors (inside and outside of the bay) on the life cycles of living resources is important; for example, food web dynamics. Rose underscored the need of setting up realistic expectation for the audience and emphasized living resources responses are on longer and larger time scales than water quality studies. STAC members suggested relating the SGA effort back to CBP "designated uses" as a bridge to incorporate living resources using similar CBP language. Mark Monaco (NOAA) and Stephenson agreed that by citing CBP activities throughout the report, habitat will interconnect with the overall SGA effort. In reference to best practices, Larry Sanford (UMCES) commented on the difficulty in addressing living resources by water quality standards (WQS) due to their mobility. Rose agreed that many species are unaccounted for in the bay TMDL, such as zooplankton. Responding to the lack of benthic species inclusion in the bay TMDL, Jeremy Testa (UMCES) proposed a habitat suitability framework as means of incorporating living resources in the SGA activity and Monaco further proposed a fish habitat assessment including macroinvertebrates. Sanford advised linking STAC with relevant workgroups and decision-makers in the CBP for feedback on the current SGA outline.

DECISION: SGA Steering Committee will reevaluate the title of this effort and will propose a new title.

Microplastics Workshop Report-Out—Bob Murphy (*Tetra Tech*)

Bob Murphy (Tetra Tech), a member of the SC for the April 2019 STAC workshop entitled "Microplastics in the Chesapeake Bay and its Watershed", updated STAC on workshop outcomes and recommendations. Though microplastics are widespread, they are an unquantified threat to the bay. Research shows there is a need to standardize microplastics terminology in conjunction with an organized effort to monitor and manage microplastics and nano-plastics in the bay. Murphy presented the most urgent need is to identify assessment endpoints representing areas of environmental and health concerns as well as the severity of these risks.

Key recommendations from this workshop included for the CBP to create a cross-GIT Plastic Pollution Actions Team to address microplastics and nano-plastics, the Scientific, Technical Assessment and Reporting Team (STAR) should incorporate development of an Environmental Risk Assessment of microplastics into the CBP strategic science and research framework, the CBP should develop a source

reduction strategy. Murphy will present the findings and recommendations to the Management Board in October. A full list of recommendations can be found in the workshop report [here](#).

Triblets Workshop Report-Out—Kathy Boomer (FFAR)

Kathy Boomer (FFAR) shared outcomes and recommendations from the May 2018 STAC workshop titled “Revisiting Coastal Land-Water Interactions: The Triblet Connection.” The working definition of a “triblet” is a waterway and its adjacent floodplain corridor that flows through the Terrestrial-Estuarine Transition Zone (or T-zone) and connects uplands to coastal waters. Triblets provide critical habitat for species of concern and also represent areas where human activities concentrate. In addition, triblets function as biogeochemical reactors that regulate watershed and estuarine interactions. These waterways also are highly sensitive to human activities including non-point source pollution, shoreline management, bridges and navigation channels, and sediment agitation. Despite the relevance of triblets to stakeholder interests, their sensitivity to human activities, and the powerful framework that triblet distributions can provide to advance our understanding of land-water interactions, these landscape units remain largely understudied. Workshop participants agreed that the CBP should recognize triblet catchments as important focus areas for advanced watershed and coastal management.

STAC Scientific Gap Analysis (SGA): Themes from other restoration efforts

Kenny Rose (UMCES) presented “Assessing ecosystem restoration effects on fish and shellfish: necessary, messy, doable”. Emergent patterns in restoration actions are the tightening of resources and tradeoffs, coevolution (hypoxia, warming, acidification, coastal development, agriculture, and habitat), increasing knowledge of savvy stakeholders, crucial role of coupled models, and increasing demands for linkage to living resources. Technical issues pertaining to bay research are the following: excessive modeling selection, loss of information in coupled models, validation, uncertainty, multiple and ensemble modeling confusion, undefined domain of application, delay in difficult decisions, and consequences from coupled human-natural systems. Non-technical issues affecting bay restoration are multiple – the role of stakeholders, finding a unified voice, communication of models, uncertainty, and risk, and establishing definitions for familiar terms such as fish, fisheries, habitat, resilience, etc. Though the bay has specific and complex challenges to management and restoration, going forward, Rose advises the work is necessary, messy, but doable. The questions are known, extensive data and process-level knowledge is available, and large-scale models are currently available.

Don Boesch (UMCES) presented “Barriers and bridges in abating coastal eutrophication” on lessons learned from global eutrophication abatement campaigns. The successes and failures of comparable programs can provide important takeaways for the Chesapeake Bay Agreement Nutrient Source Reduction Goals – specifically 2025 TMDL targets. For example, Boesch stressed the need to look at indicators of change, load reductions, and temperature increases in restoration goals. Preparing client response research is also beneficial.

Panel Discussion: Themes from other restoration efforts—Zach Easton (VT), Jeremy Testa (UMCES-CBL), Lisa Wainger (UMCES-CBL)

The purpose of this panel discussion is to consider cross-commonality in outside watershed restoration efforts and share that cumulative knowledge with STAC members to inform recommendations to the CBP.

Testa began the panel by questioning whether restoration goals will be met when bay WQS are achieved. Similar to the Baltic Sea, the Chesapeake Bay is a multi-metric indicator with multiple factors impacting management goals. Referring to the Tampa Bay, Testa cited research indicating when

wastewater loads are decreased, SAV increase, but when nutrients decrease overall, eel grass beds specifically, did not reemerge. Testa queried this may be due to nutrient-rich sediment and the “legacy and lag” phenomenon. There is not much evidence supporting that nonpoint (NP) BMPs increase WQ overall and climate change will be a further barrier to success in getting nutrient point-source reductions.

Easton spoke to three outside restoration efforts. First, Easton discussed a project he participated in which collected global data from 13 watersheds to assess the effect of timing, location, and suite of agricultural BMPs on watershed WQ. Additionally, social and economic factors that either facilitated or impeded the implementation of BMPs at the watershed were studied. BMP programs which focused not only on nutrient, sediment, but also hydrologic flow paths, were found to be the most successful. Water quality improved when “hotspots” of nutrient and sediment mobilization with areas of the landscape of increased hydrologic production. Particularly effective programs were those that were able to define surface water flowpaths and then implemented BMPs that addressed the hydrologic production or disassociated the hydrologic production from the nutrient-source area (e.g. ditching, land-surface shaping, etc.). The second project referenced was an aggressive no-till program to combat particulate phosphorus in the Lake Erie basin. Though the implemented BMP was effective in reducing particulate phosphorus, dissolved phosphorus is now being translocated from the surface to the tidal drainage in the system and subsequent surface water bodies. Lastly, Easton cited a National Academy study assessing NYC’s aggressive watershed agriculture intervention program for soil phosphorus. Overall New York’s nutrient mass balance is unchanged, but the state has been successful in a ~20% drawdown in phosphorus from redistributing manure from high-test soil phosphorus areas and to low-test soil phosphorus areas.

On the subject of social science, Wainger spoke to the economic incentives that may be leveraged to address the NPS problem in the bay region. Three approaches for behavior change discussed were legal/regulatory-driven, economic/market-driven, and social/peer-driven approaches. In stormwater management, fees are intended to induce private behavior by incentivizing the individual to private action. Qualifying stormwater practices may be bioretention areas, rain barrels, permeable pavements, rain gardens, etc. Research has been found that such fees are not steep enough to incentivize single-family households to implement stormwater BMPs but are high enough to motivate big runoff producers and those with altruistic environmental agendas. In Prince George county, Maryland, large companies are participating in performance incentives for cost-benefit purposes, though smaller projects are routinely out-bid as the supply-chain is at capacity and implementation fees are costly.

In respect agriculture, Wainger spoke on cognitive factors (knowledge, perceived risk, heuristics/biases, financial objectives), dispositional factors (personality, values, risk tolerance), and social factors (peer group values, social norms, engagement strategies), relevant in farmer BMP implementation. Using Maryland’s cover crop cost share program as an example, Wainger stated that the most successful programs are those which do not take lands out of production as conservation tillage is now practiced on 70% of soybeans and 65% of corn. Nationally, cover crops are only on 5% of acres, yet Pennsylvania has 13% and Maryland has 43% of acres on cover crops (Claassen et al. 2018); Chesapeake Bay region program success may be due to individual farmer environmentalism and increased farmer compensation at the state level. Additionally, payment programs which support the adoption of soil health practices are helpful. Farmers often do not perceive benefits as exceeding the costs, and soil health benefits accrue slowly while initial costs are substantial.

In conclusion, programs with centrally administered fee-based programs have been successful in getting stormwater and agricultural best practices implementation. There is a high potential to increase gains from existing programs, but administrators “have to want to change” and although behavioral nudges show promise for increasing cost-effectiveness of existing programs, gains are modest. Wainger states a more coherent approach to NPS programs, with more emphasis on fewer larger practices.

Acknowledge STAC Members Rotating Off—*Brian Benham (VT)*

Benham acknowledged STAC members rotating off including Charles Bott (HRSD), Carl Hershner (VIMS), Lisa Wainger (UMCES-CBL), and Gene Yagow (VT). Benham and STAC thank the former STAC members for their contributions to the greater CBP.

Wednesday, September 11 Minutes

Attendance (W: Webinar):

Members: Brian Benham, Lee Blaney, JK Bohlke (W), Kathy Boomer, Charles Bott, Chris Brosch, Anthony Buda, Amy Collick, Bill Dennison, Zach Easton, Alix Fink (W), Lara Fowler (W), Deidre Gibson, Kirk Havens, Carl Hershner, Thomas Johnson, Elliot Kellner, Chancee Lundy, Andy Miller, Mark Monaco, Leah Palm-Forster, Kenny Rose, Michael Runge, Larry Sanford, Leonard Shabman, Eric Smith, Jay Stauffer, Kurt Stephenson (W), Jeremy Testa, Tess Thompson, Lisa Wainger, Denice Wardrop, Gene Yagow, Weixing Zhu (W)

Guests: Caitlyn Johnstone, Scott Phillips, Lewis Linker, Kristin Saunders, Gary Shenk, Peter Tango, Emily Trentacoste

Administration: Bill Ball, Annabelle Harvey, Meg Cole

Science Needs of the Chesapeake Bay Program (CBP)—*Emily Trentacoste (EPA), Scott Phillips (USGS)*

Emily Trentacoste (EPA) updated STAC on the Science Needs of the Chesapeake Bay Program (CBP) by reviewing the program’s newly incorporated Strategies Science & Research Framework (SSRF) within the larger Strategy Review System (SRS). The SSRF process identifies and prioritizes ongoing cohort science needs resulting from knowledge gaps within individual Goal Implementation Teams (GITs), 2017/2018 SRS-identified needs, and STAC workshop recommendations. These needs are shared with STAC for input to facilitate ongoing resource assessment as STAC can use this science needs list to inform research priorities and workshop topics. Trentacoste reported-out the targeted science needs of the Watersheds cohort (Brook Trout, Fish passage, protected Lands, Fish Habitat, Healthy Watersheds, and Stream Health) to STAC, as the Healthy Watershed cohort most recently presented to the MB in August 2019. Bill Ball (CRC) suggested a mechanism be developed in which STAC could discuss long-term strategic needs, while effectively communicating those needs to those who are well-positioned to meet those resource needs.

Several STAC members with applicable expertise showed interest in the discussed Brook Trout science needs. Regarding eDNA method development, Stauffer raised the additional factor of speciation and referred to research being conducted in Pennsylvania around Brook Trout populations. After some discussion among STAC members on local Brook Trout research, Scott Phillips (USGS) stated STAC members bring insight from their research on GIT and workshop needs to the CBP, adding that a past STAC report on the pilot fish habitat assessment, may be of value to the Brook Trout cohort. With clear

overlaps in program knowledge gaps and STAC expertise, Ball suggested a mode of facilitating conversation between the cohorts and STAC members, noting the need for a clearer communication strategy and funding support. In response, Trentacoste stated that she, along with Phillips and Kristin Saunders (UMCES), will monitor future engagement between parties.

Similarly, STAC expertise mirrored some of the presented Fish Habitat cohort science needs. Monaco referenced the STAC fish habitat assessment report, commenting that an update on this effort and resulting comments would be beneficial to STAC as a whole, and the SRS/SSRF process. Further areas for collaboration noted were on phytoplankton and zooplankton monitoring, current STAC research efforts on shallow water monitoring, finer scale model performance and guidance, and modeling fish habitat effectively to assess habitat change. The Healthy Watersheds cohort targeted areas for further research which were of relevance to prior STAC activities such as monitoring conditions using models based on large-scale needs. Regarding Healthy Watersheds vulnerability assessments, Fowler commented on the proposed need for more information on current and future stressors beyond water quality such as co-benefits.

Phillips presented further details on the Stream Health Workgroup science needs under five proposed metrics (hydrology, hydraulic, geomorphology, physiochemical, and biology) for stream improvement. Defined needs are the following: improved tracking of stream health, stressors affecting stream health, and restoration activities and functional lift. With many unmonitored streams in the Chesapeake Bay region, the Healthy Watershed Workgroup is seeking advice from STAC on integrating the defined metrics so that efforts across the watershed are aligned via statistical extrapolation. STAC members suggested the Stream Health Workgroup bring Matt Baker (UMBC), a watershed researcher focusing on mapping small stream geomorphology, into the effort to provide expertise on methods for finding causal relationships.

STAC members spoke to the importance of connecting STAC with the GITs for the purpose of meeting their goals within the given time constraint. Benham suggested a cross-over webinar “or two” at STAC meetings for the purpose of informing membership on GIT discussions and bridging the information gap more effectively. Miller agreed, but further recommended STAC members first be connected to the correct GIT webinar or information based on their specialization, and follow-up with the connected groups with additional information. Culling pertinent outside researchers into identified GIT science needs was echoed by both Kirk Havens (VIMS) and Jason Hubbard (WVU). Hubbard suggested collecting information on outside colleagues using an online form such as Survey Monkey.

<p>ACTION: STAC Staff will work with STAR to connect STAC members to workgroups in the SRS process to provide input on cohort science needs.</p>

STAC Scientific Gap Analysis (SGA): Workgroup meetings

The three SGA groups met individually to assess system response and discuss section formatting. First, the watershed group identified issues with system assessment, and on a low-high scale, the group evaluated level of impact, understanding, control, and ease of implementation, for each issue. Afterwards, the group evaluated whether the right targets had been identified, the effectiveness of NPS management efforts, climate change impacts, and behavioral response to existing policies.

The estuarine group focused on gaps in assessment. Identified estuarine science gaps were the following: tipping points, ramifications of climate change in bay responses, monitoring program

integration, changing water clarity, and the importance of land/sea interface on estuarine response. The group defined water clarity, dissolved oxygen, inadequate monitoring and modeling, living resources, and watershed loading as possible tipping points. Land/sea interface research gaps were habitats, influence on the bay/human activities, groundwater inputs (septic, stormwater, wetlands), shoreline erosion, saltwater intrusion, and increased flooding. Further, unintended consequences of climate change for estuarine system response are sea level rise, freshwater inputs, temperature, carbon dioxide in the atmosphere, uncertainty and risk management, modeling, and monitoring. Lastly, estuarine monitoring requiring reevaluation are dissolved oxygen profilers, oyster reefs/wetlands, and phytoplankton and zooplankton.

The last group, living resources, reviewed the CBP Goals and Outcomes to provide a list of all living resource mentions with numerical targets. These aggregate measures will then be reviewed based on their economic and commercial value, public opinion, and likelihood of system response. Moreover, a table of the following criteria is being drafted, with structural redundancy, functional redundancy, and ways to evaluate these measures. An outline connectivity of analysis, map of TMDL attainment areas, and fish habitat assessment meta data will also be drafted.

At the December quarterly meeting, the watershed workgroup will provide an in-depth look at their findings and process forward for the SGA effort. The SGA Steering Committee will meet prior to the meeting to refine the language in the Introduction/Background Document and the effort's title.

Wrap Up

STAC thanks Brian Benham for leading STAC as Chair for the past two years. Benham welcomed Andrew Miller at the next STAC Chair. The next quarterly meeting will be December 18-19, at the Chesapeake Bay Environmental Center.