Scientific, Technical Assessment and Reporting (STAR) Meeting

Thursday, July 28, 2022
10:00 AM – 12:00 PM

Meeting Materials: Link

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

ACTIONS

- ✓ If interested in volunteering to be Chair of Status and Trends Workgroup, reach out to Katheryn Barnhart at barnhart.katheryn@epa.gov
- ✓ Submit a ROAR concept template by August 5th (contact Vanessa Van Note at vannote.vanessa@epa.gov for assistance)
- ✓ Reach out to Breck at bsullivan@chesapeakebay.net if any outcome wishes to move their monitoring plan forward with a monitoring design plan and cost estimates.
- ✓ STAR: work with STAC to better integrate STAC into SSRF.
- ✓ Identify a future STAR or Coordinator/Staff meeting to host a working session on utilizing the baytrendsmap app.
- ✓ Assist with coordinating outcomes hoping to put together a joint GIT funded project coordinating use of high-resolution land use land cover data to fill multiple science needs.
- ✓ If interested in incorporating climate into a GIT funding proposal and looking for someone to act as a climate consultant and connect the project with Climate Resiliency Workgroup (CRWG) actions, contact Alex Gunnerson (agunnerson@chesapeakebay.net) or Amy Goldfischer (agoldfischer@chesapeakebay.net) who have volunteered to be on the subcommittee or proposal team committee to help address climate throughout the project

AGENDA

10:00 AM **Welcome, Introductions & Announcements – Bill Dennison** (UMCES) and **Scott Phillips** (USGS)-STAR co-chairs, **Breck Sullivan** (USGS) STAR Coordinator, **Peter Tango** (USGS) CBP Monitoring Coordinator

Announcements

Communications Update - *Marisa Baldine (CRC)*

Marisa Baldine (CRC) announced that the communications team released the Submerged Aquatic Vegetation (SAV) press release. She said that the Executive Council meeting will potentially be the second week of October and will most likely be in DC at EPA headquarters. Topics may include: green infrastructure and a mix of public and private discussions looking at outcome attainability and what happens after 2025, while still showing that the Chesapeake Bay Program is sticking to goals for 2025. The meeting for members is in person but will be livestreamed for the public. On August 16th, the Communications team is hosting a webinar on

filter feeders (oysters and mussels) in Chesapeake waterways. The link to register is here. There will be two press releases in August. The poster proposal deadline for the Watershed Forum was extended until tomorrow.

Clean Water Cohort SRS Dates - *Breck Sullivan*

Breck Sullivan (USGS) said that for the Strategy Review System (SRS) Clean Water Cohort, dates have been pushed back a month. The dry run is August 18th, with materials due September 1st, and the Management Board Quarterly Progress Meeting (MB QPM) is September 15th. STAR supports the Water Quality Standards Attainment and Monitoring (WQSAM) Outcome within this cohort, and they're working on the narrative analysis and presentation. They will send the materials to the Chairs and Coordinators of groups within STAR prior to sending to the Management Board, so look out for that within the next month.

Update on the PSC Monitoring Report - *Peter Tango*

Peter Tango (USGS) said that the report is completed, and it's being restructured to meet USGS requirements. All the material was given to the MB and the Principals' Staff Committee (PSC). It's been well used already to line up investments by a variety of agencies. Public availability of the report should be in August pending final review by USGS.

Call for Chair for the Status and Trends Workgroup - *Katheryn Barnhart*

Katheryn Barnhart (EPA) said that the current chair of Status and Trends can't commit to the responsibilities so they're looking for another chair to transition into that position. Background experience with indicators is recommended, but they're looking for someone with 1-2 hours/week to dedicate to the group, someone who is excited about indicators, and can help with giving direction to the group. If interested in volunteering to be Chair of Status and Trends Workgroup, reach out to Katheryn at barnhart.katheryn@epa.gov.

Bill Dennison (UMCES) announced that a final paper from the SAV Synthesis group has been accepted to be published. The paper is called Data Synthesis for Environmental Management: A Case Study of the Chesapeake Bay, and it has been accepted in the Journal of Environmental Management. Bill will send the PDF around. He also announced that they have two new team members joining the Chesapeake Bay Program web team. Catherine Krikstan, previously the web content specialist years ago, and the communications' team as a staffer before that, is coming back as a web production manager and strategist. Kaitlyn May, who has been the web content person, will be replaced by Susanna Pretzer. Both Catherine and Susanna will start on August 9th.

Greg Barranco (EPA) said the MB meeting in August will be cancelled. The time will be filled with planning to shorten the MB and PSC meetings. There will be a meeting in relation to Chesapeake Assessment Scenario Tool (CAST)-19 and CAST-21 in late August in order to find consensus on the final CAST-19 and CAST-21 models.

Chris Guy (USFWS) highlighted the Wetland Outland Attainability Workshop which is next Tuesday and Wednesday virtually.

Upcoming Conferences, Meetings, Workshops and Webinars

- World Seagrass Conference and International Seagrass Biology Workshop - August 7-12, 2022, Annapolis, MD.
- Global HAB symposium on automated in situ observations of plankton - August 22-26, 2022. Kristineberg, Sweden.
- Increasing Coastal Resilience Webinar (Delaware Living Shorelines Committee) – September 14, 2022. Virtual.
- 2022 Potomac River Conference: A Conversation on PFAS – September 22, 2022. Virtual/in person hybrid.
- Chesapeake Watershed Forum - November 4-6, 2022. Shepherdstown, WV. Session proposals due June 3, 2022.
- Coastal and Estuarine Summit – December 4-8, 2022. New Orleans, LA.
- A Community on Ecosystem Services - December 12-15, 2022. Washington, D.C. Metropolitan Area.
- National Water Quality Monitoring Council's 13th National Monitoring Conference - April 24-28, 2023. Location TBD. **Session proposals due June 24, 2022.**
- Species on the Move – May 15-19, 2023. Everglades National Park, FL.

10:10-10:45 **ROAR Proposals - Breck Sullivan** (USGS) **and Vanessa Van Note** (EPA)
Vanessa will introduce the ROAR program, share some examples of past proposals, and highlight the relevant deadlines. Breck will then identify some ways this program can be connected to building a proposal to address science needs in the Strategic Science and Research Framework. Project proposals are due August 5th.

Vanessa Van Note is in the Science, Analysis and Implementation branch of the EPA and mostly works in analysis on annual progress towards the 2025 WIP Outcome under the Water Quality Goal. Vanessa presented on a research program called ROAR. This is a regional Office of Research and Development (ORD) applied research program. It is an internal EPA program, but ORD thinks the Chesapeake Bay Program (CBP) should be involved. CBP is under region 3 of the EPA and can submit CBP science needs to this program. ROAR is a program to advance collaborative ORD regional research partnerships to address near term, high priority regional, state, tribal and strategic agency research needs. The goals of this program are to provide the near-term research on high priority research questions, foster collaboration between regional offices and ORD to build a foundation for future work, support research collaborations to address region, state, tribal, local government or community needs, support research to address strategic topic areas or innovative research approaches, and provide opportunities for ORD scientists. ORD scientists and researchers will be very involved with this program, and it is an opportunity for them to interact with the CBP more and to bring their research capacity to region 3.

The research proposals submitted to this program need to align with EPA's 2022-2026 Strategic

Plan. Everything we do at the Bay Program falls under this. It also needs to align with ORD's Strategic Research Action Plan. These belong to 6 of their national research programs. They have research programs in air, climate, energy, chemical safety for sustainability, health and environmental risk assessment, homeland security, safe and sustainable water resources, and sustainable and healthy communities. There are 3 tracks of the ROAR program: Office of Science Advisor, Policy and Engagement (OSAPE) track, Sustainable Healthy Communities (SHC) track (CBP efforts fall mostly under here), and the Regional Track. The CBP would be submitting as Region 3 EPA to support what the CBP identifies as high priority, short term research needs. If what people submit is not a good fit for the track it's submitted to, there is a possibility to submit it for a different track. The Regional Science Council and liaison will try their best to get these projects funded.

What about external collaboration? Proposals need to be submitted and written by EPA staff. After project selection, external collaborations are developed. Once awarded for a proposal, you can start being more clear about who's involved such as an entity outside EPA. The EPA lead has to be the one to write and submit the proposal and communicate with the regional science liaison, but once the proposal has been accepted, external collaborations can be developed. In the proposal, the EPA lead can propose external collaborations without mentioning the name of that entity (i.e., collaboration with a university rather than collaboration with University of Maryland specifically). Once a project is awarded, you can be specific about who is involved.

The concept template deadline is August 5th. The concept template is to ensure that ORD is aware of what the project is and able to provide input for the ROAR proposal itself. The final deadline for the ROAR project proposal is October 28th. The information needed for the concept template is to identify the region, the track, the title, and a brief proposal description (3-5 sentences), and an anticipated start and completion date. They've requested whoever is submitting a concept to provide as much detail as possible about the science idea and conceptual proposal, but it is just a draft. The proposal team will have more time to refine it.

Vanessa described some key roles of the ROAR program and said that Regina Paskey is the Regional Science Liaison (RSL). The assistant center director is a really important component of the program. They're responsible for providing direct input to the proposal team. Vanessa suggested looking at the proposal template ahead of time for anyone interested in submitting a project proposal. The Assistant Center Director is to ensure alignment with ORD's national research program. The ORD and regional proposal leads – aka an EPA region 3 employee - work together to develop a proposal. The ORD lead is responsible for ensuring the anticipated funding mechanism for the proposal is appropriate and will provide input on funding and distribution of these funds. It is necessary to identify who is the regional lead and have tentative ORD leads.

Vanessa described the timeline for ROAR proposals after the August 5th concept template deadline. The project announcement will not come until April 7th of the following year. The

draft proposals are due September 16th so there is plenty of time to get feedback. The national program director for ORD will sign the proposals. Breck noted in the chat that there is no penalty for pulling out your proposal. If a STAR member has an idea, even if not fully thought out yet, she would recommend still submitting a concept template by August 5th.

It's important to identify a high priority, short term research need, and take into consideration EPA's and ORD's strategic research action plans. If the project proposals don't fit in those plans, it won't go anywhere. Once you have a concept, prepare 3-5 sentences. Then identify an EPA lead who will be responsible for communicating with Regina and be the person to submit the concept template. Some CBPO concepts have been brought forward and Vanessa has already forwarded these concepts to the regional liaison and identified an EPA lead.

Breck commented the Bay program has had success getting funding through here, for example Ryan Rossi's project on Ecosystem Services was funded through the ROAR program. Breck said that she's looking forward to seeing how the CBP can support some of the science needs through this process. STAR provided a list of science needs for GIT funded projects but those could also be appropriate for ROAR proposals.

Kristin Saunders (UMCES) commented that it's an untapped opportunity that CBP could be taking advantage of. Kristen asked if the projects Vanessa showed as examples came from the CBP or other programs in the region? There was a recent webinar ORD put together for looking at wetlands and resiliency. There were projects there that Kristin hadn't heard of put together by other folks in the region, but they weren't connected with Bay Program. Is there someone who could bring those things back to the CBP to make that connection?

Vanessa responded that the ROAR program started last year and it's a combination of multiple programs. One was the recent ecosystem services project. CBP was the lead on that project. What was submitted in the past round does impact the Bay, for example, there is a blue carbon project and a microplastics project. Those came from outside of the Bay Program. Bill Jenkins was the lead on the blue carbon project. LSAS was the lead division on that project, not the CBPO. For the microplastics project, the lead was Water Division in Region 3, not the CBPO. Vanessa said she has been working on connecting programs to region 3 research going on. She has been planning to follow up on projects that were part of last year's ROAR solicitation since they directly impact the Chesapeake Bay watershed. Vanessa said she would like to work with Kristin on this.

Julie Reichert-Nguyen (NOAA) commented that the presentation was helpful. She realized she connected it with the EPA Region 3 climate adaptation and resilience plan, but there is a science need out of the CBP that it fits too. Julie said she would email Vanessa that exact science need. Julie asked where in the process would the identified EPA lead reach out to interested stakeholders? Vanessa responded that would happen during the proposal development. That will be something they will have to manage internally at the CBP.

Bill said this is a great opportunity for regional funds to support the CBP, and it's a great

opportunity to take advantage of. The hard slog of going through and identifying science needs can come to the forefront now that there are well-articulated science needs and a mechanism to advance good research on these important topics.

> **10:45-11:15** **GIT Funding Projects to Address Science Needs** - **Alex Gunnerson** (CRC)**, Amy Goldfischer** (CRC)**, and Breck Sullivan** (USGS)
> Alex, Amy, and Breck will present different types of science needs from different outcomes to highlight how GIT Funding can be utilized to address science needs. The presenters will also walk through a complementary document that lists potential science needs that could serve as GIT Funded projects.

Alex Gunnerson stated STAR compiled a list suitable for GIT funding, and since then, many people commented on this list. The updated document is posted on the calendar page. Alex reminded everyone of the GIT funding brainstorming session at the August 9th Coordinator/Staffer meeting. This presentation only covers some of the science needs on the list provided. Alex reminded the group that the science needs brought forward are not definitively qualified for GIT funding; this is just to get the conversation started. Alex also reminded the group that science needs fit under the Strategic Science and Research Framework (SSRF) and showed the SSRF process diagram to show how it works. In the past, GIT funding has been a great source of funding to address science needs. An example of a past project was the Chesapeake Bay Climate Change Data and Mapping Repository conducted by Eastern Research Group.

Alex went over a proposal from STAR to assist Outcomes with their monitoring plans – the idea is to use GIT funding to get a contractor to help an outcome develop a monitoring plan as described from their needs in the PSC monitoring report. Breck stated that STAR would take the lead on this, but it would be a collaborative project with a GIT to make sure the project is moving the monitoring need forward with their ideas. STAR would write the draft proposal, Table 1 and Table 2. If interested in this project, please reach out to STAR. Breck gave the example of the Toxic Contaminant Workgroup – they came up with a monitoring design plan and cost estimates. It took a lot of their workgroup time to do that, so STAR wants to provide outside support for groups to do it too.

Alex reminded the group of the different categories that science needs are organized by in the database. He then reviewed a science need that could be a good GIT funded projects from the Black Duck Outcome. Alex reviewed a couple of science needs (linked in the presentation) from the Wetlands Outcome that could both be addressed by a GIT funded project. Amy Goldfischer went over science needs from the Forest Buffers, Stream Health and Toxic Contaminants Research Outcome. Breck Sullivan reminded the group that GIT funded proposals need to be tied to an identified need in a Management Strategy or Logic and Action Plan. That is not an issue when discussing these science needs because all the science needs help progress an Outcome. Breck also reminded the group that STAR can only put projects forward for the WQSAM Outcome or the Climate Outcomes, so Outcomes would need to be responsible for submitting proposals related to their Outcome. However, if there are not a lot of proposals and

there is extra money, it may be possible to put a proposal under STAR that's connected to other Outcome's science needs.

Key Dates:

- August 9 - Idea Sharing Meeting
- August 16 – Chesapeake Bay Trust (CBT) Online System Table 1 Training Video released + CBT Office Hours Announced (for Q&A)
- September 1 - Draft Table 1 entered into CBT online system – one project idea per outcome
- September 28 - Project Ideas Scoring Meeting

The GIT Funding Program manual is linked here. Labeeb Ahmed asked in the chat if the final selection of GIT funded projects is a combination of need versus types of project idea such as data collection versus monitoring, etc., by thematic grouping. Kristin responded in the chat that the scoring table in the program manual walks through the criteria and scoring, as well as bonus points for certain categories.

Given the cross-cutting nature of climate change, Alex and Amy have volunteered to be climate consultants for the GIT funding award cycle. For any project that would like to include a climate aspect, you can reach out to Amy (agoldfischer@chesapeakebay.net) and Alex (agunnerson@chesapeakebay.net) for how to connect it with the CRWG actions. They are volunteering to be on the subcommittee or proposal team committee to help address climate throughout the project.

Kristin Saunders commented in the chat, and Peter Tango agreed, that this is exactly what they had in mind when they created the Strategic Science and Research Framework. Seeing it put to use and action is very exciting! Bill Dennison urged everyone to take advantage of multiple funding opportunities. He said something that's highlighted a lot is the importance of not just shallow water, but also land edge. It's a dynamic area biogeochemically and with climate change, and is cross-cutting (fisheries, habitat, water quality and more). Breck commented in the chat that she proposed the shallow water continuous monitoring ROAR proposal and would love to meet with others interested in this topic. It matches really well as a regional science need. Others are interested in analyzing trends with shallow water continuous monitoring. Some initial ideas are working with MD and VA shallow water monitoring data; conducting analysis on the 2 current RIM continuous monitoring data to help with justification on why 5 more installations are needed from the Monitoring Report; and the following Science Need from the database for WQSAM Outcome: improve understanding of water quality responses in shallow water to nutrient loads. Kristin Saunders commented in the chat that she just pinged fisheries and suggested talking to Bruce Vogt (NOAA) about shallow water along with folks from habitat. Kaylyn commented she is interested in helping with the ROAR proposal for shallow water monitoring and will be setting up a meeting with Vanessa, Peter and Breck to work on that.

Peter Tango commented in the chat that SAV sentinel sites are an important monitoring interest. The hypoxia network needs coincident shallow water monitoring for habitat characterization that can be developed from the 4-Dimensional Interpolator outputs, so there are complementary program elements than can help inform the strategy. Heis happy to help support development of such a strategy and to help add other insights to help bolster the proposal concepts.

Renee Thompson (USGS) said it spurred some ideas with regards to protected lands and land use methods and metrics now that there is high-resolution land use land cover data for two years. There are opportunities to look across outcomes that utilize this data and how it might further inform and fill some of these science gaps which mention the use of this data within the science needs database. It would be good to look at those and see if there is the inhouse capacity to answer some of those questions or if additional support is needed. There are also some interesting conversations about utilizing high resolution stream and facet tools related to incision and sedimentation to fill science gaps. Renee wondered where some of these larger, big picture, how-to-apply-new-science-to-fill-gaps type projects fit. Renee thought they may fit better with the ROAR framework, but they don't have an EPA lead with regard to those data products. Renee stated her GIT has maybe 5 ideas between land use methods and metrics, healthy watersheds and protected lands. However, if she has 5 GIT funding projects next year, she won't have time to do anything else. She doesn't want to leave money on the table. She sees the opportunity to get these going but is struggling with how to get the right people together to oversee these projects.

Peter commented in the chat that fish community health and bug community health has been evaluated against lower resolution cover/use data historically. Regionally it could be possible to rewrite the scientific understanding of these relationships with the new high-res data available. Because the data available at 1m resolution is the Bay Watershed and not nationwide yet, this could be the jumping off point for a national push on such understanding over time.

Breck agreed with Renee. It's great to have so many opportunities, but many outcomes are having capacity issues. She liked Renee's idea to see which science needs utilize the high-resolution land use and land cover data. The monitoring report comments on those needs To help with the capacity issue, all those outcomes could come together to put one project forward, or two projects with a group of 3 or 4 Outcomes so that GIT leads are not overwhelmed. Breck reminded the group that each year GIT funding projects have bonus points such as for climate and DEIJ.

Peter commented in the chat that if legacy sediment is a metric for evolving the stream health assessment, then the wetlands may want to team up with stream health on such proposal work. Peter also commented for the forest buffer proposal idea, that given natural succession comes about because of the available seed bank in soils, seeds birds bring in – is it possible to just get land out of production and let natural succession take place? Is it worth investing/is there an ideal forest buffer character or do we have wide latitude with so many different local

condition to work with across the watershed? Stephen Faulkner (USGS) responded to Peter that fallow land will revegetate naturally, but not necessarily ideally for CBP outcome purposes. For example, invasive *Microstegium* already quickly takes over open areas in forests.

Bill commented that there is an important role for STAR to help people navigate funding opportunities and do "matchmaking" of projects with ROAR vs GIT funding.

Kristen said she a had similar feeling to Renee, thinking about all the funding opportunities that are available right now. CBP needs to think outside the box on how to get the work done since it's an unusual availability of funding. Coordinators are stretched thin, and some GITs have said they won't put projects forward since they don't have bandwidth. Perhaps there are other members of GITs, or other people in the office who may not be on that particular team but who has interest in particular issues and is interested in working across GITs. For example, a staffer or other person interested in another workgroup's project as professional development project. It might help to think more widely about who to recruit and who is doing the work in our teams.

Kathy Boomer said she worries about a mismatch between the way the science needs are presented as a list from various GITs. There is a need to connect these science needs and find overlaps and connections. Wetlands, black duck, stream health, forest buffers, all have a strong overlap and common data needs to inform managing those objectives. It's essential when trying to secure funds, to not overwhelm funders with a long list they can't prioritize. Kathy said her other concern is that it's difficult to connect the science needs with stakeholder discussions at MB and PSC meetings. One example is some frustration at the lack of attention to flood and climate change impacts in nontidal regions. Another example is the CBP is counting on the agricultural community to meet a large portion of the TMDL, yet it's difficult to connect these science needs listed here to the questions, concerns and challenges the agricultural community faces when considering how best to manage their farmlands to meet water quality objectives and their other concerns. It's not introducing a whole new list of science concerns; it's connecting concerns for building wetlands, forest buffers, etc., making it more relevant and easier to connect with the agricultural community, like specifically talking about edge of field and edge of stream practices.

Breck agreed with the need for connecting science needs outside the CBP and commented that outside opportunities are a good way to get support for enhancing these science needs. In terms of connecting more to the agricultural committee, right now the Clean Water Cohort is going through SRS. They'll be updating their science needs to think long term and a connection can be made there. Kathy clarified her comment was not about generating another list, but about prioritizing science needs and figuring out how to get the biggest output for investment across stakeholder groups. Breck responded that management has had this conversation about prioritization of outcomes given 2025 is coming and where to put the most effort into our outcomes now, understanding they may not all be achieved.

Kaylyn Gootman (EPA), a new employee with the EPA Science Implementation and Analysis Team, commented that a lot of these topics are a big interest to her, especially monitoring but also high-resolution land use data. If anyone needs an EPA person to assist with ROAR proposals, she's interested in helping.

Julie Reichert-Nguyen said she's been in the same boat as Renee. She's interested in the ROAR funding because for the Climate Outcomes, sometimes the GIT funding is too low of a funding cap for some of the analyses they want to do, especially those around resilience metrics or projects involving modeling. ROAR has more money to tap into; it can be at the $150,000-250,000 level. Amount of funding needed would drive Julie's decision with which funding opportunity to apply for. Staff resources is also a concern. Last time the CRWG committed staff resources to components of GIT funded projects since they didn't get enough money to contract it all out, but that means they're limited in what they can do now to put new proposals together. ROAR would bring extra resources and capacity through EPA's ORD. The CRWG has been trying to figure out how to bring more people in to help apply for these grants and manage these projects. Julie also endorsed Kristin's suggestion to look more broadly across the partnership to find capacity. It becomes a lot when the coordinator and staffer have to juggle all of these things. The climate outcomes are also going through SRS now.

Kathy Boomer asked in the chat if the Management Board (MB) would look to STAR, STAC and the Bay science committee for guidance on how to prioritize science needs? They can prioritize goals (i.e., relative importance of different GITs), which will help inform science priorities. However, the science community has the greatest capacity to identify overlapping research needs and prioritize science needs based on risk to meeting our Bay restoration goals. Presenting the science needs in this format could be helpful to justifying expense and need for investment. Kathy added that a missing need is social science to understand concerns and barriers to practice adoption. Breck responded in the chat that social science is very much something the CBP are missing within the science needs, and there is a current GIT funding project going on to help the CBP understand how best to strategize for social science. Also, these comments about prioritization and science needs missing are a great example of how STAC can be more involved in the Strategic Science and Research Framework because STAC can help identify what is missing. When developing the Strategic Science and Research Framework, it was best decided that GITs should prioritize their own science needs. STAR should not prioritize them especially since STAR is in charge of three outcomes, so STAR could show bias. Breck added that she is happy to discuss more how STAC could potentially help the SSRF in terms of prioritization or identifying science needs. Kristin added that it might be good to have STAC leadership and the SRS small team talk through some of the ways to better integrate. Kristin said she'll suggest that to Dave Goshorn.

11:15-11:35 **Hypoxia Forecast - Isabella Bertani** (UMCES)
Isabella will provide a brief overview of the model used to forecast seasonal hypoxia in the Chesapeake Bay and this year's forecast results.

Isabella Bertani works with the modeling team of the CBP. Since 2007, every year in early June a seasonal forecast of summer hypoxia in the Bay is released and picked up by media outlets. It is instrumental in raising awareness and bringing attention to water quality issues in the Bay. A model is used to make this forecast, and this model was originally developed at the University of Michigan. The original model has only one driver, which is total nitrogen load from the Susquehanna River over the period of January to May. This is called the spring load. The original model version predicted average July hypoxic volume or the volume of the Bay where DO concentration is below 2 mg/l. The raw model output is not directly hypoxic volume, but the model essentially predicts a profile of DO concentration moving downstream from the Susquehanna River. From this longitudinal profile of DO concentration, they estimate the length of the hypoxic zone by summing up all segments of this profile where DO is predicted to be less than 2 mg/l. Next they use a simple empirical relationship that relates hypoxic volume to predicted hypoxic length to estimate hypoxic volume.

Isabella gave a brief overview of how the original model was developed and showed a track record of how the model has performed since it was used to make forecasts. In most years, there was good agreement between predictions and observed data. There are some years where the model missed the target and overpredicted July hypoxic volume. In these years, there were intense transient weather events that occurred right before the cruises that measured DO in the Bay happened, so they temporarily disrupted hypoxia and caused a lower measurement than would be without those weather events. In 2019, the modeling team was looking at this issue, and there was discussion if they should keep predicting July hypoxic volume given it's a sensitive metric to weather the week before cruise. There was discussion of alternatives such as average summer volume or total annual hypoxic volume which would make more sense from a stakeholder perspective. It would also improve model performance because metrics that consider hypoxic volume throughout summer are less sensitive to weather events occurring right before the cruise.

In 2018 the modeling team revised the model and looked at how model performance changed. They tried to predict other metrics of hypoxic volume. They saw how model performance would change if they predicted annual summer hypoxic volume and total annual hypoxic volume. They used 3 different sets of estimates of hypoxic volume which are obtained by interpolating DO measurements taken throughout the Bay throughout the summer. They referenced 3 authors who came up with slightly different interpolation methods to get an estimate of hypoxic volume. Originally the model was calibrated to methods from Rebecca Murphy, and the team saw what would change using the methods created by Aaron Bever and Yuntao Zhou. Another big point of discussion was that the original model only used loads from the Susquehanna River. Even though that mimics pretty well the overall variability, they knew it's not the only river that contributes total nitrogen to the bay. The modeling team did experiments using other rivers; the Potomac, the Susquehanna and Potomac, the Susquehanna, the Potomac and point sources

below the fall line. They also tested how the model performance would change if they used Total Nitrogen (TN) from all the RIM rivers, then the RIM rivers plus point sources below the fall line. They also changed the period over which the load is considered. They found they got the best model performance if they used total nitrogen load from all rivers plus point sources below the fall line. It was also better when predicting total annual load rather than just July. That resonated with stakeholders since it's a more comprehensive assessment. The modeling team started using the updated model in 2020. The Susquehanna load mimics interannual variation, but they get better prediction by including other rivers and point sources. Because this is a new model version, the team doesn't have record of how it performed in the past, so they made a pseudo record by performing blind forecasts. This is a model prediction generated by first calibrating the model to all the years before the forecast was made and generating a forecast for that year. For example, how would the model predict for that year if they had used it in the past. They generated a set of blind forecasts from 2007-2017. This year the team released a new forecast for this year. This year load was 20% below the long-term average, and the team predicts a total hypoxic volume about 15% below the long-term average. They also have an indication of what it would be if the WIP 3 load reductions were achieved.

Isabella commented that there's been a lot of discussion about what constitutes a good ecological forecast in the literature. There's been momentum in the scientific community in producing ecological forecasts and using ecological forecasting best practices. The hypoxia forecast in the Bay program is one of the most mature examples of ecological forecasting that's out there – it checks all the boxes for what constitutes best practices for ecological forecasting. It has a pretty thorough quantification of uncertainty and it's used to generate forecasts and communicate to the public. An annual assessment of the forecasts is performed, and the model is improved every few years based on these assessments. Links in the presentation have resources for the data contributions that go into the forecast. The University of Michigan releases a webpage with extra information about the forecast whenever the Bay program has a new release. Bill commented that the total annual hypoxic volume makes more sense than the maximum because it's more relevant to the management actions.

Peter Tango commented in the chat that he is definitely a fan of the total annual hypoxic volume as for a long time it looked more responsive to management as a metric compared to the maximum extent each year. He added that Zhou also used a different basis for accounting which started earlier and ended later than Bever who didn't start accounting until 2 cubic kms were present. But the two approaches parallel DO patterns over time. Peter added he thought the full value of the forecast as Isabella approaches it highlights the value of monitoring, shares scientific understanding of the system, and makes a complicated issue approachable that is significant to track with the health of the bay and its restoration. Well done and appreciate the adjustments made to produce the new forecast effort!

11:35-11:50 Overview of the baytrendsmap app - Breck Sullivan (USGS)
Breck will present the new tool associated with the CBP annual tidal trends results to provide access to maps depicting short- and long-term trends in nutrients, dissolved oxygen, secchi depth, and chlorophyll-a.

Previously Breck has provided information about the Chesapeake Bay Tidal Trends results which are released annually and available on the Integrated Trends Analysis Team (ITAT) page (which is the group that oversees this work). Maryland Department of Natural Resources (MD DNR), Virginia Department of Environmental Quality (VA DEQ) and District of Columbia collect bimonthly water quality sampling data. Tidal trends for nutrients, dissolved oxygen, secchi depth and cholorophyll-a are produced from a Generalized Additive Model (GAM). ITAT wanted to provide a more interactive and user-friendly version of the tidal trends and maps produced. The contractor TetraTech has developed an app to show these maps, which is available on CAST and will be available on the ITAT page. The app shows results for more than 130 stations throughout the Bay, from 1985 to present. The app also includes an option to create custom maps based on a user's own data from GAMs. There are different data options: long term is data from 1985-present, and short term is data from the most recent 10 years. There's also flow adjusted long term and flow-adjusted short term. The maps can be filtered by parameter, layer and season. Some are annual and some are provided for spring and summer months. The app allows users to select a color palette, and to select whether the direction of the change is good or bad for trends going up or down. To get more details, click on an individual station and a pop-up will appear with greater detail. There is also a static range map for saving and downloading and this can also be changed to look at different parameters. There is also a change map which shows the change from the first two years of the time period from the change of the most recent time period.

In addition to the view tidal trends feature, there is a feature to create custom maps using one's own data from a GAMs analysis. Users can also use the data available from tidal trends to create custom maps. Additional tabs are background information explaining terms, flow and salinity adjustments, and laboratory and method changes. There is also a help tab to provide guidance on using the app and to help creating custom maps.

Kaylyn Gootman asked how adaptable the platform is for other types of CBP data (e.g. watershed data, non-tidal data, etc.)? Breck responded that the data uploaded can be from any data that uses GAMs for results. This can be down through the R package called baytrends. If you scroll all the way to the bottom of the Help tab, it will describe it more. Breck also welcomed anyone to come ask questions about GAMs and the baytrends package at the ITAT meeting with researchers that use this. Breck added in the chat the text at the bottom of Help Tab: "baytrendsmap is a "Shiny app" used to create on-the-fly maps using output from "baytrends". baytrendsmap is open source and can be downloaded and run from your desktop RStudio. Go to https://github.com/tetratech/baytrendsmap to download the source code. Report bugs "here"."

John Wolf (USGS) commented in the chat a suggestion to swap out the current GAM elements of the Watershed Data Dashboard and substitute this. Kristin Saunders suggested a future working session to try out different utilizations of the app and others agreed that would be useful. Greg Allen commented that it is great that the tool is two-way allowing upload and analysis instead of the more frequent one-way push data out to people.

Bill commended this effort and added that from the UMCES report card they learned that people really appreciate interactivity. He encouraged STAR members to take a look, share with others and provide feedback. Breck said that the hope is to integrate tidal trends work more into Chesapeake Bay Program efforts.

11:50-12:00 **Global Sustainability Scholars Update** - **Bill Dennison, Lawren Caldwell, Anna Calderón, Nick An, and Pheng Lor** (UMCES)

The Global Sustainability Scholars and Fellows cohort visiting UMCES Integration and Application Network (IAN), working in collaboration with the COAST Card program, will present updates on their work comparing the Chesapeake Bay to the Goa Coast of India, Manila Bay in the Philippines, and Tokyo Bay and Sekisei Lagoon in Japan.

Anna Calderón introduced the four Global Sustainability Scholars, who are part of the 2022 cohort and were placed at UMCES Integration and Application Network (IAN). The Coastal Ocean Assessment for Sustainability and Transformation (COAST) Card project is an innovative stakeholder driven tool that monitors forecasts and reports the effectiveness of management decisions on coastal and ocean sustainability. COAST Card partners with 4 study sites, the Chesapeake Bay, U.S.; the Goa Coast, India; Manila Bay, Philippines; and Tokyo Bay, Ishigaki Island and Sekisei Lagoon, Japan. COAST Card also partners with Norway, but there is no study site based there. The components of this project include a socioeconomic report card, a social network analysis which creates social connectedness maps to illustrate relationships within a community, and systems dynamic modeling which is studying dynamic behaviors using computer models and simulations within a system like a watershed to inform management decisions.

Nick An explained that for the U.S. side of the project, the specific case studies site for the summer was the Potomac Watershed and most of the work was spent preparing for the community partners' open house which occurred last week. The goal of the open house was to create community interest and gather community input regarding a Potomac report card. Nick presented on his work. Nick is getting his MPH in Environmental Health at Emory University and his focus for this project was on the public health side. He wanted to frame sustainability issues as pressing public health concerns. There has been a lack of public health indicators with previous report cards, so with his research he wanted to identify some indicators that could be used for data analysis. The indicator he chose is the Social Vulnerability index (SVI), which is a tool developed by the CDC to assess how vulnerable a community is based on social conditions

and the overall vulnerability score is based on 4 different social categories: socioeconomic status, household composition and disability, minority status and language, and housing type and transportation. This data can be used by public health officials and planners to focus resources on communities who need it the most. Nick created maps using data from the CDC and presented an infographic on Frederick County at the open house. While the county overall seems to be doing well, there are some disparities. Accessibility for minority status as well as different types of housing and transportation negatively impacts some communities more than others. By focusing on different regions in this area using this type of spatial analysis you can emphasize resources for some of these more vulnerable communities.

Anna Calderón is a rising senior attending Wellesley College majoring in geoscience and anthropology with a special interest in hydrology. Anna's research focused on flooding as an indicator in the Potomac watershed. Her overall goal was to analyze flood frequency over time in 3 counties: Frederick, Washington and Carroll. She analyzed data from July 2015-July 2022. The types of data she gathered were gauge height (elevation of river water where data is being collected), gathered from the USGS sources, and flood stage (elevation at which overflow of natural banks begins to cause damage to the local area from inundation) gathered from the National Weather Service's Sources. She synthesized findings and created graphics to share with Potomac community members. Anna's findings, which were communicated through graphics, showed the frequency of moderate or major flood events, frequency of when there was minor flooding or susceptibility to flooding, as well as within which month(s) the flood stage was exceeded in each county. Anna found that Frederick County experienced the most severe flooding.

Lawren Caldwell is a rising junior at North Carolina A&T University studying agricultural and environmental systems with a concentration in environmental studies. Lawren's research dealt with the social network analysis (SNA) component of the COAST Card project, and her questions included why is social network analysis important to transnational research, how can it positively impact communities, and how do we identify and engage stakeholders. SNA is important as it creates international relationships that aid in developing and applying solutions surrounding sustainability. It can positively impact communities because it allows the opportunity for different perspectives to be considered when engaging in these discussions as everyone has a different outlook in regards to sustainability and what they experience. Stakeholders can be identified as anyone who has direct influence and anyone who is directly or indirectly impacted by decisions. We engaged stakeholders by showing understanding and being open to these discussions. They respond well and listen better when you show you understand what they're experiencing, and you show that you care. At the stakeholder mapping activity that occurred at the Potomac open house, we asked our guests to identify their organization, who they work with, and who they wish to work with. We had 4 indicators: social/cultural, economic, governance, and environment. Participants identified their organization on an orange sticky note and identified their partners on a green sticky note,

placing each note in the relevant category and drawing a line between the notes. Then on a separate board they identified organizations they wished to work with, writing those on pink sticky notes, and again placing their orange sticky notes and connecting the two notes. Lawren noticed from this activity that many participants were in the governance and environmental categories but wanted to work more with stakeholders in the social/cultural and economic categories.

Pheej Lauj (Pheng Lor) shared about his background; he was born and raised in Fresno, CA and has lived in the Bay Area for the past 7 years. His project is called Evaluating Transdisciplinary Project Development and focused on evaluating the COAST Card project itselfThe project also involves 25 plusproject collaborators from 5 different country teams each with unique coastal and ocean sustainability goals. COAST Card objectives to build a social network analysis tool, develop a socio-economic report card and integrate systems modeling suggests an efficient and effective development and collaboration process. That is why Pheng's focus was to conduct formative evaluation that will help assess COAST Card's process and identify a project's strengths and project's potential for improvement. He did this by conducting 30-minute voluntary partner interviews, interviewing 14 partners representing all country teams. Based on interview feedback, he was able to draw on synergies and make general recommendations for the project process and activities. Synergies were patterns of statements or similar feedback from multiple interviews, and recommendations were findings to suggest dialogue or action which could use more immediate attention from internal organizational processes. His takeaways included that transdisciplinary efforts require an open mind, determination, flexibility and accountability. Transnational work is also cross societal and cross cultural which adds layers to the complexity and demand. There's a long road ahead for the development of global research approaches to tackle climate and sustainability challenges, but he is glad to be a part of it. Pheng closed by thanking Bill and Vanessa with UMCES, Global Sustainability Scholars, and the National Science Foundation.

Anna shared in the chat that if people have any questions about flood data/findings they can reach out to Anna at ac8@wellesley.edu. Anna also shared the COAST Card social media accounts: Instagram and Facebook. Bill Dennison closed out the meeting by inviting everyone to the next STAR meeting which is on August 25th.

12:00 Adjourn

Participants:

Alexander Gunnerson (CRC), Amy Goldfischer (CRC), Breck Sullivan (USGS), Marisa Baldine (CRC), Bill Dennison (UMCES), Jamileh Soueidan (CRC) ,Kaylyn Gootman (EPA), Julie Reichert-Nguyen (NOAA), John Wolf (USGS), Kathy Boomer (STAC), Renee Thompson (USGS), Sophie Waterman (CRC), Vanessa Van Note (EPA), Kristin Saunders (UMCES), Matthew Kierce (IWLA), Peter Tango (USGS), Jeremy Hanson (CRC), Greg Barranco (EPA), Nick An (UMCES), Isabella

Bertani (UMCES), Anna Calderón (UMCES), Lawren Caldwell (UMCES), Pheng Lor (UMCES), Tom Parham (MD DNR), Mandy Bromilow (NOAA), Katlyn Fuentes (CRC), Vanessa Vargas-Nguyen (UMCES), Alexandra Fries (UMCS), Mark Nardi (USGS), Katheryn Barnhart (EPA), Marina Metes (USGS), Labeeb Ahmed (USGS), Chris Guy (USFWS), Greg Allen (EPA), Caroline Johnson (CRC), Stephen Faulkner (USGS).