Scientific Technical Assessment

and Reporting (STAR) Team Meeting

Thursday, August 28th, 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) Chesapeake Bay Program (CBP) Monitoring Coordinator.*

Upcoming Conferences, Meetings, Workshops and Webinars

- 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 – 10:30 AM – *Governance and Accountability Team Updates* – *Ken Hyer (USGS)*

Description: The Governance and Accountability Team (GAT) will be meeting earlier in the week, prior to the STAR meeting. In this non-decisional agenda item, Ken will be providing updates from their discussion.

Ken Hyer: As part of the Beyond 2025 process and the revision of the watershed agreement, we recognize governance and accountability as key elements. This includes how we govern ourselves, make decisions, conduct annual planning, and manage meetings. The partnership has a governance document that details these processes. We formed a group of 11 people from different jurisdictions, non-governmental organizations (NGOs), and federal representatives, to evaluate existing information and recommendations. We reviewed the governance and management framework, the Eastern Research Group (ERG) report, the Beyond 2025 Steering Committee report, key priorities, the issues log, and public feedback. These documents provided a foundation for the Governance and Accountability Team (GAT) discussions.

We met in late July to identify priority issues, using a hybrid version of a sticky note exercise to group similar ideas into bins and fundamental challenges. From 44 unique priority issues, we distilled six fundamental challenges: (1) priority setting and decision making, (2) defining roles and responsibilities, (3) reducing complexity while enhancing local connections, (4) increasing transparency, (5) improving accountability and adaptive management, and (6) strengthening communication. These are interconnected and organizing them into categories help guide our work.

The Governance and Accountability Team has been tasked with providing suggestions and recommendations to the management board (MB) and Principals' Staff Committee (PSC). We aim to prepare one-page summaries for each of the six challenges, defining problems, identifying short- and long-term solutions, and informing the MB retreat at the end of September. A version of the governance document incorporating these recommendations will follow in the next fiscal year.

In June we began pre-planning, in July we prioritized and organized issues, and in August we met again to unpack topics of priority setting, decision making, and roles and responsibilities. We've had productive discussions, considering governance both within the current structure and in potential new structures. Our next meeting is September 8th to continue drafting one-pagers, with the goal of completing all six by the MB retreat. By the end of September, we expect to have a strong set of suggestions to enhance governance within the partnership. While the revised watershed agreement focused on organizing goals, outcomes, and vision, this effort is focused on how we conduct our work.

10:30 – 11:00 AM – *Water Quality Standards Attainment and Monitoring Outcome Indicators and Discussion on Showcasing Progress Beyond 2025* – *Qian Zhang (University of Maryland Center for Environmental Science, UMCES) and Breck Sullivan (USGS)*

Description: To provide context to the ongoing indicator conversation, Qian Zhang will be sharing an update on the indicators for the Water Quality Standards Attainment and Monitoring (WQSAM) Outcome. This will include what the indicators are, the assessment period results, and other analysis, like the attainment deficit and buffer. Please refer to recent publications on improvements in the shallow zone, attainment indicator application (and deficit), and a history of dissolved oxygen criteria attainment since 1985. Then, Breck Sullivan will be relating these findings to the 2025 Agreement revision process.

Qian Zhang: Here we will focus on providing an update on the Chesapeake Bay water quality standards attainment (WQSAM) indicator and highlighting findings from recent publications. This indicator evaluates progress toward achieving the Bay's water quality standards under the 2014 Watershed Agreement, with a focus on dissolved oxygen (DO), water clarity/submerged aquatic vegetation (SAV), and chlorophyll. It integrates monitoring results from 92 tidal water segments across different designated uses, such as open water (OW), deep water (DW), and deep channel (DC), to provide an overall Bay-wide assessment. While results show considerable interannual variability influenced by weather and nutrient delivery, the long-term trend remains significantly positive.

Data from recent assessment periods demonstrate these fluctuations. Attainment peaked near 40% in 2015–2017, the highest since the late 1980s, but then declined following extreme high-flow years in 2018–2019. More recent results suggest some recovery is underway. These patterns illustrate the Bay's responsiveness to climatic conditions, yet also underscore the value of long-term monitoring in identifying encouraging overall improvements. Two interactive tools allow exploration of Bay-wide and segment-specific attainment data: ChesapeakeProgress site and Shiny apps (attainment indicator and attainment deficit).

Our recent publication (link) further examined differences between shallow and deep zones of the Bay. Shallow zones (tidal fresh and oligohaline) showed faster improvement, with attainment increasing at roughly 0.5% per year, compared to 0.2% in deeper mesohaline and polyhaline areas. Shallow zones also rebounded more quickly after high-flow events. While DO primarily drives changes in deep zones, shallow zones are influenced by both oxygen and water clarity/SAV improvements. These findings highlight the importance of considering different regions of the Bay separately in assessing progress.

Analyses of external and internal drivers showed that nutrient load reductions, particularly nitrogen and phosphorus from the watershed, are the strongest contributors to improved attainment. Scenario modeling confirmed this: without reductions, attainment would be far lower, while an additional 20% reduction would significantly raise attainment levels. However, internal factors such as rising water temperature and stratification hinder progress, particularly in deep waters. These results demonstrate both the success of nutrient management under the Total Maximum Daily Load (TMDL) and the challenges posed by climate-related stressors.

A second recent publication (link) shifted focus to attainment deficits, which measure how far segments fall short of meeting standards rather than simply pass/fail. This approach provided a more nuanced view, showing small overall deficits (0–10%) and significant long-term improvements, particularly in OW and, more recently, DC. Tributary-specific analyses revealed varied trends, with some systems like the Potomac and Tangier showing consistent improvements, while others such as the York experienced short-term degradation. A report card-style summary was created to communicate these findings. Collectively, the results confirm long-term Bay-wide improvements, emphasize the role of nutrient reductions, and highlight the need to address changing environmental conditions and internal system dynamics.

<u>*Discussion:*</u>

Q: *Katie Brownson:* On Slide 18, I have a question about the relationship between water temperature and attainment. In the shallow zone, increasing water temperature appears to increase water quality standards attainment. That seems counterintuitive. Is that what you expected?

- ***A:*** *Qian Zhang:* For the deep zone (blue), the temperature effect is not surprising given its linkage to DO. For the shallow zone, remember the attainment indicator spans more than DO; even for DO, temperature can influence both production and consumption in ways that could improve DO in shallow regions (e.g., effects on primary producers). Also, shallow-zone attainment includes water clarity/SAV and chlorophyll; SAV responses could contribute. That said, temperature is not the most important driver in the shallow zone, so I wouldn't overemphasize it. The key takeaway remains that reducing nutrients consistently drives improvement.

- ***Response:*** *Katie Brownson:* That's helpful. We recently held a workshop on rising water temperatures as a major issue. From a habitat perspective, there may be impacts not captured by the water quality standards. So, even if standards attainment is increasing, habitat quality could still be negatively affected. It's an interesting tension and a communications challenge.

Q: *Breck Sullivan:* Just a broader question to everyone, on slide 8, our Chesapeake Progress indicator shows a Bay-wide estimate of standards attainment as a bar chart. As you've seen today, we can also break results down by deep versus shallow zones, show attainment by tributary, and display attainment deficit (how close we are to attainment). Thinking ahead to Beyond 2025, what resonates most? Should we differentiate what we show internally versus to the public? We welcome feedback on which analyses are most useful to showcase.

- ***A:*** *Ken Hyer:* I've fielded several calls about how the indicator is presented in the revised watershed agreement like what the rate means and how to interpret it. We need to tell a clearer story of progress. There's great information on shallow zones and this is something that has been discussed in Beyond 2025 around habitats and living resources in the shallows, but that progress can be masked by deep-channel performance. We should better convey that nuance without overwhelming people with too many indicators.

- ***Response:*** *Qian Zhang:* I agree. We have a lot to share, but we can't make it overly complex. The single indicator tells the overall story, but not the whole story, which can be discouraging if viewed in isolation. I'm glad we can tease out the continued effect of nutrient reductions.

- ***Comment:*** *Kaylyn Gootman:* Looking at the Bay-wide bar alone, one could misinterpret it as a lack of progress and question the value of our efforts. We need the right balance of nuance to tell the fuller story. Within STAR, this is the place to discuss which indicators are the "capital-I" indicators used externally (e.g., tracking agreement progress or for jurisdictions' reports) versus the additional indicators we use for scientific tracking. There's a lot of nuance and many positives from 40+ years of work that we should communicate.

- ***Comment:*** *Kristin Saunders:* Building on Ken's point: at the Water Quality Goal Implementation Team (WQGIT) meeting, we discussed shallow-water targets and tiered implementation. Qian's results, simply stated, show more rapid change in shallow areas. The Comprehensive Evaluation of System Response (CESR) report suggests that focusing on shallow waters could yield earlier habitat and living-resource benefits while we continue addressing open-water and deep-channel issues. There's internal uncertainty about tiered implementation and what tiered targets would look like. Connecting these attainment findings to that could help educate partners and build support, especially since shallow areas are where people most interact with the resource.
- ***Response:*** *Jeremy Hanson:* At the WQGIT we need two things: a refresher on how targets were set previously (especially in a post–Gary Shenk context), and an educational discussion on what tiered targets and tiered implementation could look like. We haven't covered that at the GIT level yet. After today's presentation, we also need a deeper dive on attainment – what we're seeing in standards across the watershed and Bay. We'll aim to pair these discussions, potentially later this year (October–November), to be determined.
- ***Response:*** *Kaylyn Gootman:* Work is underway on tiered implementation feasibility, and in parallel we need educational conversations like how targets were set last time, and what "tiered" means for both Bay Program audiences and the broader public. Cross-group connection is important

Comment: *Breck:* Based on previous conversations and todays, there is a central theme of just how important storytelling is and continued cross collaboration among outcomes that interconnect.

11:00 AM – 12:00 PM – *Current Science Efforts, Lightning Rounds*

6PPD-Quonine Sampling within the Anacostia River Watershed – *Leah Staub (USGS), Tristan Mohs (USGS) and Tyler Bowser (USGS)*

Leah Staub: We're studying 6PPDQ, a transformation product of the tire additive 6PPD. 6PPD protects tires from wear, but as tires abrade, particles accumulate on roads and react with ozone to form 6PPDQ. During major storm events, these particles are flushed into waterways. 6PPDQ is highly toxic to certain salmonids and is now being detected in the Chesapeake Bay region. We are sampling at two sub-watersheds in the largely urban Anacostia: Hickey Run (highly urbanized with extensive impervious surfaces) and Colesville (still urban, larger, and somewhat more forested).

Tyler Bowser: Our aim is to locate 6PPDQ concentrations along the storm hydrograph (rise, peak, fall; Slide 3) because responses differ by site. These flashy urban streams rise and recede quickly, so we use ISCO Avalanche refrigerated autosamplers programmed for time-integrated sampling to capture entire events. Storm durations differ: at Hickey Run, a typical event is ~1.5 hours; at Colesville, with more forest cover, a comparable event lasts ~14.5 hours. We've captured four events at Hickey Run and three at Colesville (awaiting one more at Colesville), including rise, peak, and fall for analysis.

Leah Staub: Preliminary results from four Hickey Run storms (slide 7); blue is discharge and red marks the sample composites we sent to the lab. For the July 14 event, we submitted nearly all ISCO bottles (minus QA/QC) to resolve concentration changes between rise, peak, and fall. Preliminary results from the first two Hickey Run storms show the highest 6PPDQ concentrations on the rising limb, lower at peak, and lower still on the falling limb – the same pattern in both events. At Colesville, concentrations are much lower overall (Hickey Run peak ~170 vs. Colesville ~2), but the rise-highest/peak-lower/fall-lowest pattern persists. The Hickey Run magnitudes align with prior Anacostia findings, which is encouraging. We're awaiting additional results.

<u>*Discussion:*</u>

Q: *Kaylyn Gootman:* I'm working with colleagues from Environmental Protection Agency (EPA) region 10 and University of Maryland on 6PPDQ and related issues like road sealants. If you're not already connected, I'm happy to facilitate. Your results suggest the "first-flush" principle may apply to 6PPDQ.

- ***A:*** *Leah:* We're coordinating with Kelly Smalling and Chesapeake team colleagues sampling 6PPDQ in the non-tidal network. We've also spoken with Stephanie Gordon and Brianna Williams, who developed a helpful 6PPDQ heat map with fish-species layers.

Q from chat: *Sushanth Gupta:* Is there any consensus on which levels of 6PPDQ are concerning vs non concerning?

- ***A:*** *Leah:* For the thresholds of concern, there's active discussion by species since sensitivity varies. I can share sources.
- ***Comment from chat:*** *Paul Mayer:* coho salmon LC50 is 41 ng/L

Q from chat: *Nick Staten:* What is the extent of monitoring of 6PPDQ throughout the non-tidal regions?

- ***A:*** *Leah Staub:* Rebecca Gorney is a good contact for this but I believe they are grabbing base flow samples at a handful of USGS gage location within the Chesapeake bay watershed.

- ***Response in chat:*** *Ken Hyer:* My understanding is that the 6-ppdq sampling at the nontidal network sites will include both baseflow and stormflow samples, but likely individual grab samples - not the sort of sequential sampling that Leah presented.

Comment from chat: *Paul Mayer:* FYI - EPA/ORD and Region 2 and Offices along with University of Maryland are sampling for 6PPDQ in streams in NYC and DC. more info: mayer.paul@epa.gov.

Tracking Status and Trends in Seven Key Indicators of River and Stream Condition in the Chesapeake Bay Watershed *– Rosemary Fanelli (USGS), Lindsey Boyle (USGS) and Marissa Cassell (USGS)*

Rosemary Fanelli: Here, we will introduce our newly published USGS Scientific Investigations Report (SIR) that compiles status and trends for indicators of freshwater stream and river health. This large, four-year collaboration builds on the USGS Non-tidal Network. We added stream-health indicators that explain patterns in living resources (fish and benthic macroinvertebrates): stream temperature, hydromorphology, salinity, nutrients, toxic contaminants (status assessment), and flow regime. We compiled inventories for each indicator, harmonized data, selected methods to describe status and trends, and the report details those methodologies and summarizes general patterns across indicators.

The report is organized by indicator. Most sections include a status analysis (spatial patterns for 2015–2017) and, where data allow, a trend analysis. We also began exploring trend “explanations” by relating indicator metrics to major land-use classes (Slide 3). Our current work builds on this by examining interactions among indicators to integrate multiple measures of stream health. Phase 2 expands each indicator network with additional sites to better capture spatial variability and compiles ecological benchmarks to evaluate whether abiotic stressors exceed biota-relevant thresholds. For example, EPA National Streams and Rivers Assessment benchmarks for total phosphorus allow us to bin sites as good, fair, or poor. After standardizing categories across indicators, we analyze common watershed characteristics shared by sites with similar conditions.

We are also synthesizing at the HUC-8 scale to describe broader patterns. Using benthic macroinvertebrate index of biotic integrity (IBI) as an example: the left chart shows, for each of 53 HUC-8s, the number of sites with IBI values (2015–2017; Slide 5). The middle chart shows the percentage of sites rated excellent/good/fair/poor/very poor. The map translates those percentages into an overall HUC status: purple indicates most sites are excellent/good; gold indicates most are poor/very poor; fuchsia indicates mixed results.

Our goal is to replicate this for each stream-health indicator (e.g., benthic IBI, streamflow, salinity) and deliver a watershed “stream-health report card,” similar to the UMCES Chesapeake Bay Report Card. For each HUC we’ll report: the number of sites with indicator data, the percentage in high/low condition relative to ecological benchmarks, and any data gaps.

Marissa Cassell: We are building an interactive data-visualization tool so collaborators can explore background and methods, site-specific status, HUC-level status and summaries, and references. The "Synthesizing Indicators" tab explains the six indicators and our synthesis methods (Slide 7). The "Status Mapper" tab provides an interactive map; for example, selecting salinity displays sites with specific conductance greater than 3x background versus at/below background (Slide 8). Users can overlay biological community status (fish: poor = red, intermediate = yellow, good/fair = blue) to compare indicators (e.g., where high salinity co-occurs with poor fish status). Clicking a site opens details on site info, status results, and land use (e.g., a heavily forested site shown via pie chart). We plan additional tabs for HUC summaries and an "About" section with resources. We expect to release this in the coming months (next fiscal year).

Q from chat: *Kaylyn Gootman:* This is fantastic! Are the monitoring data submitted to the Water Quality Exchange (WQX) portal? I think the nontidal network (NTN) data are but curious about the other data sources too.

- ***A:*** *Rosemary Fanelli:* All data are publicly available, though repositories vary by indicator. Salinity was compiled from the Water Quality Portal; much of the dataset is USGS-derived (National Water Information System; NWIS and the Water Quality Portal). We also have public data releases for our compilations.
- ***A from chat:*** *Matthew Cashman:* The hydromorphology/habitat data are available from the Chesapeake DataHub database, which are submitted by the jurisdictions alongside the benthic invertebrate results from the ChessieBIBI.

Q from chat: *Gina Hunt:* How is Fair, interim, and good fish status determined?

- ***A:*** *Rosemary Fanelli:* We use the Chessie BIBI (Benthic macroinvertebrate Index of Biological Integrity). States collect the underlying data, and Interstate Commission on the Potomac River Basin (ICPRB) provides the cross-jurisdictional harmonization methodology.
- ***Q from chat:*** *Gina Hunt:* So not fish data? USGS developed the fish habitat assessment that used fish data collected from the states/partners. Wondering if that could be used? Brook trout data would be great too.
- ***A from chat:*** *Matthew Cashman:* I believe that the fish community component uses the decile ranking scheme developed by Kelly Maloney within Using fish community and population indicators to assess the biological condition of streams and rivers of the Chesapeake Bay watershed, USA - ScienceDirect.
- ***A from chat:*** *Rosemary Fanelli:* We have fish and benthic data; Marissa was just showing a subset of data that will be housed in the tool. Just confirmed we are using the MMI for fish. Latest fish data compilation from the jurisdictions: Attribution of fish sampling data to NHDPlus HR catchments within the Chesapeake Bay Watershed - ScienceBase-Catalog.

- ***Comment from chat:*** *Gina Hunt:* Thanks, I would use more detail on that. The Kelly Maloney work was a habitat condition assessment and used broad fish data from partners. I don't understand if that is connected to USGS compiling fish data for this purpose. I also ask because the nontidal fish habitat assessment is also a target in the draft fish habitat outcome.
- ***Response from chat:*** *Rosemary Fanelli:* No worries, Kelly oversees the fish data compilation efforts so he is very much involved in this work. And yes there is an update to the 1:100K fish assessment underway by Kelly, Alex Kiser, and others at the USGS. This will be at higher resolution (1:24K) and is leveraging the latest data compilation from partners. The work shown today for Status &Trends is a separate (but complementary) effort by USGS.

Q from chat: *Kristin Saunders:* Does this work utilize or connect to any of the information compiled in the healthy watershed assessment?

- ***A:*** *Rosemary Fanelli:* Not yet but great idea. This project focuses on documenting patterns and data availability in observed data only for now, but I am happy to chat more if there are additional datasets that could be pulled in for context.

4-Dimensional Interpolator *– Breck Sullivan (USGS)*

Breck Sullivan: The 4D interpolator tool, once fully developed, will enable the Chesapeake Bay Program to do something we've never been able to do before: fully assess attainment of tidal water-quality standards for dissolved oxygen (DO). 4D means three spatial dimensions plus time, yielding a spatiotemporal interpolation capability. Visually, we're building a 3D representation of DO that evolves through time. For example, we'll be able to interpolate DO Bay-wide at midnight on March 1, 2024, then 1:00 a.m., and so on into 2025. Interpolation lets us estimate values inside gaps, e.g. if we have data for March 1st and August 1st but not July 1st, we use the surrounding observations to predict July 1.

Because it's neither feasible nor sustainable to monitor everywhere at all times, we need a 4D interpolation framework to assess criteria that currently lack sufficient spatial/temporal coverage. As Peter often says, we have the "Cadillac" of water-quality criteria but the "Volkswagen" of monitoring – both are good, but the latter can't meet every demand of the former. Today, only the criteria outlined in green can be evaluated with existing methods; our goal is a tool that supports a more complete DO criteria assessment (slide 9). We can build this now because monitoring has advanced: bi-weekly long-term data since 1985; flow-through (moving-boat) data added in 2003; shallow-water continuous stations collecting every 15 minutes (rotated every three years for spatial coverage); vertical arrays since 2021 capturing continuous profiles at multiple depths; and citizen-monitoring datasets.

The framework will also accommodate future data. The tool ingests all available DO data, though different subsets feed different statistical steps. There are four components: (1) a midday space–time interpolation that produces daily Bay-wide DO; (2) a within-day cyclical interpolation that uses high-frequency data to propagate diurnal and tidal cycles, yielding hourly Bay-wide DO; and (3–4) large- and small-scale correlation components computed from monitoring data to generate multiple realizations that mimic observed variability across distances and times. For example, if a week of continuous data has a one-day gap, the midday component captures the gradual weekly decline, the within-day component adds tidal/diurnal oscillations, and the correlation components provide multiple plausible fills, enabling robust hourly estimates across space and time. This vision dates back 20+ years (early 2000s), but the needed data density exists now; development began in 2022, with targeted completion by December 2025, documentation to follow, an improved method proposed in the watershed agreement by 2028, and a 2030 goal for criteria reporting.

Habitat Suitability Assessment *– Kaylyn Gootman (EPA) and Bruce Vogt (National Oceanic and Atmospheric Administration, NOAA)*

Kaylyn Gootman: This is a first step at the CBP to link robust assessments of living-resource, water-quality, and fisheries data. The figure (from the CESR report; Slide 2) illustrates "knobs" or controls that influence habitat condition. On Slide 3, this figure provides an opportunity to link them where closest to management are water-quality factors we track in standards attainment (DO, water clarity); the next ring includes habitat conditions such as shorelines and marshes which is still within management influence but via different on-the-ground actions; the outer ring includes factors largely outside our control (temperature, salinity, currents). Considering these together helps us identify local responses and "turn the right knobs" to shift habitat from poor toward good, with an initial focus on shallow tidal waters.

The goal is to produce a habitat-suitability model for all 92 tidal segments sometime next calendar year; this is central to exploring a tiered TMDL implementation/targeting approach under the Fish Habitat Outcome (still in draft). The concept originated with last year's "priority living-resource habitat area" work to connect water-quality outcomes, habitat, and living resources in a way that can be operationalized by the partnership. The timeline has slipped because fisheries data are complex to compile across sources, but progress continues.

In May, NOAA and EPA (project leads Bruce Vogt and me) convened a charrette to confirm feasibility and approach, forming a Management Relevancy Team (primarily NOAA/EPA) and an Analysis Team (Virginia Institute of Marine Science; Virginia Institute of Marine Science (VIMS), UMCES, NOAA, EPA), with essential support from the Chesapeake Research Consortium (CRC) and a USGS component. We're updating the work plan; activities include data compilation, statistical analyses, and modeling (VIMS leading modeling).

This is a cross-team effort supported by the Scientific and Technical Advisory Committee (STAC), CRC, the Bay Program Data Center (as needed), geospatial analysts, and communications. We'll start with the VIMS water-quality model and incorporate Phase 7 models when operational, integrate habitat datasets, and initially analyze three fisheries species/life stages: juvenile striped bass, bay anchovy, and croaker. It's a lengthy process on a tight timeline and work will continue through late summer, fall, and winter.

Q from chat: *Kristin Saunders:* The habitat suitability modeling is exciting and very relevant! As we are talking to our MD folks, we have gotten several questions about how we can successfully marry the habitat suitability work with what is happening on the landscape. In past shallow water work, our folks have learned that BMP implementation that is not combined with protective conservation or complementary land use planning just holds the line and does not really allow us to see the full potential of targeted restoration. My question is as you get closer to the final version of the model, will there be efforts to investigate or marry it with complementary land use lenses as the next step in "turning the dials on management actions" as CESR would say? Something to think about going forward. We will be trying to do that exercise with Whole Watershed. I realize this is more of an implementation phase question than model development but to the extent we can tie them together, we may see more durable success.

- ***A from chat:*** *Kaylyn Gootman:* Great question, Kristin, and glad folks are thinking about this. I should have included this slide in my talk. Our habitat suitability work is the first step (red box below), and the upstream and estuarine contributions will be considered, and will include land use information. However, this could be better highlighted (and discussed more often) for sure! I would love to connect on the living resource and water quality work with MD Whole Watershed team!

"The Regulatory Chain": Are our actions aligned with the causes of impairment? A case-study with sediment and physical habitat – *Matthew Cashman (USGS)*

Matthew Cashman: Link to the publication. I'll discuss recent work and the broader "regulatory chain of actions" shaping watershed management: how we got here, where we are, and why. When we say "the TMDL," we often mean the Bay TMDL, but there are many watershed TMDLs across the basin: jurisdictions designate uses (e.g., recreation, ecological/aquatic life, drinking water) and assess whether those uses are supported, not supported, or uncertain; impairments are then linked to specific causes. I compiled impairments across the Chesapeake for non-tidal rivers and summarized causes by use.

For ecological uses, notable causes include nutrients and salinity/chlorides, plus a cluster of sediment-related issues (sediment, turbidity, altered habitat). For recreational uses, pathogens drive more than half of impairments. In practice, ecological impairment often begins with biological sampling (e.g., a kick-net survey) showing loss of sensitive taxa and dominance by tolerant species – degraded biology that triggers a stressor-identification process. Many jurisdictions, following EPA guidance, infer "sediment problems" from metrics like percent fines and riffle embeddedness, which then flow into a sediment TMDL.

Implementation commonly emphasizes stream restoration because of favorable cost per pound of sediment reduction where about 900 miles of restoration in the Chesapeake to date values at roughly half a billion dollars. The assumed chain is: restoration reduces sediment loads, which improves bed habitat, which improves ecology. I examined whether restricting sediment supply actually improves bed habitat and biology, and how confounding altered flows (e.g., from urban hydrology) factor in, since flashy flows both erode banks (adding sediment) and degrade habitat directly.

Using habitat metrics collected by jurisdictions, I built a predictive model and found two major clusters: (1) channel-stability metrics and (2) bed-substrate/percent-fines/embeddedness and hydromorphic-diversity metrics. I related these to estimated sediment concentrations using SPAtially Referenced Regression on Watershed (SPARROW) model and to a flow-alteration model. Results indicate the “bed habitat” problem is dual: restorations largely target channel stability, while the substrate/diversity metrics that often trigger listings relate less to sediment loads and more strongly to altered flow. This suggests we may be treating symptoms (load and stability) rather than the primary driver (hydrology) in many watersheds. Because habitat alteration and altered flows aren’t pollutants under the Clean Water Act, they cannot receive TMDLs, and a sediment-only lens can incentivize actions disconnected from the original ecological listing and its underlying metrics.

Paths forward include avoiding over-stabilizing channels purely to meet load reductions (which can harm in-stream habitat), focusing on restoring healthy fluvial processes rather than a target planform alone, and prioritizing sites where other stressors are low so habitat gains can translate to biological improvements (outlined further in our recent paper).

12:00 PM Adjourn

Next meeting: Thursday September 25th from 10 AM – 12 PM.

Attendees:

Breck Sullivan (USGS), Ken Hyer (USGS), Allison Welch (CRC), Qian Zhang (UMCES), Kaylyn Gootman (EPA), Gabriel Duran (CRC), Stephanie Nummer (ICPRB), Rosemary Fanelli (USGS), John Wolf (USGS), Marissa Cassell (USGS), Rebecca Murphy (UMCES), Matthew Cashman (USGS), Coral Howe (USGS), Ashley Hullinger (PADEP), Ann Foo (UMCES), George Doumit (DNREC), Zafer Defne (USGS), Keith Bollt (EPA), Douglas Austin (EPA), Jeremy Hanson (CRC), Alexandra Fries (UMCES), Megan Thynge (EPA), Chris Guy (USFWS), Kristin Saunders (MDDNR), Tyler Bowser (USGS), Matthew Kierce (IWLA), Katie Brownson (USDA), Erin Sonnenburg (CRC), Marisa Baldine (Alliance for the Chesapeake Bay), Sushanth Gupta (MWCOG), Nick Staten (CRC), Leah Staub (USGS), Emily Young (ICPRB), Gina Hunt (MDDNR), Paul Mayer (EPA), Angie Wei (MDDNR), Julia Fucci (CRC), Bo Williams (EPA).