

## Integrated Trends Analysis Team (ITAT)

### Meeting

Wednesday, February 22, 2023

11:00 AM – 1:00 PM

Meeting Materials: [Link](#)

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

### ACTION ITEMS

- Anyone interested in applying for the STAR Co-Chair position should submit a statement of interest (no more than half a page) that details why they would be a good fit for this position. Please submit the statement of interest to Breck Sullivan ([bsullivan@chesapeakebay.net](mailto:bsullivan@chesapeakebay.net)), and please reach out with any questions. More information on the position can be found [here](#). This request is due Friday, March 3, 2023.
- Alex Gunnerson will work with Tom Parham and the striped bass team to find time at a modeling *ad hoc* meeting to discuss how the newly provided scenarios can be integrated into the analysis.
- Climate Change Section of the Tributary Summary
  - Anyone with comments on the initial draft outline should email Breck Sullivan ([bsullivan@chesapeakebay.net](mailto:bsullivan@chesapeakebay.net)), Kaylyn Gootman ([gootman.kaylyn@epa.gov](mailto:gootman.kaylyn@epa.gov)), and Alex Gunnerson ([agunnerson@chesapeakebay.net](mailto:agunnerson@chesapeakebay.net)).
  - Alex, Breck, and Kaylyn will look into incorporating the National Atmospheric Deposition Program information into the section. Alex will reach out to the modeling team for access to the data.
  - Alex, Breck, and Kaylyn will emphasize the connection between increasing temperatures and decreased solubility of oxygen throughout the climate change section by incorporating four suggested papers ([paper one](#), [paper two](#), [paper three](#), [paper four](#)) into the living resource section or section 3 and by considering the incorporation of other observational temperature data.
  - Alex, Breck, and Kaylyn will work with Veronica (Nani) Lucchese to incorporate the Integrated Application Network visual into the draft.
  - Alex, Breck, and Kaylyn will ask Rebecca Murphy which section is most appropriate for the warming temperature trends.
  - Alex, Breck, and Kaylyn will return to present a more fully developed draft climate change section for ITAT to review.

## Meeting Minutes

**11:00 – 11:10 Welcome – Kaylyn Gootman (EPA) and Breck Sullivan (USGS)**

### Announcements –

- Attendees were asked to complete a poll indicating if they would attend an in-person ITAT meeting and which locations they would prefer.
  - Results indicated that nine people wanted to attend an in-person meeting and there was a slight preference for October over November. Hosting locations were generally equal across the poll, but there was a slight preference for Annapolis and a slight aversion to the Eastern Shore.
- Breck announced STAR is accepting applications for the STAR Co-Chair position and encouraged those interested to apply. More information can be [found here](#). Interested parties should email Breck Sullivan at ([bsullivan@chesapeakebay.net](mailto:bsullivan@chesapeakebay.net)).
- Conferences of potential interest
  - [Environment Virginia Symposium](#) - March 28-30, 2023. Location: Lexington, Virginia. Session proposals were due in September 2022.
  - [National Water Quality Monitoring Council's 13th National Monitoring Conference](#) – April 24-28, 2023. Location: Virginia Beach, VA. [Session proposals](#) were due June 24, 2022.
  - [Species on the Move](#) – May 15-19, 2023. Everglades National Park, FL.
  - [CERF 2023 Conference: Resilience & Recovery](#) – November 12-16, 2023, Portland, Oregon. [Session and workshop proposals](#) due September 19, 2022. [Abstracts](#) due May 10, 2023.
  - [Citizen Science Association conference, C\\*Sci 2023](#) - May 22-26, 2023, Arizona State University campus in Tempe/Phoenix, Arizona.

**11:10 – 12:00 [Climate Change and Striped Bass Chesapeake Habitat](#) – Tom Parham, Jim Uphoff, Andrew Keppel, and Renee Karrh (MD-DNR)**

Tom, Jim, Andrew, and Renee discussed progress on an analysis to apply MD DNR's newly developed striped bass water temperature and dissolved oxygen thresholds to look at how summer habitat conditions for resident striped bass have changed since 1986. In addition, using these new thresholds, they evaluated likely future conditions through 2055 using several modeling scenarios (climate change, achieving or not achieving WIP goals).

### Summary

Tom began the presentation with some context on their analysis, including the trend in changing summer distribution of striped bass, regional economic importance of striped bass, declining resident striped bass abundance, and the current status of the striped bass fishery. Tom noted that this analysis does not focus on migratory striped bass, but instead focuses on resident striped bass which are most important for commercial and recreational fishing in the Chesapeake Bay.

One trend in the summer location of resident striped bass is the transition to areas north of the Bay Bridge. Another trend is striped bass are moving out of river mouths and into the mainstem Bay.

Tom introduced the concept of the striped bass habitat squeeze, which shows how striped bass habitat is compressed vertically between bottom hypoxia and warmer water temperatures at the top of the water column. The team was able to create habitat suitability thresholds based on field studies and literature. The team used this information to map habitat suitability throughout the Bay over time.

Tom then walked through multiple research questions on [slides 14 – 32](#) to explain results and findings from the scenario analysis. Tom summarized the conclusions of the team's work on [slides 33 and 34](#).

#### Discussion

Lew said the modeling team will be sending the additional scenarios to Tom and the striped bass team today. Lew suggested having another modeling *ad hoc* meeting on this topic to discuss how the new scenarios will fit together.

Lew commented on [slide 16](#), noting the profound influence of increasing temperatures on the solubility of dissolved oxygen. Lew recommended placing greater emphasis on this relationship in the conclusion of the paper, perhaps slide 33, and noting that staying steady on dissolved oxygen levels would be a victory given the challenges of rising temperatures. Lew suggested referring to Richard Tian's paper in 2022 which demonstrates how increased temperatures decrease dissolved oxygen solubility, increase respiration in the deep water, and increases the cap of the pycnocline. Lew said Richard's analysis might help with quantifying the impacts of warming temperatures. Tom said in previous versions of this presentation they have stressed this relationship more strongly but had left it out of this iteration. The striped bass team has Richard's paper and is finding it helpful.

Breck said this work is an excellent example of collaboration in the partnership and the importance of accelerating progress to meet the 2025 Watershed Implementation Plan (WIP) targets. Tom agreed reducing nutrients and sediments is still critical in the face of climate change.

Lew said when it comes to writing papers on this work, a point of nuance is the 2020 monitoring data includes nutrient reductions and climate change, although that can be left off presentations for now.

Breck asked how the 2020 monitoring results on [slide 25](#) could be so similar to the 2055 no action results for habitat. Tom explained the monitoring results represent habitat conditions at the one point in the peak of the summer, whereas the 2055 no action scenario is a ten-year average of conditions. Tom explained the episodic conditions are expected to become the norm in a 2055 no action scenario but noted that this does not include any 2055 no action episodic conditions.

Alex asked what the next steps are for the team and how the team plans to communicate this work out to the partnership. Tom replied the first part is developing a manuscript which goes through the 2020 data and defines and explains what the habitat suitability thresholds are. Future manuscripts might include the additional scenarios being worked on. Other efforts include working with the new scenarios provided by Lew

and Richard, investigating the usage of General Additive Models (GAMs) with Jon Harcum, Rebecca Murphy, and Elgin Perry, looking at the “lens” area of 3-8 meters depth, and investigating segment trends by area. The team plans to apply this work to Virginia waters once the methodology has been finalized in Maryland. Potential efforts include responding to a NOAA request for proposals on climate change effects for different species. Tom said the team is also thinking about how these results can be applied to striped bass management, which is a challenge. Currently habitat is not a large component of striped bass management, so the group wants to make this information usable to the striped bass fishery’s management. Lew asked if Tom and the team would be comfortable presenting this information to the Water Quality Goal Implementation Team and the Scientific and Technical Advisory Committee sometime this summer or later in the year. Tom said he will check in with the team to see what their timeline is. Lew said presenting draft work is welcome as it can foreshadow future conclusions.

Kristin said she just forwarded this presentation to Rachel Felver in the Communications Office to put it on the radar for her team.

Breck suggested sharing this work at Chesapeake Bay Program biennial meeting given its cross-cutting work and relevance to the themes of the meeting. Tom said his team is open to collaboration and asked for Breck to share more information with them as the meeting gets closer.

**12:00 – 12:30 [Draft Climate Change Section of the Tributary Summaries](#) – Breck Sullivan (USGS), Kaylyn Gootman (EPA), and Alex Gunnerson (CRC)**

Breck, Kaylyn, and Alex provided an outline of the climate change section for the tributary summaries and asked ITAT members for their feedback on how to improve the section.

Summary

Breck explained the goal of the climate change section is to document how a changing climate impacts the trends and data in the tributary summaries. Breck walked through the draft outline which has four main sections: an introduction, increased precipitation, warming water temperatures, and changing habitats.

Carol Cain said the National Atmospheric Deposition Program (NADP) may have useful information for this section. Breck asked if the modeling team has this dataset available or noted in the documentation. Lew said the modeling team could help and NADP could be broken out to tidal waters and/or the watershed of each tributary.

Lew said the link to dissolved oxygen via Richard’s paper in the living resource section would be a great addition. Breck suggested including the striped bass work discussed earlier and SAV updates as well for the living resource section. Lew said there are three articles coming to mind that could be referenced here. The three additional articles were not identified.

Elgin said a potential theme for this section could be how warming water temperatures create an uphill battle for achieving dissolved oxygen and other water quality standards. Breck asked if previous work on shallow water continuous monitoring data and Rebecca

Murphy's work could be utilized to address this theme. Lew said observational temperature data Tom and Richard have utilized in the deeper and shallower waters may have a place in section 3. Lew said he is not sure how it should be communicated. Kaylyn said data visualizations that communicate the overall message, like climate stripes, might be utilized here.

Breck asked if the warming temperature trends data should be included in section 3 or if it should be reported in the other section with the trends. Kaylyn and Breck agreed to follow up with Rebecca on this topic.

Kaylyn suggested including an Integrated Application Network (IAN) visual in section 3 to explain how warming temperatures impact an estuary. Veronica (Nani) Lucchese volunteered to pull the most recently updated visuals from IAN and share them with the group.

Breck, Kaylyn, and Alex will return to present a more fully developed draft climate change section for ITAT to review. In the meantime, ITAT members are welcome to send any comments or questions to Breck, Kaylyn, and Alex.

**12:30 – 1:00**     **[Analysis Plan for UMCES Patuxent Hypoxia Course](#) – Jeremy Testa, Ryan Woodland, Laura Harris, and the 2023 Patuxent Issue Study Group Class (UMCES)**

Students (Allison Dreiss, Amir Azarnivand, Anna Hildebrand, Fardis Pourreza, Syeda Sadia Ali) from 2023 Patuxent Issue Study Group Class at UMCES presented their analysis plan for the Patuxent hypoxia project to ITAT. ITAT members were asked to provide feedback. The students will return to present their results to ITAT in May.

**Summary**

Jeremy provided some context on the course, explaining how the Marine Estuarine Environmental Sciences (MEES) Program has an issue study group class requirement which focuses on addressing a problem and produces a product. This course is focused on producing a peer-reviewed publication regarding oxygen depletion in the Patuxent River.

The students in the issue study group introduced themselves and their research interests. They decided to focus on the Patuxent Estuary since it has oxygen depletion at multiple scales and despite improvements in wastewater reductions, there is still poor water quality in the lower part of the estuary.

Each of the students presented part of the presentation, outlining the major research questions and goals of the analysis. The two research questions were 1) what are the major factors that control oxygen depletion in the Patuxent River and 2) is there a relationship between these factors and benthic biomass. The four goals were 1) analyze dissolved oxygen in the Patuxent from 1930-present, 2) quantify long-term changes in hypoxic volume and area (1985-2022) and quantify controls, 3) derive estimates of hypoxia onset, breakup, and rates of dissolved oxygen depletion, and 4) relate changes in oxygen depletion to metrics of living resources.

**Discussion**

Breck asked if the class has considered investigating the relationship between changes in land use and dissolved oxygen levels. Breck said the new high resolution land use/land cover data produced by the CBP might be informative for this work. Nani said

this could be a productive addition to the analysis given the agricultural nature of much of Maryland's watershed and the well documented relationship between nutrient pollution and hypoxia. Jeremy said the class has been in contact with Chris Delia about old data reports going back to the 1930s, which includes work done on population and land use change around the time of the initial eutrophication signal in the Patuxent.

Lew asked the class to speculate as to why the plot comparing hypoxia to nitrogen loading seemed to not show a response. Lew said these speculations might be fodder for future research directions. Jeremy said the class would discuss this further and report back to Lew on ideas since many are new to this work.

Breck said the intention is for the class to present the findings of their research to Bay Program partners, including ITAT and management, in early May.

**1:00            Adjourn**

**Next Meeting: Wednesday, March 22, 2022**

**Participants:** Alex Gunnerson, Allison Dreiss, Amanda Shaver, Amir Azarnivand, Anna Hildebrand, Andrew Keppel, August Goldfischer, Breck Sullivan, Carl Friedrichs, Carol Cain, Cindy Johnson, Claire Buchanan, Elgin Perry, Fardis Pourreza, Helen Golimowski, Jeremy Testa, Jim Uphoff, Jon Harcum, Kaylyn Gootman, Kristin Saunders, Lew Linker, Mukhtar Ibrahim, Mike Lane, Qian Zhang, Renee Karrh, Rikke Jepsen, Roger Stewart, Ryan Woodland, Syeda Sadia Ali, Tish Robertson, Tom Butler, Tom Parham, Veronica (Nani) Lucchese.