Chesapeake Bay Program's (CBP)
Scientific and Technical Advisory Committee (STAC)
March 2025 Quarterly Meeting Minutes
March 4-5, 2025; Virtual
Meeting Webpage

Attendance:

Members: Matt Baker (UMBC), Kathy Boomer (FFAR), John Bovay (VT), Chris Brosch (DDA), Tony Buda (USDA-ARS), Shirley Clark (PSU), Bill Dennison (UMCES), KC Filippino (HRPDC), Carl Friedrichs (VIMS), Kathy Gee (Longwood University), Jeni Keisman (USGS), Christine Kirchhoff (PSU), Scott Knoche (Morgan State, PEARL), Ellen Kohl (UMBC), Yusuke Kuwayama (UMBC), Erin Letavic (Herbert, Rowland, & Grubic, Inc. [HRG]), Dave Martin (TNC), Mark Monaco (NOAA-NCCOS), Greg Noe (USGS), Efeturi Oghenekaro (DOEE), Leah Palm-Forster (UD), Joe Reustle (Hampton University), Kenny Rose (UMCES), Mike Runge (USGS), Larry Sanford (UMCES), Tess Thompson (VT), Valerie Were (CIRA), Joe Wood (CBF), Weixing Zhu (Binghamton University)

Guests: Doug Austin (EPA), Doug Bell (EPA), Patrick Bitterman (Kent University), Jess Blackburn (Stakeholders' AC), Keith Bollt (EPA), Katie Brownson (USFS), Sarah Brzezinski (EPA), Ruth Cassilly (UMD), Joel Cover (EPA), Michelle Drostin (Green Fin Studio), Melissa Ehrenreich (ICC), Melissa Fagan (CRC), Su Fanok (TNC), Liz Feinberg (CalVan Environmental), Tom Graupensperger (Dewberry), Amy Handen (EPA), Scott Heidel (PA DEP), Eric Hughes (EPA), Ashley Hullinger (PA DEP), Lew Linker (EPA), James Martin (VA DCR), Martha McCauley (EAEST), Kevin McLean (VA DEQ), Sabine Miller (MD DNR), Daphne Pee (GWU, Stakeholders' AC), Lucinda Power (EPA), Kristin Saunders (UMCES), Jillian Seagraves (MD DNR), Kevin Sellner (Hood College), Gary Shenk (USGS), Kathy Stecker (MDE), Uchi Dominic Terhile (OBAGC)

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

Tuesday, March 4th

Call to Order, STAC Business, Announcements – *Larry Sanford (STAC Chair – UMCES)*
STAC Chair Larry Sanford (UMCES) called the meeting to start at 9:10 AM with a recap of the December 2024 Quarterly Meeting and the 2024 Executive Council (EC) Meeting. STAC Staff debriefed on STAC workshops held in the past quarter: Striped Bass Survey Assessment and Habitat Connections on February 13-14, 2025, and Leveraging Artificial Intelligence and Machine Learning to Advance Chesapeake Bay Research and Management: A review of status, challenges, and opportunities on February 24-25, 2025. The December 2024 STAC Quarterly Meeting Minutes and December and February Executive Board Meeting Minutes were approved without comment.

DECISION: December 2024 Quarterly Meeting Minutes approved; December 2024 Executive Board Meeting Minutes and February 2025 Executive Board Meeting Minutes approved.

Received STAC FY25 Workshop Proposals – *STAC Staff*
Before the meeting, STAC members reviewed the FY25 Workshop proposals for preliminary scoring. The lead proposers and/or STAC sponsors of each workshop proposal explained their proposed workshop and answered questions from STAC.

Lew Linker (EPA), with STAC sponsor Bill Dennison (UMCES), championed the proposal titled "*Thresholds in the Recovery of Eutrophic Estuarine Systems and Associated Watersheds*." The proposed workshop will focus on four main objectives: recent applications and lessons learned in eutrophic coastal watersheds; recent applications and lessons learned in coastal and estuarine ecosystems; challenges and gaps; and recommendations and opportunities. Improving our understanding of thresholds and breakpoints, particularly in relation to water quality and living resources, could enhance insight into trophic system responses and support more effective environmental management. These insights may help inform decision-making within the Bay Program and in other eutrophic coastal systems. The workshop aims to produce timely recommendations on threshold discoveries, approaches, and opportunities, and may yield new methods for addressing the complex interactions among watersheds, shallow waters, estuarine ecosystems, and climate change.

STAC sponsor KC Filippino (HRPDC) and Efeturi Oghenekaro (DC DOEE) championed the proposal titled "*A Cross-Disciplinary Evaluation of Urban/Suburban Soil Health and Management*." The goal of the proposed workshop is to bring together soil health researchers, stormwater and watershed management practitioners, and members of the ecosystem services community to share the latest information on the interconnected roles that healthy soils play in developed communities. The workshop will also explore opportunities to improve education and management practices that support soil health and promote overall community well-being. The Urban Stormwater Workgroup has recommended this workshop as a way to build on current efforts, including the use of carbon and biochar to improve water quality, as well as ongoing discussions related to the Urban Nutrient Management Expert Panel. The workshop is expected to produce a report outlining priority research questions, relevant case studies, and potential policy frameworks the partnership could pursue to advance soil health in urban and suburban settings.

Katie Brownson (USFS), with STAC sponsor Matt Baker (UMBC), championed the proposal titled "*Healthy Forests: Proactive Strategies for Managing Threats and Promoting Conservation*." The proposed workshop will focus on identifying major stressors to forest health and resilience in the Chesapeake Bay watershed and evaluating the extent to which these stressors may contribute to declines in forest condition. It will also examine how impairments to forest

ecology may affect forests' ability to improve water quality, the potential for such impairments to lead to forest loss, and the implications for achieving Bay Program goals. The workshop will culminate in the development of actionable recommendations to improve forest health and resilience and to support long-term conservation outcomes. As forests continue to face pressures from changing physical, biological, and social conditions, as well as from ongoing losses, these challenges threaten to undermine the progress made by the Partnership, the essential ecosystem services forests provide, and the Bay Program's water quality and habitat goals. The workshop will result in a final report summarizing the state of forest health and outlining specific management actions to support conservation. Additional materials will include an appendix synthesizing background information compiled in preparation for the workshop, factsheets tailored to local and small nonprofit audiences, and media briefs.

STAC sponsor Greg Noe (USGS) and KC Filippino (HRPDC) championed the proposal titled "*State of the Science (SOS) of Salinity Risks in the Chesapeake Bay and Its Tributaries – Connecting Monitoring, Modeling, and Management*." The proposed workshop aims to assess the state of the science on salinization in the Chesapeake Bay watershed, improve understanding of long-term trends and the frequency and magnitude of extreme salinity events, and identify effective strategies for anticipating and managing salinity changes. While salinity is now a common feature of both nontidal and tidal waters, there has been little comparison of its impacts across inland and coastal ecosystems. The workshop will produce a comprehensive assessment of salinity risks and highlight specific monitoring, modeling, and management needs related to urban runoff, wastewater, coastal water supplies, and other contributing factors. It may also inform the next phase of modeling in the Chesapeake Bay watershed. Let me know when you're ready to continue.

Gary Shenk (USGS), with STAC representative Christine Kirchhoff (PSU) and Denice Wardrop (CRC), championed the proposal titled "*Challenges and Opportunities in Operationalizing Coupled Human and Natural Systems Research (CHANS) in the Chesapeake Bay Watershed*." The proposed workshop will focus on synthesizing the current state of CHANS science and its relevance to addressing challenges in the Chesapeake Bay ecosystem, mapping feedbacks and identifying gaps, assessing existing CHANS applications, and developing recommendations for future use. CHANS research offers a holistic framework for understanding persistent watershed restoration challenges. Applying CHANS concepts can shed light on why current management efforts may fall short, how socio-ecological feedbacks influence both short- and long-term outcomes, and where scientific and modeling efforts should be directed. The workshop will result in detailed system maps that illustrate key socio-ecological feedback mechanisms affecting Bay restoration, a summary of gaps between current system dynamics and management practices, and actionable recommendations for testing CHANS-based approaches. Additional outputs will include a workshop report for Bay Program partners and a peer-reviewed journal article documenting the workshop outcomes.

Kevin Sellner (Hood College), with STAC sponsor Charles Bott (HRSD), championed the proposal titled "*Data Center Issues*." The proposed workshop aims to identify the characteristics of data center effluent in order to develop specific recommendations that minimize its impacts on wastewater treatment plant biological processes, equipment, and operations. It also seeks to establish pretreatment criteria or thresholds for data center discharges and to define effective strategies for salinity management, ensuring protection of publicly owned treatment works, receiving streams, and downstream uses. Given the rapid expansion of data center campuses, it is critical that their water demand, use, treatment, and discharge be assessed at the time of application to local governments and before any permits are issued. The workshop will produce a detailed report to be distributed to all counties currently hosting (or considering) data center development. The report will include recommended strategies and technologies to minimize threats to treatment processes, safeguard local water quality, and protect natural biogeochemical processes and habitat in nearby waterways.

Following discussion of the various proposals, STAC members agreed to provide an opportunity for proposers to revise and resubmit their proposals based on feedback received during the meeting. Once revised proposals are submitted, members will have the option to rescore them and provide updated comments, which should be sent directly to STAC Staff. Final decisions regarding which workshops will receive funding will be made by the STAC Executive Board (EB), based on the updated materials and revised scores.

DECISION: Proposers of FY25 workshop proposals will be given the opportunity to revise their submissions. Following these revisions, STAC members may submit updated scores. The STAC Executive Board will make the final decisions on funding allocations.

April 3rd Advisory Committee Meeting on CBP Outcomes – *STAC Staff*
STAC Staff announced a joint Advisory Committee meeting to take place virtually on April 3rd, 2025. Members of STAC, the Local Government Advisory Committee (LGAC), the Stakeholders' Advisory Committee, and the new Agricultural Advisory Committee (AAC) will receive an update on revisions to the outcomes in the 2014 Watershed Agreement and will have the opportunity to ask questions and provide initial feedback to the Management Board and other Chesapeake Bay Program partners.

Discussion:

- Sanford: We should also invite the chairs of the new Agricultural Advisory Committee (AAC) and make space to discuss what the partnership will look like when the federal agencies are diminished.

Short- and Long-term Role and Opportunity of STAC in Evaluating CBP Structure
– Greg Noe (USGS), Kathy Boomer (FFAR)

Greg Noe (USGS) and Kathy Boomer (FFAR) led a discussion on opportunities for STAC to contribute to the Beyond 2025 efforts by offering advice on structuring the Bay Program and the overall partnership to better achieve its goals. STAC was encouraged to consider both short- and long-term guidance that could improve the Bay Program's governance. Noe provided an overview of the current program structure and progress on the Beyond 2025 initiative, noting key gaps such as the absence of a reevaluation of high-level goals and a lack of a holistic approach to operational structuring. He emphasized the Bay Program's reliance on single-loop learning within the Beyond 2025 process and stressed the need to incorporate double- and triple-loop learning for more effective adaptive management. Boomer shared an example of an alternative structure grounded in adaptive management principles. While much of the Bay Program's past focus has been on ecological uncertainty, there is now a recognized need to integrate social science frameworks to better understand how social uncertainty affects the program's ability to achieve its goals and desired outcomes.

Noe reviewed the CBP's current governance framework, and the discussion noted a common criticism that the program's structure is siloed, limiting integrated progress. The GIT 6 team's ongoing work to simplify and streamline governance and operational processes as part of Beyond 2025 was described, including plans to standardize partnership meeting procedures and improve decision documentation. The group reflected on whether the right questions are being asked in the program's adaptive management approach, introducing the concepts of single-, double-, and triple-loop learning to encourage deeper organizational learning. Finally, participants considered how lessons from organizational science and other large-scale ecosystem restoration efforts might inform improved governance and systems operations, underscoring the importance of evolving the partnership's structure to better meet its goals. Boomer shared a Mural that described Post 2025 CBP structure options as they related to livable communities and swimmable, fishable waters.

Discussion:

- STAC Staff [chat]: At our September 2023 Quarterly Meeting, STAC discussed institutional learning. Targeted Outcomes included: investigate the successes and challenges of implementing hydro-social frameworks used to guide interregional water management programs across the country; reflect on tractable opportunities to improve governance and management of Chesapeake Bay Program's adaptive watershed management program; and reflect on research needs to support science-based decision-making.
- Noe: One field we have not tapped into is organizational science and organizational structure systems. We can also learn from other systems such as the San Francisco Bay, Great Lakes, Luisiana, Florida, Baltic Sea, etc.

- Dennison [chat]: CESR took multiple years; a structural review might also take multiple years. I think that STAC can do a really good job of delving into other large ecosystem restoration programs and investigating the social science of organizational structures.
    - Wardrop [chat]: Don't underestimate investing effort in a thoughtful exploration that has a product in the future – it is often worth waiting for (e.g., CESR)
- Sanford: What do you know about the charge to GIT6 to develop a scope of work?
    - James Martin: Scope of work will be a collection of short- and long-term recommendations to the Management Board that we think they can implement.
- Sanford: The outcomes and the structure are intertwined; a different structure might result in different outcomes and vice versa. In MB meetings, discussions about revising outcomes has been within the current structure; revising the structure might revise what is thought of as an outcome.
    - Boomer: Many conversations do not recognize the overlap in strategies that different outcomes have (i.e., a strategy can have multiple outcomes)
- Wardrop: Is STAC's role to come up with the process by which the structure is determined or an actual structure? What is the real objective?
    - Noe: Coming up with a specific suggestion may not be well-received; coming up with a process and considerations might be better received. STAC can also gather organizational science literature and input from other large landscape restoration efforts, let the larger Bay Program partnership decide on the structure that would result from that.
    - Boomer: STAC seems to have the capacity to explore different models and evaluate practicality.
    - Wardrop: Many legal and political considerations to go into the structure, beyond STAC capabilities.
- Kohl (UMBC): Different outcomes based on the questions asked; framing and the language used is very important. Does the restructuring need to be done in the timeline being pushed or is there space for it to be done over a longer time? The timeline is too short for effective conversation and changes.
    - Noe: This is an initial thumbnail, we definitely need to include people in the language. GIT6 is on the shortened timeline, STAC's most effective role might be a long-term thorough discussion, analysis, suggestion.
    - Boomer: The goals and strategies identified all heavily depend on the human context, bringing understanding of socio-economic constraints to the table.
    - Palm-Forster [chat]: I was also thinking about structures that more explicitly include people, decisions, policy, etc. I'm not sure how it would be embedded in this structure, but perhaps there is a way to show how the teams focus both on decisions and policy and natural system responses – and it would be good if these teams connect across the goal teams and workgroups.

- James Martin: There is interplay between governance structure process and outcomes. STAC can add value to GIT6 in helping us understand the interrelations between all 31 Outcomes.

Wednesday, March 5th

Day 2 of the STAC March meeting was led by the Social Science Workgroup (SSWG) and focused on exploring the role of social science within the Chesapeake Bay Program. The agenda included a large group conversation followed by a series of lightning talks from social science experts. After the talks, the group debriefed key insights before breaking into smaller groups for focused discussions. The breakout sessions addressed challenges and opportunities for integrating social science with natural sciences, and groups reported their findings back to the full committee.

The meeting concluded with a large group discussion that reflected on the breakout reports and explored next steps for strengthening social science engagement in STAC and the broader Bay Program. Topics included improving collaboration across disciplines, addressing barriers such as funding and communication, and institutionalizing social science contributions in decision-making processes. The day's work laid the foundation for ongoing efforts to better incorporate social, economic, and community perspectives into Chesapeake Bay restoration efforts.

Framing the Challenges – *Social Science Workgroup*

The opening discussion set the stage for the day by asking participants to reflect on the importance of social sciences in advancing the Chesapeake Bay Program's mission. Framed by two guiding questions (why social sciences matter for realizing the vision of the Bay Program, and what gaps or challenges exist in integrating them) the conversation highlighted a wide range of perspectives across disciplines. Participants emphasized the need to move beyond a narrow view of social science and to consider how understanding human behavior, governance, values, and decision-making processes are central to restoration efforts.

Several themes emerged, including the difficulty of integrating social science into existing program structures, the lack of funding and institutional support for social science approaches, and the need for better mechanisms to translate findings into actionable outcomes. The group also underscored the importance of interdisciplinary collaboration, inclusive visioning, and reframing restoration goals to better reflect human needs and priorities alongside environmental outcomes. Ellen Kohl (UMBC) led the conversation.

Discussion:

- Kohl: social sciences on STAC are discussed in certain ways (economics, behavioral change, adaptive management and decision science) which are important, but want to

encourage members to think beyond that and see social sciences more broadly; acknowledge this is a hard conversation but considering what can social sciences do for the CBP? Studies about engagement, adaptation; how can it help advance the mission? e.g., governance and the mechanisms of their partnerships. Two questions to frame the discussion:
    - why are social sciences important for helping realize the elements this vision?
    - what are the current gaps and/or challenges for integrating these disciplines?
- Letavic: Critically important because we have human decision-makers and we have an obligation to steward the land and nature. Difficult part is in identifying where and how social science can interject into the discussion.
- Zhu: From a natural science perspective, nutrient pollution in the Chesapeake Bay watershed follows predictable patterns - nitrogen and phosphorus added to the land inevitably flow downstream and impact the Bay. While we understand these biogeochemical processes, the real challenge lies in changing human behavior, especially when individual actions (like farming practices) contribute to a broader common pool problem. Social science is essential in addressing these behavioral and systemic issues and expressed interest in being part of that conversation.
- Palm-Forster: Can you talk more about why and how integration has been challenging in different cases? Understanding the specific obstacles could help us figure out how to improve these efforts moving forward.
    - Were: Any examples from the Chesapeake Bay Program?
    - Knoche: The Bay Program's vision is itself a major social project; shaped through collective input, expert judgment, and public values. While the vision includes ecological goals, it fundamentally reflects what people and communities have decided is important. Social science is not just an add-on; it's embedded in how priorities are set and what restoration aims to achieve. Recognizing this helps us see that human values and decisions are at the core of the entire effort.
    - Letavic: In a Pennsylvania project, I thought about measuring some sort of behavior change in advance of a new cover crop program, but it was challenging to define how to do that with project partners. One of the barriers was the lack of a quick, relatively simple approach that doesn't compete with other funding or attention, like the perception that people monitoring is competing with environmental monitoring.
    - Sanford: After years of working on the Bay from a physical science perspective, it's become clear through the Beyond 2025 effort that people must be at the center of restoration. This is a human-made problem, and success depends on engaging people where they live, understanding their needs, and shaping solutions around them - not just around technical goals. This is a chance for STAC to help shift the focus: from trying to change people to changing our approach so that restoration is truly for the people. Hillary Harp Falk wrote in a Bay Journal editorial, it's time for a change, technology should serve people, not the other way around.
        - Kohl: Most of the work in this space is inherently interdisciplinary, but our training has largely kept natural and social sciences separate, shaping

how we talk, think, and frame problems. That framing matters, even in subtle ways, and shifting it can fundamentally change how we approach solutions. Building on Larry's point, the goal isn't to get people to do the technical work, but to reframe the work so people are part of the solution from the start.

- Shenk: This is a comment about what to do with social science findings and how actionable science is delivered and received, which has long been a challenge even in the physical sciences. STAC members often publish valuable work, but translating it into impact takes a lot of effort. For example, CESR made an impact not just because it was a good idea, but because Denice and Kirk presented it repeatedly. Another way science has influence is through boundary spanners in the Bay Program Office—people whose job is to connect research with management. While that model has worked in physical science and even AI, it's not yet clear how well the Bay Program has figured out how to integrate social science findings.
    - Palm-Forster: I hope we can keep this conversation going. Something Gary said about how it's not always clear how to integrate social science findings into the Bay Program really struck me. I wonder why that is - whether it's about how social scientists share their work or something else. I'd like to discuss this more and maybe set aside time in a future meeting to dig into why effective integration remains a challenge.
    - Handen: Key challenge is the lack of social scientists involved in the partnership's decision-making. While there has been decades of investment in biophysical sciences, increasing social science presence and investment could greatly improve decision-making and priority setting.
    - Noe: Gary's observations also indicate an opportunity and need to add social science findings into the broader adaptive management cycle. In other words, align structure/process/governance to directly insert social science as needed actionable information.
    - Kirchhoff: I want to echo some of Amy's comments and say that I feel like we're just getting started with social science and there hasn't been a critical mass yet. When I started with STAC, Lara Fowler encouraged me to contribute my time and expertise and pointed me to a spreadsheet of needs that were identified and available to work on. Ninety-nine percent of those needs were focused on natural science questions. I think that's part of the structure, the mechanisms, and the history - most questions generated within the Bay program haven't been informed by social scientists or raised from that perspective. One question I remember wanting addressed was about BMP adoption, which is

important but definitely not the only area that could be useful for the Bay program's work.
        - Kuwayama: We've heard about the importance of social science in predicting human behavior, designing interventions, and communicating clearly. Building on Larry's point, understanding the values of people in the watershed is key to using the Chesapeake Bay Program vision to prioritize actions. Words like "sustainable" and "clean water" carry different meanings tied to people's values, so social science helps define these terms and connect them to measurable outcomes that reflect how people benefit from the Bay.
    - Ruth Cassilly (UMD) [chat]: I think part of the reason it has been challenging to integrate social science into natural science and research is western science's emphasis on scientific research and data as more important and more reliable in terms of decision making than traditional or indigenous knowledge, and also the U.S. measure of societal health being completely dependent on economic growth without consideration of quality of life.
    - Filippino: I often think about local economic development and how decisions there are made in silos without considering broader impacts on natural resources and water quality. There's a need to better understand local decision makers and how they're influenced by their communities. Strengthening connections with other advisory committees could help bridge this gap and improve how people inform those decisions.
    - Letavic [chat]: We have a work flow problem - is it enough to study, implement, do the look back, and include in the work flow the analysis and policy changes? Is the problem a commitment from decision makers to stay flexible when our science indicates we need to change? Or is the log jam at the natural science level and a reluctance to change standard operating procedures based on a lack of response on the behavior change we're looking to achieve?
    - Bovay: Key issue is that Bay restoration goals require cooperation and buy-in from all stakeholders, including everyone living in the watershed, whose priorities often lie elsewhere. We need to understand how to persuade people that restoration matters while balancing human needs (like agriculture and housing) with the health of natural systems. It's important to recognize that social and economic realities must be part of the restoration conversation.

SSWG Member Introductions – *Social Science Workgroup*

To build shared understanding and showcase the diversity of social science work already taking place across the partnership, SSWG members were invited to give lightning talks highlighting how their research connects to the Chesapeake Bay Program's goals and challenges. Each speaker shared examples from their own work, ranging from economics and governance to justice and communication, demonstrating both the relevance and potential of social science to inform restoration, policy, and community engagement. Summaries of each talk are provided below. Lightning Talk slides are available on the meeting webpage.

Leah Palm Forster (UD), an agricultural and environmental economist at the University of Delaware, focuses her research on understanding resource manager behavior, especially farmer decision-making related to water quality practices. She studies adoption of best management practices (BMPs) like cover crops and buffers, exploring program designs such as flat payments versus reverse auctions to improve cost-effectiveness and adoption rates. Palm-Forster also examines how farmers signal environmental stewardship to shape social norms. Recently, she expanded her work to coastal residential landscapes, investigating responses to climate risks like flooding and saltwater intrusion. Her new interdisciplinary project involves partners in Delaware, Rhode Island, and South Carolina, combining hazard assessments by natural scientists with social science research on behavior and adaptation. Palm-Forster emphasized the importance and challenge of deep interdisciplinary collaboration and hopes her work can inspire further integration of social science into Bay program decisions.

Christine Kirchhoff (PSU), an associate professor at Penn State, works at the intersection of law, policy, and engineering to study the social science of infrastructure governance, water, and climate adaptation. Her lab focuses on understanding the behavior and interactions of people, organizations, and institutions involved in water and climate governance. Using interdisciplinary and transdisciplinary research methods, including interviews, event history calendars, and data analysis, Kirchhoff's team explores topics like collaborative governance for water quality improvement, climate readiness of water policies, and enablers and barriers to adaptation, resilience, and transformation of infrastructure systems. Her work also addresses questions of equity, such as who experiences persistent disruptions from underperforming infrastructure like combined sewer overflows. Kirchhoff emphasizes the importance of co-production of actionable knowledge through engaged research and evaluates how research can impact policy and practice. Recently, her group has incorporated AI tools & human coding alongside traditional methods to track adaptation progress globally. Supported by NSF, NOAA, and others, her research aims to build trust, generate actionable knowledge, and support change relevant to challenges like those facing the Chesapeake Bay.

Yusuke Kuwayama (UMBC), an associate professor at UMBC's School of Public Policy and a fellow at Resources for the Future, applies economics to environmental and natural resource issues, often collaborating with hydrologists and ecologists. His work centers on three main methodological areas: non-market valuation, dynamic and stochastic optimization, and social-environmental systems modeling. Non-market valuation involves assigning dollar values to environmental goods like water quality that aren't bought and sold directly, helping inform decision-making by quantifying benefits such as recreation and property values tied to cleaner water. Dynamic and stochastic optimization models explore how different stakeholders, including managers and farmers, make decisions amid uncertainty, time delays, and ecological thresholds, common complexities in natural systems.

Kuwayama also works on social-environmental systems modeling, integrating broad costs and benefits to humans within ecological models, such as agroecological or groundwater recharge systems. A notable project uses GPS cell phone data to track how people interact with coastal water resources at fine scales, providing new insights into human behavior related to water quality. He investigates challenges like unknown or shifting ecological thresholds and imperfect monitoring, which complicate decision-making under uncertainty. Kuwayama's research combines rigorous economic methods with interdisciplinary collaboration to better understand and support complex water resource management challenges, including those relevant to the Chesapeake Bay.

Ellen Kohl (UMBC) is a critical human geographer at UMBC whose work centers power and systemic oppression in environmental governance, science, and activism. Trained as a human geographer, she works from the starting point that systems of inequality shape how policies, institutions, and science are constructed, contested, and experienced. Drawing from feminist and Black geographies, she studies how knowledge is produced and legitimized, especially whose voices are elevated or dismissed in environmental decision-making contexts.

Kohl uses qualitative methods, including interviews, storytelling, archival research, and critical policy analysis, to examine the relationships among activists, scientists, and policymakers. She's particularly interested in how scientific knowledge is communicated and used in ways that can either uphold or challenge existing power structures. She questions, for instance, why statements from policymakers are often treated as valid, while lived experiences shared by marginalized community members are viewed as anecdotal or emotional. Her work also considers how language, framing, and the structure of environmental governance shape who is included or excluded from these processes. She applies these approaches to several areas: the dynamics of environmental justice activism and government response; institutional governance and how justice is (or is not) integrated into environmental policy; and children's environmental health, especially around air quality and PFAS. Kohl has done work on the Eastern Shore related to CAFOs, biogas facilities, and participatory mapping with frontline communities. She also examines how the EPA and other agencies have approached environmental justice across presidential administrations and why federal attention to environmental injustice has not translated into systemic change. Across all her work, she emphasizes collaborative and community-responsive research, grounded in reflexivity not just as a personal practice, but as something developed in relationship with those most affected.

John Bovay (VT) is an associate professor in the Department of Agricultural and Applied Economics at Virginia Tech and a specialist with Virginia Cooperative Extension. Though not trained as an environmental economist, he brings expertise in regulatory impact analysis across the agricultural supply chain & examining how policies affect both producers and consumers. His appointment to STAC marked an opportunity to expand his work into more environmentally focused areas and to engage with interdisciplinary approaches. Bovay described economics,

from his perspective, as a quantitative social science that has evolved beyond traditional theory. While it once focused primarily on modeling consumer and producer behavior, contemporary economics often emphasizes causal inference methods, identifying the effect of one variable on another using empirical data. His research often uses statistical tools to assess policy impacts and institutional incentives, particularly within the food and agriculture sectors.

Bovay shared examples from three major projects. The first, a large study of food safety inspections in poultry processing, used a regression discontinuity design to examine how public disclosure thresholds influenced producer behavior. He found that while some producers responded to incentives to improve food safety outcomes, threshold-based categorization may sometimes distort behavior - suggesting continuous disclosure might be more effective. His second project explores on-farm food loss and waste, analyzing USDA administrative data to identify how crop insurance, contracts, and weather affect the gap between what's planted, harvested, and sold. This work has implications for both environmental sustainability and food system efficiency. Lastly, he discussed his involvement in a climate-smart agriculture initiative, which experimentally evaluates how financial incentives influence farmer adoption of conservation practices. Although funding for this program is uncertain, it reflects a growing intersection between his policy expertise and environmental concerns.

Valerie Were (CIRA) is a social scientist with the Cooperative Institute for Research in the Atmosphere (CIRA), a NOAA-funded collaboration between NOAA and Colorado State University. While she technically works for CSU, she's assigned to the National Weather Service in Silver Spring, Maryland. Were described herself as an applied sociologist by training, with a background in water resources science before moving into social science for her PhD. Her doctoral work focused on how communities participate in international development water projects, including research in Kenya. She mostly uses qualitative methods (i.e., semi-structured interviews, focus groups, participant observation, and surveys) and emphasized that much of her data "is words." She framed her work at NOAA around understanding how people use environmental data to make decisions. She noted that the value of NOAA's observations isn't realized until they're applied to mitigate negative outcomes from hazardous weather and climate events. Were works with a small team of social scientists within the Weather Service (about 14 people total) who support the entire agency.

One example Were shared was her role in supporting the Space Weather Advisory Group, a federal advisory committee that needed to understand user needs. She questioned whether a survey was the right tool and instead helped design focus group protocols. She also supported the process of obtaining Paperwork Reduction Act (PRA) approvals, which required clear articulation of the study and its value. Because she couldn't conduct all the groups herself, she trained others to run focus groups and emphasized the importance of properly analyzing the qualitative data. Were wrapped up by sharing that she's also worked with NOAA's tsunami and tropical programs and is currently evaluating a heat product.

Scott Knoche (Morgan State-PEARL), director of the Morgan State-PEARL Lab and an environmental and natural resource economist, leads a team that includes both trained economists and natural scientists who have taken up social science. Their work spans a range of applied research from monetizing the value of environmental changes to conducting surveys that assess public opinions and preferences about natural resources. His expertise focuses on two key areas with relevance to the Bay Program: regional economic impact analysis and nonmarket valuation. In the first area, Knoche described how economists can help decision makers understand the local economic implications of restoration activities. For example, through NOAA funded projects, he and collaborators have estimated the impacts of oyster reef restoration on commercial fisheries in the Choptank River and Virginia's Middle Peninsula. In the second area, he shared a study estimating trout anglers' willingness to pay for cleaner water due to acid mine drainage remediation in the North Branch Potomac River linking environmental improvements to economic value via travel cost models. He also highlighted how his team works with ecologists to use food web models like Ecopath which inform economic tools like IMPLAN. These models help trace how environmental changes like restored reefs affect fish landings and can be translated into estimates of employment, income, and sales metrics that resonate with policymakers and communities.

Knoche emphasized that economists are well known for using abstract graphs but when partnering with natural scientists like ecologists you can use some pretty wild other graphs and charts as well. For example, the oyster reef food web trophic model can serve as an input into economic models. Restoration changes the structure and function of the environment producing something different that has value to people. The model captures how an oyster reef changes through restoration resulting in more blue crab and striped bass which can be converted to dockside value changes and moved into IMPLAN to produce estimates of employment total sales income labor income and value added. Understanding how fishers spend their money on employees gas bait gear and maintenance allows for producing numbers highly relevant for policymakers especially dollars and jobs in their local communities.

Discussion:

- Sanford: When you're an expert in one area, you tend to view others' work in a simplified way, but once you get to know it, you realize it's just as deeply embedded and complex. We won't wave a magic wand and solve all social science needs; instead, we'll work from specific projects toward specific goals that, added together over years, have significant impact.
- Dennison: Like Sanford, I'm pretty overwhelmed. Historically, we had just a token social scientist, like Lisa Wainger (UMCES), but now the breadth and depth of social science work you've presented is exciting and transformative. Social science is becoming a central feature of what STAC can do, especially as we shift focus to diffuse and agricultural nutrient sources. That's why the new Agricultural Advisory Committee was

created—to address this need. I see social scientists as key to mentoring that group and helping the Bay Program move forward.

- Boomer: To share an 'aha" moment as a preface to my question: several years ago, I attended an American Water Resources Association seminar given by Dr. Karletta Chief, a Diné hydrologist within the Navajo Nation. She shared a slide showing the adaptive management cycle in the Navajo language, and my first aha moment was realizing that adaptive management is nothing new; it is how Indigenous tribal nations have developed ecosystem knowledge over time. The title of her slide was "decolonized science," which made me think, no wonder it's so hard, because it's very counterintuitive to how we've all been taught to conduct and engage in science. Since then, I've had the privilege to explore different ways of learning and develop opportunities to collaborate differently. So I wanted to ask the panel: as social scientists, is this something that comes into your work? Do you often think about whether there are better ways to understand how to integrate social science if we considered different ways of learning or collaborating?
    - Kohl: I've spent a lot of time thinking about this. It may seem simple: what is science, and what counts as science? For example, legally, air quality monitoring must meet EPA standards to be valid in court, but those are often impossible for communities to meet because they're cost-prohibitive and limited in scale. Low-cost sensors can raise awareness but aren't legally recognized. This highlights the important question of what counts as science. Regarding decolonial science, we must consider where our knowledge comes from and its colonial roots, including what participation, collaboration, and inclusion really mean, and our relationship to the land. It's not enough to just add an Indigenous scholar as a checkbox. Much environmental justice work is like that, but true progress requires systemic change and deep self-reflection. We need to question what scientific ideals we reproduce, why some knowledge is privileged, and how we may continue exclusion. These questions are central to how I approach my work. As Larry and Bill said, it's easy to get stuck in narrow approaches, but we must remember the broader context.
    - Were: And just to add to what Ellen said, working with Alaska tribes has really made us think differently about how we approach engagement and collaboration, exactly for the reasons Ellen pointed out.
- Kuwayama: I'll just add that social scientists vary widely in their methodologies, policy issues, and types of community and policy engagement. No single social scientist can cover all forms. For example, Leah has worked a lot with farmers, Valerie worked on projects involving sectors affected by space weather, and working with program managers requires yet another kind of engagement. So, as Bill mentioned, building a critical mass of social scientists in STAC brings the benefit of diverse research experiences, not just technically or methodologically, but also in community engagement and collaboration.
    - Filippino [chat]: Charles Bott (HRSD, STAC member) is planning large-scale managed aquifer recharge with treated wastewater, the pilot has been underway for years, first plant is in construction.
    - Dennison [chat]: Commentary that we published on working across boundaries here.

- Letavic [chat]: When measuring a nonmarket valuation, how do we elevate the dollar per WQ impact? It feels symbolic or theoretical rather than direct.
    - Kuwayama [chat]: A more comprehensive measure of water quality benefits would raise the dollar value per unit of quality. This has been a focus of water economists in recent years--trying to quantify human values of water quality that have been missed in past studies.
    - Letavic [chat]; At HRG, we've done this analysis for the purpose of stormwater fees, and pushback can get quite expensive in terms of legal challenge. If there was more buy-in at the front end, the overall approach would be more effective, so that's why I've been thinking about the analyses we can do.
    - Thompson [chat]: I'm curious what areas/expertise within the social sciences are we missing?
        - James Martin [chat]: Organizational science?
    - Thompson [chat]: I'm curious what areas/expertise within the social sciences are we missing.
- Sanford: I've been thinking about themes for breakout groups. One obvious one is economics (different kinds of economic valuation of natural resources). Another is modeling. We have such a narrow definition; Boomer showed a slide where modeling is just a tiny box focused on water quality, but there are many others like social and economic modeling that impact the Bay Program. Adaptive management is another theme I heard. Any others?
    - Kohl: I think it's interesting these aren't the themes I saw! As we said earlier, we all bring our biases. If we each listed themes, they'd reflect where we're starting. For me, it's who's involved: not just scientists, but whose ideas. Everyone's examples showed working with different groups. Second is how social science ideas are integrated, especially what knowledge is valued and seen across the Bay Program. Palm-Forster's points on collaboration are important and worth more discussion.
    - Palm-Forster: I'm exploring why social science hasn't been fully integrated into the Bay Program (what's missing or challenging) and how we can find actionable ways to improve.
        - Sanford: My personal bias is that the Bay Program has become very focused on the TMDL—achieving measurable water quality goals. While important, it's not the only focus the program should have. Because it's measurable, technical, and enforceable, it has become the central goal, but there are many other important goals too.
            - Palm-Forster: I think that point says a lot; because the TMDL is technical, quantitative, and clearly defined, it's easier to understand and support. Social science work varies some is quantitative, some qualitative, and often relies on assumptions or values people might not agree on. Plus, political issues come in because it's about people, money, and well-being. That makes action harder since there's disagreement on the basics, unlike clear measurable goals. I don't have the answer, but it's a key challenge for the group to tackle.

    - Boomer [chat]: I value Sanford's comment about modeling but want to underscore that it includes (perhaps most importantly) engaging and valuing diverse perspectives and conceptual modeling.
- Palm-Forster [chat]: As we're hearing, social scientists integrate with other disciplines (including other social sciences) in different ways. A helpful discussion for the group could be understanding what these different multi- or interdisciplinary collaborations look like. i.e., What might it look like (specifically) to integrate our sciences and build knowledge that is actionable for the Bay program? Can we come up with some concrete examples and ideas?

Breakout Groups: Integration and Collaboration

Members met in four breakout groups, each including at least one Social Science Work Group (SSWG) member. Non-STAC members were also invited to participate. Groups discussed three questions over approximately 45 minutes, dedicating about 15 minutes per question. Main points were recorded in a shared Google Slides deck. All breakout Google slide decks are available on the STAC March Quarterly meeting page. Breakout questions are listed below:

1. What pressing question or challenge facing the Chesapeake Bay Program can social scientists uniquely address in collaboration with natural and physical scientists?
2. What barriers hinder collaboration between social and natural scientists, and how might these be overcome?
3. How can the value of social science insights be better communicated to natural science practitioners and policymakers?

Breakout Group #1 summary: Slides. This breakout group focused on how people perceive environmental conditions and changes over time, particularly in relation to CBP activities. Participants discussed the challenge of understanding how public perceptions relate to outcomes that CBP can directly manage, such as water quality or ecosystem restoration—and how those perceptions are shaped by both current and past experiences. They emphasized the need to better understand how people perceive descriptions of proposed activities and how social scientists can help link measurable, physical indicators to community values and perceptions. Much of the conversation centered on this pressing question of understanding the nature and influence of perception in CBP decision-making.

The group also discussed barriers to collaboration between social and natural sciences, with a key focus on disciplinary language. As one member noted, scientists are trained in specific "languages" unique to their fields, which can slow collaboration when cross-disciplinary work is needed. Without incentives to engage across disciplines, and given that such work often takes more time and effort, collaboration can falter. Social scientists are often brought in late, limiting their ability to shape research questions or outcomes. The group questioned whether social science should be required from the start of CBP efforts. Funding limitations and cultural tendencies to privilege physical science results were also named as challenges. To better communicate the value of social science, the group suggested "showing as well as telling", i.e.,

embedding social science into projects, highlighting successes (and missed opportunities), and using social science to link ecological metrics to outcomes that matter to people and policymakers.

Breakout Group #2 summary: Slides. This breakout group identified a wide range of interrelated challenges, many of which echoed themes raised by other groups. Participants reflected on both what social scientists can offer CBP and what structural or governance challenges within CBP limit that contribution. The current emphasis on TMDLs, for example, affects how agricultural and nonpoint source sectors are engaged and can constrain solution spaces. As CBP moves beyond 2025, there is a desire to shift goals toward healthy ecosystems and human populations, which will require a cultural shift away from solely regulatory metrics and toward incentives and values-based approaches. Communication was a central theme, especially the need to move from top-down messaging to more collaborative, community-centered approaches. This involves understanding which tools communities need, tailoring efforts to local goals and values, and questioning who is included or excluded from these processes and why.

The group also discussed barriers to integrating social science into CBP conversations and decision-making. Few social scientists are present at key tables, and power dynamics often go unacknowledged. These dynamics can limit whose voices are heard and which knowledge systems are valued. Social science is often brought in late or undervalued, particularly when it is qualitative. Economics tends to be elevated because it is quantitative and more easily linked to models or natural science outcomes. Yet, other social sciences offer essential perspectives that should be included from the beginning. Members discussed how long timelines for community-based research and relationship-building can be at odds with existing processes and how better integration requires both institutional openness and a systematic, collaborative approach. There was also discussion about improving internal coordination, such as how STAC engages with other CBP groups and how to increase mutual understanding of what STAC can do.

A final thread focused on how methods, language, and assumptions shape both scientific modeling and communication. Disciplinary language differences make collaboration difficult, not just between natural and social sciences but within social sciences themselves. Participants reflected on how modeling decisions influence what is learned and whose perspectives are centered or left out. They highlighted the difficulty of translating complex science into decision-relevant insights, particularly when researchers hesitate to recommend actions and policymakers hesitate to act on uncertain or nuanced findings. Improving this connection will require both better communication tools and more intentional strategies about who the priority audiences are, especially if those people are making key decisions.

Breakout Group #3 summary: Slides. This group's discussion echoed many of the themes already raised. On the first question—what is a pressing challenge social scientists are suited to

address—the group emphasized understanding behavior change. This includes ethical concerns, discomfort about potential manipulation, and mistrust that can stem from language differences across disciplines and between institutions and communities. Another topic was understanding how and where critical decisions are made, particularly by local landowners and officials, often without broader coordination. Local decisions like zoning may not align with federal priorities but have cumulative impacts. The group noted that social scientists, especially economists, can help assess tradeoffs and understand how people prioritize CBP-related outcomes. They also stressed the importance of using language that resonates, for example, some may dismiss "stormwater" as unimportant but view "flooding" as urgent. Including social scientists early in collaborative efforts was seen as essential.

Barriers to collaboration included a bias toward quantitative data and a lack of understanding about what social scientists do, especially those using qualitative methods. Terms like hard and soft science were seen as unhelpful and reinforcing hierarchy. The group emphasized the need to improve workflows to create better feedback loops between natural and social science and policy outcomes. Differences in observational scales were noted, with natural science often working at finer spatial resolution than social science. There was also recognition that social science research can take longer, which may cause frustration in collaborative projects. On communication, the group felt social science insights should not need extra justification - they are valuable because they improve outcomes for people. The conversation ended with examples where social science contributed to policy success, such as demonstrating economic value for marine protected areas, and a cautionary case where a stormwater program failed due to lack of public buy-in.

Breakout Group #4 summary: Slides. The group began by discussing how behavior change is a central challenge, one that needs to occur at multiple levels. There was agreement that problems are systemic and require a more holistic approach, such as examining how economic systems feed into ecosystem decline. Some participants felt there was a perception that CBP efforts have been misguided, but others emphasized the importance of understanding the history and intent of what has already been done, noting that the aim is not to start over but to enhance what exists. The group also raised questions about adaptive management, who is at the table and what perspectives are reflected, highlighting the dominance of environmental metrics and the need to bring in more economic and social considerations. There was discussion of the limits of voluntary behavior change and the role that economics, price signals, and market-based tools could play.

On barriers to collaboration, the group named time, money, and institutional inertia. Participants noted that collaboration takes time to build, and when people are just trying to get through the day, it is hard to step back and expand their view. The academic reward system, particularly for non-tenured faculty, often fails to incentivize interdisciplinary work, and some people simply do not want to collaborate. With institutional knowledge being lost and the

challenge of agreeing on the problem to be solved, the group questioned whether current governance structures are well suited to articulating and advancing solutions.

To better communicate the value of social science, the group noted that politicians are skilled at reading people, and social scientists could benefit from learning similar strategies. Stakeholder engagement, co-production of knowledge, and case studies, especially those that include failure, were all seen as important tools. There was interest in giving students more direct experience in policy settings, like attending fisheries management hearings, and a desire to better share best practices across fields. Finally, the group stressed the need to identify and address differing assumptions among disciplines early in the research process, even when it feels messy and uncomfortable, so that collaborative research is more effective throughout.

Following the breakouts, all meeting participants were invited to discuss the following:

- Concrete steps the Chesapeake Bay Program can take to foster collaboration between social and natural sciences
- Ways STAC can support these efforts going forward

During the closing discussion, participants reflected on the importance of incorporating political science into conversations about applying social science within the Bay Program, given the role of politics in moving ideas to action. There was strong interest in continuing the momentum from the group breakouts and larger discussion by capturing key takeaways and sharing them across the partnership.

One specific idea raised was that STAC could mandate at least one natural and one social scientist on each workshop steering committee or review effort, as a way to institutionalize interdisciplinary representation. Participants also expressed enthusiasm for in-person engagement at the June STAC meeting, which is being designed to foster informal and productive one-on-one conversations, though remote access will be limited. Federal travel limitations were acknowledged as a consideration.

A few participants asked what will happen with the input gathered during the session; there was also a request to share governance-related materials from a previous session with broader audiences, including GIT6.

The idea of producing a primer or white paper on what social science can contribute to the Bay Program was revisited. While a 2022 white paper from Wainger and colleagues was mentioned as a foundation, participants felt that the day's broad discussion brought in new insights that could expand or update that work - especially with a focus on how STAC can normalize the inclusion of social science in its work and communications.

Kristen Saunders (UMCES) added a closing point in the chat: when the Principals' Staff Committee revisits the Bay Program's vision and principles, it could be a timely opportunity for STAC to share actionable insights from this session, particularly on the integration of social science.

DECISION: STAC members should be strongly encouraged to attend the June STAC meeting in-person in order to advance these conversations in informal and structured settings; **STAC Staff** will anticipate limited remote access but strive for the inclusion of those facing travel restrictions.

ACTION Items:
STAC Leadership will consider a recommendation to include at least one social scientist and one natural scientist on each steering committee and review panel.

STAC Staff will share governance session materials (with permission from Greg and Kathy) with GIT6 and others, to build awareness of recent discussions.

The **Social Science Workgroup** will coordinate with **STAC leadership** to explore how social science inclusion can be routinized and communicated more clearly across committees and workgroups.

The STAC June 2025 Meeting (i.e., STAC June 2025 Quarterly Meeting) will take place in-person at the National Conservation Training Center (NCTC) on June 16-18, 2025. This will be a strategic planning meeting with the theme "Setting the Science Agenda for 2026."