Chesapeake Bay Program's (CBP)
Scientific and Technical Advisory Committee (STAC)
Quarterly Meeting – December 6-7, 2022
Virtual
Meeting Webpage

Tuesday, December 6th

Attendance:

Andy Miller (UMBC), Bill Dennison (UMCES)**,** Celso Ferreira (FFAR), Chris Brosch (DDA), Dave Martin (Nature Conservancy), Deidre Gibson (Hampton), Denice Wardrop (CRC), Ellen Gilinsky (Gilinsky LLC.), Ellen Kohl (St. Mary's College of Maryland), Efeturi Oghenekaro (DOEE), Eric Smith (VT), Erin Letavic (Herbert, Rowland & Grubic, Inc.), Greg Noe (USGS), Jason Hubbart (VT), Jeni Keisman (USGS), Jeremy Testa (UMCES), Kenny Rose (UMCES), Kirk Havens (VIMS), Kathy Boomer (FFAR), Lara Fowler (PSU), Larry Sanford (UMCES **),** Leah Palm-Forster (U Del), Leon Tillman (USDA-NRCS), Leonard Shabman (Resources for the Future), Mark Monaco (NOAA), Mike Runge (USGS), Scott Knoche (Morgan State), Shirley Clark (PSU), Tess Thompson (VT**),** Tony Buda (USDA), Weixing Zhu (Binghamton).

Guests: Adrienne Kotula (CBC – W), Alex Gunnerson (CRC), Amy Goldfischer (CRC – W), Amy Handen (EPA – W), Amy Jacobs (TNC), Bo Williams (EPA – W), Breck Sullivan (USGS), Brian Benham (VT – W) Chris Guy (USFWS), Clinton Gill (DDA – W), Gary Shenk (USGS – W), Greg Barranco (EPA – W) Jennifer Starr (Alliance – W), Jeremy Hanson (CRC), John Clune (USGS – W), Joseph Prenger (USDA – W) Joseph Prenger (USDA – W), Judy Denver (USGS), Julie Reichert-Nguyen (NOAA – W), Karl Blankenship (Bay Journal – W), Katlyn Fuentes (CRC – W), Ken Staver (UMD – W), Kristina Saunders (UMCES – W) Kurt Stephenson (VT – W), Lew Linker (EPA – W), Marjorie Zeff (AECOM –W), Ola-Imani Davis (Alliance – W), Olivia Devereux (Devereux Consulting– W), Pam Mason (VIMS), Patrick Thompson (EnergyWorks – W), Rachel Felver (Alliance – W) Shannon Sprague (NOAA), Todd Lutte (US EPA), Tom Ihde (Morgan State – W), Kandis Boyd (EPA).

Administration: Denice Wardrop (CRC), Meg Cole (CRC), Melissa Fagan (CRC)

Call to Order, Introduction and Updates on STAC Activities — *Kathy Boomer (STAC Chair – FFAR)*
Kathy Boomer (FFAR) called the meeting to order at 9:30 am. At the start of the Quarterly, Boomer outlined STAC business responsibilities and targeted outcomes for the two days, including a vote on both a FY21 STAC-funded workshop report and the FY23 STAC workshop request for proposal (RFP). Day 2 was reserved for the meeting theme: environmental flows. The purpose of the themed discussion was to identify alternative strategies to facilitate a CBP-wide understanding of the environmental flows concept and its relevance to stream, river, and estuary management. STAC Business was considered at the end of the second day.

Boomer reviewed items from the STAC September quarterly meeting for members and guests. In September, STAC approved the 2022 Scientific and Technical Advisory Committee Report to the Executive Council (EC), which had been drafted by the STAC Executive Board (EB) prior to the quarterly. Lara Fowler (PSU) suggested STAC members read the Local Governmental Advisory Committee (LGAC) and Citizens Advisory Committee (CAC) letters – especially LGAC's report as it speaks to the need for local capacity in addressing concerns across the Bay including systemic issues like flooding and resulting water quality concerns. Materials from the October 2022 EC meeting are available on the CBP website, including mentioned committee reports. Boomer also detailed the STAC endorsement and recommendations for the Wetlands Action Plan resulting from the last quarterly. Recommendations comprised of the following: develop a multi-objective, river systems framework to prioritize restoration

initiatives and evaluate progress towards the CBP goals; recognize wetland conservation as a critical strategy to achieving wetland targets and related outcomes; allocate resources to align federal programs and technical service capabilities across the CBP partnership; and promote technical workforce development. STAC leadership will attend the December 8th Management Board (MB) meeting to share the above conclusions from the STAC September quarterly. At this point, Ellen Gilinsky (Gilinsky LLC.) advised the recommendation "simplify permitting processes" be altered to mention restoration projects. An implication from the STAC report, Comprehensive Evaluation of System Response (CESR) is the need to focus on the shallows within the Bay, which ties in the Wetlands Action plan, Denice Wardrop (CRC) stated.

CAST-21 Update and Discussion — *Gary Shenk (USGS)*
Gary Shenk (USGS) provided a presentation on an ongoing discussion at the Chesapeake Bay Program with the involvement of STAC regarding the release of Chesapeake Assessment Scenario Tool (CAST-21). Shenk began with a historical perspective on the model including two errors found in 2019 and 2021. Executive Board provided a statement advocating for the correction of this data at the August 2022 Principals Staff Meeting (PSC) as required to "support the transparency of the best available science." The PSC agreed and decided that over the next year, the partnership will determine how the unaccounted additional loads will be addressed post-2023 and on what timeframe. Maryland has put forth a proposal to create interim 2025 planning targets by adding the difference betwen the Watershed Implementation Plan (WIP) on the current version of CAST and CAST-2017, interim planning targets would change when CAST version change.

Boomer wondered how best STAC may contribute to the discussion in helping craft QA procedures, Shenk agreed to meet with anyone interested those conversations to connect with him offline. Chris Brosch (DDE) noticed the anticipated increases in load have occurred since calibration and asked if the increases were validated with more than recent monitoring data. This is difficult to discern as there is high uncertainty across all model versions, though Shenk stated the Program is currently developing an indicator that combines modeling, monitoring, and indicators for each station. Andy Miller (UMBC) asked in anticipation of CESR, how recommendations for beyond 2025 may be incorporated into the management process. A revision of planning targets will occur in 2023 with the new Phase 7 models, which will be heavily informed by CESR and incorporate the additional loads and changes in loads – Shenk.

Report from the Plastics Pollution Action Team — *Kelly Somers, PPAT Vice Chair (EPA)*
The Plastic Pollution Action Team (PPAT) began in 2019 as a recommendation from a STAC workshop on the current state and science around microplastics. The workshop was formulated around conducting an ecological risk assessment (ERA) as it helped focus on linkages and effects. Main findings included establishing an action team (later the PPAT), develop ERAS on multiple living resource endpoints, review and develop a terminology and size classification document for broad application throughout the watershed, a source reduction strategy, and finally, collaborate on a monitoring network. The PPAT is comprised of various stakeholders from Federal, State, Local, NGO, and Academia and is responsible for guiding deliverables in this project and providing expertise. The team seeks to reduce the presence and impacts of plastic pollution on the bay by overseeing research that will help determine the effects that specifically microplastics have on the ecosystems of the Chesapeake Bay.

Through this oversight, the PPAT develops and updates strategies that identify and prioritize gaps in understanding and highlight future research questions that need to be answered. The first task of the project was to develop a uniform size classification document, the second was to develop a preliminary conceptual risk assessment for the Potomac River, and lastly, a science strategy to address future microplastics efforts. In 2022, the EPA contracted again with TetraTech on technical oversight for the

PPAT to update the ERA focused on specific taxa. Significant data gaps exist in understanding trophic transfer of microplastics although recent research has demonstrated Mysid shrimp as a strong source of microplastics and associated contaminants to fish. Recommended next steps that came from the 2022 ERA update were the following: assess the loadings of microplastics within the prey community; measure uptake of microplastics in these taxa; conduct behavioral studies of prey taxa after microplastics consumption and assess trophic transfer to YOY striped bass.

The team is in the final process of awarding for upcoming 2023 contracts though Somers highlighted confirmed projects as of December 2022:

- Microplastic source tracking pilot in the Chesapeake Bay. Pilot is a partnership between EPA's Office of Research and Development and EPA's Water division through a regional applied research grant. The project proposes to collect plastic samples at several conveyance types, including agriculture, wastewater, stormwater, urban, suburban, and wetlands along a gradient from the tidal headwaters towards the confluence at baseflow and stormflow.
- Develop a monitoring and analytical reference guide and monitoring framework for plastic pollution in the Chesapeake Bay. The monitoring program will establish baselines to inform environmental concentrations, monitor trends, and potential hotspots and inform and decision makers and researchers on BMPs to prevent and reduce plastic pollution.
- Assessing Microplastics in Various Trophic Level Fish in the tidal Potomac and Anacostia Rivers. Research funded by EPA through DOE's Chesapeake Bay Implementation Grant. The study found microplastic fragments were found in all trophic levels with more and a higher frequency of occurrence at higher trophic positions.

The discussion period was started by Boomer, who inquired on where Somers envisions the work moving forward, Somers stated they hope to work on source reduction strategies as the next logical step after the modeling framework. Outstanding research that still needs to be explored is the risk plastics may have on living resources. Eric Smith (VT) stated that there are many studies on plastics, but a data management system used to combine all this data would be helpful – Mark Monaco (NOAA) shared a link to an ongoing NOAA tracking study that provides grants for microplastics: NOAA Marine Debris Program. Referencing a recent policy report from the Basic Bay Commission on extended producer responsibility for plastics packaging, Whitney Pipkin (Bay Journal) asked if the PPAT effort was related or overlapped; although Somers was not aware of the publication, she stated that the PPAT is intentionally looking into source reduction as it develops the strategy. Gilinsky applauded the PPAT's effort and thought it could serve as a model for other watersheds. She underscored the importance of sampling and monitoring over simply building theoretical models. In the chat, John Reeves (Rockingham County citizen) wondered how Potomac and Shenandoah River Friends might work and gain info for microplastics research and Somers replied that the Interstate Commission on the Potomac River Basin (ICPRB) is already on the PPAT but there is not currently any representation on the team from groups in the Shenandoah.

Briefing on the FY22 STAC Workshop and Resulting Report, "*Rising Watershed and Bay Water Temperatures: Ecological Implications and Management Responses"*

– Rich Batiuk (CoastWise Partners)

Rick Batiuk (CoastWise Partners) presented on behalf of the FY22 STAC workshop entitled, "Rising Watershed and Bay Water Temperatures: Ecological Implications and Management Responses". The workshop webpage with additional materials such as presentations from the event is available here. This STAC activity sought to secure policy level commitments by the Chesapeake Bay Program to address and work to adapt to rising water temperatures in the Bay and watershed, across the full array of shared decision-making by the Partnership. Unique to other STAC workshops, this effort had a steering committee, a larger project team, and a series of synthesis drafting teams. In total, about 70 people

helped plan this workshop. The activity addressed the workshop outcomes in three sequential phases including a synthesis of the available science and data through 10 papers. A year of research and writing was completed in advance of the workshop, which was virtual, and split across two days. Both one-day workshops were structured with parallel sessions focused on the watershed and the tidal waters.

During the 2-year process over which this effort was conducted, clear evidence showed that water temperatures are rising. Drivers for tidal temperature increase is mostly air temperature, but to a lesser degree, ocean temperatures. Influences on non-tidal water temperature are more complex, but air temperature is an obvious driver in addition to groundwater, land use changes, and river flow. Recommendations for the watershed were focused on mitigation and using the practices and conservation to lower water temperatures, while on both the tidal and watershed side, adaptation and minimizing of impacts and adjusting is needed. A recognition that some projected changes cannot be reversed, particularly in the tidal water resources (grasses, oysters, crabs, etc.), impacts our ability to make substantial mitigative shifts.

Coldwater recommendations focused on increasing resiliency, mapping coldwater fisheries, and promoting good agricultural stewardship practices. The report recommended minimizing the extent to which water quality BMPs are further heating waterways and strategically use cooling BMPs to counteract warming effects of climate change and landuse where possible. For state temperature Water Quality Standards (WQS), the group recommended state and EPA review and modernize those elements. For each management recommendation, the report provided a series of science needs, research, and monitoring recommendations; to improve the understanding of rising temperatures on aquatic systems, it is suggested to increase monitoring of water temperature in smaller streams and expand the use of CAST and the Chesapeake Healthy Watershed Assessment.

For tidal fisheries and submerged aquatic vegetation (SAV), there were both positive and negative, direct and indirect effects. Positive effects such as increased growth rates and earlier maturation for forage species, longer spawning season and more algae/food for oysters, are outweighed by the negative impacts already seen in the Bay like shifts in ranges, habitat, and the connection between food and species life stages. Tidal recommendations includes an emphasis on continuing the look at Fisheries management from an ecosystem based perspective and temperature increases should be considered from a habitat perspective. There is also a need for communications and to discuss this story from a water temperature perspective. Further, temperature should be built into population models for not only direct impacts, but changes to behavior, distribution, food sources, and available habitat. Nearshore habitats require an ecological and climate resiliency perspective, not only an area that protects the shoreline and reduces nutrients.

As of December 2022, the workshop report was still under review. The steering committee encountered challenges with recognizing USGS and EPA research colleagues as contributing authors of the workshop report given it contains management recommendations. Several synthesis papers were still undergoing USGS reviews and further edits needed to be made, and finally, an 8-page summary paper to communicate workshop findings and recommendations to a broader audience was being drafted by UMCES colleagues. Batiuk ended his presentation with an ask for STAC to challenge the Management Committee to integrate the workshop management recommendations into plans for implementation for the *Chesapeake Executive Council's Directive No. 20-1 Collective Action for Climate Change*.

After Boomer opened the session for Q&A, Wardrop reflected that in the CESR document, there are trade-offs between water quality and temperature and asked Batiuk how that will be presented or talked about. Batiuk said that will be in the next set of conversations. Wardrop suggested the steering committee present their findings to the Chesapeake Bay Commission. Kirk Havens (VIMS) questioned

whether existing sampling methodologies are valid as they face rising temperatures – for example, the Blue Crab Winter Dredge Survey has historically been used to set harvest limits on blue crabs under the assumption that crabs are buried and nonmobile during the wintertime but as Bay temperatures rise, crabs are becoming more mobile during the winter. This was shown in the multiyear derelict crab pot removal program that documented blue crab bycatch in removed pots throughout the winter. It is a valid issue though not highlighted in the report as it could have been, though findings were supportive of independent fisheries monitoring due to change in seasonality and spawning time. In the chat, Breck Sullivan (USGS) mentioned a few mentioned science needs are currently being structured to be put in the CBP Science Needs Database for associated outcomes. Science Needs/Recommendations coming out of STAC Workshop reports is a great way to involve the input of STAC into the CBP science needs.

DECISION: STAC approved the report from the FY22 STAC workshop entitled, "Rising Watershed and Bay Water Temperatures: Ecological Implications and Management Responses" to be published.

Report out on the Local Government Forum: Integrating Resilience into Local Planning
— Jennifer Starr, LGAC Coordinator (Alliance)

Each year, the Local Government Advisory Committee (LGAC) host a one-day, problem-solving event with funding by the EPA through a NFWF grant. The forum is on a challenge LGAC members have identified that is impacting their communities and requires recommendations to further watershed protection and restoration. Forums are facilitated with LGAC, jurisdictions, local governments, and subject matter experts. The planning team develops a problem statement and drafts a one- to 2-page background document covering the issue and with identified obstacles, barriers, assumptions, and example case studies. A draft report is prepared and reviewed for approval, and then a final report is published. Past LGAC Local Government Forums covered the following: 2021 - Developing Collaborative Watershed Partnerships; 2020 - Building Local Community Resilience Against Climate-Related Flooding, 2019 - Stormwater & Green Infrastructure Workforce Development; and 2018 - Filling Gaps to Advance WIP Implementation. Report from past years can be found on the LGAC Bay Program webpage.

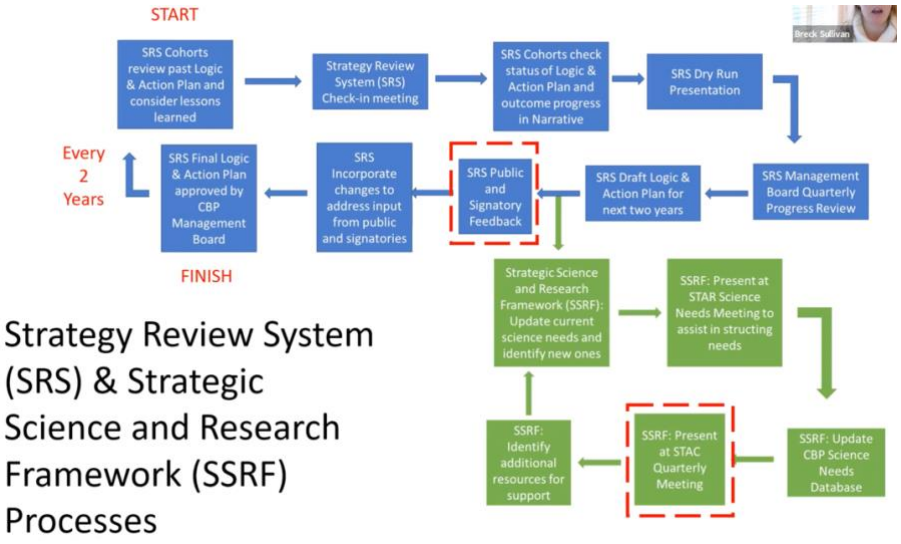
The 2022 Local Government Forum focused on integrating resilience into local planning and recognized there are persistent barriers to achieve this success, including staff capacity limitations, lack of funding clarity, and unclear paths to resilience plan implementation. The innovative case studies featured were the Coastal Resiliency Program in Hampton Roads, Va., the Climate Action Plan in Cumberland County, PA., and the Disaster Preparedness and Planning Project (DP3) in Baltimore City, MD. Five recommendations were found to be most significant:

- Communication and Outreach: Develop clear, localized language to provide local governments with public education and outreach resources to build support and buy-in for resilience efforts.
- Guidance: Provide local governments guidance on integrating resilience into existing processes, based on state and federal mandates and requirements such as hazard mitigation, stormwater, watershed, and comprehensive land use plans.
- Funding: Expand funding opportunities to increase flexibility and eligibility criteria for funding sources while demystifying and streamlining funding application process.
- Partnership and Buy-in: Host an annual resilience conference for local and state elected officials, local government staff, academia, and subject matter experts within the non-profit and private sectors to increase awareness regarding the need for resilience throughout the Chesapeake Bay watershed, promote buy-in and support, and highlight funding opportunities.
- Capacity Building: Identify a mechanism to build additional capacity in each state to provide technical assistance and support local governments with resilience planning and grant writing with consideration for additional dedicated full-time staff.

For the upcoming annual resilience conference, Wardrop advocated for all three advisory committees collaborating to host and contribute the event as it is a topic relevant to all groups. Starr agreed and thought inequitable water quality issues such as flooding is important to the Citizens Advisory

Committee (CAC) and LGAC and could be a focus for a joint conference in 2023. The Local Government Forum Report: Integrating Resilience into Local Planning can be accessed here.

Science Needs of the Chesapeake Bay Program: Clean Water Cohort
— Breck Sullivan (USGS), Outcome Leads
The Clean Water Cohort consists of the Toxic Contaminant Policy and Prevention Outcome, Toxic Contaminant Research Outcome, Water Quality Standards Attainment and Monitoring Outcome, and WIP 2025 Outcome. The Cohort identifies factors influencing science during the Strategy Review System (SRS) and updates their science needs as part of the Strategic Science and Research Framework (SSRF). The CBP Science Needs Database can be found here. The Strategic Science & Research Framework was developed to increase the amount of science for the CBP. SSRF provides a strategic approach to 1.) gathering, tracking, and maintaining science needs for each outcome, 2.) focusing existing resources to help address the science needs, 3.) identifying priorities for new resources, and 4). expanding CBP science capacity through more partnerships.



In the figure above, blue represents SRS, the adaptive management process. Green represents SSRF. At this split, the SSRF team breaks off and focuses on the science barriers and trying to expand our science capacity with the program by updating the database of science needs, cohort leads meet with STAR to structure their science needs, followed by a presentation to STAC at the STAC quarterly meeting. At the December STAC quarterly meeting, the Clean Water Cohort submitted their Logic and Action Plan for the next 2 years which begins a public and signatory feedback period for 30 days. The Logic and Action Plan may consider comments on policy, finance, and science, though the presentation given by Sullivan and Cohort leads to STAC solely focused on science needs to help the cohort achieve its goals at bay program. Sullivan provided examples of science capacity fulfilling outstanding science needs as a framework for how STAC members might engage with SSRF. Projects included faculty research (VIMS – Katrinna Nunez's research on shoreline inventory), student research (VIMS – Katrinna Nunez's PhD student's research), course focus (ODU – Introduction to Mitigation and Adaptation Studies Course, focus on Chesapeake Bay), internships (USGS – Internships with a regional focus, this summer is Chesapeake Bay), and department seminars (UMBC – Scientists share research, CBP share science needs).

Emily Majcher (USGS) presented on the two outcomes for Toxic Contaminants Research and Policy & Prevention Outcomes on 1) research (increase understanding of the impacts and the mitigation options

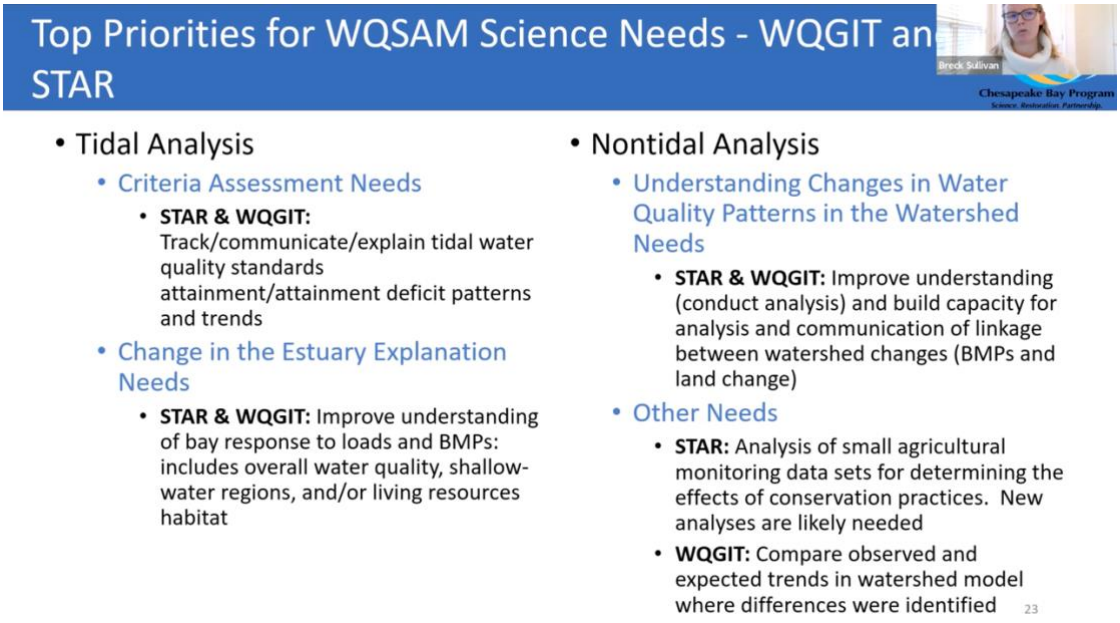
for toxic contaminants) and 2) improving practices and controls that reduce and prevent the effects of toxic contaminants. Outstanding science needs that have either partial or no resources below:

- Assess effects of toxic contaminants on fish and shellfish in tidal waters
    - Majcher was a steering committee member on the FY21 STAC workshop, "Improving the Understanding and Coordination of Science Activities for PFAS in the Chesapeake Watershed" and mentioned some needs recently added to the database are related to the impacts of PFAS on human health and the health of fish and shellfish
- Document occurrence, concentrations, and sources of legacy and widespread contaminants in different landscape settings
    - Utilizing the Delaware River Basin Commissions database as a model and for estimates as the Chesapeake Bay does not have a watershed-wide TMDL for PCBs and/or requirements for analytical methods to follow. Databases of 1668 (congener-based) PCB data and PCB-era and current land use will be used to develop a statistical model to identify patterns in PCBs related to current and/or former land use categories.
    - Using a recent USGS data release - 2022 Priority Toxic Contaminant Metadata Inventory and Associated Total Polychlorinated Biphenyls Concentration Data - to assess retrospective statistical trends in PCBs in fish tissue in 3 basins of the Chesapeake Bay watershed.
- Improved understanding of BMP effectiveness for removal of PCBs
    - Within both the policy and prevention and research outcomes.

Smith asked how NOAA's PCB program integrates with the Cohort's efforts and Majcher stated there are NOAA representatives on the work group and they have said that they are not sampling regularly within the Bay. Monaco added additional information on the program, the NOAA Mussel Watch Program, which historically has sampled every other year in about 300 sites around the country. For the NOAA Contaminant program, Monaco shared Lonnie Gonsalves' contact: Lonnie.Gonsalves@noaa.gov. In the update on plans this year, Majcher shared that NOAA indicated it will not sample the Chesapeake again until 2026.

Alex Gunnerson (CRC, STAR Staffer) presented on the 2025 Watershed Implementation Plans (WIP) Outcome. The WIP outcomes is by 2025, all practices and controls installed to achieve the Bay's dissolved oxygen, water clarity/submerged aquatic vegetation and chlorophyll a standards as articulated in the Chesapeake Bay TMDL document. Gunnerson emphasized that the outcome is not solely for practices to be in place but to be in place and achieve water quality standards. There is needed support for additional multiple tributary models (MTMs) for Phase 7. In short, they are being performed to assist with TMDLs, to improve assessment of shallow water processes, to improve the CBP science analysis and implementation for climate change impacts and to adhere to STAC guidance on bay modeling. For more information on multiple tributary models, Gunnerson recommended STAC members review presentations given by Lew Linker (EPA) at the July 2022 Modeling Workgroup Meeting Quarterly (meeting webpage): Modeling Workgroup Support for Expert Group on Conowingo Dredging as a CBP Management Practice and Approach to the Selection of Multiple Tributary Models for the Assessment of 2035 Climate Change Impacts in the Chesapeake Watershed and Bay. Management Board (MB) approved in November 2022 the 6 multiple tributary models (MTMs) that will be selected for the Chesapeake Bay: Potomac, York, James, Rappahannock, Choptank, and Patapsco tributaries. It was noted in the decision and from the cross-Goal Implementation Team process 3 more tributaries, if possible, should be added and modeled at a higher resolution. On cost, $250,000 covers one tributary team to develop the model, engage with stakeholders, and apply the model over the course of five years. Approximately it costs $50,000 per year, per team.

Scott Phillips (USGS) wrote in the chat that development of the finer scale tributary models especially including living resource components) could help address CESR shallow water focus. Wardrop commented that she has seen MTMs but not a succinct listing of their potential or functionality if living resources were incorporated. The modeling team has collaborated with UMCES and VIMS and others running the models, Shenk emphasized, and running the model for linked living resources are funded through the tributary model and a high interest of the Bay Program. Raleigh Hood and Victoria Coles (UMCES) on modeling and forecasting the distribution of Vibrio vulnificus, and with Marjy Friedrichs (VIMS) on climate change modeling. Gunnerson added there is some work being done with the Corsica River estuary, which STAC member, Jeremy Testa (UMCES), is involved in. Regarding these shallow water models, Testa confirmed the shallow water models may model SAV better and can represent the high frequency dissolved oxygen dynamics to some extent so one outcome is to better assess the criteria but also to associate higher frequency, higher spatially resolved changes to organisms. The challenge Testa added is to determine the most effective way to establish those connections. Larry Sanford (UMCES) requested the Cohort provide resources for analysis or outreach of model results; Gunnerson said they were at capacity with the 6 MTMs but it could be a topic for a future Modeling Ad-hoc Team meeting or quarterly. STAC members and participants interested in potentially creating a model for another tributary, can be involved in group meetings to help understand how others are approaching it.
Sullivan presented science needs are based on either monitoring, tidal analysis, or nontidal analysis. Most needs were identified through a PSC monitoring request on enhancing Chesapeake Bay monitoring networks – presentation on this request given by Breck to STAC in September 2021 can be viewed here. 31 recommendations totaling $5.2 million were identified to help enhance CBP core networks, of which $4.9 million has been secured to help implement those recommendations.



The Water Quality Standards Attainment and Monitoring Outcome pulled out the highest priority science needs (shown in the slide above). Wardrop asked about the process to focus the needs – Sullivan said each group was asked internally too breakdown tidal and nontidal science needs and those identified needs were brought the WQGIT and STAR to reflect on via a Mentimeter for each category. Erin Letavic (Herbert, Rowland & Grubic, Inc.) was glad to see analysis for agricultural practice effects is a top priority. With more investment now available for agricultural BMPs, Letavic recommended the Bay Program use the next few years of new construction to gather more data.

ACTION: STAC members should consider opportunities for their organizations or universities to partner with a staffer to address a science need. The CBP Science Needs Database hosts all current Bay Program science needs.

ACTION: STAC members are requested to submit feedback on the Clean Water Cohort. You may either email STAC Staff or Breck Sullivan directly (bsullivan@chesapeakebay.net) with your comments and suggestions on the following questions:

- Do you or any of your colleagues have interest in contributing to addressing one of these needs?
- Do you or any of your colleagues know of existing efforts to support one of these needs?
- Do you want more information to come back to STAC from any groups on specific needs/projects?
- Are these needs appropriate? Do you see something missing?

Links: CBP Science Needs Database

Citizens Advisory Committee (CAC) Findings on Equitable Access to Grants — *Julie Lawson (CAC Chair)*
The Citizens Advisory Committee (CAC) membership is split into three subcommittees: Water Quality, Emerging Issues, and Stewardship and Engagement. Subcommittees drive the agenda and projects CAC explores, and in September, the Stewardship and Engagement subcommittee tackled equitable access to grants. Individuals on the subcommittee manage and audit grants and sought to understand what barriers are out there and how to make the best use of various funding resources in order to achieve equitable spending and projects around the region. One segment of the activity was focused on the $19.5M of EPA Chesapeake Bay Program budget which is planned for Small Watershed grants and Innovative Nutrient & Sediment Reduction grants. These funds are administered by National Fish and Wildlife Foundation (NFWF) and is closely tied to CBP priorities and highly competitive. Panels goals were to 1) understand if grant eligibility requirements and priorities set by resource providers/funders lead to funding disparities, and 2) identify barriers and solutions to advance the capacity of organizations that do not meet these requirements. Of the three-part panel, the first part was a planned facilitated discussion with three community organizations (Latino Outdoors, ReBUILD Metro, and Ward 8 Woods Conservancy) that have environmental components to their work. Second, there was an overview of findings from a contractor who evaluated systematic community engagement barriers within the Chesapeake Bay Program. A conversation with Jake Reilly and Joe Toolan (NFWF) finished out the panel reviewing changes NFWF is making to incorporate Diversity Equity Inclusion and Justice (DEIJ) into their grant making.

CAC published a report of findings from the panel discussion, which included barriers and potential solutions for the grant making process and the grant execution process. Common barriers found in the grant making process below:

- Confusing language -- very technical, requiring the applicant to have advanced knowledge of scientific and administrative terminology and previous experience in grant writing.
- Human capital – small, frontline groups lack the human and experiential resources to develop the type of proposal required by federal agencies and other Bay Program partners.
- Upfront costs. Many grants reimburse recipients for costs spent to start their project. However, not all organizations have the financial capacity to make these upfront investments.
- Federal requirements. Federal grant requirements, such as submitting financial audit reports, using approved accounting systems, providing various insurance, etc. are prohibitive in many ways.
- Matching fund requirements. Grants that require organizations match funds being allocated exclude those with limited liquid capital.

- Award criteria. The metrics used to evaluate grant proposals tend to be technical, quantitative and built around pollution reduction calculations, while benefits related to education, community engagement and other public benefits are overlooked.

The panel generated important observations on grant equity for organizations including that small, community groups may not seek Bay funding because their primary focus is not Nitrogen, Phosphorus and Sediment reduction. Opportunities to advance viable applications from small community organizations needs to be supported through a more tailored grant application and grant execution process. To achieve priorities while reducing nutrient pollution to the region's waterways, existing funding should emphasize community groups determination of what and where green infrastructure projects are installed. CAC supports nutrient sediment reduction requirements for the Chesapeake Bay grants currently administered by NFWF. However, many of the existing Chesapeake Bay grants may not be effective in meeting the CBP's DEIJ goals. Therefore, expanded and new grant funding should be developed to explicitly support capacity building for frontline community organizations. CAC recommends this new funding consider a measurable 'community uplift' or 'capacity building' outcome.

Fowler echoed what Lawson was saying about concerns and capacity in general; could be helpful to allocate NFWF resources to balance funding out. In the chat, Gilinsky noted that similar issues are arising with distribution of the Bipartisan Infrastructure Law (BIL) money for infrastructure for first time communities -- a technical assistance program has been set up using a portion of the funds to help communities plan for what they need and then actually apply for the money -- and consultants have been selected through a competitive process to help them with this. Fowler stresses that there needs to be a longer-term commitment for capacity building support: not 1 year or 5 years, for example. Building regional partnerships or coalitions can be a way to bridge some of these capacity gaps for any given community, Fowler.

Wednesday, December 7th

Introduction to Meeting Theme, Environmental Flows — *Kathy Boomer (FFAR*)
Boomer began Day 2 with an overview of the meeting theme and a discussion of advancing the environmental flows concept. Environmental flows push us to think consider hydrologic regimes of a stream system as it is critical in defining the driver of stream function. The magnitude of flooding, the frequency, duration, timing, and rate of change all effect the habitat condition and interaction of water with the adjacent river corridor. This can affect the recreational and aesthetic characteristics of a stream system and flood protection and filtration. Environmental flow regimes have been significantly altered by human activities dating back to the 1700s; Boomer cited a paper by Ellen Wohl (Colorado State University) which highlights the impact of human alteration on freshwater environments - Land before water: The relative temporal sequence of human alteration of freshwater ecosystems in the conterminous United States. Trapping beavers, intensive modification of rivers and wetlands for navigation, mining, flood control, power generation, and agriculture, all led to the instability of many contemporary river corridors. Climate change has shifted precipitation patterns, causing an increase in winter and spring months with predicted drier summer and falls.

Targeted discussion outcomes from the meeting are the following:

- Facilitate a CBP-wide understanding of the environmental flows concept and its relevance to stream, river, and estuary management
    - Double-Loop Learning: Should CBP leadership further explore environmental flows (flow and temperature regime) as management targets (means objective) to advance Bay Agreement?

- Identify/evaluate existing tools and opportunities for innovative model development that evaluate flood/drought risks and environmental flow requirements to inform management decisions (e.g., manage risk from episodic weather events)
    - Single-loop learning: Is there adequate knowledge to evaluate (model) system responses and inform management strategies (e.g. inform GIT decisions).

Panel recordings from all three panel discussions and presentations given are available on the December STAC quarterly meeting webpage.

***Panel*: Introducing and Exploring the Environmental Flows Concept and River Corridor Management and Its Relevance to CBP Management**

The first panel focused introduced the environmental flows concept and included panelists *Kelly Maloney (USGS); Ben Hayes (STAC, Bucknell University); and Andrew Mueller (USNA)*. At the end of the panel presentations, Boomer asked Mueller is he is observing a variation tied to patterns/seasonal variations and if he has seen differences in those patterns across triblets. As they look back at continuous monitoring data for these water quality parameters in both triblets and state data, there is evidence of close ties to precipitation events Mueller stated. Jeni Keisman (USGS) applauded how supported community science is in the triblets. Agencies often do not have the resources to do the intensity of sampling that citizen science collaborators may be able to. She asked there is potential to look across the small tributaries or triplets to address some of the discussed drivers of differences. Mueller said they are beginning to tie land use to other metrics with preliminary data.

From the social and human standpoint, Fowler asked the speakers how they engage people and leverage resources to build capacity. In the chat, Hayes agreed and restated that socio-ecological systems are coupled. Andrew Warner (PSU) replied to Lara that there are good examples of social engagement in e-flow development and implementation (community valuation, etc.) and that he has worked with the US Army Corps of Engineers (USACE) on a project in Tanzania. Hayes added that stakeholders want to be involved, and that it is an opportunity for local engineering firms, landscape planners, architects, and others to be involved in designing ecological, hydrological, and municipal boundaries. Hayes noted this is an opportunity for STAC to engage in this conversation in multiple ways, such as a workshop.

Resources shared during this session are included below:

- The Chesapeake basin-wide index of biotic integrity for stream macroinvertebrates, or "Chessie BIBI," is a multi-metric index of biological health for freshwater streams and small, wadeable rivers in the Chesapeake Bay watershed.
- Ecosystem Flow Recommendations for the Susquehanna River Basin report (TNC)
- Hydrological Simulation Program - FORTRAN (HSPF) model
- To Revive a River, Restore Its Liver, Scientific American
- Spatial Heterogeneity of CDOM, Optical Brighteners, and Oils in Mesohaline Tidal Creeks Using Self-Organizing Maps (Andrew Muller, Diana Muller)

***Panel*: Exploring How Humans Have Changed Environmental Flows, Associated Impacts, and Our Capacity to Mitigate those Changes**

The second panel explored how humans have changed environmental flows, associated impacts, and what is out capacity to mitigate those changes. Panelists included *Daren Carlisle (USGS); John Balay (SRBC); and Nathanial Hitt (USGS).* Fowler asked how about invasive species (e.g. snakehead) response to disrupted flow regimes, Balay replied they were not seeing Conowingo flow alteration deterring snakeheads from showing up at the fish lifts. Piggybacking off of Fowler's comment related to non-native species, Andrew Warner pointed out a number of example where an environmental flow project has expanded restoration beyond that of restoring native but is a tool for helping to address or mitigate

the impacts of non-native species. Warner asked if any other speaker or STAC member has seen a flow restoration project restoring the health of floodplain systems by controlling non-native species in the system. Carlisle referenced a big restoration project in Reston, VA that includes long-term biological data tracking the restoration of the aquatic community since the restoration occurred. Boomer asked Balay what some strategies from the SRBC are in promoting consumptive use policies – Balay said that traditionally these focus on developing water supply storage, to use as a source of satisfying that consumptive use of water. They have expanded the scope of alternatives for achieving the SRBC's mitigation goals to include activities like drought operations, grant programs seeking to develop water conservation projects, and leak detection and water loss savings projects. They have also looked at the local scale to address stormwater management and drainage impacts.

Resources shared during this session are included below:

- E-flow work with USACE is organized as part of the Sustainable Rivers Program: https://www.hec.usace.army.mil/sustainablerivers/ and https://www.iwr.usace.army.mil/Missions/Environment/Sustainable-Rivers-Project/
- SRBC Consumptive Use Mitigation grant program information (including policy information)

***Panel*: Potential Recommendations for CBP: Current and developing tools for environmental flows management**

The final workshop panel dug into imaginative decisions and insights regarding modeling tools used to inform management. Panelists included *Julie Zimmerman (TNC)*, *Robert Burgholzer (VA DEQ)*, *Gopal Bhatt (Penn State)*, and *Eric Smith (VT)*. At the close of the final panel presentations, Fowler applauded the discussions but wondered where to go next with these findings; Fowler suggested considering how these panels might fit in with the upcoming STAC report, CESR. One possible action step could be to continue to encourage climate adapted storm water management, Lew Linker (EPA) said, citing a new tool available at the county level for the entire Bay region that allows for users to adjust stormwater parameters under various timelines. With higher intensity rainfall projected due to changing precipitation patterns, Linker recommended focusing on BMPs that both repair and manage this excess through a multitude of co-benefits such as planting and maintaining riparian buffers. Though overall, these events are nearly unmanageable and Linker highlighted the need to decrease temperatures overall. Fowler pushed back on this, referencing a previous STAC-funded workshop on co-benefits and the lack of follow-up from the Bay Program on those findings. The Nature Conservancy in California is currently developing a framework in partnership with Upstream Tech to develop machine learning models of actual streamflows and those under climate projections in the state. Information gathered will be site-specific and watershed specific.

Burgholzer said that although there is a growing understanding of how environmental flows change the upper watershed, there is still a disconnect and suggested future research track concretely how environmental flows might affect the Bay. Warner pushed back on this, arguing that without any restoration of the upper bay, it is clear the overall Bay effort is impacted. To gain traction on management actions in Pennsylvania, Warner highlighted that this must be politicized as a local issue: over one-third of PA streams are not meeting their designated uses. Moving towards implementation, Warner counceled that when looking at flow restoration opportunities, tracing the routes that are available in the system (e.g. dam-altered flow regime or land-use altered flow regimes) can be helpful in identifying agencies, programs, and funding outlets that may be appropriate to pursue. In a closing comment, Linker noted with a longer growing season, there will be lower flows during the summer months in this region than historically familiar.
Resources shared during the session are included below:

- Projected Intensity-Duration-Frequency (IDF) Curve Data Tool for the Chesapeake Bay Watershed and Virginia - https://midatlantic-idf.rcc-acis.org/
- Developing Future Projected intensity-Duration-Frequency (IDF) Curves: A technical report on data, methods, IDF curves for the Chesapeake Bay Watershed and Virginia: https://www.rand.org/content/dam/rand/pubs/tools/TLA1300/TLA1365-1/RAND_TLA1365-1.pdf
- NC e-flow link: https://files.nc.gov/ncdeq/Water%20Resources/files/eflows/sab/EFSAB_Final_Report_to_NCDENR.pdf
- Additional modeling for climate change precipitation based on RCPs. https://precipitationfrequency.ncics.org/
- ELOHA: ecological limits of hydrologic alteration: https://www.conservationgateway.org/ConservationPractices/Freshwater/EnvironmentalFlows/MethodsandTools/ELOHA/Pages/ecological-limits-hydrolo.aspx