Chesapeake Bay Program
Science. Restoration. Partnership.

Scientific Technical Assessment and Reporting (STAR) Team Meeting

Thursday, June 26th, 2025

10:00 AM – 12:00 PM

Meeting Materials: Link

This meeting was recorded for internal use only to assure the accuracy of the meeting notes.

MINUTES

10:00 – 10:05 AM Welcome, Introductions & Announcements – ***Ken Hyer*** *(US Geological Survey, USGS), STAR Chair,* ***Breck Sullivan*** *(USGS) STAR Coordinator,* ***Peter Tango*** *(USGS) CBP Monitoring Coordinator*

Upcoming Conferences, Meetings, Workshops and Webinars

- 2025 Capital Area Natural Resource Management Symposium – August 22, 2025, Washington, D.C.
- Chesapeake Watershed Forum – November 7-9, 2025, Shepherdstown, West Virginia.
- Coastal and Estuarine Research Federation (CERF) Conference – November 9-13, 2025, Richmond, Virginia.

Announcements

- UM-SEAS Master's Project Proposals due September 29, 2025.

10:05 – 10:15 AM: ***Defining Indicators*** – *Breck Sullivan (USGS)*

Description: Based on conversation at the May 22nd STAR Meeting, participants requested a better understanding of the definitions of indicators, how they are currently defined within the Chesapeake Bay Program (CBP), and how they may be revised to fit the new outcome structure with targets. Breck will provide an overview of the current CBP Indicators Framework and insight on the definitions used for indicators in the paper, "Assessment of Chesapeake Bay Program Selection and Use of Indicators."

Breck Sullivan: The indicators framework includes three types of indicators associated with each outcome in the Watershed Agreement: influencing factors, outputs, and performance indicators. While the program currently has few influencing factor indicators, it uses outputs to assess whether actions outlined in workplans are being implemented, and performance indicators to evaluate progress toward achieving outcomes. These

indicators are available on Chesapeake Progress and are designed to help track implementation and impact.

The current revision of the Watershed Agreement presents an opportunity to improve the indicators framework process by ensuring indicators are more readily measurable and useful from the start. In a 2007 paper that assessed the program's use of indicators, the authors categorized 30 system-level metrics into functional types: condition, evaluation, diagnostic, communication, and future indicators. They emphasized that effective indicators often serve multiple purposes. For instance, acres of bay grass can be used to assess current conditions, track progress, and communicate findings to the public. The paper also highlighted the importance of aligning indicators with management objectives, ecological insights, and monitoring design.

Looking ahead to 2025, the revised outcome structure now includes overarching language supported by measurable targets, objectives, or outputs. This raises new questions: should these targets be treated as output indicators or performance indicators? Do they fit within the existing indicator framework, or do they suggest a need for adjustment? We should reflect on how definitions and uses of indicators have shifted over time and to consider what the indicator strategy should look like going forward.

10:15 – 10:25 AM: ***Formal and Informal Indicators*** – *Peter Tango (USGS)*

Description: CBP outcomes produce information for indicators on ChesapeakeProgress, but they also produce other supporting information to help inform the story on outcome progress. Peter Tango will provide examples of these different types of indicators and the complimentary information as represented through the Water Quality Standards Attainment and Monitoring (WQSAM) Outcome.

Peter Tango: In this presentation, we will reflect on the development and future direction of the Chesapeake Bay Program's water quality indicators, using the Water Quality Standards and Attainment (WQSAM) Outcome Indicators as an example. There are past efforts and peer-reviewed studies that established the scientific credibility of the current indicator, which ties directly to the Bay's Total Maximum Daily Load (TMDL) and monitoring efforts. However, there is growing feedback from stakeholders that this indicator, while technically sound, may not be easily understood by broader audiences. This presents a challenge in making progress more relatable and engaging to the public.

To address this communication gap, we introduced the idea of using "myth-busting metrics", i.e. alternative or supplemental indicators that tell a compelling story and are easier for non-experts to grasp. One example is the suite of dead zone metrics, such as hypoxic volume, duration, and start and end dates. These indicators, though not formally required in the Watershed Agreement, resonate more with the public and can serve as powerful storytelling tools. While these metrics are ancillary to the core agreement, they are scientifically valid and relevant for broader community engagement.

These indicators are directly tied into forecasting and ecological models. For instance, the length of hypoxia is strongly correlated with hypoxic volume, which is used in forecasting models developed by scientists. Hypoxia patterns are shifting over time due to changing environmental conditions and restoration efforts, with recent studies showing that without intervention, hypoxia would have extended farther down the Bay. These insights help reinforce the importance of using accessible, science-based indicators to communicate both progress and emerging challenges.

Another key theme was the need to consider localized impacts. Dead zones are not limited to the mainstem Bay; they also occur in tributaries like the Severn and Patuxent Rivers. Events like the 2005 Corsica River fish kill show how nearshore hypoxia and algal blooms affect public perception and local ecosystems. Nearshore and tributary indicators, supported by continuous monitoring data, are critical for connecting people to the health of the Bay in their own communities.

We should think critically about which indicators should be formalized within the updated Watershed Agreement. While the WQSAM Indicators remain important, supplemental indicators such as hypoxic volume days or attainment deficits provide additional insight and may be more compelling for communication. The goal moving forward should be to maintain scientific integrity while ensuring that indicators are clear, relatable, and capable of telling a cohesive and meaningful story to both policymakers and the public.

10:25 – 11:00 AM: *Discussion on Defining Indicators and Formal and Informal Indicators* – *All*

- *How do the current definitions of CBP indicators fit the revised Agreement and outcome structure? Should the definitions be modified?*
- *What is the relationship between a Watershed Agreement Target and an Indicator?*
- *What do we want to communicate to our audiences about our work toward these goals and outcomes? What is a formal indicator? Is there space to highlight complimentary information to indicators?*

Comment: *Chris Guy:* One of the things I always struggle with is the regulatory side of the Bay Program. It's not very flexible. Regulatory indicators and targets are difficult to adapt, and that makes this kind of work especially challenging. When we do a good job with a regulatory indicator, it's worth acknowledging how complex and fixed it is. In contrast, the majority of the Bay Program's indicators and targets are voluntary. These should be more flexible and meet many of the indicator qualities Peter just described.

In the Habitat Goal Implementation Team (GIT), I've been thinking about this idea of performance-based functionality. For example, in the water quality realm, even if we've reduced dead zones and improved dissolved oxygen, species like waterbirds may not be responding positively. Ospreys are a great example – despite 40 years of reducing contaminants and improving water quality, their numbers are now declining. The same is

true, to a lesser extent, for blue crabs, marsh birds, and even some waterfowl species. These biological indicators, while not always directly tied to our management actions, are critical. We invest significant resources in restoration efforts, but if biological responses don't align with improvements in environmental conditions, it calls our strategy into question.

I'm concerned that in the Outcomes discussions, the importance of biological indicators was overlooked because we don't have direct control over them. But these indicators matter deeply to the public. They are the things people notice and care about. Even if we only indirectly influence these outcomes, they help us evaluate whether our investments are making a meaningful difference. Ignoring them not only limits our understanding but could also misguide future funding and strategy decisions. We need to be willing to consider when something isn't working, even if it's uncomfortable.

In the 1980s, US Fish and Wildlife Service (USFWS) produced extensive research on the life histories of a wide range of Bay species, even seahorses. Today, we've narrowed our focus considerably, which has benefits, but also risks losing sight of what people value. We need to bring those functions and indicators back to the forefront and communicate them clearly. Not just as scientific metrics, but in ways that resonate with the public. Whether it's the abundance of rockfish or the effects of changing environmental conditions, we must frame our indicators around what matters to people.

Finally, I want to emphasize that this approach isn't about shifting blame or oversimplifying. It's about recognizing that we influence, even if we don't directly control, many outcomes. That's why we structured the waterbirds indicator around existing networks, capturing trends across multiple species rather than focusing on just one. Some species will increase, others will decline. But if we can show that our efforts are supporting a broader positive trend, that's meaningful. As we move forward, I encourage us to think strategically about how to integrate these types of indicators into our framework, both to better reflect the system's biological responses and to communicate more effectively with the people we serve.

- ***Comment from chat:*** *Kristin Saunders:* We might benefit from thinking about indicators of how WE are doing toward our targets and indicators of how the system is responding as well as the indicators that show factors that affect our success and how we message around those distinctions.

Q: *Peter Claggett:* My perspective on this is shaped by the struggle to develop targets for the Protected Lands outcome. While I'm not leading it, I'm supporting the effort. Essentially, the goal is to protect around 1.5 million acres between now and 2040, divided among six target categories: community green space, tribal lands, agricultural lands, forests, wetlands, and so on. For each of those categories, the targets were envisioned as quantitative, e.g. protecting a certain number of acres of forest or wetlands. The geospatial aspect of this involves determining which areas qualify under those categories. There was

concern raised, including at the recent Chesapeake Community Modeling Program (CCMP) meeting, by land conservation practitioners about the reporting requirements. For example, if tribal lands are protected, would that need to be reported to the Bay Program? I clarified that our intent was not to impose new reporting burdens. Instead, we envisioned spatial overlays that would track overall protected lands, and then we would assess whether they fall into categories like healthy watersheds afterward. My question for the group is: when is it appropriate to set a quantitative target, and when might it be more appropriate to define the value or goal qualitatively? If we avoid a numeric target like "protect lands in healthy watersheds" without specifying an acreage, how does that affect communication or prioritization? The program tends to emphasize quantitative goals, and I'm concerned that qualitative goals may receive less emphasis or support. It's becoming clear that these sub-targets could be problematic when working with conservation practitioners.

- ***A:*** *Kristin Saunders:* I've been involved in land conservation efforts since before the 2014 Agreement was signed and was part of the discussion Peter mentioned yesterday. Historically, when we've set basic acreage targets we have seen two common reactions: support for protecting as much land as possible, and concern about whether that land is the right land. Does it benefit habitat, water quality, or community needs? It's important to understand which audiences value which aspects of land conservation. For instance, of the 2 million acres we committed to protect under the 2014 Agreement, what matters is why we're protecting those acres and who benefits. That's why it's valuable to categorize those acres: forests for habitat and water quality, cultural lands for historical or tribal significance, and lands with public access for recreation and community value. These subcategories help with messaging and with securing funding from sources aligned to those specific goals. When I was at Maryland DNR, this thinking led to the creation of the Chesapeake Conservation Atlas, which tracks forests, farms, cultural sites, and more. Specific categories align with distinct funding streams, whether state, federal, or private. Highlighting these categories helps us tell a compelling story and supports future investments. There was some confusion in yesterday's conversation about reporting, which I think contributed to concern. Some jurisdictions worry about additional reporting burdens, but we might be able to streamline this using remote sensing, GIS, or tabletop reviews to classify protected land without creating more work. This would allow us to show progress, like conserving enough wetlands to support waterfowl habitat, without demanding new reports from jurisdictions. That could ease concerns while still meeting our indicators team's needs.
    - ***Response:*** *Peter Claggett:* I agree that we can categorize land protection using GIS overlays without requiring extra reporting. I also see the value in clearly stating where we want to see conservation happen. But when trying to assign numerical targets to those priorities, it gets tricky. For example if we say we want to protect 10,000 acres for watershed health, do we mean

one acre in each of 10,000 watersheds or two watersheds with 5,000 acres each? We're not the ones protecting the land, it's other people and so it becomes difficult to set targets we can't control. I realize this might be straying from the original discussion, but in the context of indicators, outcomes, and targets, sometimes it makes more sense to avoid setting quantitative goals, or to phase them in over time. We don't yet have a complete picture of what our current protection portfolio looks like, so trying to direct future actions without that knowledge feels premature. Still, your explanation was helpful, and I agree we'll need to spend more time thinking this through.

- ***Response:*** *Chris Guy:* I want to emphasize that we need to distinguish among three related but separate components: the management strategy, the logic and action plan, and the indicators. Although they inform one another, conflating them complicates our discussion. Much of what we are debating does not necessarily resonate with the broader community. From the public's perspective, indicators are a quick way to ask, "Are we moving in the right direction?"

  Take Peter's example of protecting 10,000 acres. As scientists, we might say that effort is insufficient, yet the public sees measurable improvement. It is our responsibility, as scientists, to refine the logic and action plan and strategic planning. When we jam all the complexity into the indicator, people's eyes glaze over, and the message loses meaning.

  It remains true that people like numbers. In my risk-assessment work, numbers clearly signal progress: Are we meeting the goal? How close are we? An alternative is a weight-of-evidence approach, but that requires an uncertainty analysis, which can confuse non-scientists. Scientifically, weight of evidence may be superior, yet for communication, nothing beats a simple metric. That tells everyone, at a glance, how effective the effort is.

- ***Comment from chat:*** *Jess Blackburn:* An added level from some stakeholders and the interested public is "are the progress reports reflective of observed reality or it is a rosier than real report based on modeled results?". The level of trust in the model varies among different audiences. So yes, the indicators need to be evidence based and easy to understand.

- ***Comment from chat:*** *Meg Cole:* As Kristin mentioned, Scientific Technical Advisory Committee (STAC) decided at our retreat earlier this month to take a big-picture/holistic look at the Bay Program outcomes and a review of the whole process (models, outcomes, science-policy translation). We met two weeks ago but those conversations on how to conduct this review will be starting sometime in July.

        - ***Comment from chat:*** *Peter Claggett:* Agreed. Your statement is why we need to emphasize strategic conservation so that we can tell those stories- about preserving cultural heritage, working lands, wildlife habitat, and stream health. We can tell these stories by tracking where and when conservation happens and assessing benefits by location (spatial overlays). This can be done without numerical targets for each value category… but I do appreciate the need to figure out how much conservation is needed to make a meaningful contribution towards protecting the things we value.

    - ***Comment from chat:*** *Peter Tango:* Having the portfolio of protection seems helpful – you could use Conservation Biology principles to drive preferred options, e.g., larger patches are better than smaller patches, more acres protected is better than less, connected patches are better than disparate patches, etc. I would think you have the capacity to create statistical distributions of land use acres that can be used quantitatively to evaluate relevant changes towards foundation principles favorable for managing species/population/community/integrity.

        - ***Response in chat:*** *Katie Brownson:* Agreed, but wondering if some of this is more at the management strategy level rather than something that needs to be tracked as an indicator?

        - ***Response from chat:*** *Peter Claggett:* Yes, but we're required to develop numerical targets before updating the management strategy- and we've only been given the next 2-3 months to finalize the targets… so we essentially must update the management strategy.

        - ***Response from chat:*** *Peter Tango:* Agreed here, Peter - a lot of time on our process work, important, but challenging timeline to vet the appropriateness of a target, and, fundamentally, will the measure we choose to use be responsive to management with the resources and methods we have. Definitely a crunch to consider high value issues on what we will be responsible for as a community.

    - ***Comment:*** *Larry Sanford:* From a public point of view, the most common question I hear is: Is the Bay getting better? Not how much better, but is the direction positive? That perspective is somewhere between a hard number and something more interpretive. If you can evaluate trends smoothed over time, removing interannual variability, you can simply say, “Yes, the Bay is getting better,” or “The trend is negative,” without needing to quantify exactly how much. For certain problematic issues, simply reporting trends may be sufficient, especially for public communication.

- ***Response:*** *Peter Tango:* When I think about balancing quantitative and qualitative measures, I assume that if we claim we're improving something, then we at least need to agree on a baseline. From that baseline, we build the message. I like the idea of being able to say, "This is improving," as long as we clearly understand the starting point from which we're measuring progress.

- ***Response:*** *Chris Guy:* Let me offer two examples that support Larry's point. For stream health, in the most recent update, I asked the workgroup, "Are we on track or off track?" They responded, "We're on track but not everywhere." That nuance is important. Overall, across the watershed, stream health is improving. But when we break down the data, we see that while rural areas show improvement, urban areas are trending in the wrong direction. We're seeing increased development, more runoff, and declining stream health. Riparian buffers are being overwhelmed by flash flood events. So, while the overall trend is positive, the story is more complex. We included that in the narrative that accompanies the visual.

  Another example is SAV. Looking at any single year of SAV data doesn't tell you much, and even a few years in isolation can be misleading because SAV is highly dependent on precipitation. But if you smooth out the data, you see a consistent, steady improvement in SAV, which is directly related to better water quality. There are complicated stories, of course, like changing environmental conditions. We're losing stenohaline zones due to warming, and eelgrass is dying from heat stress rather than nutrients or sediment. But those narratives are being addressed by our teams, and overall, SAV is improving thanks to the Bay Program's efforts. These are good examples where we might get lost in the details, but we shouldn't. We should call it out clearly: SAV is improving, stream health is improving. That doesn't mean the problems are solved but that we're moving in the right direction. That nuance matters.

- ***Comment from chat:*** *Chris Guy:* As scientists we can understand non-numeric quantitative targets, but the public and politicians who fund us love to have numeric benchmarks.

- ***Comment from chat:*** *Peter Tango:* A manager's saying: "If you don't measure it, you can't manage it." Aldo Leopold said: "The first rule of tinkering is saving all the parts." Parts have been degrading; we are attempting to set boundaries on saving what we can to allow for change both natural and human-induced compromising between economic pressures and well-being measures. There is probably not a

perfect equation given moving targets of priorities in society over space and through time.

Comment: *Keith Bollt:* Your slide on the different types of indicators (Slide 2) reminded me that we may have a branding or messaging problem: the term "indicator" can refer to three distinct things, yet we often present it as if it means all three at once. That blurs the line between describing the state of the environment and describing what we, as partners, have achieved. We should adopt a single, public-facing definition of "indicator" and decide whether it reflects environmental conditions or Bay Program performance. Once that decision is clear, we can communicate more effectively.

I have two related thoughts. First, as Peter noted, setting specific, measurable, achievable, relevant, and time-bound (SMART) targets does not guarantee that those targets are actually achievable or relevant for the Bay Program. Second, our historic practice has been to present indicators as evidence of continuous environmental improvement. In truth, holding steady or slowing a decline can also signal success, even if it is harder to convey.

We now have more proposed targets than the original Agreement had outcomes, and many indicators lack funding. Achieving an indicator for every target will be challenging. We need to be careful not to report merely for reporting's sake, and we must ensure we understand the implementation burden on practitioners before adding new requirements.

Comment: *Julie Reichert-Nguyen:* In my view, you can quantify almost anything; the quality of that quantification depends on available data, resources, and the effort people are willing to devote. With the Climate Resiliency WG, we have struggled to develop indicators that go beyond changes in precipitation or temperature to show their implications for habitat, living resources, and water quality. We held joint sessions across workgroups on sea-level rise and tidal-wetland impacts and even commissioned a contractor to propose a climate-change-indicator framework. All produced excellent ideas, yet none advanced because we lacked resources to implement them.

Impact matters: we should know whether restoring acres or installing resilience strategies actually moves us toward our mission of a healthy Chesapeake Bay under changing environmental conditions. Connecting indicators to the outcomes people care about would strengthen communication, but it requires significant investment: staff time, requests for proposals, and collaboration with university partners. Bean-counting metrics, like acres restored, are comparatively easy to gather and display, yet they rarely convey the "why" that resonates with stakeholders.

We need to deliver data in ways that connect with people if we want continued support. If anyone wants to form a subgroup to brainstorm practical ways to craft indicators that demonstrate environmental response to management actions and to develop messaging that "sells" that story upward, I would be eager to join. This challenge has long needed a resource-focused solution, and I am ready to help move it forward.

- ***Comment from chat:*** *Laura Cattell Noll:* Tied to what Julie is saying, social science points to storytelling as an important tool for creating messages that breakthrough to target audiences. With this in mind, indicators need to tell a story that connects to existing constituent priorities (for example, quality of life).

- ***Comment from chat:*** *Peter Tango:* I love this! I imagine having a designated position that is THE CBP Storyteller, podcasting and YouTubing and Tik-toking their way around the watershed each day, showing our analyses, showcasing local waters and groups and leaders. (I vote Rachel Felver out and about in a camper van and a video camera) Agreed - more story telling each day desirable would be complementary to the great work the communications folks are already doing! (Go SET).

- ***Comment from chat:*** *Peter Tango*: Also appreciate we have the Bay Journal and our SET team doing this in print. Some of our community science folks are imagining reporting from the field recordings that link static data results to place based live recordings enhancing our reports and data. Evolving the story-telling as we continue to do.

Q: *Breck Sullivan:* For the WQSAM Outcome, we need to articulate what people are caring about but do we have the resources and mechanisms to do that. However, if our indicators should be about what people care about, what do we do with some of our targets being more methodological instead of quantitative values. Maybe we should consider having a clear distinction between our types of indicators.

- ***A:*** *Julie Reichert-Nguyen:* Is there a way to translate WQSAM into something people actually care about? I wonder if that's where we can make stronger connections across outcomes. We've talked about this a lot in the context of planning beyond 2025, but the kind of cross-outcome collaboration some of us hoped for during the Watershed Agreement revision hasn't fully materialized. It's easy to become siloed in individual outcomes but I question whether the way we currently report progress to the public is the most meaningful. Instead of narrowly tracking improvements within specific outcomes, maybe we should look for collaborative opportunities across outcomes to tell a more compelling story and, most importantly, one that resonates with the public. Internally, yes, we need to track things like the number of acres restored or projects completed. But does that need to be our primary message externally? Could we instead identify indicators that cut across outcomes and better communicate how water quality improvements are contributing to broader ecosystem health?

  For instance, I've been trying to connect water quality gains to improvements in nearshore environments and how that supports living resources. Is there an indicator that could link those elements across outcomes and serve as a strong public-facing metric? I realize that approach would require more coordination,

more shared datasets, and more joint analysis, but it might ultimately yield an indicator that reflects what the public actually values and wants to see. I really liked what Larry and others said about focusing on direction: "are things getting better overall?" That may be a more effective way to communicate than simply putting a number on everything. In the adaptation outcome, for example, we've said we've worked with seven sub-watershed areas on nature-based solutions. That helps from a management perspective, but from a communication standpoint, maybe it's not the most impactful message. Perhaps we should continue internal tracking as needed but also invest effort into crafting collaborative, cross-outcome indicators that connect to what the public genuinely cares about.

- ***Comment from chat:*** *Jess Blackburn:* YES! Translate the WQ Attainment to language that speaks to fishable, swimmable, recreation safety.

- ***Comment from chat:*** *Keith Bollt:* If we have two types of indicators, they should be branded as such. The Bay Program provides a service to report on the state of the watershed, it provides another service which is to say how much we have achieved or prevented from declining through partnership (accountability). Don't know what those two would be called though.

- ***Comment from chat:*** *Chris Guy:* during outcome development the MB insisted that targets not be redundant across outcome. I think that was back then a mistake. Having the same target across outcomes would break down silos and be more meaningful to what people are interested in.

- ***Comment from chat:*** *Gina Hunt:* AMD is an opportunity to connect water quality directly to living resources. I think we ended up with more targets for the reason that folks were trying to get targets that people could see the connections.

11:00 – 11:30 AM: *Patterns and Commonalities of Influencing Factors throughout the Partnership* – *John Wolf (USGS)*

Description: Using the previously developed tool on connectivity throughout the partnership, John Wolf has been able to analyze the influencing factors of outcomes and determine which are the most common. The exploration of cross-outcome indicators may help guide Workgroups and Goal Implementation Teams to work together and explore common ground on indicators.

John Wolf: The concept of factors affecting outcome achievement has been integral to the Chesapeake Bay Program's efforts, particularly in recognizing that some factors are spatial in nature – their influence can vary across geographic areas. This understanding shaped early involvement in the geospatial analysis of outcomes. The 2014 Watershed Agreement and ChesapeakeProgress introduced high-level factors, but these were inconsistently

defined due to multiple authors contributing across various outcomes. This inconsistency made it difficult to compare or evaluate factors across the program in a meaningful way.

A deeper examination of the management strategies revealed more detailed and varied descriptions of both spatial and non-spatial factors influencing outcome achievement. From a geospatial perspective, there was interest in identifying which of these factors, like impervious surfaces, were mappable and relevant to multiple outcomes. Mapping such shared factors could enable more effective communication and targeted actions that benefit several outcomes at once.

To support this goal, an exploratory effort was undertaken using AI to simulate how a consistent vocabulary for outcome-related factors might be developed in the absence of finalized 2025 management strategies. A standardized list of 100 potential factors was generated and categorized into themes such as environmental, funding, infrastructure, and stakeholder engagement. This vocabulary aimed to provide a consistent foundation for cross-outcome analysis and highlighted the importance of community involvement, which appeared as a top factor across all outcomes.

Each of the 21 outcomes was then individually evaluated to identify its top 10 contributing factors from the standardized list, revealing patterns and overlaps. This analysis demonstrated the potential of using AI tools to support early-stage brainstorming and organization, though expert validation would ultimately be necessary. It also enabled both outcome-centric and factor-centric views. For example, identifying which factors most influence brook trout or which outcomes are supported by a factor like fisheries management.

Looking ahead, there is a need to organize these factors in ways that are practical for GIS and geographic targeting. Factors should also be classified by their level of human control, associated costs, and whether they can be measured spatially. Standardizing how factors are defined in future management strategies will help ensure consistency and unlock broader applications, particularly for targeting interventions that can yield multiple benefits.

Discussion Questions:

- *What are the common influencing factors across outcomes? Do you agree with them? Are any major ones missing?*
- *How and should we present these factors as indicators?*
- *How can we communicate these factors and fill the gaps?*

Comment from chat: *Kristin Saunders:* I just want to underscore what John just said - as we draft the next version of management strategies, keeping an eye on the language and making sure there are similarities across the strategies will help ensure higher success using these AI tools to help look across the work.

- ***Comment from chat:*** *Kristin Saunders:* in addition to plain language, I think common language or vocabulary is what I am hearing him say so people use similar words to make it easier to compare across silos and map them.

Comment: *Chris Guy:* What struck me when looking at this is that when you use AI, it operates more like a high-casting model. It's not actually artificial intelligence in the futuristic sense; it's really just pulling from what already exists in the data. So, when you do an analysis like this, you're inherently integrating existing biases. I think that's part of the reason water quality still ended up in the top 10, it reflects our own built-in assumptions and priorities. We emphasized water quality in the dataset, so the model made it more important, even if the general public might not rank it that high. That raises the question: how do we deal with the fact that these biases are embedded in the tools we're using? Personally, I was surprised water quality ranked as low as it did – I thought it would be higher. But maybe the issue is that people care about clean water, not necessarily the term "water quality." That's something we as scientists focus on, but it might not resonate the same way with the public.

- ***Comment:*** *Larry Sanford:* What it made me think of is that this could also be really relevant for the Bay Program's structural discussions. For example, instead of organizing WGs solely by outcome or sector, we could think about structuring them based on the factors that are most important for achieving specific outcomes. The membership of a WG could be informed by those top-ranked factors, rather than which agency or group someone belongs to. It could mean shifting from a large-group model to a more outcome-focused structure, where the expertise and influence align more directly with what matters most for that outcome.

- ***Comment from chat:*** *Bruce Vogt:* I like the big picture concept you raised at the end and Larry followed up on. That is to look at the network and map out the most important factors and where they overlap across outcomes and targets or spatially so we can collaborate more effectively across the CBP.

Q from chat: *Keith Bollt:* Did you look at if selection or lack of selection of some factors affected the ability to select others? For example, if the partners are not interested in investing in one factor, then it is probably off the table no matter how valuable.

- ***A:*** *John Wolf:* These are like social network tools, it's more of a metric as to how many things are connected to any given node. There are other metrics that look at jumping beyond one node, like that path that something is on. I am no expert at that but there are capabilities along that line, and we might be able to tease out some of those relationships.

Q: *Kaylyn Gootman:* do you have a preference of the methodologies used?

- ***A:*** *John Wolf:* I would not advocate for something that is entirely AI driven but it might help inform. The main takeaway for me was consistency in terminology and vocabulary. If you can enforce that, you will have the ability to use these tools more efficiently and make comparisons across outcomes more than if you're operating in silos. So, using the AI tools was an interesting technique to enforce vocabulary consistency. And beyond that, it is most useful in summarizing and scarping text in different ways. Again, it is not intended to take the place of subject matter experts. Looking forward, we need to position ourselves well for writing the management strategies so that we have consistent information across the board.

- ***Comment:*** *Chris Guy:* For the last few months, our WG has been putting together and creating common terminology around wetlands only. Things like, what does it mean to restore? What does it mean to create? What does it mean to enhance? Etc. This document will be coming out soon for all the members and every partner, and we intend to use this common terminology because we find ourselves in disagreements with just the words we use. I think we should explore more in creating these common terminology documents and we should look to try to codify the Bay Program.

11:30 – 12:00 PM: *Discussion and Exploration on Priority Indicators for Each Outcome -* *All*

Each outcome will be encouraged to fill out a shared spreadsheet with their indicators, including type of indicator. Using this data, participants can discuss similarities and nuisances within the indicators for the revised outcomes. If an outcome is not ready to state what will be their indicators, what questions come up to identify your indicators? What discussions or information would help you identify your indicators?

Q: *Bruce Vogt:* Our targets and outcomes are supposed to be finalized this year, right? Then we move into drafting the management strategies. But when do we need to decide on the indicators? Are indicators part of the management strategy process, or is that a separate step? I ask because I believe several of our indicators are going to change. For example, the blue crab indicator will likely remain similar, still based on the stock assessment. But we're thinking differently about how to assess progress for oyster restoration, and we need a conversation around that. The oyster abundance indicator is completely new, so we don't yet know what that will look like. As for fish habitat, that might be the clearest path forward, we have the living resource assessment and we're working on developing a habitat suitability baseline. Still, we have work to do, and I may have missed something, but is there a timeline for agreeing on indicators?

- ***A:*** *Breck Sullivan:* I don't think we have a defined timeline. That's why STAR has been raising these discussions, to give ourselves space to think these things through. From the last Management Board meeting, I know that a small governance

team is being formed, and one of their objectives will be to talk about indicators. It's unclear whether they'll create a framework themselves or just establish a timeline, but indicator planning is definitely part of that group's work.

- ***Q:*** *Peter Tango:* But does that mean we're presenting something to the Executive Council for approval, an updated agreement with targets even though we don't yet know how we'll measure or report on those targets? Are we essentially giving governors a set of targets without knowing how to assess them? I understand we need to track our targets, but are targets the same as indicators? And are we even sure these are achievable? I guess we won't know until we try.

- ***Comment:*** *Chris Guy:* I think some of those targets will remain uncertain for now. For example, with waterbirds, there's no way we'll have defined targets by December. So, what Sarah has asked is for us to outline how we plan to develop those targets, essentially a concept of a plan. We'll be able to say who we need to bring together and set a reasonable timeline. Up until now, I had assumed targets and indicators were the same. But based on conversations today and others I've had, I'm not sure anymore. Our indicators should communicate what people care about and connect to outcomes in a meaningful, storytelling way. For habitat, we approached the targets with the mindset that they are indicators broadly based on what people care about. That's also why "black duck" was changed to "waterbirds." People care about the overall habitat function and the ecological guild, not necessarily one specific species. Everyone may have their favorite bird, but collectively, the habitat matters more. That said, some targets the public can't really connect with were specifically requested by partners to be included in the outcomes and not just in the logic model or action plan. So that's been a challenge.

- ***Comment:*** *Julie Reichert-Nguyen:* I agree that not all targets need to be indicators. We still need to track progress on some things internally, but I'd really like to translate some of our "adapting to changing environmental conditions" targets into more relatable indicators. Since we're focusing on nature-based solutions and collaborating with other goal teams, I think some of our indicators will need to reflect that cross-cutting nature. We don't have it all figured out yet, but I do know that our old climate monitoring indicators are being archived. We'll be doing something different now that climate work is part of what they're calling "fundamental strategies." That shift implies each outcome area should incorporate climate data into its indicators. This new tier of "fundamental strategies" raises more questions. How will they be implemented? How will we communicate about them? What kind of indicators will be used? We'll need to figure that out, but I just wanted to bring it up as a reminder to everyone.

Key Takeaways:

- ***Aligning Indicators with Public Communication:*** It was emphasized across different comments that it is important to make indicators not only scientifically valid but also clear, relatable and capable of telling a story. Indicators should be used to build narratives that resonate with diverse audiences. Additionally, Indicators should help both policymakers and the public understand whether we are making meaningful progress. Efforts to communicate success should consider that maintaining conditions or slowing decline is often a victory, even if harder to explain.
- ***Clarifying the role and distinction between targets and indicators:*** many comments expressed the need to express the distinction between *targets* and *indicators*. It was broadly understood that the two serve different purposes. Indicators should reflect system response and resonate with public values, while targets may not always be measurable in the same way.
- ***Framing indicators to reflect system and human responses:*** many individuals expressed that indicators should capture not just environmental metrics but also reflect the ecosystem response and how program actions and external factors influence progress. This considers having internal indicators (not public-facing) for performance and more contextual factors affecting success. This could support a more holistic assessment.
- ***Cross-Outcome Indicators:*** Many people acknowledged that current reporting of outcomes operates in isolated silos. Some advocated for cross-outcome indicators that link related outcomes. This approach could better highlight the interconnected nature of multiple outcomes and create more powerful public-facing messages about ecosystem health and community benefits.

12:00 PM Adjourn

Next Meeting: Thursday, July 24th, 2025

Attendees:

Breck Sullivan (USGS), Peter Tango (USGS), Gabriel Duran (CRC), Allison Welch (CRC), Keith Bollt (EPA), Chris Guy (USFWS), John Wolf (USGS), Kaylyn Gootman (EPA), Olivia Devereux (Devereux Consulting), Scott Heidel (PADEP), Rachel Felver (Alliance for the Chesapeake Bay), Ashely Hullinger (PADEP), Sophie Waterman (USGS), Emily Young (ICPRB), Kristin Saunders (UMCES), Ann Foo (UMCES), Jessica Blackburn (Alliance for the Chesapeake Bay), Ezra Krantz (CRC), Douglas Austin (EPA), Catherine Krikstan (UMCES), Julia Fucci (CRC), Rick Mittler (Alliance for the Chesapeake Bay), Gina Hunt (MDDNR),

Melissa Fagan (CRC), Lawrence Sanford (UMCES), Emily Heller (EPA), Marisa Baldine (Alliance for the Chesapeake Bay), Laura Cattell Noll (Alliance for the Chesapeake Bay), Katie Ayers (EPA), Caroline Kleis (CRC), Zhaoying Wei (UMCES), Peter Claggett (USGS), Alex Gunnerson (USGS), Dede Lawal (CRC), Meg Cole (CRC), Bruce Vogt (NOAA), Julie Reichert-Nguyen (NOAA), Matthew Kierce (IWLA), Tou Matthews (CRC), Katie Brownson (USDA), Christina Garvey (CRC), Sarah Brzezinski (EPA), Doug Bell (EPA).