Chesapeake Bay Program
Science. Restoration. Partnership.

Scientific Technical Assessment and Reporting (STAR) Team Meeting

Thursday, April 24th, 2025

10:00 AM – 11:00 AM

Meeting Materials: Link

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

MINUTES

10:00 AM – 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*

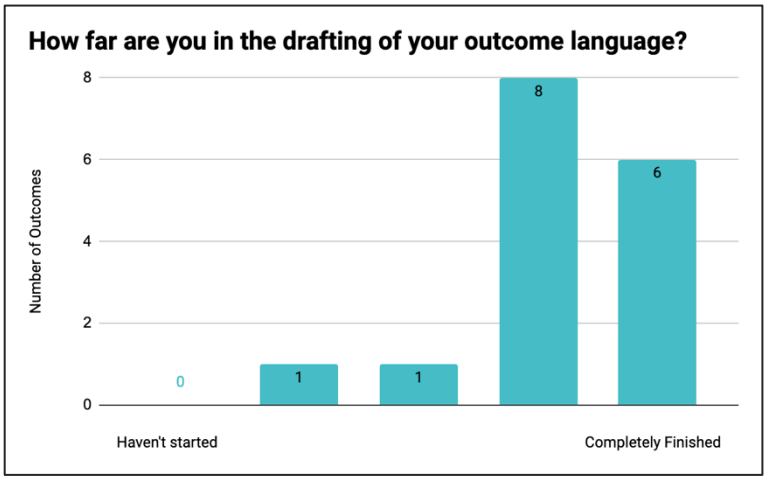
Upcoming Conferences, Meetings, Workshops and Webinars

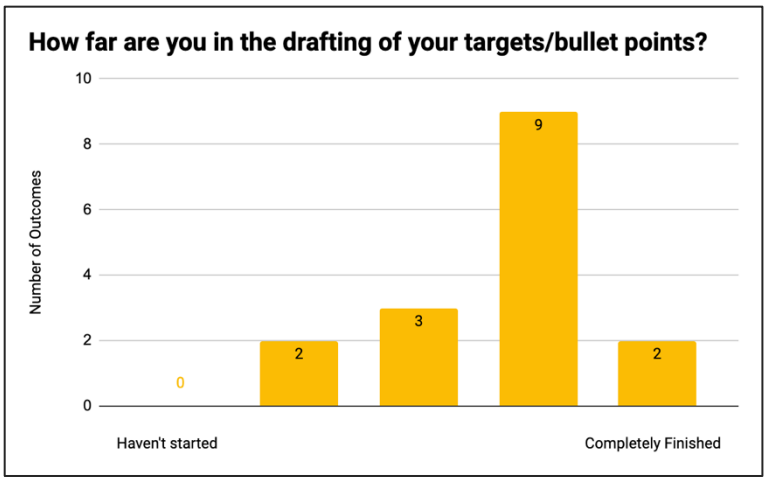
- Choose Clean Water Conference – May 19-21, 2025, Harrisonburg, Virginia.
- Coastal and Estuarine Research Federation Conference – November 9-13, 2025, Richmond, Virginia.

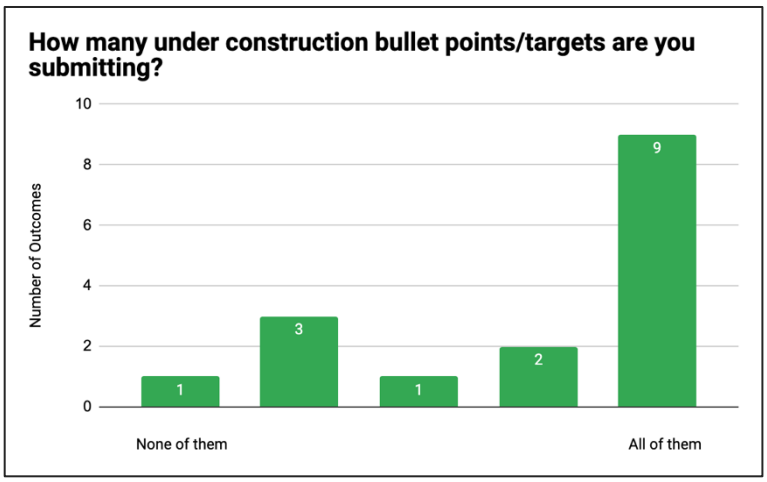
10:05 AM – 10:20 AM Target Language Status Update Poll

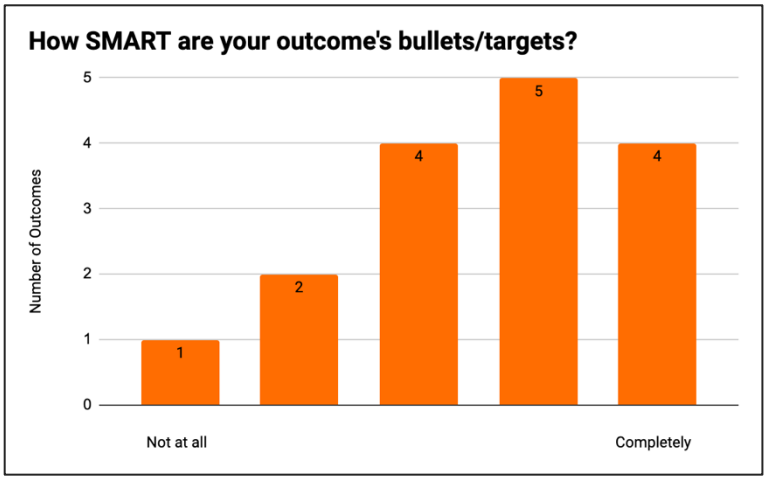
Description: Each outcome will fill out the Poll to share where they are in their outcome language production, specifically on the target/output language. If a representative from your outcome cannot attend the meeting, please reach out in advance to fill out the poll.

Results:









Discussion:

Comment: *Chris Guy:* For our outcomes, it was either straightforward or very difficult, nothing in between. For Submerged Aquatic Vegetation (SAV), wetlands, and black duck, we had all the necessary information. But for stream health and brook trout, it's been a

struggle. Fish passage was actually easy, but it got lumped under fish habitat, complicating things. Stream health has been the most challenging, even bordering on impossible.

- ***Q:*** *Ken Hyer:* Would you say the bigger challenge was drafting the high-level outcome language or making the bullets SMART?

- ***A:*** *Chris Guy:* It's not just about making them SMART. There's a fundamental disagreement in the partnership around healthy watersheds and stream health. The partnership has traditionally taken a watershed-level approach, but some states are only interested in their individual jurisdiction. For example, Pennsylvania insists on using their own index, which doesn't translate across states. As a result, we'd need a different metric for each state, which undermines a unified watershed approach. Some states don't see value in contributing to a broader framework if they don't directly benefit. I'm paraphrasing, but that's essentially why this has been so difficult. If states don't support the watershed-level approach, we can't move forward. We're out of time and have exhausted all options at the Goal Implementation Team (GIT), workgroup (WG), and staff levels. Honestly, I'm not sure we can even claim "under construction." We're at the end of the road. If only some states participate, outcomes like stream health and healthy watersheds might be dead in the water. You can't just have Maryland, Delaware, and D.C. support it and no one else.

- ***Comment from chat:*** *Britt Slattery:* It's the agreement among WG folks on the language and approach that is making us spin wheels. And THEN coming to an agreement on numbers for the targets is a whole other ball of wax. Our stewardship outcomes are less data-driven, so it's harder to quantify targets. The protected lands outcome has better data, but overall, we've had different opinions and not enough time to resolve them. Most of our drafts still have placeholder numbers like "X." I don't think they'll be ready by tomorrow. A few might be ready before public comment, but most won't. I'm not sure how these will fit into a finalized agreement.

Comment from chat: *Julie Reichert-Nguyen:* We're working on the adaptation outcome with the Climate Resiliency Workgroup. I think our language is generally solid, and we've gotten no major pushback. The Management Board (MB) liked the direction and just wanted it to be more specific and measurable. We're taking a place-based approach and identifying seven sub-watershed areas where we'll develop adaptation options and work closely with local stakeholders. We included some numeric targets, like working in at least seven sub-watersheds by 2040, but those are tentative since we haven't finalized the areas or needs yet. Two weeks wasn't enough to sort out all the details, but we're submitting what we have.

- ***Comment from chat:*** *Keith Bollt:* Easy to know what the answer is, but hard to get the wording exactly right and to frame the questions and discussion for this important meeting with this important audience. So, overall very time-consuming.

Comment from chat: *Keith Bollt:* Another challenge is making an S, M, & T output/target that is also A&R. Toxics will not be proposing a SMART target because the WG doesn't affect a change in environmental state. While partners affect resources, so far, there has not been interest in giving the partnership control over those resources. Which is fine, and means the outputs are based on convening and capacity building through knowledge sharing, but there are tradeoffs for what targets look like if the priority is convening. It's probably possible to make a SMART target based on convening, but no idea if there's money to make that indicator.

Comment: *Britt Slattery:* Virginia pointed out at a recent MB meeting that we may be setting ourselves up to track more things than we did with the original 31 outcomes. I interpreted the question about "how many under-construction bullets" literally. If an outcome had three bullets, I counted all three. For our five outcomes, we're tracking at least 16 targets. It feels like we're heading toward an unmanageable situation.

- ***Q:*** *Ken Hyer:* The idea is of the targets you are developing; how many are you taking "under construction" for the new drafted outcome language?
- ***Comment:*** Breck Sullivan: Also, her comment brings up an important point. WQSAM faced the same question: how many targets should we be submitting? If we're including work that supports our outcome, the number of targets could be much higher than what was originally envisioned as a traditional outcome indicator.

Q: *Amy Handen:* I was wondering if anyone feels confident, like you have one or two clear targets and the discussion with the MB should be smooth. Does anyone feel that way, or is everyone dealing with varying levels of uncertainty and really looking to the MB for feedback?

- ***A:*** *Chris Guy:* Either we're done or we're not. There's no middle ground. For example, SAV is done. I'd expect a quick 5-minute conversation with the MB, something like "great, keep going." Fish passage is the same. We didn't get much feedback the last time we proposed it, and the draft language hasn't changed much since then. So, I think those will be easy. But for outcomes with a lot of controversy and unresolved discussions—like healthy watersheds and stream health—nothing has changed. We haven't made any progress from the very first MB meeting through to now. I don't think we've addressed the core issues at all.
- ***Comment from chat:*** *Katie Brownson:* I think we're in decent shape with our two former outcomes that are now becoming "targets", but our new proposed target will need some more discussion
- ***A:*** *Peter Claggett:* For the Land Use Decision Support outcome, I think we're in good shape. We've got a target and a metric. It's qualitative rather than quantitative, but everyone at the Land Use Workgroup and the Healthy Watersheds Goal Team is happy with it. It's "SMART enough," and whether or not the MB agrees, it's what

we've got, and it's rooted in common sense. So, we feel ready, even if they might not think we are.

- ***Comment from chat:*** *Julie Reichert-Nguyen:* What we are proposing for adaptation would need more resources than what has been given to the CRWG in the past. Interested parties and the MB wanted to expand adaptation beyond coastal projects to also include nontidal. Also include terrestrial with aquatic. It is unclear to me how this will be resourced to allow for this.
- ***Comment from chat:*** *Keith Bollt:* Cautiously optimistic the MB will be comfortable with the output and target language itself, but that's just step one, The MB hasn't had a conversation about target definitions, that "SMART" includes "achievable" tradeoffs, resources, resources for indicators, membership engagement, workgroup leadership, etc. I raise a lot of those topics in my presentation. So I think we'll be ok May 7 but unsure what happens after then.
- ***Comment from chat:*** *Christina Garvey:* The Fish GIT feels confident moving forward with the Blue Crab Sustainability Outcome. The Fish Habitat outcome is moving along, but there is still work that needs to be done on the tidal vs nontidal targets. We expect there may be more conversation around this during the MB meeting. Due to some additional conversations, we have recently combined the two oyster outcomes into one overarching outcome with restoration and fishery targets - we feel good about this and where our targets stand so far but will see what MB says. We got confirmation from our Executive Committee on Monday that they are happy with the direction we are going.
- ***Comment:*** *Ken Hyer:* There's a consistent theme—many workgroups are still revising their outcome language. Some are updating what they already had, but most are not fully comfortable yet. A lot of these targets are still under construction or aren't "SMART enough," as Peter put it. That phrase "SMART enough" is interesting. Britt, I also noted your point about the proliferation of targets. The idea was for targets to serve as outputs, but it seems we're now tracking more outputs and possibly fewer consolidated outcomes. We'll need to be thoughtful about that.

10:20 AM – 10:35 AM New Changing Environmental Conditions Team Overview and Discussion – ***Ken Hyer*** *(US Geological Survey, USGS)*

Description: In response to recent MB decisions, the Monitoring and Assessment Outcome is transitioning into a "framework." Ken Hyer will present on the newly proposed Changing Environmental Conditions Framework.

Ken Hyer: We're proposing a shift from the traditional "Monitoring and Assessment" outcome, which focused on tracking climate conditions and their impacts, toward a broader framework that works with various outcomes to incorporate changing

environmental conditions. This includes precipitation, streamflow, and other evolving factors. We want to ensure this is being integrated effectively into outcomes.

The existing outcome was: *"Continually monitor and assess the trends and likely impacts of changing climate and sea level conditions on the Bay ecosystem, including the effectiveness of restoration activities and BMPs."* That version emphasized monitoring and assessing trends, rather than supporting outcomes. Our proposed replacement shifts from just reporting trends to a framework focused on working with different outcomes to integrate environmental change considerations. This supports forward-looking planning.

At recent MB meetings, members noted this concept doesn't fit the structure of a traditional outcome. Instead, they described it as a guiding principle – an essential consideration that should be embedded in all outcomes. Simultaneously, Scientific and Technical Advisory Committee (STAC) was developing a similar concept: the "Braiding Knowledge Streams" outcome, which emphasizes integrating scientific, indigenous, and local knowledge. The MB concluded this too should be a guiding principle. So, we now have two guiding concepts—braiding knowledge and incorporating environmental change—that should be woven into all outcomes.

We propose forming a dedicated team that would work with each outcome to support integration of changing environmental conditions. Past examples of success suggest including subject matter experts in flow, temperature, and modeling; ensuring facilitated, collaborative processes; bringing in external expertise as needed; and identifying science gaps and ways to fill them. The goal is to co-develop implementation plans that are supported with resources and are informed based on changing environmental conditions.

Rather than apply this universally every year, we could prioritize a few outcomes at a time—perhaps two to four annually. Since STAR meetings include strong representation from across WGs, we'd like to use the next few minutes for feedback. Please share in the chat or through brief discussion: What would you want to see in such a team? What should be included in a two-pager that outlines the team's composition and goals—a charter, essentially? If you're imagining this team sitting with your outcome group to help integrate considerations, what guidance, suggestions, or concerns would you want addressed?

Discussion:

Comment: *Larry Sanford:* I think it is a great idea to have a resource team available to support any of the outcomes. However, I wouldn't set too rigid a schedule. If you have a team of subject matter experts, then outcomes should be able to come to the team when they need help. It's important to allow flexibility, even with a regular meeting structure in place.

Q: *Denice Heller Wardrop:* Given how closely the braiding knowledge streams concept aligns with this, I wonder if we could consider combining efforts. STAR has a stronger

connection to the GITs, while STAC has broader access to external expertise, especially around changing environmental conditions. Both groups have complementary strengths. Would it be possible for STAR and STAC to jointly support these two guiding principles or foundational strategies? Since both groups have different strengths, and implementing these ideas will require resources, it makes sense to do it together. I liked the meeting we had the other day about combining efforts, and I'd like to keep pursuing that—it would be really helpful.

- ***Response:*** *Ken Hyer:* I think having a joint effort between STAR and STAC is the best idea moving forward. There is no strict feeling of having this team in either group because we really need both groups to make this work.
- ***Comment from chat:*** *Keith Bollt:* Thanks for the opportunity to help brainstorm this in Dec-Jan. Step 2, the facilitated process seems like the sticking point and why the 2021 Executive Council (EC) directive has not been fully successful yet-accountability. Would the scientists also be the facilitators or would that need CBPO policy people to facilitate? How would the team find outcomes, a formal calendar or more informal? Would outcomes' participation be mandatory? Would there also be a mandatory box to check as part of the SRS process and would the MB make sure the box is checked?

- ***Response:*** *Denice Heller Wardrop:* Our idea is that braiding knowledge streams could be a foundational strategy addressed through the management strategy development process. There's room in the agreement language to do that. The Principals' Staff Committee (PSC) could write the principles, and the MB would be responsible for implementation and would have to report back to the PSC on progress. That way, accountability is clear.

Q: *Breck Sullivan:* Since we have several members of the Geospatial Science and Application Team (GSAT) here, I'd like to ask—do you have any lessons learned from situations where groups came to you with spatial analysis needs while you were already balancing your own task list?

- ***A:*** *John Wolf:* We've seen this before—multiple WGs submitting requests and raising expectations. A few weeks ago, we sent out a note asking for input on what people expected from GSAT, and that's still ongoing. After talking to Lee McDonald yesterday, it seems there's some uncertainty about who should direct those requests. Should they come from WGs or from the MB? We need to prioritize as some requests are continuations, others are brand-new and haven't been vetted yet. We want to be strategic about how we handle them.

  There are recurring themes across outcomes, particularly regarding data needs like high-resolution land use, and we want to ensure we're treating similar requests

consistently. So, we're initiating a prioritization process. There's definitely more to come. We've seen a surge in activity on the output side in particular.

Comment from chat: *Britt Slattery:* I'm watching this effort because I really think Stewardship needs to be one of these teams that serves like an internal resource (or a means to coordinate resources) to help the other outcomes weave stewardship into their work. Workforce could be similar.

10:35 AM – 11:00 AM Interconnectivity of Chesapeake Bay Program Goal Implementation Teams and Workgroups – ***John Wolf*** *(US Geological Survey, USGS) and* ***Gabriel Duran*** *(Chesapeake Research Consortium, CRC)*

Description: John Wolf and Gabriel Duran have been developing a resource that identifies connections between each of the Chesapeake Bay Program's (CBP) outcomes. This resource could be helpful in busting organizational silos and connecting workgroups focused on similar topics. Here they will discuss their network map and facilitate a discussion on the interconnectivity of CBP's outcomes.

John Wolf: This project relates to work we did last summer with our C-StREAM intern (Chesapeake Student Recruitment, Early Advisement, and Mentoring internship program), who developed a series of knowledge graphs. You can think of these as system maps or network models. I had also worked with Britt on a social network mapping exercise for the Stewardship GIT, and the C-StREAM intern's work helped lay the foundation for a broader suite of knowledge graph products. We've continued to evolve the concept since then.

I want to emphasize that these products weren't created in response to the updated Watershed Agreement. They're simply tools for information sharing at this point. I'd like to thank Sophie, Bailey, and Alex on my team for helping with data updates and proofing over the summer, and especially Melinda, our C-StREAM intern and a sophomore at Cornell, who did exceptional work developing these products. I'll walk through a few examples today. I'm not going to go into all of them - there are links in the PDF shared with the meeting invite for deeper exploration (slide 5). They're especially useful because you can filter the graphs based on your interests.

I'll wrap up the overview with a chord diagram, which I think generated the most interest, possibly from the GIT Chairs meeting. To begin, this is a simple example of a knowledge graph showing the relationships between goals, themes, and outcomes. It's essentially a network diagram similar to an organizational chart. Nodes represent elements, and edges represent the connections between them. The purpose is to highlight how interconnected various entities are. This first example shows the themes associated with goals and outcomes, and you can filter by selecting a specific element to isolate its related components.

My involvement in this goes back several years when there was more of a Geographic Information System (GIS) focus. When management strategies were initially developed, we recognized a category called "factors affecting outcome achievement" or "factors affecting progress." I was particularly interested in whether those factors were geographically specific and shared across multiple outcomes. If so, they might point to areas where a single intervention could benefit multiple outcomes, thus informing geographic targeting.

The project has since expanded. One of the challenges in using management strategies for this work is the inconsistency in terminology due to multiple authors and unstructured text. That's not unique to this effort. Gabriel and I have experimented with using ChatGPT—not for editing, but to create consistent nomenclature across outcomes. Results have varied, but this example focuses on "factors affecting outcome achievement." After filtering, we found that funding, for instance, is a common factor cited in many outcomes. This isn't a geographic factor, but it's cross-cutting. Each connection includes a description and a strength score—on a scale of 1 to 10—representing how critical that factor is to the outcome, based on the management strategy text or other sources. Again, this is AI-generated and hasn't been thoroughly proofed.

That's one example. Back in the PowerPoint, you'll find several more knowledge graphs that came from Melinda's work, supported by Sophie, Alex, and Bailey. For instance, we mapped stakeholder organizations from the "Find a Bay Watershed Organization" tool and linked them to outcomes based on functional roles. Some organizations are narrowly focused, while others connect to multiple outcomes or goals. The PDF includes links to explore those further.

At the last MB meeting, several models were presented showing possible structures for a future agreement - Peter Tango, Wendy O'Sullivan, Anna Killius, and Jeff Lerner each had variations. I used Jeff's "Living Resources Group" as a filter to see which stakeholders align with his model. The four models were quite similar, and I wanted to test whether this kind of filtering revealed consistent audience groups. While it was interesting, I wouldn't say these findings are influencing organizational design directly—more of an exploratory analysis.

Another example involves science needs. This comes from STAR's science needs database. It's a bit more complex since some needs are tied to goals rather than outcomes, but the idea is the same: can we identify overlapping science needs across outcome groupings to inform broader planning?

Lastly, we looked at partnership membership: goal teams, workgroups, action teams, and their members. One of the more revealing charts shows the affiliations of someone like Peter Tango, who's connected to 14 different WGs. This visualization shows the extent of cross-cutting participation and might have implications for things like meeting loads.

Now to the chord diagram. This visual attempts to show the relationships among outcomes, generated using ChatGPT queries. It cross-references management strategies and identifies connections between outcomes, providing both descriptive context and a strength score. For example, selecting the Fish Habitat outcome shows which other outcomes it connects with, including descriptions and a strength rating. These values haven't been ground-truthed - they're AI-generated - but they demonstrate the concept.

As Gabriel will explain next, the key to using tools like ChatGPT lies in prompt design. How specifically you define the scope and inputs determines the quality of the output. These products stem from the knowledge graph work led by Melinda, and while we're not yet sure how applicable they are in this context, we're very open to feedback and ideas for making them more useful.

Gabriel Duran: To follow up on what John presented, I had previously shared this at the GIT Chairs meeting, but I'll quickly go over it again in case anyone missed it (presentation link). Our methodology relied on ChatGPT to help define our network elements—specifically, the nodes (which represent outcomes) and the edges (which represent relationships between outcomes). Each edge is formed based on the strength of shared characteristics, as John described.

We created a large dataset where each row represents a relationship between two outcomes. This is based on a set of defined criteria, and we added a scoring system to quantify relationship strength—higher scores indicate stronger connections. We then visualized the network to help interpret these relationships.

For my criteria, I used the final two-pagers submitted to the MB, similar to what I presented previously. I fed ChatGPT a defined set of metrics to identify connections, like shared outcome recommendations, shared challenges and opportunities, value added by the Chesapeake Bay Program, and others. Some criteria were later struck out based on feedback from the GIT Chairs meeting, and we plan to integrate those revisions in follow-up steps.

Additional feedback from that meeting included suggestions like applying a threshold to define a "true" connection, using node size to indicate outcome importance within the network, incorporating more documentation such as management strategies, and identifying clusters of outcomes that may share common goals. I've continued developing this work, and although I haven't created a network visualization as detailed as John's, I've put together a hierarchical cluster diagram.

In this diagram, outcomes are on the Y-axis and "distance" is on the X-axis, which refers to dissimilarity. The further from zero, the more dissimilar two outcomes are; the closer to zero, the more similar. Outcomes are color-coded by clusters to highlight potential cross-outcome groups. For example, one cluster includes outcomes related to forage,

adaptation, monitoring and assessment, and diversity in the workforce. These appear to have strong interconnections, likely indicating cross-program relevance.

Another cluster includes many of the living resources outcomes, as well as student and environmental literacy and toxic contaminants. A third grouping includes local leadership, forest buffers, tree canopy, land use, and methods and metrics. Toward the bottom, we noticed some errors like Black Duck which appeared in an unexpected cluster, and "monitoring and assessment" was repeated twice. These issues highlight the need for continued refinement and validation.

Despite the imperfections, this exercise has helped us start identifying clusters of outcomes that could benefit from shared meetings, collaborative initiatives, or coordinated partnerships. We're hopeful this tool can guide more efficient and strategic planning across the partnership.

I won't take up more time, I just wanted to share this and open the floor for feedback. In particular, we'd love to hear how this kind of information could support your work — especially with outcome language development and upcoming discussions about organizational structure.

Discussion:

Comment from chat: *Laura Cattell Noll:* For folks interested in this network science approach, the Strategic Engagement Team has a new GIT-funded project that just launched that will offer training and resources for coordinators and staffers on how to use network science to advance our collective goals.

Comment from chat: *Sarah Brzezinski:* I'm interested in potential applications for adaptive management and strategic decision making.

Comment: *Ken Hyer:* My quick reaction is that this work will become essential as we transition from discussions on organizational structure to questions of operational structure. Once the outcomes are updated, the next step is figuring out how to implement and operationalize these interconnections. Using science and tools like this to drive that interconnectedness is key. The boxes on a page don't define our success—the connections and how we implement them do.

- ***Response:*** *Breck Sullivan:* I agree. But I also think this work has implications for the organizational structure itself. If we're going to condense our outcomes into four goals, we want to be sure those groupings reflect real, meaningful connections and not just historical categories.
- ***Comment:*** *Denice Heller Wardrop:* I'd be really interested in how you represent the value of shared learning. That kind of knowledge exchange is foundational to

adaptive management. I'm not sure exactly how you'd articulate it, but I love the direction of this work. Thanks.

- ***Comment from chat:*** *Katie Brownson:* Building on what Ken said- with a bit of additional refinement wondering what these tools can tell us about how these outcomes are connected so we can see opportunities for collaboration (rather than just seeing which outcomes are connected).

11:00 AM Adjourn

Next Meeting: Thursday, May 22nd from 10 AM - 12 PM.

Attendees:

Breck Sullivan (USGS), John Wolf (USGS), Gabriel Duran (CRC), Allison Welch (CRC), Kenneth Hyer (USGS), Chris Guy (USFWS), Douglas Bell (EPA), Keith Bollt (EPA), Sophie Waterman (USGS), Anne Coates (TJSWCD), Pat Thompson (EnergyWorks Group), Kaylyn Gootman (EPA), Scott Heidel (PADEP), Amy Handen (EPA), Catherine Krikstan (UMCES), Ashley Hullinger (PADEP), Sarah Brzezinski (EPA), Rebecca Murphy (UMCES), Jake Solyst (Alliance for the Chesapeake Bay), Jess Blackburn (Alliance for the Chesapeake Bay), Lucinda Power (EPA), Julie Reichert-Nguyen (NOAA), Julia Fucci (CRC), Denice Heller Wardrop (CRC), Emily Young (ICPRB), Britt Slattery (NPS), Laura Cattell Noll (Alliance for the Chesapeake Bay), Katherine Brownson (USDA), Sushanth Gupta (MWCOG), Alexandra Fries (UMCES), Christina Garvey (CRC), Matthew Kierce (IWLA), Larry Sanford (UMCES), Ann Foo (UMCES), Jessica Shippen (TJSWCD), Jennifer Olszewski (USGS), Tou Matthews (CRC), Meg Cole (CRC), Anne Coates (TJSWCD), Bill Dennison (UMCES), Carl Friedrichs (VIMS), Zhaoying Wei (UMCES), Peter Claggett (USGS).