Integrated Trends Analysis Team (ITAT)
Meeting

Wednesday, October 26, 2022
10:00 AM – 12:00 PM

Meeting Materials: Link

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

ACTIONS & DECISIONS

- **ITAT decided to select the James River as the pilot tributary summary to update on the new timeline.**
    - **To support this pilot, the following actions will be taken:**
        - **Breck Sullivan will identify the structure used on the USGS Microsoft Teams site to use on the Chesapeake Bay Program Microsoft Teams site.**
        - **Alex Gunnerson will invite all parties responsible for some part of the tributary summary update process to the Chesapeake Bay Program Microsoft Teams site.**
- **Breck will meet with Renee Karrh and assist her by reaching out to USGS to help acquire about collaboration in using the results of Maryland nontidal network data after they have been run through WRTDS so the data can be compared with outputs from baytrends.**
- **Qian Zhang will look into adding a feature to the Water Quality Standards Attainment Indicator app that allows the user to pause the change in snapshots.**
- **Qian will create a "Readme" or "About" tab for the Water Quality Standards Attainment Deficit app to explain caveats, what criteria exactly are being assessed, and to provide contact information.**

Meeting Minutes

10:00 – 10:05 **Welcome – Kaylyn Gootman** (EPA) and **Breck Sullivan** (USGS)

Announcements –

- Conferences of potential interest
    - Chesapeake Watershed Forum – November 4-6, 2022, Shepherdstown, WV. Registration closed September 23, 2022.
    - A Community on Ecosystem Services – December 12-15, 2022, Washington, DC. Abstracts were due July 15, 2022.
    - National Water Quality Monitoring Council's 13th National Monitoring Conference – April 24-28, 2023. Location TBD. Session proposals were due June 24, 2022.
    - CERF 2023 Conference: Resilience & Recovery – November 12-16, 2023, Portland, Oregon. Session and workshop proposals due September 19, 2022. Abstracts due May 10, 2023.

10:05 – 10:50 2021 Tidal Trends – Rebecca Murphy (UMCES)

Rebecca presented the draft 2021 baywide tidal water quality trends generated through a joint effort with ITAT, Maryland Department of Natural Resources (MDDNR), Virginia Department of Environmental Quality (VADEQ), Old Dominion University (ODU), District of Columbia Department of Energy and the Environment (DC DOEE), and Metropolitan Washington Council of Governments (MWCOG). Rebecca examined any new patterns for this year and got feedback on the presentation and dissemination of the results. DC DOEE added supplemental comments when relevant.

Summary

Rebecca began with a reminder of what the tidal trends results entail and the announcement that new this year, Washington, D.C. tidal trends results have been included thanks to the work of Mukhtar Ibrahim and Karl Berger from MWCOG, Efeturi Oghenekaro, Blessing Edje and George Onyullo from DOEE, and Breck Sullivan, Alex Gunnerson, and Rebecca Murphy from the Chesapeake Bay Program (CBP). These new additions include parameters & time periods for 18 stations and are included on the 2021 maps where applicable. Future work for the Washington, D.C. stations might include additional parameters, analysis of the results with the team, and the inclusion in Potomac Tributary Report during the next revision.

Rebecca provided a review of the Generalized Additive Models (GAM) method used to produce the tidal trends results (slides 5-11).

Rebecca then walked through some of the 2021 Tidal Trends, specifically Total Nitrogen (TN), Total Phosphorus (TP), Secchi depth, Chlorophyll *a*, and Bottom Dissolved Oxygen (DO).

- For TN, the long-term trends can be summarized as decreasing at a majority of stations (bottom is similar) and the short-term trends are more mixed, but the largest group is improving.
- For TP, the long-term trends can be summarized as decreasing at a majority of stations (bottom is similar) and the short-term improvements are reduced by more than half, with many more regions showing “no change” over the short-term.
- For Secchi depth, the summary says more than half of the long-term degradations have turned to “no change” for the last 10 years and stations with long- and short-term improvements are fairly consistent.
- For Chlorophyll *a*, conditions have improved from the long- to short-term in both seasons. There are slightly better bay-wide trends in spring than summer.

In summary, the 2021 Tidal Trends have overall patterns consistent with last year (more TP and Chlorophyll *a* improvements). Nutrient trends are mostly improving over the long-term with some leveling out over the short-term. There are fewer degrading short-term trends than long-term trends for Secchi, Chlorophyll *a* and DO.

Results can be accessed via the ITAT webpage, Baytrendsmap, and the updated Chesapeake Bay Watershed Data Dashboard.

Rebecca concluded with acknowledgements (slide 35).

Discussion

Peter Tango commented in the chat to Rebecca, the surface TP, your station of concern - your graph was 1985-2021 which looked to be a decrease, but if your map is 1999-2021, that period appeared like maybe an increase. I wasn't sure if the "long-term" on the map was full record or 1999 to present then based on your trend graphic. Rebecca reshowed those graphs and Peter realized he had misread one of them, so his question is moot.

Peter Tango asked if the trend being seen in the Anacostia is the effect of the runoff capture tunnel or some other Best Management Practice (BMP). Qian Zhang replied, the Chlorophyll-a in the Anacostia Tidal Fresh DC segment (ANATF_DC) has been in attainment since 2012-2014, but never before then. Isabella Bertani said she thinks the Anacostia tunnel went online in 2018 and has since prevented 90% of the Combined Sewer Overflows (CSOs). Qian replied to Isabella that 2018 appears to be consistent with Rebecca's timeseries graph. Efeturi Oghenekaro said they have seen many improvements in the Anacostia since the tunnels were installed, but this specific trend is likely a result of other implemented stormwater BMPs and stream restoration work, such as bank reinforcement and reconstruction. George Onyullo said in addition to what DC has done, a lot of the success is owed to work being done in Maryland since 80% of the flow comes from there. George said the contribution of the tunnel will likely be seen going forward. Rebecca emphasized this is an example of the connections in the tidal waters. Jeremy Hanson commented construction and development projects take so long that updates to standards by DC and MD from 2010-2013 timeframe may also finally be showing up in those clarity improvements. Jeremy speculated because he did not recall when construction Erosion and Sediment control standards were updated and took effect for DC and Prince George's County. Peter Tango replied no doubt, the combined effects of all size projects gets us to our desired results feeding off each other. Peter said it is exciting to see such patterns and trends.

Kaylyn expressed her appreciation for the clarity of the visuals. Peter and Elgin expressed their appreciation for this great work.

Elgin suggested a roundtable at the next ITAT meeting to discuss questions from the 2021 Tidal Trends Results. One example of a question to discuss is why the Rappahannock is seeing degrading trends in the middle of the river by improving trends at the fall line and mouth of the river. Elgin suggested compiling a list of questions ahead of time based on the questions these results raise and what ITAT can do to answer those questions. Breck said this is a good idea and suggested this could be an opportunity to connect with those working in the nontidal portions to better understand what is happening in the estuary. Rebecca said this is a good question, and is seeing something similar to the Rappahannock in the York river. Rebecca endorsed time for a roundtable to answer these questions while referencing the results. Claire Buchannan said the Anacostia data looks very intriguing and wondered if the water clarity is improving because the concentration of chlorophyll in the cells are going down. Claire said she is suspicious of the assumption that an increase in chlorophyll results in a decrease in water clarity. Claire suggested having the roundtable discussion in person.

Bryant Thomas said from a management perspective, the terms improving and degrading are more easily understood and have clearer implications than increasing and decreasing. Peter Tango suggested maybe another figure can show "I" for improving, "D" for degrading, and "N" for no trend instead of arrows to create a more manager-

friendly view of the results. Bryant said this is a great use of monitoring data and he is looking forward to using these results in addition to modeled results.

Breck noted that it seems this year in the short-term, there are a lot of unlikely trends, meaning many of them are staying consistent and not increasing or decreasing. When communicating these type of results, Breck asked if it would be helpful to show the range of values so people could see the concentration instead of percent increase of decrease. Without taking into account current status, a station with a very high concentration and a station with a low concentration would appear similarly if they had no trend. Rebecca replied that is an important consideration and it has not yet been addressed. The current concentration could inform that status component and let managers know where trends need to change. Rebecca said they just need to think about how to show the concentration visually. Kaylyn Gootman asked if for the nontidal network results, concentrations are more easily understood. If so, Kaylyn suggested having two sets of results: the type currently produced and one with concentrations. Elgin added that earlier on in the CBP's history, they produced results for both the status and trends of tidal tributaries for water quality metrics. Elgin emphasized Breck and Rebecca's comments, saying the York and Rappahannock are good examples of the need to have both status and trends to best inform managers. Elgin expressed support for reporting both aspects of water quality metrics for tidal tributaries. Rebecca said average concentrations are already generated in the periods being examined, so they can review graphs that Renee Karrh has produced similar to this topic. Peter Tango suggested ranking the stations by concentration and applying a relative relationship between stations and their trends to address the need for showing status.

Qian asked Rebecca if there has there been any Baywide analysis to link the GAM-estimated Chlorophyll *a* to GAM-estimated TN, TP, TSS, and Secchi. Rebecca replied some of Elgin's cluster analysis could get at grouping trends for different parameters together. While Rebecca is not sure if it has been done it yet, but it seems like a possibility.

In the spirit of connecting the tidal and nontidal trends, Breck asked if there is a tool, visual, or way to produce a combined result. Breck also asked if people feel that would be useful or if they have any ideas on how to approach this topic. Jon asked who the audience would be for these combined tidal and nontidal products. Breck said the audience could include researchers who could maybe answer the questions raised by the results or managers who are looking to learn more about the connections between the watershed and the estuary. Kaylyn said there are a lot of different audiences to consider, such as technical staff and local and county implementers. Renee Karrh said she has done a lot of work matching up tidal and non-tidal trends in Maryland. In Maryland, there is a long-term nontidal monitoring program that is separate than the nontidal network. The nontidal network uses Weighted, Regression, Time, Discharge, and Season (WRTDS). Renee has run Maryland's nontidal network data through baytrends, but she is still waiting on USGS to provide the results of that data set after it has been run through WRTDS. Another challenge is that nontidal network results are done on a water year calendar while tidal trends are done on a calendar year. There is a way to manipulate baytrends to produce results on a water year basis, but it requires more technical knowledge. Renee added that in Maryland, they do not use the nontidal network data, they use what they call their core dataset and ensure the nontidal and

tidal results are comparable and in the same format. Renee said she thinks it is worth going through the effort to make this connection since there is a longstanding interest from management in how these results compare. Additionally, it aligns with ITAT's goals to better integrate the watershed with the estuary. Breck and Kaylyn said they agree this would be worthwhile to move forward with.

Bryant Thomas commented he is interested in seeing how basin tidal and non-tidal trends compare, specifically learning where we need to focus more implementation efforts, and also see where we observe successes and how we can learn from these.

10:50 – 11:20 **R Shiny Apps for water quality standards attainment data – Qian Zhang (UMCES)**

Qian demonstrated new R Shiny Apps for assessing and visualizing water quality standards attainment data.

Summary

Qian began with an overview of the Water Quality Standards Attainment and Monitoring status according to ChesapeakeProgress, as well as the work to communicate results as part of that outcome. Qian listed the different components of the two R Shiny Apps, which are the Water Quality Standards Attainment Indicator and the Water Quality Standards Attainment Deficit. Qian then walked through both apps in a live demonstration.

Discussion

There was much praise for the applications Qian showcased. Rebecca Murphy said these are very useful apps and she will use these a lot. Amanda Shaver said these are excellent and thanked Qian for sharing. Isabella said this is awesome work. Tish Robertson said she used the apps last week and they are super useful. George Onyullo said this is a great piece of work. Jeremy Hanson noted his appreciation that it's so easy to click and download the .gif of the map showing the changes over time. Kaylyn said the color scheme is color blind friendly and is informative.

Peter Tango said the term "Open Water" is the open water 30-day mean criterion assessment. For migratory fish spawning and nursery (MSN) there is a caveat, this is estimated by 30 day mean as a surrogate to achievement because we don't have 7-day mean data which is the actual decision data needed. We are working on achieving those data collections and analyses with new work and data collection investments. Qian added how there is a disclaimer on this on the About tab of the app.

Breck asked if there is a way to pause the automatic visualization on the Water Quality Standards Attainment Indicator app so users can take their time in looking at a specific period. Qian said he is not sure, but he knows the time in between snapshots can be extended. Isabella Bertani said there is an option to pause the change in snapshots. Qian said he will look into adding a feature that allows the user to pause the change in snapshots for the app. Peter asked if narration could be added to the automatic time series. Peter said an audio version telling the story of these results could help reach more people.

Dave Montali asked if there is a category for less than 1% in attainment deficit. Qian said yes, they tried to make that distinction. Dave said maybe that distinction should not be

made since there is a provision in the Total Maximum Daily Load (TMDL) that gives flexibility for segments within 1% of reaching full attainment for that designated use. Qian said that is a change he can make if others agree, since there are probably arguments for and against this change. Dave asked if segments with variance are included. Qian said he believes the segments with variance are included and he gets these results directly from Richard Tian. Gary Shenk said there is a distinction between a set of water quality standards that get the flexibility for being within 1% attainment and those that are assessed as pass/fail. Gary said when assessing the attainability of the total allowable loads with planning targets, they do allow the 1% flexibility, but that is just for planning. When it comes to determining attainment, it is just pass/fail.

Elgin suggested renaming the labels for the tabs so it is clear the criteria is for DO in those designated uses. Qian said originally he had them in the names, but removed them to make it look cleaner. In the text above the row of tabs, Qian has additional information that explains DO is the criteria being used for these designated uses. Qian said he can consider going back to those labels. Tish Robertson asked Peter Tango if we are okay publishing a graph for MSN even though we do not have a method yet and we do not have a routine assessment for that use. Peter suggested making a prominent caveat that this reflects the indicator publication approach, not a full criteria standards assessment since the full data is not available.

Claire Buchanan suggested including a readme tab that includes more details and any necessary caveats. Qian agreed this is a good idea. Qian will include a table showing what criteria is truly being assessed and other relevant information like contact information.

Renee Karrh said for the trends in attainment, those are determined using the Mann Kendall test. Renee asked if they are determined on demand in the app or is there a table of trends results for that section of the app. Renee would be interested in that analysis for a project MD DNR is working on. Qian replied there are only two periods right now, so he can add a new block at the bottom of the tab giving a table of the options. Qian can also add functionality for the user to compute trends for any period, instead of the two periods pre-specified.

11:20 – 12:00 Discussion on which tributary summary to update first – Breck Sullivan, Kaylyn Gootman, and Alex Gunnerson (CRC)

Breck, Alex, Kaylyn, and Vanessa reviewed the input provided by ITAT in October 2021, the WQGIT, the Modeling Workgroup, and the currently available cluster analysis results to identify which tributary summaries are priorities to update. Across all these groups, the James River was the only tributary to be consistently ranked as a priority. Given this alignment, they suggested ITAT begin with the James and use it as a pilot to test out the new tributary summary timeline. ITAT was asked to confirm if the James is a good tributary to start with.

As a reminder, all of the tributary summaries will be updated later, but this pilot is an opportunity to test it on this timeline.

<u>Summary</u>

Breck emphasized that all of the tributary summaries will be updated at some point, but as the pilot to test out the new timeline and additions to the tributary summaries, the James is being suggested since it was a priority for multiple workgroups and partners that were consulted.

There were no objections to the James, so that will be the pilot.

12:00 Adjourn

Next Meeting: Wednesday, November 9, 2022

Participants: Alex Gunnerson, Alex Soroka, Amanda Shaver, Amy Goldfischer, Andrea Nagel, Bryant Thomas, Breck Sullivan, Carol Cain, Cindy Johnson, Claire Buchanan, Dave Montali, Efeturi Oghenekaro, Elgin Perry, Gary Shenk, George Onyullo, Helen Golimowski, Isabella Bertani, James Webber, Jeremy Hanson, Jon Harcum, Kaylyn Gootman, Mike Lane, Peter Tango, Qian Zhang, Rebecca Murphy, Renee Karrh, Rikke Jepsen, Roberto Llanso, Roger Stewart, Tish Robertson, Tom Butler.