



Chesapeake Bay Program's (CBP)
Scientific and Technical Advisory Committee (STAC)
Quarterly Meeting Minutes
September 12-13, 2023; Hybrid
Frederick Douglass-Isaac Myers Maritime Park Museum, Baltimore, MD
[Meeting Webpage](#)

Tuesday, June 13th

Attendance:

W = webinar

Members: Matt Baker (UMBC), Kathy Boomer (FFAR), Tony Buda (USDA-ARS – **W**), Shirley Clark (PSU), John Dawes (The Commons – **W**), Bill Dennison (UMCES), Celso Ferreira (George Mason University – **W**), KC Filippino (HRPDC – **W**), Lara Fowler (PSU), Kathy Gee (Longwood University), Ellen Gilinsky (Gilinsky, LLC – **W**), Kirk Havens (VIMS – **W**), Ben Hayes (Bucknell University), Jason Hubbard (WVU), Jeni Keisman (USGS), Christine Kirchhoff (PSU – **W**), Scott Knoche (Morgan State, PEARL), Ellen Kohl (UMBC – **W**), Yusuke Kuwayama (UMBC), Erin Letavic (Herbert, Rowland, & Grubic, Inc.), Dave Martin (TNC), Andy Miller (UMBC), Mark Monaco (NOAA), Efeturi Oghenekaro (DOEE), Leah Palm-Forster (UD), Joe Reustle (Hampton University – **W**), Kenny Rose (UMCES), Mike Runge (USGS – **W**), Larry Sanford (UMCES), Leonard Shabman (Resources for the Future), Leon Tillman (USDA-NRCS – **W**), Tess Thompson (VT – **W**), Joe Wood (CBF – **W**), Weixing Zhu (Binghamton – **W**)

Guests: Camryn Arnstein (MDE), Doug Austin (EPA – **W**), Doug Bell (EPA – **W**), Joe Berg (Biohabitats), Isabella Bertani (UMCES – **W**), Gopal Bhatt (PSU – **W**), Jess Blackburn (CAC – **W**), Karl Blankenship (Bay Journal – **W**), Sarah Brzezinski (EPA – **W**), Dave Campbell (CBPO/EPA – **W**), Nicole Christ (MDE), Alex Echols (Campbell Foundation – **W**), Jason Farnsworth (Headwaters Corporation – **W**), August Goldfischer (CRC – **W**), Sushanth Gupta (CRC – **W**), Jeremy Hanson (CRC – **W**), Carl Hershner (VIMS – **W**), Amy Handen (EPA – **W**), Dave Kintgen (Maximus – **W**), Lew Linker (EPA – **W**), Lee McDonnell (EPA), Kevin McLean (CBP – **W**), Amirpouyan Nejadhashemi (MSU – **W**), Kristin Saunders (UMCES – **W**), Jillian Seagraves (National Park Service), Gary Shenk (USGS), Jennifer Starr (LGAC – **W**), Breck Sullivan (USGS), Stefanie Taillon (VAFB – **W**), Peter Tango (USGS – **W**), Richard Tian (UMCES – **W**), Gregorio Toscano (EPA – **W**), Arthur Wardle (UC Berkeley), Qian Zhang (UMCES/EPA)

Administration: Denice Wardrop (CRC), Meg Cole (CRC), Tou Matthews (CRC)

Call to Order, STAC Business, Announcements – Kathy Boomer (STAC Chair – FFAR)

STAC Chair Kathy Boomer (FFAR) called the meeting to start at 9:05AM. Boomer provided an overview of the committee and responsibilities of STAC, including changes to STAC membership, and outlined the meeting agenda. STAC Members were invited to give an update on any ongoing STAC efforts and/or funded activities, and Boomer asked members to share any

announcements on upcoming partnership activities and events of potential interest to the committee.

- STAC Membership:
 - The following at-large STAC Members will cycle off following this September Meeting: Lara Fowler (PSU), Andy Miller (UMBC), Jeremy Testa (UMCES), Len Shabman (RFF), and Jay Stauffer (PSU).
 - New Members to STAC: Matt Baker (UMBC), Charles Bott (HRSD), John Dawes (The Commons), KC Filippino (HRPDC), Kathy Gee (Longwood University), Christine Kirchoff (PSU), Yusuke Kuwayama (UMBC), Theo Lim (VT), Joe Reustle (Hampton University), Valerie Were (CIRA), Joe Wood (CBF)
 - Tentative Member: Emily Trentacoste (EPA) has been nominated as a STAC Federal Member and currently awaiting approval from the Bay Program to become an official member.
 - Kathy Boomer will transition from Chair to Past Chair at the September Meeting, and Larry Sanford (UMCES) will assume the role of Chair.
- Online and in-person participants briefly introduced themselves.
- Approval Requests:
 - June 2023 Quarterly Meeting Minutes – Boomer gave an overview of the June Meeting discussions and suggested refining the definition of the T-Zone in the Minutes. No other comments were received for the minutes.
 - July and August Executive Board Meeting Minutes – Boomer relayed that the majority of Executive Board (EB) discussion was approving new STAC Members, developing the agenda for the September Quarterly Meeting, and reflecting on STAC’s Letter to the Executive Council.
 - Nominee for STAC Vice-Chair: Bill Dennison (UMCES) was nominated by EB for the role of STAC Vice-Chair and Boomer called for a motion of approval from STAC.
 - STAC 2024 Quarterly Meeting Dates – Boomer proposed the following dates for the STAC Quarterly Meetings and no scheduling conflicts were brought up by STAC Members. Meg Cole (CRC) clarified that the March 2024 Quarterly Meeting will be virtual and STAC will later determine which two of the remaining meetings will be in-person.
 - March 5-6, 2024
 - June 4-5, 2024
 - September 10-11, 2024
 - December 3-4, 2024

<p>DECISION: June 2023 Quarterly Meeting Minutes conditionally approved, STAC Staff will address clarifying comments submitted by STAC Members.</p>
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DECISION: July 2023 Executive Board Meeting Minutes and August 2023 Executive Board Meeting Minutes approved.

DECISION: Bill Dennison (UMCES) appointment to STAC Vice-Chair approved.

DECISION: STAC 2024 Quarterly Meeting dates approved.

- Member Announcements:
 - Ben Hayes (Bucknell University): The 18th Annual River Symposium on “[Navigating the Flow: Sustaining River Communities and the Health of the Bay](#)” will be held November 3-4, 2023, at Bucknell University in Lewisville, PA.
 - Lara Fowler (PSU): The University Network for Collaborative Governance (UNCG) Conference on “[Collaborative Governance in Action: On the Ground in Virginia](#)” will be held October 26-28, 2023, at the University of Virginia’s Institute for Engagement & Negotiation in Charlottesville, VA.
 - Lara Fowler: The Local Government Advisory Committee (LGAC) will be meeting to discuss “[Addressing Bottlenecks Developing In Chesapeake Bay Watershed Network of Networks](#)” (working title) on November 30-December 1, 2023, in Washington, D.C.

STAC Letter to the Executive Council – Kathy Boomer (FFAR)

The [Chesapeake Executive Council Meeting](#) is STAC’s annual opportunity to share reflections and recommendations to the Chesapeake Bay Program’s (CBP) Executive Council (EC), submitted as the [STAC Letter to the Executive Council](#), along with letters from the [Local Government Advisory Committee](#) (LGAC) and the [Stakeholders’ Advisory Committee](#) (CAC). Boomer shared the summary of the draft letter created by the STAC Executive Board (EB). The overarching message of the letter is to advise the Bay Program to *capitalize on the adaptive management framework and decision science language to foster reflection and refinement of CBP Goals, Objectives, Outcomes, and Implementation Strategies* and was developed through findings from the [Comprehensive Evaluation of Systems Response](#) (CESR) report, STAC workshops, STAC quarterly meetings, and other initiatives. The drafted recommendations provided examples of ways to use the adaptive management framework to facilitate conversation around advancing the Bay Program.

Discussion:

- Leonard Shabman (RFF): For the recommendation “Reevaluate targeted outcomes: Need to focus on stream temperature and flow regimes influencing shallow water conditions and affected by watershed condition as well as climate shifts.” Is it a suggestion that the Total Maximum Daily Load (TMDL) be revised with new criteria for temperature or a suggestion to focus on shallow water habitats?
 - Boomer: What’s intended is not to replace the TMDLs but to think more broadly beyond nutrients and sediment, and to consider if the Bay Program wants to

actively target reducing protecting stream temperature regimes as part of baywater management. The letter prompts discussion on whether to focus on shallow waters as a goal for the TMDL and acknowledges potential redundancies within the Outcomes.

- Shabman: What are we asking for as the response? These should be actionable recommendations. The chief executives are not focused on the technical details that STAC proposes; that concerns the Management Board (MB), the Goal Implementation Teams (GITs), and other committees. The goal of the letter is to make the case that with more science and understanding, the Bay Program should consider revising the methods of trying to achieve its Outcomes; the more individual objectives in the Letter, the harder it is to keep the executives' attention on the main point.
- Boomer: The overarching recommendation is to have comfort with revisiting the Goals and Objectives and Outcomes and Implementation Strategies, and stream temperature is one example that was highlighted in CESR. There is recent scientific evidence to suggest that this is a potentially measurable outcome that can be managed through forest and riparian buffer restorations. The Beyond 2025 Steering Committee has started meeting and a portion of that group exploring opportunities to improve the efficiency and efficacy of the Bay Program while others want to remain focused on the Outcomes articulated. The work through the CESR report and other STAC discussions emphasize a need for a broader-scale approach, which should be encouraged through the STAC Letter to the EC.
- Kristin Saunders (UMCES): I've heard several STAC members in presentations to GITs or the MB highlighting issues of land conversion, fast rate of development, and animal concentrations. While the Bay Program has been focusing on best management practice (BMP) implementation and restoration practices, the rate of land conversion is not receiving the attention it is warranted, similar to stream temperature. Is this included in the Letter or would it be considered as an addition?
 - Boomer: That can be included and all STAC members and participants are encouraged to make suggestions. The Letter should not have too many details that may dilute the overarching recommendation to facilitate and embrace institutional learning.
- Erin Letavic (Herbert, Rowland, & Grubic, Inc.): 1) I appreciate the recommendation "Frame Bay Restoration as a decision problem, not a science problem." 2) The draft recommendations are very science-based, as they should be from STAC, but we should add more context of the co-benefits and trade-offs. Leah Palm-Forster (UD) had mentioned in the EB meeting that this is also an economics problem. 3) For the recommendation "Consider focusing on shallow water goals (rather than mainstem)," I

am concerned about terminology of mainstem and the implication that the river watershed may not have as much focus in the future.

- Boomer: The TMDLs and monitoring of the Bay Program is focused on the deep water as the mainstem of the Bay and the CESR report highlights the need to focus on restoring the shallow waters. The TMDLs are tied to the mainstem. In this context, the mainstem refers to the just the Bay footprint and not the watershed.
- Jeni Keisman (USGS): I agree with the importance of the decision problem and the shallow waters. I'm struggling with how things are framed in a dichotomy; can we nuance the language to reflect the understanding that focusing on one thing does not take away from current progress?
 - Boomer: We need to advance our understanding of when and where our practice can provide those targeted benefits.
- Palm-Forster: I appreciate Keisman's comment and it aligns with an EB discussion about not highlighting trade-offs even though we know they exist as decision makers may turn away when they think there are winners and losers. Perhaps STAC can lean into language such as, "better integrating decision science with the natural science," which links with the idea of adaptive management. The EB also had concerns with the use of the jargon adaptive management; is there a way to describe adaptive management without relying on the term itself?
 - Boomer: It has been a challenge to avoid these trigger terms and in this outline, concerns about their use were put aside. I agree that we will want to avoid that language in the final Letter.
 - Weixing Zhu (Binghamton University) [chat]: I think the term 'adaptive management' is important and should be included in the Letter. I agree with Boomer that it should not be too detailed in the different levels of adaptive management.
 - Kirk Havens (VIMS) [chat]: Adaptive management is "learn while doing and applying that knowledge."
 - Len Shabman (RFF): The last section of the CESR report addresses how to talk about adaptive management without using the term and could help when finalizing the Letter.
- Ellen Gilinsky (Ellen Gilinsky, LLC): I agree with Keisman and Palm-Forster that it is important to navigate around using an 'either-or' construct within the Letter since the recommendation is to shift emphasis rather than changing what to address. The CESR report is similar in that it cautions against targeting TMDLs to the point of ignoring relationships and living resources.
- Scott Knoche (Morgan State, PEARL): Since science feeds into decision making, it is not a classic dichotomy, and the current characterization in the draft potentially loses the understanding of the flow of scientific knowledge.

- Gary Shenk (USGS): Echoing Miller’s earlier comments on decision science, part of the goal is to convince executives to establish priorities, which might be successful with an easily understood example like temperature. For the action in the first paragraph of “explore decision making languages and strategies,” can we be more clear what we are asking principals to do?
 - Palm-Forster: I agree, we need to recommend action. For example, supporting more pilots as a way to feed into adaptive management and explore different strategies for implementation of different programs. We should include language that leads to action and might be able to adjust a few sentences from the CESR report as Shabman suggested.
- Lee McDonnell (EPA): One challenge for Outcome achievement is not getting prioritized. What three or four things do you want the EC to prioritize? The items cannot be too broad or they will not be prioritized, and too many ideas will exceed their limited scope.
 - Boomer: My understanding is prioritization is an important part of decision analysis and the Bay Program tends to shy away from it. In our suggestions to more fully embrace adaptive management and decision making, we can bring up the need for prioritization. STAC could share its perspectives about priorities but it shouldn’t be establishing the priorities; that will be an important part for the Beyond 2025 conversations.
- Kenny Rose (UMCES): To clarify for the phrasing, the TMDL covers the entire Bay, not just the deep water; we should not imply that it is being ignored. The CESR report makes the point that achieving certain goals of the TMDL or targets may not be purely driven by water quality and that’s where the shallows comes in. This is already recognized; the TMDL was based on living resources and their habitat needs. The idea is to consider the rationale of continued investments in the deep trench when actions in the shallows would have a better ecological benefit to the system.
 - Boomer: The TMDLs were developed based on the predicted response of the deep waters in the mainstem, right?
 - Shenk: The TMDL allocations and planning targets for nitrogen and phosphorus reductions were set to meet the mainstem but the water quality standards apply to the entire bay.
 - Peter Tango (USGS) [chat]: For further clarification, the TMDL is about meeting criteria in all 92 segments of the Bay. There has been a focus on the challenge of what is expected to be the most resistant region and habitat to achieve restoration - deep channel, mid Bay. Shallow water offers a closer link to management response in the nearterm, but ultimately, the TMDL is geared at taking care of the whole Bay.
- Boomer: To summarize this session: 1) There were no strong objections to the overall intent and organization of the Letter. 2) Strong suggestions were made to be careful and nuanced with the language, to avoid reinforcing dichotomous thinking, to avoid

trigger terms, and to define specific terms. 3) Ideas were given for other examples to use.

- Jeni Keisman: To reiterate McDonnell, the Letter should include an actionable recommendation.
- Boomer: The Beyond 2025 committee is still considering the scope of their work right now. STAC can recommend revisiting the Bay Program as a whole and for leadership to encourage and create space for institutional learning and update. Does that sound like an action?
- Joe Wood (CBF) [chat]: I think it is important to clarify, those learning opportunities are currently absent, or at least heavily de-emphasized in our current framework; we need substantive change to facilitate such opportunities. I think the overarching recommendations should be that we need substantive programmatic reaction to CESR by leadership to achieve the goals of the bay agreement.
- Larry Sanford (UMCES): I think so. We can suggest broadening the scope of the Beyond 2025 consideration to include an examination of other approaches that would add onto the existing framework and offer some of the examples from this discussion.
 - Gilinsky [chat]: The point of CESR is to broaden the scope.
- Miller: Along with that, we can suggest that adjusting the scope has a more effective outcome. To McDonnell, 'prioritize' was considered a trigger term during the EB discussion; do you think we should use it?
 - McDonnell: The Beyond 2025 Steering Committee will ultimately prioritize; feedback from the Partnership is that there are too many things going on without the bandwidth to support everything. I think we need to use 'prioritize' more and view it as a positive.
 - Tango [chat]: The discussion of re-evaluating targeted outcomes, links stream temperature, which tends to be an upper watershed issue, to shallow water habitats, which may be dominated by shoreline hardening and development along the Bayshore. I would more succinct language when mentioning a targeted outcome to avoid such challenges.
 - Tango [chat]: I think a shift in emphasis on how to get more nearterm gains is what is meant when developing letter language about innovative shifts in focus and emphasis (i.e. "prioritizing) on the shallow water related management.
- Dennison: I think the headwinds from many jurisdictions is to revert to water quality while from CESR and STAC discussions, the message is to resist the tendency to focus on water quality and nutrient reduction. The timeliness of the Letter to the EC is important to impress the need for a broader view.

- STAC Staff: The Letter is due September 28th and the EC Meeting is October 19th. The EB will review the feedback and comments to begin writing the longer draft, which will be sent to STAC for review before it is passed on to the EC Planning Committee.

Introduction, Chesapeake Bay Program Interim Director – *Dave Campbell (EPA)*

Dave Campbell (EPA) is the Acting Director of the Chesapeake Bay Program since April 2023 and joined STAC to share his background, guiding principles while maintaining the position, and feedback to STAC. The CESR report identified shallow waters as a key focus area to address; further discussion of shallow waters must include benefits to local water quality and living resources on top of benefits to the Bay. Campbell is in support of sandboxing and believes social sciences will be important in program implementation and establishing public equity in Outcomes.

Discussion:

- Boomer: I want to acknowledge the value and courage of embracing uncertainty and encouraging us to be comfortable with talking about and exploring uncertainty.
- Mark Monaco (NOAA): As STAC continues to educate and market the CESR report to various stakeholders, is there anything we can do to make implementation of its recommendations easier?
 - Campbell: STAC is doing a great job reaching different audiences and presenting the message of key findings from the CESR report. I would recommend “Stay the course” that you are on.
 - Lee McDonnell (EPA): One of the things that was discussed last STAC meeting was creating strategic engagement teams to reach smaller groups and expand upon a specific topic. What would be the form for that?
 - Monaco: We’re asking entities like the Bay Program to somewhat change their way of doing business so you need the reasoning behind why this change is needed. As you mentioned, having this smaller group conversation would be helpful to figure out the best ways to complement the existing work of the Bay Program and move it forward with some of the complementary work coming out of CESR.
 - Boomer: McDonnell, your comment sparks the idea of STAC needing to do a better job keeping track of these conversations and looking for opportunities to participate in these smaller topic groups. STAC needs to figure out where the opportunities are and who to start with.
- Dennison: The Bay Program is at an inflection point; it has focused on TMDL for the past decade but discussion now is of refocusing the effort. Years ago, STAC tried to assign individuals to attend various goal team and work group meetings but it was difficult for academic and agency scientists to have meaningful participation in the monthly meetings. STAC can provide valuable contribution to the topically oriented small group

meetings that McDonnell brought up but it will need some wrangling from Campbell and other connections in the Bay Program.

- Sanford: Does shallow waters mean only the Bay or the watershed as well? As I understand, the TMDL only applies to the Bay and not the watershed; to what extent can the Bay Program support the idea of cleaning up the watershed outside of the TMDL?
 - Campbell: The organic conversations of CESR are valuable to start to coalesce around and have helped Beyond 2025 discuss ways of organization. Small group conversations will be important to spur innovation and bringing in different voices and will be a valuable effort. Part of it will be improving the dialogue beyond the shorthand of what shallow waters means and to consider the benefits of activities being pursued by partners.
 - Dennison: STAC discussion of shallow waters is defined as the transition zone in the CESR report. Edges are particularly important in the Chesapeake Bay as it has more coastline than the entire West Coast of the U.S. and the edges include the near shore land as well as the water.
 - Boomer: Maybe this is a topic that should be at the top of our priority list for this strategic group thinking. There are two dimensions of this conversation that we're not all on the same page: 1) the TMDL is tied to the response of the Bay's main stem, the deep waters, while the CESR report highlights the need to focus on response to shallow water systems where living resources occur; and 2) recognizing that land-water connections are important and relevant not only in the transition zone, but throughout the entire watershed.
- Miller: Part of the CESR report is adaptive management; how is adaptive management perceived at the level of the MB or the core decision makers?
 - Havens: To follow up on Miller, adaptive management is learning while doing and then applying that knowledge to decisions. So how do we provide the tools for the MB to make those difficult decisions of prioritization of multiple objectives based on the things we've learned over time? And how do we get the MB to begin utilizing this at the point of learning while doing?
 - Campbell: I'm learning how the MB functions and how they come to decision making points and then how the decisions are made. I think the dialogue for the tools and processes to use would be useful for me and you might want to leverage the experiences of others that have been part of the decision making process longer than me. I am an advocate of adaptive management and I think that alluding to the critical role of adaptive management in advancing decisions will be beneficial.
- Keisman: Messages tend to morph into entirely new messages as they're passed on, like a game of Telephone. With the development of the TMDLs, at the time the models and data showed that the shallow waters were on track to attain standards while the deep

waters needed more priority to attain those standards. This is an example of learning and adapting, to now refocus on the shallow waters.

- Shabman: The term adaptive management was not used frequently in the CESR report due to the regulatory and legal structure of the TMDL world; recommendations for sandboxing were an attempt to come up with an experimentation design that can fit within the legal and regulatory structure of the TMDL. Once we step outside of the TMDL, we can do all kinds of adaptive work.
- Boomer: I worry that the reality you just put on the table, constraints are thinking about what we need to move forward in advancing the Bay Program's restoration. What Beyond 2025 does for us is create a space to explore working outside and accommodating those regulatory constraints.

[Introduction to AI Within Watershed Management](#) – *Isabella Bertani (UMCES), Qian Zhang (UMCES), Mike Evans (Chesapeake Conservancy)*

Isabella Bertani (UMCES) presented "[Broad introduction to Artificial Intelligence, Machine Learning, and Deep Learning](#)" to define the language, scope, and history of the emerging tool of Artificial Intelligence (AI). AI is a broad term that encompasses a wide range of technologies and is used to refer to a set of techniques that focus on programs that can reason, learn, and act in ways typically associated with human intelligence. Machine Learning (ML) is a subfield of AI that uses algorithms to make predictions without being explicitly programmed and Deep Learning (DL) is a subset of ML algorithms that are based on advanced artificial neural networks typically characterized by several layers. DL can process raw data with minimal human influence at a predictive accuracy, which opens the possibility for the models to discover relationships and concepts beyond human conception. Efficient application of DL would be in processing and analyzing data in the field of Earth systems science, such as with remote sensing data.

Qian Zhang (UMCES) presented "[Examples of Machine Learning applications in the Chesapeake Bay Watershed](#)" to introduce ML and DL approaches and literature that are specific to the Bay watershed. Zhang expanded on Bertani's briefing of ML categories, of which 'Classification' and 'Regression' are within 'Supervised Learning' and 'Clustering' is within 'Unsupervised Learning.' Predictions for Bay conditions of salinity ([DeSilet et al., 1992](#)) and chlorophyll-*a* ([Yu et al., 2022](#)) were made using neural network models and regression network models. Predictions of biological conditions for headwater streams ([Maloney et al., 2018](#)) and nutrient limitation of phytoplankton ([Zhang et al., 2021](#)) were made using classification models. Predictions of total nitrogen trends ([Zhang et al., 2022](#)) were made using clustering models.

Mike Evans (Chesapeake Conservancy) presented "[Using Deep Learning to map wetlands and solar arrays in the Chesapeake Bay Watershed](#)" to demonstrate the possibilities of DL

techniques and share methodology that STAC might be able to adapt. DL can process remote sensing data to summarize spatial information and extract variables that are not present in the initial data and one application is image segmentation, which classifies each pixel into different categories. Evans and team trained a model that was able to automatically delineate all ground mounted solar rays within an image, which was scaled up to create a map of solar arrays across the six states of the watershed. Using a similar process, Evans developed a pilot method of mapping wetlands across four counties and is working on extending it across the watershed. Another class of models and analyses Evans has been leveraging is Long Short-Term Memory (LSTM), which is able to also model the temporal component from a series of images.

Discussion:

- Dennison: When mapping these wetlands, can you start classifying them for woody wetlands, productivity and height?
 - Evans: That is a common question. Philosophically, yes. The limitation often comes down to training data and the models we're using need to be provided with classification examples that we are confident in. Finding enough of those examples that we are confident in has been a limiting factor, but if that data was readily available, the model should be able to distinguish the different types.
- Palm-Forster: When you train a model in a particular geographic location, how easily can you apply it to another location?
 - Evans: We encountered this with the wetland work; the model was initially trained with data from Minnesota, New York, Delaware, and another location. When using it for Lincoln, Nebraska, the landscape was different enough that the model was inefficient but it was able to be refined quickly and without much training data from that landscape. We want to include as much realistic variability as possible in the initial training to make the model robust in different geographies but it may need to be refined and retrained in a new landscape.
- Sanford: How sensitive are the outputs to the amount of data, the order which it's put in, and the complexity of the model that you choose? Do you get very different answers if you change one factor?
 - Evans: We've not experimented much with changing variables. From my work with these programs, I don't think the order would matter or that the structure would produce very different results. The model learns what is important to pick up from the input data during the training process.
- Matt Baker (UMBC): How long does it take to run that process given the supercomputing infrastructure?
 - Evans: With all the data gathered, training the model is a 48-72 hour process. A trained model running through predictions for the watershed is a 24-48 hour process. The more time-consuming step is getting all the imagery stacked and

sampling all the chips; it was a long process to get the infrastructure built and now it takes weeks to a couple months.

- Christine Kirchoff (PSU) [chat]: What is the minimum size you can map of wetlands or of solar arrays or of something else?
 - Evans: The minimum size is somewhat dependent on the resolution of the imagery. The solar arrays uses ten-meter resolution, so a very small panel will be missed.
- Fowler: I can see using these visuals to show the benefits that farmers and producers in the field are enacting, as well as to show the changes over time. I encourage STAC and other parties to think about the use of this technology.
- Baker: One of the drawbacks for neural networks has been that we don't know "what makes the secret sauce." Are there approaches you have become aware of for understanding what factors are important in driving the predictive accuracy?
 - Evans: As I understand, the approach is to isolate the weights that are learned and visualize the activation, similar to a heat map. Then correlate that to try to understand what the model is learning. I haven't studied this but with the wetland work, we experimented with models and variables to see which are actually important in the learning process.
- Boomer: At a recent agriculture conference with the U.S. Soybean Board and other partners, there was a strong interest in the power of AI and two key points STAC should keep in mind. 1) These are statistical models and the results are only as good as the input. STAC has a role in thinking about the conceptual models that are driving our decisions about what data to collect and feed into these AI models. 2) It's important to understand the mechanisms driving the patterns that we see from AI analyses in order to manage them and to know where and when a particular practice can provide the targeted benefits. There is a lack of understanding of these mechanisms and it is STAC's responsibility to keep abreast of these concerns when advising the Bay Program on using the technology.
 - Shenk: Announcement: The EPA has put out a [Request for Applications](#) (RFA) for leveraging high resolution watershed data for water quality modeling using machine learning.

[Briefing on Findings from the FY22 STAC Workshop "Using Local Monitoring Results to Inform the Chesapeake Bay Program's Watershed Model" and Request to Approve Workshop Report](#)

– KC Filippino (HRPDC)

KC Filippino (HRPDC) summarized the STAC Workshop, "[Using Local Monitoring Results to Inform the Chesapeake Bay Program's Watershed Model](#)," that was held on March 7-8th, 2023 in Fairfax, Virginia. The objectives of the workshop were to: 1) Identify current monitoring data that can be used to inform watershed model processes under Phase 7 of the model. 2) Determine how representative the monitoring data is of watershed-wide conditions. 3)

Determine if any additional analyses of existing data would make it useful for informing the watershed model. 4) Identify potential changes to current local monitoring programs that would make their data more useful for informing watershed model updates in the future.

Discussion:

- McDonnell: Has the group considered mapping land use data through time and comparing that to policy decisions?
 - Filippino: Looking at land use change and what is affecting the trends over time is a necessary action. However, we first need to generate the trends over time and it is just now ten years which is not enough time.
- Leon Tillman (USDA-NRCS): There's been a lot of discussion related to monitoring and small agriculture watersheds. Was there any discussion about recommendations for how to approach better quantifying BMP effectiveness?
 - Filippino: This was a large part of the discussion and the recommendation was that we need a whole other workshop on it.
 - Shenk: I was the breakout leader for the Agriculture group and the general consensus was that even with new monitoring tools, the characteristics of the agricultural watersheds was often not understood. Hypothesis-based monitoring design, in which the desired type of data is identified before monitoring is set up, could be useful but feedback was that it wasn't always foremost in how these monitoring studies had been designed in the past.
- Miller: One of the recommendations from the CESR report that has been widely praised is the idea of sandboxing. To do sandboxing, an intensive monitoring program is needed to go along with what is being sandboxed. There are places that have studies that were designed based on something that was about to happen, such as for BMPs in the Clarksburg area of Montgomery, MD. The county started with the decision to develop watersheds and then studied the impacts.
- Fowler: Setting up monitoring networks is expensive. In the workshop, how did you discuss funding for new monitoring and also for maintaining existing monitoring?
 - Filippino: We did not talk about funding during the workshop but that is one of the big issues at Hampton Roads. What would be helpful is the recognition of the importance and value of monitoring data by the Bay Program for appealing to local practitioners.
- Breck Sullivan (USGS): Would you include participatory science monitoring and community monitoring in the definition of local monitoring?
 - Shenk: When there was a recommendation to develop new statistical tools, part of that was to take advantage of the large amount of synoptic monitoring that has been done in the watershed but not integrated into decision making. Community monitoring gathers synoptic samples but from those at the

workshop, it seems this data has not been used, perhaps due to the lack of methods developed for that.

- Filipino: To clarify, the next steps for the workshop would be to shop the recommendations around the Partnership to get the recommendations filled?
 - Boomer: There is not a general plan of action following STAC approval of the report. We hope that the report will go out to the relevant entities to the Bay Program to inform and guide decisions.
- Boomer: I have a discomfort with the term sandboxing. It is jargon that could confuse partners that are not regularly part of these conversations.
 - Filipino: This workshop convened shortly before the CESR report was released and sandboxing was the buzzword at the time.
 - Boomer: Regarding the CESR report, STAC should consider whether it wants to continue using this jargon of sandboxing.
- Boomer: In Recommendations to the Bay Program 5, monitoring and modeling are separated with monitoring being favored while in Recommendation 7, promotes hypothesis-driven design. These recommendations seem contradictory; to me, model is the same as hypothesis. Is this a point that needs clarification?
 - Shenk: The question of the workshop was “how are we going to use this [monitoring] information to get into the decision model that is used by the Bay Program or the Chesapeake Assessment Scenario Tool (CAST)?” It has to get into CAST to be part of the TMDL. One of the county participants asked if monitoring can be used directly in policy; the discussion then focused on using the monitoring results as a measure of policy effectiveness. That is the thought that is trying to be interjected into the Bay Program.
 - Boomer: My concern is that it’s still a model being used for that accounting framework and if we’re seeing different results than expected, that should be informative to thinking about uncertainty in our models. I am concerned about reinforcing the disconnect between monitoring and modeling when the work would benefit from integration.
 - Shenk: I think we’re on the same page. The predictions of how nutrients are changing in the watershed are better in many places for nitrogen while not as well for phosphorus. We need to upgrade our assumptions; the watershed model used for the TMDL is the accumulation of knowledge that the Bay Program has, developed by the entire Partnership. In that, watershed studies can be used to generate knowledge and affect policy. When predictions are opposite observations, that’s a problem that can only be understood with more research like small watershed studies.
 - Shabman: The term sandboxing is taken from the International Literature on Insurance Reform and a paragraph in the CESR report explains how it is different from a pilot. One challenge for the Bay Program is what to do if the findings in

the watershed are better than the model predictions and how to incentivize implementers to do better than the model. This is considered in the CESR report through sandboxing.

- Gilinsky: What steps have to take place to implement this local monitoring? Is it a three-year process to figure out how to put local monitoring data into the Bay database to use in the model?
 - Shenk: There are three basic ways information is used in the watershed model.
 - 1) Calibration: Bertani is gathering data from throughout the watershed and Zhang will help get it into loads. That database will be sent to the Partnership for review and feedback for missing data. If local monitoring has an estimate of loads for an area for a time period, that data can be used directly in calibration.
 - 2) Knowledge Generation: Various monitoring can be combined into a spatially referenced regression on watershed attributes (SPARROW) model.
 - 3) Validating Predictions of the Watershed Model: A trend is calculated from monitoring data that does or does not contradict what the watershed model is saying. Based on the implementation of management practices and changes in land use, perhaps that can be used in policy. Past estimated load reductions or increases and expected trends can be viewed with the [Nontidal Network Mapper](#).
- Alex Echols (Campbell Foundation): I worry about fatigue of those that are doing the on-the-ground management when the model doesn't show any movement; the CESR report's recommendation for finer granularity may help the Bay Program to engage stakeholders more positively. Did the workshop consider the social implications of engaging managers if they have finer resolution of data?
 - Filippino: It was considered; beyond the scope of the workshop, it is built into some of the recommendations. This is the tip of the iceberg for understanding what monitoring data can provide.
 - Echols: Keeping farmers and those in the conservation community engaged is critical. If we can help them identify where they're having an effect, it can keep them much more highly motivated.

Fowler made a motion to approve the workshop report, seconded by Palm-Forster. No objections were made.

DECISION: STAC conditionally approved report for the workshop "Using Local Monitoring Results to Inform Chesapeake Bay Program's Watershed Model," following the completion of the USGS review.

[Moving Forward, Faster Together](#) – Lara Fowler (PSU), Leah Palm-Forster (UD)

Fowler and Palm-Forster presented on how STAC and the CBP can accelerate implementation and effectiveness, which is important with the current 2025 goal progress and Beyond 2025 discussions. Key findings from the [CESR report](#) show that new implementation tools and strategies are needed, along with institutional innovation. These findings are supported by

findings from the [Chesapeake Governance Study](#), STAC workshop “[Overcoming the Hurdle to BMP Implementation](#),” STAC workshop “[Is targeting the answer?](#)” and [PA in the Balance](#). From a behavioral-economic lens, Palm-Forster suggested thinking more carefully and testing different approaches to change decision-making environments since the structure of the decision-making environment can affect people. The [Agri-Environmental \(Ag-E\) MINDSPACE framework](#) is available to consider the ways to construct decision-making environments during program and policy implementation and the [Center for Behavioral and Experimental Agri-Environmental Research \(CBEAR\)](#) has put together several short reports to help apply MINDSPACE insights.

The CBP’s challenge is to find examples of successes, try different strategies, and consider how to apply these at larger scales to get to the desired outcomes and opportunities arise in targeting areas that will have a higher impact (i.e. low-hanging fruit). The practice of “sandboxing” is a systematic approach to testing different strategies to see what works and then expanding them, which is useful in piloting and experimentation. Palm-Forster talked about a [pilot project](#) in Georgia to improve water management by reducing the groundwater pressures caused by agricultural irrigation. Fowler talked about the work of [Lancaster Clean Water Partners](#) in bringing people together to start to solve issues in one of the hot spots within the Bay watershed. This presentation was to prompt STAC Members to think of ways to accelerate water management actions and to consider what pilots will or should look like.

Discussion:

- Hayes: Stories are very effective in finding common ground among diverse groups and constituencies. Could you talk more about your use of stories?
 - Fowler: It’s hard to get work done with the narrative that scientists don’t know how to carry out solutions; in LA and Washington, a narrative switch to everyone working together at the local level seemed to result in lesser worth of damages from floods and a faster recovery. Story telling is a different way of looking at the world and important in shifting the narrative. There are current pilots ongoing and the question turns to how to accelerate the pilots and then share stories of success.
- Dennison: The Chesapeake Report Card is as regional as possible given current data available and creates peer pressure and competition. Interregional program comparison might be the way to affect behavior change. How can we use the power of our granularity of our data to incentivize this comparison and highlight good behavior rather than just bad behavior?
 - Fowler: In Chehalis, newspapers would only cover the program when things were going poorly; scientists had to write their own story when things were getting done. In the communication world, bad news sells; solutions lie in journalism networks that focus on successes stories. Consideration should be put on making the comparisons and proactively telling the success stories.
 - Palm-Forster: The presentations from earlier in the day on using AI technologies to report and demonstrate success on a finer scale and engage people differently could be incorporated into a pilot. It taps into many of the things that matter to

people; putting things at a finer scale increases the salience of understanding the connection between the action and the outcome, and it provides an opportunity to tap in to the comparisons made across groups and to engage groups of people to allow solutions to come from the ground up.

- Boomer: We've highlighted the idea of developing and supporting pilot projects and there are current sandboxing projects where outreach specialists are working with researchers and landowners to put practices on the ground within the regulatory framework set in place. An opportunity to support or advance suggestions would be to bring in Christine Kahn and Amy Handon and their efforts.
- Keisman: 1) How is the scalability of sandboxing and pilots evaluated and is it being done? 2) Does the need for sandboxing and pilots to have an observable effect constrain these projects and possibly remove things that need to be done?
 - Fowler: Yes, so we need to consider other places where we can do more micro-experiments and better control it.
 - Palm-Forster: Though controlled research is important, there are opportunities to do exploratory research that does not emphasize measurements but rather ask and learn from important questions. These opportunities take partnerships as a first step; a researcher may not appropriately develop an experiment that is scalable as they are not implementing such solutions every day. It is critical to work with those who are implementing programs and to understand what matters to them to be able to move forward at a larger scale. This also creates opportunities for continuity and refinement of pilot experiments.
- Letavic: 1) I think that scaling can only occur if our Workforce Development goals continue to get implemented. Forty years of work has developed a network of people paying attention and funding to demonstrate that the work is worth it, which will give us the momentum to keep propelling forward for the next 40 years.
- Shenk: Measurability relates to scale – all of these plans rely on measurability of some outcomes but some measurements are more accurate at smaller scales while others are more accurate at larger scales. Previous STAC reports have discussed some of the difficulties of measuring in small watersheds and the need to roll up the information to make better sense of it.
- Knoche: My understanding is that most small-scale experiments, especially in education, don't replicate of scale out because of selection problems. I'm concerned that the people that opt into these experiments are not representative of the broader population; to what extent do you consider that and mitigate for that in your work?
 - Palm-Forster: We think about who is engaging in the experiment and try to reach the right population to get a sample from. The best approach within the watershed is to work within the current system.
- Sanford: Is there a participation threshold for the experimentations or pilots?
 - Fowler: From working on large-scale mediation questions, there were usually two or three people to propose a different way and scale from the bottom up – as large as an entire watershed and an entire state. A personal frustration is the

amount of money spent on projects is much greater than the spending on process.

- Palm-Forster: The sample and participation is important because it affects the researcher's ability to actually measure an effect of what is being tested; even if an effect exists, too small of a sample might not find that effect.
- Alex Echols (Campbell Foundation): There's a fundamentally different social operation going on in Lancaster – the WIP was not developed by a collaborative group rather than a state or agency. There is not an equivalent of this partnership anywhere else in the basin, as far as Echols is aware. Lancaster has an incredible rate of change and is effective enough to be able to de-list rivers in the upcoming years.
- Yusuke Kuwayama (UMBC): Pilots will need to be prioritized in some way with limited resources and time to conduct; perhaps a separate exercise in understanding stakeholder relationships, constraints and incentives might be valuable and parallel.

Interaction Between STAC and the SRS and SSRF Process – *Carl Hershner (Retired, VIMS), Meg Cole (CRC), Breck Sullivan (USGS)*

Carl Hershner (Retired, VIMS) presented on the origin of the [Strategy Review System](#) (SRS) and the [Strategic Science and Research Framework](#) (SSRF). Hershner suggests that the key activity STAC can play in moving the Bay Program and helping enhance its efforts to achieve a socioecological perspective is to begin asking the critical questions of the GITs and the MB. These would be: What exactly do we want to accomplish? What has to be managed for us to get there? If we can't manage the critical things, why are we doing this? How do we know when we are succeeding or when we are failing? What are the bounds of the response that we should be seeing?

Sullivan and Cole proposed changes to the interaction between STAC and the SRS. Currently, STAC is integrated into the process as a review for the science needs that have been developed and prioritized by STAR; at previous quarterly meetings, Sullivan and cohort representatives would present science needs from various Outcomes and ask for STAC support. With feedback from previous meetings and to implement adaptive management, Sullivan and Cole suggest that STAC have an earlier involvement in the process; members can connect to the cohorts while the logic and action plans are being drafted to better ask and fulfill the critical needs questions. This will allow STAC to better focus on research needs over technical and tool development needs and to follow the progress of the GITs more closely.

Each STAC member will be paired with one or more Bay Program Outcomes based on their expertise and interest and will provide mentorship during the development of logic and action plans. The responsibility of STAC members will be to attend the one to two GIT meetings each year in which they review their logic analyses and advise on the framing and prioritization of [science needs](#). GITs also request for STAC input on indicators, GIT funding projects, and tools

for specific projects, though the interaction with each GIT will be different as the teams have their own approaches to the logic analysis. To implement adaptive management, STAC members may be matched with Outcomes different from their main expertise. The first cohort in the SRS Cycle will be presenting to the MB in December; the SRS Cycle is also undergoing changes at the same time, so the new structure of STAC in the cycle will be an iterative process.

Discussion:

- Rose: Prioritization is a necessity. Did you ask the GITs their rationale for why it is a critical need?
 - Sullivan: The GITs are asked to self-prioritize between 'high,' 'medium,' and 'low' but sometimes needs aren't prioritized or all Outcomes are marked 'high.'
 - Rose: The cost of obtaining Outcomes as a priority can be factored in as well. This can be difficult since the science needs and the level of priority for each are coming from different sources. Perhaps a group can create a strategy for how to factor in the evidence of each need's importance and a ranking among their own group [of needs] to better systematically sift through the lists.
- Meg: We will also have a STAC-wide conversation, potentially annually, to talk about lessons learned and check in about integration into the SRS. Feedback from members will help to adjust interactions to be more efficient.
- Tess Thompson (VT) [chat]: Are the GIT meeting agendas published in advance? How do we determine when those specific meetings [discussing their logic analysis] are?
 - Saunders [chat]: Goal teams each have a page where they post their members, agendas and meetings. You can look at the [chesapeakebay.net calendar](http://chesapeakebay.net/calendar) to find when goal teams or workgroups are meeting. I would suggest that once we know who the STAC mentors are for each outcome, Sullivan, Cole and I can help connect the STAC members to the coordinators for each team.
- Havens [chat]: We should keep in mind that one role of STAC members is to help connect to other experts in various fields.
- Boomer: Can you say more about the intent to revisit the SRS process and the implications for STAC's participation or engagement in it?
 - Sullivan: Jeff Lerner (EPA) and Sarah Brzezinski (EPA) presented to the recent MB meeting and proposed a new time frame and way of moving through the SRS where Outcomes will be able to present to the MB every year but not have to walk through their logic framework each time. STAC would help the groups with logic frameworks. The proposed SRS revisions have not yet been approved by the MB.
- Fowler: Dennison, how does this all fit into the [Chesapeake Bay Report Card](#) process? Do you guys raise these same types of science questions? Are they separate or connected? Are there ways to accelerate this from what you see?

- Dennison: The Report Card team consults and collaborates with [Council Fire](#) for environmental economics and the [Centers for Disease Control](#) to develop the Environmental Justice Index, as well as the Bay Program, which most of the environmental data comes from. The Report Card is not embedded in the Bay Program but works in parallel; the Office of Management and Budget (OMB) had advised for some degrees of separation to mitigate biases. While not fully separate, the Report Card maintains autonomy and independence and is constantly evolving. While STAR is a partner in presenting its release each year, the Report Card does not fit into the Outcomes nor do the GITs impinge on the assessment; it also augments progress reports of watershed efforts to government executives and encourages dialogue within the broader public.
- Saunders [chat]: The data for the report cards is drawn from resources including the ChesapeakeProgress reporting (which the SRS supports)
- Fowler: We might want to also include success stories along with the reports of what is not working and what needs to change. A conversation to address for the SRS and STAC interaction is how to most efficiently incorporate members to help; the community is already stretched thin and there might be reluctance to attend even more meetings.
- Dennison: The proposition for STAC members to attend only a few meetings with the GITs, rather than their monthly meetings, is a more efficient way to engage. As scientists and researchers, STAC would do best to prepare and provide input and then let the goal teams process.
- Cole: Hopefully the coordinator will brief STAC members before the meeting on the conversations of the goal teams and the advice they are seeking.
- Miller: Many STAC members are new since the beginning of the year. It would be good to have members submit a longer list of their expertise and interests to better link them with Outcomes.
- Saunders [chat]: When we were reshaping this process to lighten the load, I likened this new sequencing approach to having STAC members parachute into a workgroup/goal team for one or two meetings when the team is going through their analysis of the logic. They look back at their work and lessons learned over the last two years, show their progress, evaluate how they need to modify or change approaches and then make the next two year plan. This would take up less of STAC members' time and use their expertise in the best way to make sure the logic is sound and that the science needs make sense and the goal teams are adapting.
- Gilinsky [chat]: I support a change about when STAC interacts as many of us have felt there is not much to say by time Sullivan comes to us at the quarterly meetings.
- Boomer: This proposal highlights the integrity the adaptive management process with being able to fully reflect and learn and improve. The process will be easier, more

guidance and directive will be available to all GITs to facilitate their efforts, and STAC members will be able to better engage in the process, which can be a STAC-wide conversation.

- Sullivan: The role of the yearly conversation would be to check in with members on their interactions with the Outcome groups and GITs and search for common threads that seem to help GITs across the board. This will give STAC the opportunity to provide assessment on the actual SRS process and help to adjust and adapt it.
- Cole: From here, the first step will be for members to update their expertise with STAC Staff. I'll match members to the cohorts and Outcomes in the coming weeks.
 - Dennison: Maybe ask members for a ranking of the goals they are most interested in as both expertise and interest will be relevant to matching.
- Boomer: In SRS conversations in future STAC meetings, we will have to ask the question, are we forgetting about creating opportunities to learn to advance the science as we're advancing management? Technical learning is one of the objectives of that process.

DECISION: STAC members will interact with the SRS process through attending specific meetings to advise Outcome groups on the development of their logic analyses.

Before calling for recess, Boomer acknowledged STAC members cycling off in September 2023. STAC Leadership thanked Lara Fowler, Andy Miller, Jeremy Testa, Len Shabman, and Jay Stauffer for their contributions to STAC during their respective terms.

Wednesday, June 14th

Attendance:

W = webinar

Members: Matt Baker (UMBC), Kathy Boomer (FFAR), Tony Buda (USDA-ARS – **W**), Shirley Clark (PSU), John Dawes (The Commons – **W**), Bill Dennison (UMCES), Celso Ferriera (George Mason University – **W**), KC Filippino (HRPDC – **W**), Lara Fowler (PSU), Kathy Gee (Longwood University), Ellen Gilinsky (Gilinsky, LLC – **W**), Kirk Havens (VIMS – **W**), Ben Hayes (Bucknell University), Jason Hubbard (WVU), Jeni Keisman (USGS), Christine Kirchhoff (PSU – **W**), Scott Knoche (Morgan State, PEARL), Ellen Kohl (UMBC – **W**), Yusuke Kuwayama (UMBC), Erin Letavic (Herbert, Rowland, & Grubic, Inc.), Dave Martin (TNC), Andy Miller (UMBC), Mark Monaco (NOAA), Efeturi Oghenekaro (DOEE), Leah Palm-Forster (UD), Joe Reustle (Hampton University – **W**), Kenny Rose (UMCES), Mike Runge (USGS), Larry Sanford (UMCES), Leonard Shabman (Resources for the Future – **W**), Tess Thompson (VT – **W**), Joe Wood (CBF – **W**), Weixing Zhu (Binghamton – **W**)

Guests: Camryn Arnstein (MDE – [W](#)), Doug Austin (EPA – [W](#)), Mike Beezhold (KDHE-BEFS – [W](#)), Doug Bell (EPA – [W](#)), Joe Berg (Biohabitats), Gopal Bhatt (PSU – [W](#)), Daniel Chao (LGAC – [W](#)), Nicole Christ (MDE – [W](#)), Ashley Dayer (VT – [W](#)), Becky Epanchin-Niell (UMD), Jason Farnsworth (Headwaters Corporation – [W](#)), August Goldfischer (CRC – [W](#)), Alex Gunnerson (CRC – [W](#)), Adrienne Kotula (CBC – [W](#)), Lew Linker (EPA – [W](#)), Edwin Martinez (USDA-NRCS – [W](#)), Kevin McLean (CBP – [W](#)), Laura Cattell Noll (Alliance for the Chesapeake Bay – [W](#)), Jillian Seagraves (National Park Service), Gary Shenk (USGS), Jennifer Starr (LGAC – [W](#)), Breck Sullivan (USGS), Stefanie Taillon (VAFB – [W](#)), Peter Tango (USGS – [W](#)), Arthur Wardle (UC Berkeley)

Administration: Meg Cole (CRC), Tou Matthews (CRC)

Framing the Discussion: [Institutional Learning: Informing watershed management through an inter-regional program comparison](#) – *Kathy Boomer (FFAR)*

Over the last two years, STAC has been exploring how to use the adaptive management framework to guide its work and create feedback to the Bay Program. Boomer reiterated the adaptive management process to STAC and other parties, of which revisiting the goals and objectives and overarching implementation strategies, or institutional learning, is a key part in the process. Social science plays a large role in working with stakeholders to set trackable and feasible goals. At the June Quarterly Meeting, STAC proposed looking at the structure and project implementation of other programs to advise the Bay Program’s decisions for 2025 revisions.

Provocateur Panel: Exploring the Successes and Challenges of Water Resource Management Programs That Compare in Scale to the Chesapeake Bay Program – *Edwin Martinez (USDA-NRCS), Ellen Gilinsky (Ellen Gilinsky, LLC), Jason Farnsworth (Platte River Recovery Implementation Program), Michael Beezhold (KS Dept. of Health and Environment), Arthur Wardle (UC Berkeley)*

Edwin Martinez (USDA) presented on the [Great Lakes Restoration Initiative](#) (GLRI), which is one of many approaches that the Natural Resources Conservation Service (NRCS) has developed with federal, state, and private partners to improve water quality in the Great Lakes Region. The GLRI is accelerating Great Lakes and public health more than any other coordinated interagency effort in U.S. history; it is currently on the third Action Plan that is implemented into 2024 and the next action plan will soon be developed. The Action Plans have multiple focus areas to guide the actions of various stakeholders, who are able to provide feedback twice yearly at stakeholder forums.

Gilinsky shared her experiences working with the [Mississippi River/Gulf of Mexico Watershed Nutrient \(Hypoxia\) Task Force](#) (HTF), which focuses on reducing nutrient loads into the Gulf of Mexico via the Mississippi River. These efforts do not have a dedicated funding stream and the action plan has a science-based goal; Gilinsky believes the inability to measure and track progress towards the goal is a problem since there are many other variables contributing to

nutrients in the Gulf besides the Mississippi River inputs. Membership of the HTF includes five federal agencies, the National Tribal Water Council, and the twelve mainstem states of the Mississippi River, which is only half of the Mississippi River Basin. Participation is voluntary but there are many people engaged; the involved states meet in a forum to learn from each other and the federal partners coordinate. The land grant universities created the [Southern Extension and Research Activities Committee Number 46](#) (SERA-46) to advise the HTF, developing a research plan and a science priority plan.

Jason Farnsworth (Platte River Recovery Implementation Program) presented on the [Platte River Recovery Implementation Program](#), which is an endangered species recovery program in the Platte River Basin, a major tributary of the Missouri River. Due to the arid region and historic conflicts, water quantity has a greater emphasis than water quality. Unique to the program is that power is not consolidated in the partnership and decision making is made with a consensus, and that the executive director, staff and financial management are all independent from the partners. Farnsworth also introduced structured decision making (SDM) and advised STAC on ways to incorporate this framework based on observations from conversations from Day 1.

Michael Beezhold (KS Dept. of Health and Environment) presented on the [Kansas Watershed Restoration and Protection Strategy](#) (WRAPS). The Kansas Department of Health and Environment are responsible for water quality, the Kansas Water Office monitors water quantity and the Kansas Department of Agriculture and the Division of Water Resources manages water rights. WRAPS is funded through federal, state, industry, and municipal sources; there are currently fourteen active projects that WRAPS works with not-for-profit organizations to implement. Priority watersheds are generally related to reservoirs that have drinking water allocations; watersheds of less priority are managed through funds given to the Kansas Association of Conservation Districts, which has county-level mechanisms to facilitate funds into practice. Beezhold discussed examples of practices with partners such as specific agricultural management, marketing and outreach, and permitting and crediting.

Arthur Wardle (UC Berkeley) presented on the [Sustainable Groundwater Management Act](#) (SGMA) in California. Due to constant issues of water scarcity, groundwater plays an important role in agricultural and municipal consumption of water and can exceed 50% of water consumption in drought years. Groundwater use was unregulated in California beyond exportation restrictions until the SGMA passed in 2014 that split the state into subbasins, within which the local area had to create a groundwater sustainability agency (GSA) to develop and implement a plan to restore their subbasin by 2040 or 2042. GSAs write their own groundwater sustainability plan (GSP) or collaborate to write an overarching plan; in order to understand and manage the aquifers effectively, a large part of the documents is scientific information. Each GSA defines sustainability for themselves, within the SGMA broader guidelines, creates specific goals and measurable objectives, and then determines their

management actions. It is too early to determine the efficiency of the program; at the moment, all GSPs have been submitted and the State Department of Water Resources is midway through the process of reviewing the plans for adequacy, some of which have already been returned with a call for revisions.

Discussion:

- [to Martinez] Fowler: What were the opportunities, barriers, and key lessons learned while working with so many stakeholders? What might be able to be applied to Chesapeake stakeholder engagement?
 - Martinez: The forums that are held twice a year in different locations within the Great Lakes region has worked well. The GLRI encourages landowners and other participants to join and usually have a good turnout. Great Lakes Day gathers people in D.C. who are from the Great Lakes Region to discuss with the Canadian Embassy restoration work that has been done and ways to improve. Within the region, there is a lot of interest, participation, and commitment among the different stakeholders; the main challenge is outreach and education in such a large region. The interagency agreements offer a unique opportunity for all agencies to be working in one template but it can be difficult to coordinate that effort.
- [to Martinez] Palm-Forster: It is amazing how many projects have been implemented and people invested in the region. Is there a process in place to take lessons learned from smaller scale projects and think about which should be scaled up and prioritized?
 - Martinez: There is not a specific process in place; funding is targeting different conservation partners from the local, state, and federal agencies, which offers the opportunity for all different projects. The coordination within the Great Lakes is the opportunity for a project to scale up.
- [to Martinez] Ashley Dayer [chat]: What is the role of the relative influence of regulatory versus voluntary programs to get practices off the ground?
 - Martinez: The funding comes from the EPA, which is a regulatory agency, and voluntary agencies like NRCS. The NRCS works through the Farm Bill Program Delivery so landowners that receive funding do not know which agency it is coming from other than the GLRI while federal funding works differently. The GLRI has a heavy demand since the program has been successful in its research, practice, implementation, and agency coordination.
- [to Gilinsky] Dayer [chat]: Why aren't farmers, ag, city, industry at the table? What are the barriers to change this? What would be the benefits (or concerns) of more meaningful involvement of them?
 - Gilinsky [chat]: The membership of the HTF is set by the Congressional Act. Many lawyers at EPA have looked at this – to add others would constitute establishing a Federal Advisory Committee Act (FACA) which could be done but is

a whole other process. So that is the barrier another group would need to be established which takes time and money. The workaround has been to have informal and public discussions involving other stakeholders.

- [to Gilinsky] Miller [chat]: It seems strange that there is no dedicated funding compared to \$300 million per year for Great Lakes despite the strong national interest in conditions in the Gulf of Mexico. Is this because Great Lake states are more unified because almost all of them actually border one of those lakes and have more of a stake in Great Lakes water quality and living resources? Is it just multistate coordination that brings a large enough number of members of Congress to push something through?
 - Gilinsky [chat]: There have been attempts to get sponsors in Congress for a dedicated funding bill but there are so many states, and a lot of politics in the basin. Also, the ag community looks at other programs like Chesapeake Bay that have money and regulation, so that is a fine line to walk. There are ongoing efforts to get sponsors in Congress particularly by the non-government organization community.
- [to Farnsworth] Boomer: Is it fair to call the [Compass consulting](#) a specialized facilitator?
 - Farnsworth: Yes, they understand the science they deal with. Even ignoring such consultation, consider how to link policy questions and decisions back down to science implementation. Also, in traditional adaptive management language, sandboxing is essentially management experiments that will inform decision making.
- [to Farnsworth] Sullivan: How did you incorporate SDM throughout the program? It is something we have mentioned throughout the Bay Program, but training and integration has been slow/hard.
 - Farnsworth: We use SDM at the adjust stage of adaptive management to help policy makers decide how to adjust management. [Example](#).
- [to Farnsworth] Shenk: Your statements about the complexity/confidence tradeoff resonate with us in the Chesapeake. New STAC member Theo Lim has written a couple of papers about our transition to simpler models and some positive and negative outcomes of that process.
- [to Wardle] Boomer: How the state has provided science support is essentially what reduced the transaction costs of developing and implementing those programs on the ground, right?
 - Wardle: Engagements take in a lot of different forms. Science advisors from the state agencies have been made available and helped GSA by accessing state data and organizing workshops for plan development. Different environmental groups have done the same in more informal ways. A large part of the grant for implementation has supported the science research that went into putting the GSPs together.

- Fowler: There seems to be common themes from all of the panelists on the questions of how to bring science to the table and how to deal with uncertainty. We are also at an inflection point of trying to deal with insufficient funds and rapidly changing conditions. As Farnsworth said, we need to be making structured decision making processes in this, and Beyond 2025 offers an opportunity for that.

Response Panel & Group Discussion: How can we advance CBP science-based resource management? – Daniel Chao (LGAC), Leah Palm-Forster (UD), Becky Epanchin-Niell (UMD), Ashley Dayer (VT)

The response panelists provided initial thoughts of connections between Bay Program efforts and the watershed programs presented by the previous panelists. Becky Epanchin-Niell (UMD) thinks that combining greater regulation with the existing voluntary participation in the Bay Program could contribute to success and that the program may need to evaluate the distance between goals and the co-benefits experienced by practitioners. Palm-Forster would like to see the Bay Program build on its culture of experimenting on the social science side through its existing partnerships and to explore the opportunities of experimental management implementation. Dayer advised bringing practitioners to the table for more meaningful stakeholder engagement and to include social science on top of the natural science when making science-based decisions. Daniel Chao (LGAC) emphasizes the need for scientists to advise policy makers, decision makers, and elected officials directly with the risk of these decision makers finding and interpreting information without proper context.

Discussion:

- Kuwayama: Understanding uncertainty and adjusting to it is at the heart of adaptive management. Knowing how programs and partnerships at different levels think about uncertainty and the values they hold around it will be an ultimate driver for implementing adaptive management.
 - Farnsworth [chat]: 1) If uncertainty becomes a focus area, pause and think about whether there is an underlying values conflict. 2) Once you deal with value conflicts, remaining uncertainty can be assessed relative to decision making.
- Sullivan: Decision makers lack the time to look into the science sent to them if it is not seen as urgent enough. How can we make sure that the tools and the science that we're developing gets to those local entities and is being utilized?
 - Chao: Elected leaders are most concerned with their constituents' opinions; showing up to a public event to engage with them and let them know why you care about this topic can be effective, particularly at the local and federal level. Local leaders have fewer resources and need more engagement with scientists, to tell them *this is where the additional information is and this is why you should care*.

- Dayer: For science to actually lead to implementation, scientists need to take the additional steps to take the additional steps to building personal relationships. That is difficult for a variety of reasons; structures that integrate scientists with decision makers and science users are the most effective. STAC should consider if being separate from the users of science is the most efficient structure and how you can integrate with those users of science.
- Epanchin-Niell: I agree with Dayer; the most effective experience I've had in having my science adopted and informing policy was when I developed that science together with the stakeholders and decision makers addressing the problem. We need to know what information to gather that is going to be useful to policy makers, decision makers, and managers as well as consider the cross-sector impacts of different choices and strategies.
- Miller: These points affirm the changes that STAC has been trying to make in the past few years from connecting workshop reports directly to decision makers to the recommendations of the CESR report. Decision makers are now at a critical point and STAC needs to uphold its role in pointing in the right direction.
- Chao: The CESR report helped me and my colleagues in LGAC share information with constituents and neighbors.
- Boomer: There is a lot to unpack from this conversation; a major shift to think about is the emphasis on science-based decision making and commitment to co-developing information to support that science-based decision making.
- Keisman: Connecting to the EC Letter, STAC can include an explanation of and recommendation for implementing structured decision making.
 - Mike Runge (USGS): We could say in the letter that part of the implication for 2025 is the need to embrace the decision aspects of what the Bay Partnership and understand that it is a decision making endeavor that needs science, not a science endeavor that will eventually lead to decision making. This is a different framing that would change how STAC works and how it interacts with the MB and the partners.

The [STAC December 2023 Quarterly Meeting](#) will take place virtually on Tuesday and Wednesday, December 5th and 6th, 2023. The theme will be “Maximizing STAC’s Impact post-CESR.”

Minutes Approved by STAC at the [December 2023 Quarterly Meeting](#)