Chesapeake Bay Program
Science. Restoration. Partnership.

Scientific, Technical Assessment and Reporting (STAR) Team

Theme: Looking back to Look Forward

Thursday, June 25th, 2026
10:00AM – 12:00PM

Visit the meeting webpage for meeting materials and additional information.

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

Purpose: This is the monthly meeting of the Scientific, Technical Assessment and Reporting Team. In this final STAR meeting, participants will reflect on past endeavors by STAR to extract lessons, acknowledge accomplishments, and chart a more intentional path for the future as the Chesapeake Bay Program (CBP) transitions to the Science Support Team.

Minutes

I. Welcome, Introductions & Announcements (10:00 AM – 10:10 AM)

Lead: ***Ken Hyer*** *(U.S. Geological Survey, USGS) STAR Chair,* ***Breck Sullivan*** *(USGS) STAR Coordinator, and* ***Peter Tango*** *(USGS) CBP Monitoring Coordinator.*

Upcoming Conferences, Meetings, Workshops and Webinars

- Restore America's Estuaries' 2026 Coastal & Estuarine Summit – September 22-25, 2026. San Francisco, California.
- Chesapeake Watershed Forum – November 13-15, 2026. Shepherdstown, West Virginia. *Submit to registration lottery by August 21st. More information here.*

II. Reflections from Past STAR Leaders (10:05 AM – 10:30 AM)

Materials: Presentation can be found on the meeting webpage here.

Bill Dennison: When we first began discussing science support for the Chesapeake Bay Program (CBP) around 2009 or 2010, the proposed group was named Technical Support and Services (TSS). To use stellar evolution as an analogy, a low-mass star quietly fades into a white dwarf; going big means taking a high-mass route toward a supernova. To us, TSS was a small path, not to mention TSS stands for total suspended solids, or "dirt in water." We refused to be dirt in water, so, we changed the name to STAR, an acronym representing five core capabilities: modeling, monitoring, the GSAT team, the web team, and integrated assessment. The core concept of STAR was to sit as an active interface between Goal Implementation Teams (GITs), data providers, and academic and agency scientists.

Our genesis phase ("nebula" stage) grew out of a process called Monitoring Realignment Action Team (MRAT), which involved months of Friday morning phone calls to divert $1 million from tidal to non-tidal monitoring. That shift made CBP look beyond the Bay itself and focus on the entire watershed, making us realize we needed the right mix of monitoring, modeling, and data analysts at the table. From there, we entered the "red supergiant" phase, led largely by Peter Tango, as we produced an in-depth report on building environmental intelligence. We mapped out decades of monitoring history, from water quality and SAV to rates and processes, and built upon key assessments in nutrient limitation, toxics, and shallow water monitoring to connect science directly to management outcomes.

We then reached our "supernova" stage with our New Insights report, where we proved that the Clean Air Act and Clean Water Act upgrades were making a measurable, positive difference in the Bay, even as agricultural and urban runoff remained challenges. Scott Phillips, Don Boesch, Nick DiPasquale, Rich Batiuk, and I spoke on behalf of the Report as a group of dedicated women, Catherine Krikstan, Brianne Walsh, Margaret Enloe, and Christina Lyerly, did all the heavy lifting to pull it off. Around this time, Mark Bennett, Scott Phillips, and I co-led STAR, until Mark transitioned to lead the newly formed Climate Workgroup (WG) after Governors O'Malley and McAuliffe successfully pushed to integrate climate into the 2014 Watershed Agreement.

To make STAR effective, we introduced a few radical operational changes. We replaced the traditional five-hour sessions with two-hour meetings from 10:00 AM to 12:00 PM. Following these morning meetings, we hosted lunchtime seminars featuring guest speakers. We also initiated joint meetings with staffers and coordinators, establishing WGs in modeling, data integrity, integrated monitoring, GIS, and status and trends to support the science capacity that individual goal teams lacked.

We populated those WGs with talented coordinators and staffers, effectively embedding rigorous science into the daily operations of CBP's GITs. Looking back, this entire evolution provided a vital vehicle for keeping the program on top of both Bay and watershed science, synthesizing data, and bridging the gap between academic researchers, agency scientists, and resource managers.

Peter Tango: Back in 2009, I was only supposed to fill in for Gary Shenk for six months, but it turned into a career defining stint. Over the years, we brought on exceptional co-coordinators like Emily Trentacoste, who spearheaded our data collection and dashboard, before Breck took over and revolutionized our accountability structure, Strategy Review System (SRS) process, and two-year adaptive management framework. Beyond that, Bill Dennison laid our structural foundation with the indicator framework, though his work briefly sparked contention between the UMCES and Bay report cards—a rivalry we've since aligned into a synergistic partnership. As STAR's scope expanded, our staffing grew through the Chesapeake Research Consortium (CRC) from a single overwhelmed staffer to a full team.

Beyond our regular products and webinars, STAR helped incubate the Chesapeake Monitoring Cooperative (CMC). After recognizing gaps in fine-scale temporal and spatial monitoring during a USGS meeting in Baltimore, we channeled community science into a full proposal, brought to life by Liz Chudoba, Alex Gunnerson, and the broader team. While we didn't always do the best job recording every name and face along the way, I remain deeply grateful for the foundational support from Scientific & Technical Advisory Committee (STAC), Meg, Tou, and the leadership at CRC through countless workshops and collaborative efforts.

III. Lightning Round Presentations (10:30 AM – 11:30 AM)

i. CRC Staffers – Global Data, Local Impacts: How data center development is changing your local landscape *(10:30 AM - 10:45 AM)*

Lead: ***Allison Welch and Daniel Koval*** *(Chesapeake Research Consortium, CRC)*

Materials: Presentation can be found on the meeting webpage here.

Allison Welch: This presentation is an intersection of STAR, the staffers, and the Geospatial Science and Applications Team (GSAT), to understand data center development across the Chesapeake Bay watershed, and to link impervious surface cover from these campuses to stream health and local environmental factors.

Daniel Koval: While data centers impact water usage, energy demand, and public health, our study specifically targets land use and impervious surface impacts. To capture hyper-localized effects, we evaluated two hydrologic units: HUC-12s (Hydrologic Unit Codes) and NHDPlus catchments (National Hydrography Dataset Plus). In our analysis, we correlated impervious surface levels with Chesapeake Bay stream health data based on macroinvertebrate sampling.

Allison Welch: Using the Center for Watershed Protection's Impervious Cover Model, we know that stream quality drops sharply as impervious cover rises: 0–10% allows for high stream quality, 10–25% exerts strong negative impacts, and exceeding 25% inevitably triggers "urban stream syndrome", causing flash floods, pollution, erosion, and severe biodiversity loss. Analyzing 2021 land use data alongside confirmed locations from the FracTracker Alliance, we mapped 128 confirmed data centers across the watershed, accounting for roughly 1,500 acres of impervious surface (about twice the size of Central Park). Over 770 of those acres were concentrated in Loudoun County, Virginia alone. For instance, in one Loudoun County catchment containing a single data center, impervious surface hit 81%; without it, impervious cover would sit at just 16%. Naturally, local stream health ratings in these heavily impacted catchments are rated "very poor." Looking ahead, as of early 2026, there are 229 proposed data centers in the watershed, including 44 in rural counties.

Daniel Koval: To evaluate how future development might affect undeveloped areas, we shifted our focus to rural Caroline County, Virginia, which currently has only 2% impervious cover countywide. Caroline County faces 12 internal data center proposals, 12 nearby external proposals, and two major transmission line expansions. Zooming into one catchment with three proposed data centers, we estimate development will add 14.4% in impervious surface—pushing the total over 20% and transitioning the area from a sensitive, high-quality stream zone into an impacted, non-supporting one. Furthermore, these massive industrial proposals sit on lands currently zoned for rural preservation, adjacent to wetlands and resource management areas, and would require complete rezoning to convert forested and natural land into large multi-building campuses.

Ultimately, local governments must account for the complete, full-campus impervious surface footprint when evaluating data center proposals. Unchecked impervious cover escalates surface runoff, degrades water quality, overloads sewer systems, and exacerbates stream flashiness. Local leaders must weigh existing rural zoning, environmental vulnerabilities, and broader public health, energy, and water impacts before approving these developments.

Discussion:

Comment: *Bill Dennison:* "Data Center Stream Syndrome" would be a great name that I would recommend for your work.

Q: *Peter Tango:* In other industries, companies are permitted to build if they provide mitigation on another parcel to elevate its health. In your research on data centers, do they have mitigation requirements or is it strictly a direct negative impact without required compensation?

- ***A:*** *Allison Welch:* At the Chesapeake Community Research Symposium (CCRS), a representative working with data center companies mentioned sustainability initiatives that different companies are undertaking, which included some mitigation efforts. However, I don't believe those measures are codified into law; they appear to be voluntary company choices.

Comment: *Ken Hyer:* At the Choose Clean Water Conference a couple of months ago, data centers came up in almost every session regarding their potential to alter the landscape; not just through stormwater runoff, but through water usage, temperature effects, and grid demand. It is great to see how timely this research is. We are seeing an emerging topic, and I look forward to bringing more people from the data center and construction community into our discussions, as this is not going away. The scale of the proposed data centers is immense, and their potential to alter the landscape is real. We are early in the process of understanding how this land use change will alter our systems and how we must plan for it. In five years, it will be interesting to see how we are planning for data centers and mitigating their impacts.

- ***Q from chat****: Liz Chudoba:* Data Centers are a big topic within the Volunteer Monitoring world right now. Is there a suite of data that is helpful to collect around these areas to track the changes to local streams? Obviously benthic macroinvertebrates would be a good indicator, but anything else that localities specifically may be using the make decisions?
- ***A from chat:*** *Amanda Shaver:* we may be able to help with this, Liz. We should touch base afterwards.

ii. STAC Synthesis Project – A Monitoring Framework for Coastal Nature-based Solution (NBS): From Ecosystem Condition to Natural Capital Accounting (10:45 AM - 11:00 AM)

Lead: ***Laura Costadone*** *(Old Dominion University, ODU)*

Materials: Presentation can be found on the meeting webpage here.

Laura Costadone: We initially developed a proposal to find a way to assess the effectiveness of nature-based solutions. This was a 3-year project with Tetra Tech but funding was cut in 2025. We lost our collaboration with Tetra Tech and our scope was changed as a consequence. The core goal of this project is to develop a scientifically sound framework evaluating whether coastal NBS recover ecosystem conditions to sustain key services, while producing outputs ready for natural capital accounting. To establish a universal baseline across regional disagreements, we grounded our work in the globally recognized International Union for the Conservation of Nature (IUCN) Global Ecosystem Typology, zeroing in on seagrass meadows, shellfish reefs, and salt marshes. By evaluating whether restoration revives core ecological functions, our approach aligns directly with the System of Environmental Economic Accounting (SEEA) to treat nature as a measurable asset. Through literature reviews and iterative feedback from focus groups and charrette workshops, we compiled and refined key performance indicators across four primary Chesapeake outcomes: Coastal Hazard Risk Reduction, Climate Mitigation, Ecosystem Integrity & Function, and Socioeconomic Benefits.

To keep this practical for users with varying resources, we distinguished high-level indicators from specific operational metrics and created tiered monitoring options ranging from basic to advanced. Using seagrass meadows as an example, we distilled literature-derived indicators into a concise shortlist connected to interactive info sheets detailing specific methodologies. By tracking these outputs against pristine reference states over time, practitioners can measure true ecological integrity and feed reliable data directly into natural capital accounting. Full ecological recovery is critical because degraded systems supply few services; quantifying these benefits translates ecological performance into standardized economic language that supports policy, finance, and long-term sustainability planning.

Ultimately, capturing this full suite of ecosystem services is vital for accurate cost-benefit analyses. Traditional comparisons often penalize nature-based approaches like living shorelines if they only measure a single outcome like wave attenuation against gray infrastructure, completely ignoring co-benefits. Monetizing the full spectrum of ecological and socioeconomic services finally allows green infrastructure to compete fairly on an economic level. Moving forward, I plan to expand this framework to additional coastal ecosystem typologies, integrate field data, and continue advancing natural capital accounting models across my broader research.

Discussion:

Comment: *Bill Dennison:* This makes me think of the SAV Watchers Program (Submerged Aquatic Vegetation). As one of those social-economic benefits, you can quantify the number of hours, the number of volunteers, and all the water quality parameters they monitor. This might be something that could be considered as an indicator.

- ***Response:*** *Laura Costadone:* That's a great example! We are familiar with their work and this effort is to hope steer us in the direction of more collaboration. The challenge now is gathering all that great work and formulating it in a way that can fit directly into natural capital accounting and translate something from a physical term to an economic term.
- ***Comment:*** *Ken Hyer:* That's a great point, and this is something that I have been thinking about for awhile on how to factor in that economic piece into our efforts.

iii. Water Quality Variability along the Salinity Gradient: Insights from high-frequency monitoring in the Chesapeake Bay (11:00 AM - 11:15 AM) Lead: ***Wes Slaughter*** *(University of Maryland, UMD)*

Materials: Presentation can be found on the meeting webpage here.

Wes Slaughter: Today's presentation is on the results from an ORISE (Oak Ridge Institute for Science and Education) fellowship on water quality variability using high-frequency temporal and spatial data in the Chesapeake Bay. The Bay Program wanted to better understand water quality variability in shallow water ecosystems, which are less represented than mid-channel systems in discrete monitoring datasets, and evaluate dissolved oxygen (DO) criteria assessment at very short timescales. While the biweekly discrete monitoring dataset is the backbone of the Bay Program, it lacks the capacity to reflect sub-weekly or sub-daily instantaneous minimum values.

To address this, we utilized two broad, publicly available datasets: DATAFLOW data which gathers surveys from cruise vessels providing high-resolution spatial snapshots roughly every four seconds, and Continuous Monitoring (ConMon) fixed stations taking readings every 15 minutes over a 25-year record. For the DATAFLOW analysis, I worked with the Bay Program's 4-D interpolator team to evaluate how water quality variance levels out over distance, contributing statistical analysis toward the next generation of our water quality model. For the ConMon dataset, high-frequency sensors revealed much broader distributions for DO and pH than discrete monitoring, prompting us to evaluate how daily minimums, means, and maximums are structured along salinity gradients.

Focusing on a case study along the Potomac River during a period with high station density, we uncovered several key salinity gradient dynamics. Total ranges and overall means for daily minimum, daily mean, and daily maximum DO and pH were significantly higher in tidal fresh waters, diminishing moving downstream primarily due to a drop in daily maxima. Interestingly, while standard models predict daily minimum DO occurs right after sunrise, the sensors revealed a surprising number of minimum DO observations occurring around or right after sunset, with the frequency of these sunset minima increasing downstream. Furthermore, the sensor data confirmed a strong, consistent coupling between DO and pH across all salinity zones driven by photosynthesis and respiration.

When comparing discrete Bay Program measurements against sensor distributions, we found that discrete measurements typically fell between daily minima and daily means, meaning discrete monitoring programs are least likely to capture daily maximum values. Additionally, preliminary exploratory analysis plotting discrete nutrient samples against sensor pH levels suggested that pH may exert control on nutrient speciation and mobilization in solution. This highlights potential biogeochemical feedback loops that could sustain or limit algal growth, representing a compelling avenue for future research.

Ultimately, this fellowship allowed us to contextualize discrete monitoring within continuous sensor distributions, document previously underrepresented DO and pH extremes, quantify DO-pH relationships, and directly support the development of the 4D interpolator.

iv. **STAR Coordination – Executing Priority Partnership Requests: From monitoring to adaptive management (11:15 AM -11:30 AM)**

Lead: ***Breck Sullivan*** *(USGS)*

Materials: Presentation can be found on the meeting webpage here.

This presentation was skipped due to timing. Please refer to the Meeting Webpage for presentation material.

IV. Looking Forward for the Science & Analytical Support Team: (11:30 AM – 12:00 PM)

Feedback from Participants

Lead: ***Breck Sullivan*** *and* ***Peter Tango*** *(USGS)*

Discussion:

Larry Sanford: I was really impressed by the breadth and cross-fertilization in STAR meetings when I became STAC chair. I'm concerned that without the Management Board and STAR, Goal Teams will become more siloed. Maintaining regular communication between them on both science and policy is crucial.

Breck Sullivan: We need a dedicated venue to share science because the Principals' Staff Committee's (PSC) eyes will glaze over if we get into detailed science. Lightning talks could be the best approach; short, concise presentations to whet appetites, trigger synergies, and help people spot potential interactions. During this leadership transition, there's a strong need for "Bay 101" fundamental materials, like explaining Phase 7 workflows. People consume science through audio-visual formats now, so creating short video summaries or fact sheets would offer valuable learning opportunities across all teams. Since the Science Support Team will only host about six public meetings a year, I doubt there's an appetite for longer Zoom meetings. Short lightning talks with breakout chats for Question & Answer would work much better.

- ***Comment:*** *Kaylyn Gootman:* I second the lightning talk concept where 12 to 15-minute presentations keep meetings shorter and more focused. I also suggest borrowing the Bay Trust Pooled Monitoring Forum model, pairing a science talk directly with a practitioner who uses the data to advance both research and application.

V. Adjourn (12:00 PM)

Attendance:

- Breck Sullivan (USGS)
- William Dennison (UMCES)
- Peter Tango (USGS)
- Allison Welch (CRC)
- Gabriel Duran (CRC)
- Ken Hyer (USGS)
- Meg Cole (CRC)
- Marisa Baldine (Alliance for the Chesapeake Bay)
- Doug Bell (EPA)
- Kaylyn Gootman (EPA)
- Daniel Koval (CRC)
- Wes Slaughter (UMD)
- Melissa Fagan (CRC)
- John Wolf (USGS)
- Laura Costadone (ODU)
- Lawrence Sanford (UMCES, retired)
- Ann Foo (UMCES)
- Liz Chudoba (Alliance for the Chesapeake Bay)
- Alex LoCurto (Alliance for the Chesapeake Bay)
- Ashley Hullinger (PADEP)
- Emily Young (ICPRB)
- Rebecca Murphy (UMCES)
- Cynthia Johnson (DEQ)
- Matthew Kierce (IWLA)
- Sophie Waterman (USGS)
- Rikke Jepsen (ICPRB)
- Amanda Shaver (VADEQ)
- Rachel Owrutsky (DNREC)
- Christina Garvey (CRC)

- Chris Guy (USFWS)
- Matthew Stover (MDDNR)
- Tish Robertson (VADEQ)