18988 Point Lookout Rd
Lexington Park, MD 20653

August 17,2023

Chesapeake Bay Program
Attn: Rachel Felver
1750 Forest Drive, Suite 130
Annapolis, MD 21401

Subject: Comments to Charting a Course to 2025

Dear Rachel,

In the decades that various organizations have been working to restore the Chesapeake Bay I have not witnessed any significant improvements in water quality or clarity, fish are accumulating toxins, and infectious diseases are present in the waters.

I suggest that a radical change of strategy is essential if we are to see water quality recover. **Vision Zero for the Bay** borrows from the concept of Vision Zero for highway traffic deaths. Given my area of expertise, I am only considering inputs to the bay from the surrounding land of the watershed, not actions that can be taken in the Bay itself.

Vision Zero for the Chesapeake Bay:

- Zero suspended solids entering the Bay
- Zero untreated sewage entering the Bay – including from inadequate or failed septic systems
- Zero trash entering the Bay
- Zero hazardous materials entering the Bay
- Zero fertilizers and pesticides (including herbicides, fungicides and insecticides) entering the Bay
- Reduction of impervious surface equivalent of all Bay tributaries to below 15%.

Draconian as this approach is, parts of it will require investment over a long period of time. However, such a strategy can be coordinated with efforts like Smart Growth and greenhouse gas reduction strategies. As much of this as possible should be implemented now rather than waiting for 2030 or 2050.

If the Chesapeake Bay is ever to return to days of abundant marine life in clear and healthy waters, then nothing short of this comprehensive and wide-ranging strategy will suffice. It's the legacy we should be leaving future generations.

Sincerely,

Frank Allen
President, Patuxent Tidewater Land Trust
Commissioner, Patuxent River Commission

ALLIANCE
FOR THE SHENANDOAH VALLEY

August 21, 2023

Chesapeake Bay Program
1750 Forest Drive, Suite 130
Annapolis, MD 21401

RE: Charting a Course to 2025

To Chesapeake Bay Program leadership and partners,

Thank you for the opportunity to comment on *Charting a Course to 2025: A Report and Recommendations for the Chesapeake Executive Council on How to Best Address and Integrate New Science and Restoration Strategies Leading Up to 2025*.

Alliance for the Shenandoah Valley is a nonprofit conservation organization working to protect farm and forest land, clean water, and thriving communities in six counties in Virginia's Shenandoah Valley. We signed onto the comments submitted by the Choose Clean Water Coalition but believe they did not address the importance of permanent land protection in reaching the Bay goals. Therefore, we respectfully submit these comments as well.

Restoration of clean water in the streams and rivers in the Shenandoah Valley is a priority at Alliance for the Shenandoah Valley. We coordinate multiple regional partnerships and programs to address non-point source pollution issues, particularly in the agricultural sector.

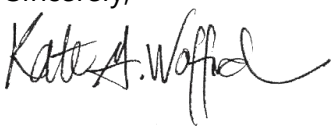
Our work is consistent with the issues identified as priority in the Charting a Course to 2025 report: 1) we are working to target our work on best management practice implementation to the highest impact areas to improve local conditions, 2) we continue to advocate for long-term funding to maintain Bay program efforts, 3) we work intentionally to engage local communities and those that have been historically underserved, and 4) we include new science in our approach to local watershed improvement. **However, upon reading the report we were surprised and disappointed to see very little importance placed on permanent land conservation efforts, outside of the "Protected Lands Outcome."**

We strongly agree with the Chesapeake Conservation Partnership comment letter, that land conservation is a critical tool to enhance Program outcomes, especially riparian buffers, wetlands and forests.

In our case, the implementation of agricultural best management practices requires significant public funds, strong relationships, consistent effort by nonprofits and agencies, and continued landowner commitment. Yet these practices are temporary, many of them only guaranteed for 10-15 years. Conservation easements are a way to make these practices permanent, while also removing the threat of land conversion, ensuring that existing buffers, forests, and wetlands, continue to produce water quality outcomes. We echo the Chesapeake Conservation Partnership's request that the Principals' Staff Committee, The Beyond 2025 Committee, and the Chesapeake Bay Program as a whole integrate permanent land conservation as a foundational principle in our efforts to chart a course to 2025 and beyond.

Thank you for your consideration of our comments and for efforts on behalf of our local streams and the Chesapeake Bay.

Sincerely,



Kate Wofford
Executive Director

Donald F. Boesch, Ph.D.
228 Meadowgate Drive
Annapolis, Maryland 21613

August 18, 2023

Mr. David Campbell
Acting Director, Chesapeake Bay Program Office
Annapolis, Maryland

Dear Mr. Campbell:

I am writing to offer comments on the draft report *Charting a Course to 2025*. I am Professor Emeritus/President Emeritus at the University of Maryland Center for Environmental Science, so I no longer speak in any institutional capacity. I have been involved in the generation and use of science related to the restoration of the Chesapeake Bay for more that 50 years, was a member of the Chesapeake Bay Program's Scientific and Technical Advisory Committee for 20 years, and served on the Maryland Governor's Chesapeake Bay Cabinet for 27 years (under five governors). Thus, I am very familiar with the Chesapeake Bay Program, its goals and evolution, and both its achievements and shortcomings. Based on that experience and firsthand engagement in other coastal regions including the Gulf of Mexico and Baltic Sea, in 2019 I published a global review "Barriers and bridges in abating coastal eutrophication." I draw on these broad, deep and sustained perspectives in developing my comments, earnestly offered because of my strong commitment to achieving the CBP goals.

General Comments:

1. I will limit my comments to the central driving component of the Chesapeake Bay Watershed Agreement, achieving the Total Maximum Daily Load requirements for nitrogen, phosphorous and sediment pollution. The outcomes for nitrogen and phosphorus loads are projected in 2025 to still be well in excess of the TMDL. Furthermore, the two outcomes intended to contribute to nutrient load reductions, Forested Buffers and Wetlands, are also substantially off course to achieve the 2025 goals, as is the Submerged Aquatic Vegetation outcome that depends on achieving the nitrogen and phosphorus load reductions. Of the 17 outcomes with an "on course" outlook, 12 are procedural rather than real-world outcomes, and none of the five others (blue crabs, oysters, stream health, fish passage and protected lands) are directly related to achieving the TMDLs.

2. Based on computer model estimates there will be substantial shortfalls in having practices in place by 2025 sufficient to achieve the load reductions specified under the TMDL. Based on the estimated reductions through 2021 given on pages 10 and 11, this is the case not only overall and in Pennsylvania, but also seems highly likely in 2025 without extraordinarily accelerated reductions in Delaware, Maryland, New York and Virginia. The predominant component of the deficiencies is, in each case, the substantial underperformance in implementing measures to reduce nitrogen and phosphorus pollution from agriculture. Long known, this was thoroughly documented in the STAC report *Achieving Water Quality Goals in the Chesapeake Bay: a Comprehensive Evaluation of System Response*, also known as the CESR report. The draft report gives minimal mention and few recommendations for achieving the needed agricultural nutrient pollution reductions, when at this point they are singularly critical to achieving the TMDL goals. This reality is hidden among the myriad goals and programs mentioned and should be elevated as a priority.

3. The draft report recommends drawing on the CESR report "to implement non-point source strategies [sic] geographically based targeting to improve conditions for living resources of the Bay," but fails to incorporate the findings and recommendations of that report that are pertinent to achieving the pollutant targets of the TMDL. In fact, the draft report misrepresents the CESR report concerning shifting emphasis to shallow water environments (see comments on Page 7, below). More to the central point, the CESR report found that existing implementation actions to reduce nonpoint sources of nutrients are insufficient to achieve the TMDL. While there are opportunities to further reduce nutrients from nonpoint sources, it noted that changes to programs and policies must be considered. The report goes on to note that additional funding of existing implementation is unlikely to produce nutrient reduction outcomes, which will likely require development and adoption of new agricultural programs and tools, such as pay-for performance approaches and addressing regional nutrient mass imbalances. Other than targeting, which is hardly a new concept, none of new tools identified in the CESR report is presented as an option in the draft report.

4. Despite its title, the draft report does not chart a course for narrowing the shortfalls between now and 2025 nor for eventually achieving the TMDL nutrient pollution load reductions. It fails far short of "recommending a *critical path* forward that *prioritizes* and outlines the next steps for *meeting the goals and outcomes* of the Agreement [emphases added]," which was the October 2022 charge of the Executive Council. While its recommendations are numerous, greater funding and staffing, greater targeting, more monitoring and research, improved models and corrected CAST spreadsheets, climate change adaptation, identifying champions and expanding conversations, and greater outreach and inclusion will fail, even collectively, to achieve the nonpoint source nutrient pollution load reductions (either for agriculture stormwater) needed to reach the TMDL. Beyond not presenting a critical path or next steps for meeting this goal, the draft report offers no prioritization among its scores of recommendations.

5. This report is supposed to advise the PSC and EC, so please dial back the happy talk and seriously address the deficiencies and options for alleviating them. For example, the statement is made: "the partnership has made incredible strides in decreasing the amount of nutrient and sediment pollution that reaches the Bay, and that should be celebrated." To the framers of the 1987 Bay Agreement that set nutrient pollution reduction goals quite similar to those we are still pursuing, it would only seem "incredible" that after 36 years we would be far away as we are from achieving these reductions. "Insufficient" would be a more honest and sober appraisal. Should we really celebrate that in 2025 the Bay Program will fail to meet the goal for reduction of nutrient pollution for the third time? In one form or another, the term "success" is used 63 times, but there is not one mention of "failure" or "fail." This report should instead provide the EC with the unvarnished truth and offer effective, if difficult, options for meeting the goals of nutrient pollution reduction within identified timeframes.

6. Finally, the draft report only sees climate change as a threat multiplier and fails to consider new opportunities for reducing nonpoint source nutrient pollution as society and governments address the climate crisis by aggressively reducing greenhouse gas emissions. An obvious example is the further reductions in atmospheric nitrogen deposition to be realized as we eliminate fossil fuel combustion in electricity generation and transportation. Opportunities afforded by new funding from the Inflation Reduction Act are mentioned in the draft report and it is noted that the funding comes with specific requirements. Substantial funding is indeed provided to abate greenhouse gas emissions from agriculture, which are largely in the form of nitrous oxide and methane. Smart application of these funds could also accomplish verified reductions in nitrate losses from fields and

phosphorus losses from animal wastes. Opportunities will abound in the energy transition if we take such creative, integrated approaches.

Specific Comments:

On Page 6, the paragraph beginning with "As the Bay TMDL" conflates two separate issues that should be clearly separated. The first issue concerns the reason the practices needed to meet the pollutant reduction loads prescribed under the TMDL will not be in place by 2025. For both N and P this is an indisputable reality even after consideration of lag times from implementation of measures to the reduction of loads to tidal waters or whether they would be sufficient to achieve all the water quality goals (the second factor). The first factor, directly associated with this issue, is described as: "Implementation, sufficient regulatory and voluntary measures not being in place to incentivize compliance in the non-point source sector." Beyond its awkward construction, this statement does not incorporate the important issue of BMP effectiveness stressed in the CESR report. This statement should be more clearly and accurately constructed. The last factor, "that these deeper waters are not as relevant to the living resources like fish, shellfish and their habitats" is not in any way related to the premise of the paragraph. It should be stricken as it does not explain why load reductions and water quality goals will be missed. As stated, this is a misreading of the CESR report which made the point that water quality standards in the deep trough will be difficult to reach, but that meanwhile there are interventions that can be made in shallow waters to enhance productivity and diversity.

The bullets that follow this paragraph also confuse actions and issues. What does "expanding the conversation" mean in practice? How can understanding of "desired [?] system response" (presumably in the estuary) be linked to a specific BMP implementation? And land cover data with water quality monitoring? Are "high-impact areas" defined by improvements of local or downstream conditions? Can BMPs in shallow water areas of the Bay achieve TMDL reductions?

Page 7, last bullet. The CESR report did not specifically recommended shifting emphasis of science and monitoring from tracking water quality standards attainment in the deep trenches to shallow water areas. It recommended that monitoring provide better understanding of processes underlying water quality response not just water quality criteria attainment everywhere. It also recommended greater efforts in reduce loads to shallow water areas and to enhance habitat value beyond the TMDL. Please be accurate and precise.

The sections on Climate Change and Diversity, Equity, Inclusion and Justice and Forests Buffers and Wetlands are both unimaginative and unhelpful as virtually all of their recommendation boils down to blame shifting and pleas for more staff and money.

Page 10. This introduction to the Chesapeake Bay TMDL makes no mention at all that the 2010 TMDL is actually the third failed attempt since 1987 by the Chesapeake Bay Program to reduce nutrient and phosphorus loads to essentially similar levels. It is very important that members of the PSC and EC understand this because few if any of them were in their offices prior to 2010.

Page 13. Statement that "the partnership continues to make steady progress in reducing pollutant loads flowing into the Chesapeake Bay" is not really accurate. After the reductions from point source treatment, the data suggest that progress on nonpoint source reductions has slowed or stalled. It is misleading to call this steady progress. Regarding actions taken over the next two years, see comments on Page 6.

Page 17. Under bullet on incorporating recommendations from STAC reports, shifting emphasis from deep trenches to shallow-water areas is a mischaracterization the CESR report. See comments on Page 7.

Pages 18–24. See comments on Page 7 regarding blame shifting and pleas for more staff and money.

Page 49–50. Striking omissions from the list of challenges are the following: Insufficient non-point source BMP implementation, ineffective and unverified BMP execution and performance, and reliance on largely voluntary measures. Missing from what is needed to accelerate progress: greater accountability, switch from practice-based to more outcome-based subsidies, and limiting animal density, among many more. Most of these issues are addressed in the CESN report.

Sincerely yours,

Donald F. Boesch

Thanks for the opportunity to comment on the draft "Charting a Course to 2025 Report". This is a fantastic overview of some of the key challenges and opportunities to accelerate progress to meeting the goals set in the Watershed Agreement.

I appreciate the level of effort that went into this report under a very tight timeline. I have several recommendations to consider as you work to develop the final report. Some of these recommendations are more editorial in nature, so please use as you see fit:

- Consider adding an acronym key at the beginning of the report

Executive Summary

- Consider developing a short set of clear, high-level recommendations to lead with at the beginning of the report (in the Executive Summary). There are currently so many recommendations, it is difficult to identify the key priorities the Program will pursue to accelerate progress towards 2025. For example:
    - Prioritize the conservation of existing forests and natural areas. These lands are our most valuable assets for meeting water quality, habitat, and climate resilience goals.
    - Support implementation of the recommendations for accelerating forest buffer and wetlands restoration, as these are key outcomes that will help meet the partnership's goals for water quality and living resources.
- Consider adding an introduction section and moving a lot of the content from the Executive Summary to the introduction. Then keep the Executive Summary at a higher level (1-2 pages) and do not repeat all the numerous recommendations made in the various sections of the report.
- In the Outcome Attainability observations on page 5, the wording on bullet #1 is a bit awkward and the second sentence is fragmented. I recommend removing the second sentence, since some outcomes will likely, by necessity, remain qualitative.
- In the Outcome Attainability observations on page 5, I recommend rewording bullet #4 to add that ambitious outcomes should be justified based on their importance for restoring local waterways and the Bay, in addition to the practical caveats already noted.
- In the Outcome Attainability observations on page 5, I recommend removing or reworking the following sentence: "Efforts should focus on high-impact actions and avoid implementation of many small, disconnected projects that can dilute staff and financial resources". These small, disconnected projects, while expensive, are often critical to engaging with historically underrepresented communities and landowners.
- Recommend adding some sort of heading or intro to the bulleted lists in each of the sub-sections (if they stay in the executive summary) to clarify that these are the recommendations identified in each section.
- On page 6, where you outline the three factors that influence whether practices would achieve the desired benefits, it is difficult to discern what those three factors are (there seem to be way more than three factors listed there). It could help to turn these into bullets or to simplify the description of the factors to improve clarity.
- The recommendations in the TMDL/WIP section don't align with the recommendations in the body of the report. The recommendations in the executive summary are much stronger in my opinion.

- The TMDL/WIP recommendation about the role of the EPA in providing oversight (on page 7) is framed differently than the rest of the list. Recommend rewording to make it more of a recommended action for consistency.
- On page 7 there is a typo in the Emerging Science section. The "be" between "would" and "improve" should be removed in the last sentence before the bulleted list.
- On page 8 in the first bullet, remove "Recommendations from" at the beginning to avoid having "recommendations" and "recommend" in the same sentence (and to be more consistent with the framing of the bullet on the CESR report)

Chesapeake Bay TMDL & Phase III WIPs

- In the third paragraph, recommend putting all these numbers into a more visual graph or chart. It is difficult to read a paragraph full of numbers.
- Page 11, Conowingo Dam bullet, third line down- "were" should be "was- "its trapping capacity for sediment and nutrients **was** being impacted".
- Page 12- is there a more precise heading that could be used for the "Miscellaneous" bullet? Maybe "External factors"?
- The paragraph after the set of bullets is confusing as currently worded. It seems to say that there is a major capacity challenge in spending the influx of new funds, but the new funds are allowing for an increase in staff (which a previous bullet contradicted- saying that funding restrictions made it difficult to use grants to increase staff). It might help to try to disentangle the challenges from the opportunities. The new funding is a clear opportunity.
- This section of the report doesn't follow the same format as the other sections with sub-headings (even though it largely seems to cover the same topics). Recommend adding in sub-headings for consistency.
- Consider replacing the recommendations in this section with the recommendations from the executive summary. The recommendations as currently written are not particularly action oriented, focusing more on conversations and messaging. While this is important, in my opinion, we need more specific recommendations on how to increase progress to meeting our water quality goals.
- Recommend rewording the last bullet so it read more like a recommendation/action rather than a statement

Emerging Science, Monitoring and Analysis

- Pg 17- recommend rewording the bullet on the Rising Water Temperatures report (consistent with the change recommended in the executive summary) to remove the "Recommendations from" at the beginning of the bullet
- Pg 17- for the bullet on capacity building and community engagement, recommend adding "Use social science to" at the beginning of the bullet to more clearly tie this work to science

Climate Change and DEIJ

- Are there opportunities to make a few statements about the nexus between climate change and DEIJ? As the section reads now, they are treated mostly separately (while acknowledging there are common challenges towards advancing these objectives). For example, something like "climate change is having disproportionate impacts on historically underserved communities

and additional focus is needed to support adaptation and resiliency in these areas". That could also potentially lead into a separate recommendation about identifying/supporting actions that can improve climate resiliency in these communities (for example, planting and maintaining trees to reduce heat exposure in urban heat islands).

- I appreciate the link to the DEIJ Implementation Plan, which a tremendous amount of work went into. Are there opportunities to bring some of the key actions from that implementation plan directly into this section? One of the key recommendations from that plan was to hire a high-level, cross-GIT DEIJ coordinator. I would consider elevating that recommendation from the Plan in the Recommendations on Progressing to 2025 sub-section in the Provide Cross-Outcome Coordination bullet. This seems like it would be a particularly actionable recommendation in the short term. A similar recommendation could be made for climate.

Forest Buffers and Wetlands

- Recommend adding some discussion of conservation to this section. The issue of land use conversion could get brought up as an emerging threat for both wetlands and forest buffers, referencing the new land use data and the recent supreme court decision reducing protections for wetlands. Then we could add a recommendation specifically focused on ensuring we are conserving existing and new forest buffers and wetlands so we protect the investments we are making in restoring these critical habitats.
- Consider revising the sub-heading "Accelerate Progress to 2025" to align with the sub-headings in the other sections, which read "Recommendations on Progressing to 2025"

Transportation and Environmental Services
Stormwater Management Division
2900-B Business Center Drive
Alexandria, VA 22314

www.alexandriava.gov

Phone: 703-746-6499
Fax: 703-519-8354

August 18, 2023

To: Chesapeake Bay Program Principals' Staff Committee
Sent Electronically to comments@chesapeakebay.net

RE: *Charting a Course to 2025: A Report and Recommendations for the Chesapeake Executive Council on How to Best Address and Integrate New Science and Restoration Strategies Leading Up to 2025*

Dear Chesapeake Bay Program Principals' Staff Committee:

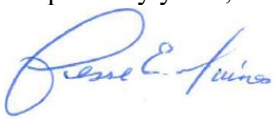
The City of Alexandria, Virginia (City) appreciates the opportunity to comment on the *Charting a Course to 2025: A Report and Recommendations for the Chesapeake Executive Council on How to Best Address and Integrate New Science and Restoration Strategies Leading Up to 2025* publication. The City commends the Chesapeake Bay Executive Council on their efforts towards a healthier watershed.

The City operates a Phase II Municipal Separate Storm Sewer System (MS4) permit, which includes a mandate to reduce pollution entering the Bay via best management practices (BMPs). Through fiscal year 2023, the City has achieved pollution reductions of 70% of nitrogen, 70% of phosphorus and 66% of sediment with the requirement to achieve 100% by fiscal year 2028. The City recognizes the inherent challenges with non-point source pollution reduction often discussed throughout the report however, the City requests the PSC consider a revision to differentiate between non-regulated and regulated non-point sources throughout the document; particularly in the Water Quality Goal (page 47). The key difference is that regulated stormwater runoff in Virginia's Chesapeake Bay watershed does come with a mandate for pollution reduction as passed through the City's MS4 permit.

Of note in the *Report* is the statement that "[c]limate change impacts that increase flow and pollution delivery above historic baseline conditions have impacted the amount of nitrogen and phosphorus that jurisdictions must reduce in order to meet their water quality goals" (Page 49) and the suggestion to "implement highly effective BMPs" (page 50). The discussion on urban BMPs and their impact on water temperature discussed in the frequently referenced *Rising Watershed and Bay Water Temperatures: Ecological Implications and Management Responses* (2023), also points to implementing specific BMPs that support cooler water temperatures. Ultimately, the City supports guidance on BMPs that are both highly effective while supporting climate change adaptation goals but cautions against being overly prescriptive on the types of BMPs required to achieve TMDL goals. Ultimately, every jurisdiction implementing BMPs has their own unique set of circumstances that must be leveraged to help local waterways as well as the Chesapeake Bay.

If you have any comments, please contact Jessica Lassetter, Senior Environmental Scientist at jessica.lassetter@alexandriava.gov or 703-746-4127.

Respectfully yours,



Jesse E. Maines, Division Chief

August 31, 2023

Re: Comments on Charting a Course to 2025: A Report and Recommendations for the Chesapeake Executive Council on How to Best Address and Integrate New Science and Restoration Strategies Leading up to 2025

To Whom It May Concern:

The Chesapeake Bay Foundation (CBF) is a 501(c)(3) non-profit organization with over 200,000 members, whose mission -- carried out from offices in Maryland, Virginia, and Pennsylvania -- is to restore and protect the ecological health of the Chesapeake Bay, the nation's largest and one of its most vital estuaries. We appreciate the opportunity to comment on the *Charting a Course to 2025: A Report and Recommendations for the Chesapeake Executive Council on How to Best Address and Integrate New Science and Restoration Strategies Leading Up to 2025* (hereinafter "the Report").[1] CBF has joined the comments submitted by the Choose Clean Water Coalition and offers these supplemental comments as well.

The timing set forth for the Report made it impossible for recommendations to be adopted in a timeframe that would impact or accelerate the partnerships' ability to reach the 2025 goals.

From the beginning, this Report was setup to fail at what it was charged to do: provide ways for the partnership to accelerate efforts towards the 2025 deadline. In October 11, 2022, the Executive Committee (EC) charged the Principal Staff Committee (PSC) with developing "recommendations on how to best address and integrate new science and restoration strategies leading up to 2025."[2] These recommendations are to be presented to the EC at the EC 2023 annual meeting in October, 2023. This leaves the agency with less than thirty days to review and

[1] It was implied at the July 27, 2023, Beyond 2025 Sterring Committee meeting, that this public comment period may simply be a "check-the-box" exercise. We encourage the PSC to reverse course and consider incorporating substantive comments it receives into the Report before providing it to the EC. This would provide for meaningful public participation as required by EPA's own guidance. See The Environmental Protection Agency's Public Participation Guide (last updated July 5, 2023) ("provides tools for public participation and public outreach in environmental decision-making." It defines "public participation" as "any process that directly engages the public in decision-making and gives *full* consideration to public input in making that decision." (emphasis added)).
[2] https://d18lev1ok5leia.cloudfront.net/chesapeakebay/documents/EC-Charge-to-PSC_2025-Beyond_FINAL_2023-02-03-190848_hhec.pdf.

incorporate comments submitted in the Report before presenting them to the EC.[3] Then presumably the EC could adopt any recommendations, at the very earliest point, in October 2023. However, we all know the time stands close to still when one attempts to, on the federal and/or state level, get new processes, procedures, or policies in place. There is no reasonable expectation that additional funding or resources could be secured in a manner that would have put any recommendations in place in a way that would have meaningful impacts on the 2025 goals. While one could call this an exercise in futility, it is clear that this was needed to inform the "what comes next" post-2025 discussions; it just will not impact or accelerate the partnerships' ability to reach the 2025 goals as the EC charge set forth.

The partnership must respond to new reports that have recently come out questioning how we move forward in restoring the Bay watershed.[4]

The partnership's Scientific and Technical Advisory Committee (STAC) released two reports: (1) Achieving Water Quality Goals in the Chesapeake Bay: Comprehensive Evaluation of System Response (CESR) report[5] and the Rising Watershed and Bay Watershed Temperatures (RWBWT): Ecological Implications and Management Responses report[6]. The STAC spent four years reviewing and evaluating Chesapeake Bay restoration efforts when developing the CESR report. They have raised several fundamental concerns related to the effectiveness of our efforts and yet the partnership has not directly responded to these efforts. The RWBWT report affirms that warming waters will make it harder to attain water quality and living resources goals and thus, water temperature considerations need to be explicitly

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[3] We encourage the partnership to release a summary of the comments it receives on the Report to further support transparency and collaboration in the process of charting what comes after 2025.
[4] The Report makes this recommendation explicitly and we urge EPA to adopt this recommendation. The Report, at 17 ("Incorporate recommendations from STAC reports: The Comprehensive Evaluation of System Response, which suggests shifting the emphasis of science and monitoring from tracking water quality standards attainment in the deep trenches of the Bay, to focusing on improving conditions in culturally, ecologically and economically important places in the watershed with an increased focus on shallow-water areas beyond 2025.").
[5] Scientific and Technical Advisory Committee (STAC). (2023). Achieving water quality goals in the Chesapeake Bay: A comprehensive evaluation of system response (K. Stephenson & D. Wardrop, Eds.). STAC Publication Number 23-006, Chesapeake Bay Program Scientific and Technical Advisory Committee (STAC), Edgewater, MD. 129 pp, available at https://www.chesapeake.org/stac/wp-content/uploads/2023/05/CESR-Final-update.pdf.
[6] Batiuk, R., Brownson, K., Dennison, W., Ehrhart, M., Hanson, J., Hanmer, R., Landry, B., Reichert-Nguyen, J, Soueidan, J., Tassone, S., Vogt,B. 2023. Rising Watershed and Bay Water Temperatures: Ecological Implications and Management Responses – A STAC Workshop. STAC Publication Number 23-001. Edgewater, MD. (505 pages), available at https://www.chesapeake.org/stac/wp-content/uploads/2023/01/FINAL_STAC-Report-Rising-Temps_April.pdf.

incorporated into goals going forward. Neither the Report, nor the Beyond 2025 committees have explicitly addressed or responded to these issues. We urge EPA to respond to the recommendations made by STAC and work to address them moving forward.

The time is now to re-invent and reinvigorate programs and approaches to restoring the Chesapeake Bay watershed.

In the 2014 Chesapeake Bay Watershed Agreement, the Chesapeake Bay Program partners "envisioned an environmentally and economically sustainable Chesapeake Bay watershed with clean water, abundant life, conserved lands and access to the water, a vibrant cultural heritage and a diversity of engaged stakeholders."[7] This guiding vision remains the same, however, the path to achieving it needs to be evaluated and updated. CBF has reflected on lessons learned from the past, and fully believes that to create a Bay-region ecosystem that is vibrant and functions for all of us, now and in the future, we must re-invent and reinvigorate programs and approaches by incorporating the five pillars going forward. We urge the EC to incorporate these pillars as soon as possible into the commitments by the partnership going forward.

1. Focus on Outcomes

There needs to be investments directly connected to tangible outcomes for living resources through monitoring and outcome-based incentive structures that value progress in local streams, shallow waters, and the Bay's deepest channel.

2. Promote Innovation

There needs to be space provided for innovation and creative approaches to achieving tangible outcomes for living resources, including new ways to prioritize and target our investments to efforts that will maximize benefits as quickly as possible. The partnership must be open to accepting and encouraging new approaches as the current framework, particularly for nutrient reductions, has been too limiting.

3. Confront Climate Change

[7] Chesapeake Bay Watershed Agreement (June 16, 2014, as amended Oct. 5, 2022).

There needs to be a concerted effort to mitigate and adapt to climate change to ensure the vibrancy and resilience of the watershed's communities and resources in a changing climate. This can be achieved through mitigation strategies that reduce greenhouse gas pollution as well as through restoration strategies that enhance the watershed's capacity to provide nature-based solutions to climate change, focusing resources in particular to communities and habitats that are disproportionately impacted.

4. Center People

Everyone has a right to clean water, a healthy environment, high quality environmental education, and access to all the Bay watershed has to offer- including a voice in shaping its future- regardless of their zip code, income, race, or any characteristic for which they have been historically excluded.

5. Build and Strengthen Partnerships

The partnership needs to be strengthened and expanded to catalyze watershed restoration – one that works in a spirit of collaboration, sets clear expectations and is accountable to each other and to the public.

We look forward to working with EPA, PSC, EC, and other partners as we re-invent, reinvigorate and redefine what comes next for the Chesapeake Bay watershed restoration effort.

Sincerely,

Keisha Sedlacek
Federal Director
Chesapeake Bay Foundation

Chesapeake
CONSERVATION PARTNERSHIP

August 21, 2023

Chesapeake Bay Program
1750 Forest Drive, Suite 130
Annapolis, MD 21401

RE: Charting a Course to 2025

To Chesapeake Bay Program leadership and partners,

Thank you for the opportunity to comment on *Charting a Course to 2025: A Report and Recommendations for the Chesapeake Executive Council on How to Best Address and Integrate New Science and Restoration Strategies Leading Up to 2025.* Public involvement is an indispensable component in accelerating the progress of the Watershed Agreement outcomes.

The Chesapeake Conservation Partnership (CCP) is a coalition of more than 85 partner organizations working at every level within the watershed to extend the conservation of culturally and ecologically important landscapes to benefit a vibrant, healthy, and sustainable quality of life for the Chesapeake region. CCP provides a forum to advance conservation through collaborative efforts, networking, influencing policy and funding, and sharing best practices. It works to build the financial, scientific, social, and policy capacity to achieve both short-term and long-term landscape conservation goals and to support the partners in carrying out specific land protection actions.

The *Charting a Course to 2025* report recommends focusing on nonpoint source pollution and prioritizing targets for forest buffers and wetlands as crucial to meeting the water quality goals. It also outlines the importance of using data to inform our decisions and considering climate change across all of our work, while recognizing the need to more effectively advance diversity, equity, inclusion and justice. We, the undersigned members of the CCP Steering Committee, wholeheartedly agree with these recommendations. We see conservation across the landscape as a key vehicle in charting a course toward these goals, as measures taken on the land significantly affect the water. As such, the undersigned members of the CCP Steering Committee recommend **highlighting the importance of land conservation to meet many of the goals set in the Watershed Agreement in the report.** Consider adding a high-level recommendation to the beginning of the report that elevates conservation as a key priority. For example: “Prioritize the conservation of existing forests and natural areas. These lands are our most valuable assets for meeting water quality, habitat, and climate resilience goals.” Please add voluntary permanent land conservation as a recurring recommendation integrated throughout the Charting a Course document. This improvement would position us for success as we look beyond 2025. In addition, we recommend the following specific examples of language edits:

- Please add an observation on Page 5 under ‘Outcome Attainability’ stating that land use planning and permanent land conservation are effective ways to ensure durable, long-lasting advancement in Bay goals.
- Please add an additional action to the recommended actions to take over the next two years on Page 13 under the Chesapeake Bay TMDL & Phase III WIPs: Explore increased focus on permanent land conservation and a focus on land use that supports permanently protected natural filters as a durable avenue to achieve Chesapeake Bay TMDLs and Phase III WIP goals.

- Please add an additional recommendation on Page 24 under 'Accelerate Progress to 2025' for the 'Forest Buffers and Wetlands' section of the report to focus investments and resources into permanent land conservation of land where there are existing wetlands and forest buffers as well as areas that have the hydrology and proximity to become wetlands and forest buffers.

The Executive Council Charge to the Principals' Staff Committee: Charting a Course to 2025 and Beyond outlines science, restoration, and partnership as three foundational considerations. We urge the PSC to add a fourth foundational consideration: land conservation. **Permanent land protection should be foundational to the Bay Program's efforts as we look to 2025 and beyond. The undersigned members of the Chesapeake Conservation Partnership ask the Chesapeake Bay Program to elevate land conservation to serve as a main pillar in the Bay Agreement alongside science, restoration and partnership.**

In its recent report, "Achieving Water Quality Goals in the Chesapeake Bay: A Comprehensive Evaluation of System Response" (CESR), the Scientific and Technical Advisory Committee noted that "the Bay system faces permanent and ongoing changes in land use, climate change, population growth, and economic development that will challenge notions of restoration based on recreating historical conditions. …Opportunities to meet these challenges exist but efforts require changes and new approaches to implementation, planning, and decision-making." The report focuses efforts for the future on non-point source pollution and shallow water habitats, including the land and water interface, which tend to be where the people are.

The *CESR Report*, suggests shifting the emphasis of science and monitoring from tracking water quality standards attainment in the deep trenches of the Bay, to focusing on improving conditions in culturally, ecologically, and economically important places in the watershed with an increased focus on shallow-water areas. Permanent land conservation is fundamental and the most direct way to save these ecologically and economically important places. Without conservation, any restoration of lands can be fleeting.

The *Charting a Course to 2025* report notes that "the achievement of the forest buffers and wetlands outcomes are critical to meeting the Bay Program's water quality goals… In fact, 10% of planned nitrogen reductions are estimated to come from forest buffer plantings alone." However, it also states that "while progress shows that wetlands are being restored and created across the watershed, the total acres of wetlands are also decreasing due to land subsidence, climate change and development pressures." Here is one example of many where prioritizing conservation can help ensure that the benefits of restoration efforts will endure over the long term. **We would recommend raising the issue of land use conversion as an emerging threat for both wetlands and forest buffers and adding a recommendation to prioritize the conservation of forest buffers and wetlands to protect the investments we are making in restoring these critical habitats.**

Land use change, development and growth have far-reaching effects on the Bay efforts and exacerbate the impacts of climate change. Thanks in part to the efforts of Chesapeake Bay Program partners, the rate of loss has fallen, but the Chesapeake Bay Watershed still loses 70 acres of forested land a day. The greatest threat is the oftentimes permanent loss of forest and other natural lands to development. These existing mature forests and natural lands are the most valuable assets we have for meeting the Partnership's water quality, habitat and climate resilience goals. In addition to conserving these high-

quality lands, to ensure return investments in restoration, we must protect what we have restored. Finding suitable sites for restoration activities can be challenging particularly given access and ownership restrictions. However, land trusts and land conservation programs, including agricultural land protection programs, are vital means to reach landowners who have the opportunity to improve the stewardship of their lands, including already protected lands, by installing water quality best management practices.

Land cleans our water and air, grows our food, and holds the special places where we live, work, play, and find solace. Land conservation will maintain water quality and habitat as well as sustain working forests, farms and communities throughout the Chesapeake Bay Watershed. Natural land cover such as forests, wetlands and natural grasslands support natural hydrology and flow patterns, which help maintain healthy aquatic habitats and communities. Wetlands, riparian buffers and forests can trap and filter sediments, nutrients, and chemicals from surface runoff and shallow groundwater. They stabilize the streambanks, mitigate floods, and can increase the water's ability to hold oxygen and support life while improving the biological diversity of surrounding areas. Birds, mammals, and other animals find the food, cover, water, and nesting sites they need, as well as corridors and pathways for movement between areas. Forests intercept harmful air particulates and absorb noxious gasses such as sulfur dioxide. They are important carbon sequestration and storage systems in the fight to mitigate climate change; every acre of forest saved sequesters enough carbon dioxide to equal the annual emissions of over fifty cars. The Chesapeake Bay Program already does have some focus on permanent conservation through its Protected Lands Outcome. However, given the far-reaching effects of permanent conservation on the region, we recommend that an element of permanent protection should be identified in every outcome where possible. While the 'Protected Lands Outcome' is on course, more protection is needed to help get many of the other goals back on course.

The CCP joins the Chesapeake Bay Program in our shared mission of protecting two million additional acres beyond 2010 levels in the watershed by 2025. CCP members are instrumental to the progress made on the Protected Lands Outcome outlined in the report; we are on track to protect two million acres of lands throughout the watershed—currently identified as high-conservation priorities at the federal, state or local level. Additional emphasis is now placed by CCP and across the nation on conserving large forest tracts and wetland acres, as well as on working to exceed the original target by striving to protect 30% of the watershed by 2030, in line with the America the Beautiful Initiative as called for by both President Biden's Executive Order 14008, Tackling the Climate Crisis at Home and Abroad, and the Chesapeake Executive Council's Directive No. 21-1: Collective Action for Climate Change. Land use and the climate are inexorably linked, and conservation plays an important role in the global climate crisis. Even if we completely converted from fossil fuels to renewable sources, we would not avert many disastrous impacts of climate change unless we can permanently protect and restore ecosystems that store carbon and mitigate climate dangers.

Through the sustained joint efforts of the Chesapeake Bay Program and the Chesapeake Conservation Partnership, their partner agencies, nonprofits, and communities continue to expand public access to the Bay and its tributaries through existing and new local, state and federal parks, refuges, reserves, trails and partner sites. We must continue to strive for more than the protection and restoration of these places but also ensure all people from all backgrounds and abilities can equitably access the watershed. Improving access to our waterways and green spaces allows more people to reap the benefits that the watershed can provide in terms of quality of life and local economies. Only then can we hope to engender the stewardship of the Bay we need to reach our shared goals. People protect

what they love. Conserving cherished, valued places throughout the watershed and making them equitably accessible are essential steps toward enlisting the aid of the watershed's residents, whose help we cannot do without – to support, vote for, participate in, and promote conservation.

Chesapeake Bay Program partners envision an environmentally and economically sustainable Chesapeake Bay watershed with clean water, abundant life, conserved lands, access to the water, a vibrant cultural heritage, and a diversity of engaged stakeholders. The CCP and its partners support this vision and agree that all parts of it are interconnected, reliant upon one another. We also must ensure that the gains we make are enduring. Permanent land conservation is a sustainable way to ensure that the progress we make stands the test of time. We must advance each goal aggressively as we approach 2025 and plan for our work in future years, and build on all stakeholders' great work and lessons learned to determine a more effective way forward.

Conserving, protecting, and restoring land and habitat for wildlife and improving public access are fundamental to the Bay Program goals. We ask that the Principals' Staff Committee, The Beyond 2025 Committee and the Chesapeake Bay Program as a whole integrate conservation as a foundational principle in our efforts to chart a course to 2025 and beyond.

Sincerely,

Members of the Chesapeake Conservation Partnership Steering Committee

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RE: Charting a Course to 2025

To Whom This May Concern,

The undersigned members of the Choose Clean Water Coalition (Coalition) write to formally comment on the Chesapeake Bay Program's (CBP) *Charting a Course to 2025* report. Thank you for providing this opportunity for public input and feedback, as it is imperative to hear from a diverse cross-section of stakeholders if we are to reach our collective clean water goals to restore the Chesapeake Bay watershed.

Executive Summary

The Coalition is made up of more than 285 nonprofit organizations spanning the entire Chesapeake Bay watershed, which includes six states and the District of Columbia. Our members represent a variety of interests, including but not limited to land and wildlife conservation, climate change, environmental justice, sustainable agriculture, clean energy, recreation and public access, and urban/suburban stormwater runoff. What connects all of our members is our collective interest and goal in restoring clean water to all of the rivers and streams in the Chesapeake Bay watershed.

For over a decade, we have worked to support the CBP and advance the goals of the *2014 Chesapeake Bay Watershed Agreement (Watershed Agreement)*. The Coalition and our members have played a critical role within the CBP Partnership ensuring the public can be heard in key decision-making processes. Now, because we have arrived at this unfortunate inflection point in the history of the Chesapeake Bay restoration effort, one of the Coalition's top priorities is helping the Partnership plot a new course beyond 2025.

The Partnership has made progress to meet several of the *Watershed Agreement* goals by 2025, including fish passage and public access. And we are pleased that West Virginia and the District of Columbia have met their pollution reduction targets for nitrogen, phosphorus, and sediment. However, Delaware, New York, Virginia, Maryland, and Pennsylvania, are not expected to meet their nutrient reductions goals by 2025. In this letter, we highlight gaps in the *Charting a Course to 2025* report and suggest changes and more specificity to the **Chesapeake Bay Total Maximum Daily Load (TMDL) & Phase III Watershed Implementation Plans (WIPs); Climate Change and Diversity, Equity, Inclusion, and Justice (DEIJ); Forest Buffers & Wetlands; and Toxic Contaminants Outcomes.** Many of our recommendations echo what is included in both the Scientific and Technical Advisory Committee's (STAC) Comprehensive Evaluation of System Response (CESR) report and the Environmental Protection Agency (EPA) Office of the Inspector General (OIG) report from July 18, 2023 (Report No. 23-E-0023).

While *Charting a Course to 2025* does include elements of these reports, it is broad and vague in how the CBP plans to accelerate progress toward 2025 and includes no timeline or deadlines. What is needed at this late date

are specific short-term deliverables and actions that can occur between now and 2025 to accelerate our progress and actions that can continue beyond 2025.

We also included recommendations for the Beyond 2025 Steering Committee to consider as their work gets underway. The Steering Committee should utilize the recommendations from all reports on the status of the restoration effort to inform the revision of the *Watershed Agreement*. A new or revised/amended agreement should be created by all CBP stakeholders, both signatories and not, and include a new clear vision, approach, and goals for the Chesapeake Bay watershed.

While this report reference's EPA's important oversight role of the Program, it lacks any recommendations for changes to the Accountability Framework. The Coalition urges EPA to embrace their leadership role within the Program, as designated by Executive Order 13508, and lead the restoration effort forward. This should be done in collaboration with the partners of CBP and the broader clean water community, but this effort needs a captain as we chart this new course.

RECOMMENDATIONS

I. Chesapeake Bay TMDL & Phase III WIPs

Since 2010, CBP partners have worked together in good faith to advance our collective goals for clean water through the WIP process. The Bay watershed jurisdictions were expected to develop plans that would demonstrate their path to success, which meant reaching their pollution reduction goals. We know now that almost all of the jurisdictions are unable to achieve what was set out in their plans by 2025.

Given the status of these plans and the load reductions, we believe that any effort to plot a new course must begin with an honest self-assessment. Each of the Bay jurisdictions should discuss what could have been done differently in order to achieve the 2025 target allocations. The leaders of the Partnership owe it to their constituents and the broader Chesapeake restoration community, to thoroughly examine the root causes of the present deficiencies in our progress. Only after such candid assessments are made can we collectively make the course corrections needed to accelerate progress.

While much has been made of the CESR report's "response gap" and the changes necessary to address it, it is striking how little discussion there is about how to address the implementation gap, especially given the maxim that it is best to focus on what one can actually control. Once again, we call on each jurisdiction to acknowledge the insufficient progress that resulted in this implementation gap and provide a candid assessment of what will be needed to close it.

TMDL & WIP Recommendations:

- **Reinstate State-Sector Evaluation Matrix**
  The Coalition is repeating its previous request to EPA to provide the state-sector matrix previously used by EPA Region 3 in evaluating progress toward WIP commitments in each state. The matrix was a simple, color-coded chart that was easy for the public to understand where progress was adequate ("ongoing oversight"), lagging ("enhanced oversight"), or significantly off-track ("backstop"). It would require minimal additional effort by EPA to post this information on its website again, with the oversight status being updated as EPA conducts its evaluations of milestone progress. This would provide clear messages to policymakers, and the public about where more resources or effort are needed to meet each state's commitments under the TMDL.

- **Enhance the Level of Detail Provided in EPA Assessments**
  While the Coalition appreciates the thoroughness of EPA reviews of state WIPs and milestones, what is often missing is a concrete statement of what *specifically* EPA expects a state to do to change course, and what *specifically* EPA will do if those expectations are not met. Clear communication and predictable follow-through actions are critical if EPA is to maintain an Accountability Framework that motivates states to accelerate progress. It would also be helpful for the dozens of Coalition members who are most active at the state level, with legislative or administrative advocacy, for EPA to provide concrete

recommendations of policy actions that would help the states address their deficiencies. If EPA maintains that any "backstop actions" or "consequences" previously set forth are no longer viable or realistic, then we encourage EPA to acknowledge this clearly and publicly so we all know what to expect going forward.

- **Acknowledge the Role of the Clean Water Act and Other Regulatory Frameworks**
  A polluted Chesapeake Bay represents the cumulative impact of countless thousands of individual agency regulatory decisions (e.g., permitting, enforcement, regulatory development). While any one single action or decision may be comparatively small in the context of the Chesapeake Bay watershed, they still have potentially significant impacts to the nearest waterway or community, and will impact the new direction proposed by the CESR report to prioritize actions that protect shallow water habitat, for example. We call upon the jurisdictions' regulatory agencies with a charge to protect and restore our waters and natural resources to acknowledge the role they could play in accelerating and enhancing those efforts. We must acknowledge these roles, including any tensions that accompany the fulfillment of them, in order to move forward under an Accountability Framework that was predicated on the full use of regulatory mechanisms. The Bay TMDL would not exist if not for the Clean Water Act, and the TMDL's goals will not be met without a robust implementation and enforcement of the Clean Water Act.

- **Effective Planning to Address Nonpoint Source Pollution**
  It should come as no surprise that both the OIG and CESR reports highlight the importance of curbing nonpoint source pollution throughout the Chesapeake Bay watershed in order to reach our clean water goals. The *Charting a Course to 2025* report agrees that reducing nonpoint source pollution continues to be the biggest challenge we face to meet our water quality goals and is "where future reduction efforts will need to be focused". The report, however, failed to mention that the best available science shows we need to significantly reform existing conservation efforts to focus more on outcomes if the Bay goals are to be achieved. The report also contradicts the CESR report and suggests the lag in water quality improvement, especially in the deepest part of the Bay, can be fixed with increased funding alone. The CESR report specifically calls for "program change, innovation, and experimentation" in our work if we are to shift course, and that is at the core of our recommendations as well.

  The EPA Office of Water's April 5, 2022 memo "Accelerating Nutrient Pollution Reductions in the Nation's Waters" provided specific strategies that could be adopted by CBP and other partners. Among the governing principles of this memo is "supporting innovation" by scaling outcomes-based and Pay for Success models. The Bay watershed is home to some of the most notable examples of this nascent policy solution, and increasing these was noted by the CESR report as a way to "encourage adoption of highly effective practices that land managers may not consider under standard cost-share programs". A focus on quantifiable outcomes will also help CBP utilize other strategies in the memo, such as building partnerships between point sources and nonpoint sources, financing nonpoint source prevention projects with the Clean Water State Revolving Loan Fund, and increasing the effectiveness of the 319-grant program.

  The Partnership should also:

  - Quantify and develop a baseline understanding of where nonpoint source pollution derives from across the watershed;
  - Assess which nonpoint source practices and policies have been most successful, both as documented in CAST, but also based on other evidence (e.g., focused monitoring by states, watershed organizations, or by farmers or other stakeholders);
  - Focus conservation on what it means to address nutrient mass imbalances given that a prominent new study concluded that "recent research emphasizes the utility of input reductions over attempts to manage nutrient fate and transport at limiting nutrients in surface waters" (Ator et al., 2020).
  - Building on the preceding assessment, create better incentives that effectively and efficiently distribute limited resources to maximize outcomes;

- Press for full implementation of “Pay for Success” programs such as MD and PA have across the watershed, so that conservation programs are purchasing quantifiable and verifiable nitrogen reduction results;

- Include incentives for best management practices (BMPs) that both prevent nutrient pollution and sequester carbon, such as vegetated streamside buffers and restored wetlands;

- Incentivize innovation and outcomes by creating a framework to accept alternative approaches to documenting performance (beyond CAST) while ensuring the integrity of these models;

- Build trust among farmers and businesses by rewarding or recognizing progress and success, while ensuring that bad actors are not rewarded for ignoring our laws; and

- Examine where point source programs have a role to play in reducing pollution that may have traditionally been considered nonpoint (e.g., manure transport, CAFO permitting, enhanced biosolid or industrial sludge land application regulations);

- **Accountability Framework**
  The *Charting a Course to 2025* report does not address issues raised with the current Accountability Framework. The OIG report is explicit that without “implementation of a process to hold jurisdictions accountable for achieving nonpoint source pollution reductions, the EPA and Chesapeake Bay jurisdictions will not meet TMDL pollutant-reduction goals.” The Coalition understands that the EPA does not believe it has any authority over nonpoint sources, however, that should not end the conversation, but rather create an opportunity to think creatively and be innovative in the Partnership’s approach to accountability and oversight.

  We agree about the need to “[d]efine the vision for what represents an acceleration of progress above present rates”, however, we had hoped this would be accomplished in the *Charting a Course to 2025* report. While it may be too late to create and implement robust new policies or programs needed to catalyze pollutant reductions before 2025, it is not too late to reboot the Accountability Framework. The report’s list of “challenges" that have “hindered progress” are almost entirely external. While we do not disagree that each of these are challenges, we do not believe this list is complete without a more candid assessment of internal deficiencies in the programs and policies maintained by each of the Partners. Again, the focus should be on aspects of Bay restoration that are *within our control*. A list of those challenges would be more meaningful as they would represent adaptive management opportunities.

  Recommendations for near-term accountability actions:

  - EPA must immediately begin sending the message to Bay jurisdictions and state partners that existing progress is insufficient and that lagging progress or outright default on various WIP commitments will not be permitted to continue indefinitely.

  - Milestone and WIP assessments have often included detailed assessments of state activities and EPA expectations, but rarely have they actually included warnings about which consequences may be implemented when a jurisdiction fails to adhere to EPA expectations or the state’s own pledges. We urge EPA to send a clear message to the entire Partnership about what specifically it expects to happen by when, and what consequences will follow. If EPA has changed its approach to oversight, it must announce this reversal so the public, policymakers, and Coalition members are all keenly aware of the status of the Accountability Framework in 2023 and moving forward beyond 2025.

  - EPA has previously produced several documents establishing the various authorities it holds to keep Partner jurisdictions on track, but it needs to act, when necessary. Nationally, EPA takes many of these actions in jurisdictions that do not even have the heightened obligation associated with the Bay TMDL and *Watershed Agreement*.

- The recent EPA settlement regarding Pennsylvania's progress under the Bay TMDL provides at least a limited playbook for various short-term actions and activities that could be utilized to accelerate progress and should be consulted as a guide applicable to any state partner that is not on track to meet the 2025 allocations.

- **Stakeholder Engagement**
  Given the solution to nonpoint source pollution may already exist in the Bay jurisdiction WIPs, we support the report's emphasis on beginning and expanding conversations with stakeholders. However, we believe that the report should include concrete recommendations that go beyond conversations. When planning these conversations, the CBP should seek consensus by working with a broad set of stakeholders, including new and previously unengaged interested parties to acknowledge existing challenges and to solicit feedback about actionable opportunities. These 40 years of work and collaboration have yielded some valuable lessons that the Partners and stakeholders can share that would improve upon our efforts and to lay the foundation for what comes beyond 2025.

  The CBP should consider convening a variety of stakeholders based on different interests, needs, and the role they have in addressing nonpoint pollution. Working with farmers, restoration businesses, nonprofit conservation organizations, elected officials and other advocates, the CBP should reform or replace existing programs by focusing them onto accounted load reductions rather than practices. This will entail working with these groups to develop better mechanisms for them to more effectively plan new conservation projects. By not taking an active role in leading frank, productive conversations with advocates and experts who drive policy, the CBP program is missing an opportunity to ensure funds are being spent in the most effective ways.

- **Accelerating Progress through Restoration**
  We are concerned about the CBP's long delay to release the Request for Applications (RFA) for the FY23 Chesapeake Small Watershed Grants and Innovative Nutrient and Sediment Reduction Grants. These competitive grant programs have contributed significantly to water quality improvements throughout the region. This setback unnecessarily delays the implementation of critical on-the-ground restoration work by up to a year; delays us from meeting our restoration goals; and causes confusion about the ability to access a regular stream of funding for states, local governments, nonprofits, communities, and a diverse array of stakeholders, including family farmers. We urge you to make this a priority and evaluate the responses to the RFA as quickly as possible and get these dollars working on-the-ground in the watershed.

II. Climate Change and Diversity, Equity, Inclusion, and Justice (DEIJ)

Climate change will continue to impede progress to meet our 2025 goals and beyond if we do not take critical steps to mitigate its impacts in the watershed. Simultaneously, frontline communities disproportionately face impacts from climate change. Each day, low-income and communities that are predominately Black, Indigenous, and People of Color (BIPOC) experience disproportionately more extreme flooding events, heat waves, and public health threats. We applaud the Chesapeake Executive Council for taking steps to address climate change and DEIJ in the Chesapeake Bay Agreement. We acknowledge the increased attention to address climate change and DEIJ in 2020 and 2021 and encourage CBP leadership to keep this momentum moving forward.

Since the Climate Resiliency and DEIJ outcomes are standalone outcomes, we discourage any recommendation to address these as one issue. Although communities of color are impacted by climate change at higher rates, the goals and outcomes written in the Chesapeake Bay Agreement are very different and have distinct needs. Therefore, they should be treated as separate issues with separate recommendations, just as the *Watershed Agreement* intended them to be. Moreover, we highly discourage the PSC from combining recommendations for other outcomes moving forward. The recommendations below are specifically for DEIJ. See our comments below on "Climate Adaptation" (p.13).

DEIJ Recommendations:

- **Evaluation**
  We agree that the structure of the CBP is not sufficiently set up to address DEIJ, however, work is already underway to strategically evaluate how to support this work. From 2018-2020, Skeo Solutions worked closely with CBP staff to develop a DEIJ Readiness Assessment & Strategy Guide that characterized CBP's strengths and opportunities for growth and developed a DEIJ Strategy. This strategy was provided to the CBP with recommendations and best practices in DEI for environmental agencies to inform policy and operations at the CBP. In the final phase of the project, Skeo facilitated a series of DEI trainings to expand CBP staffs' capacity for advancing DEI through their environmental work. Skeo also developed a series of tools and resources that CBP can use long-term to advance the recommendations of the DEI Strategy. For example, Skeo developed a DEIJ Statement signed by the CBP's Executive Council, which includes the governors of all states in the Chesapeake Bay Watershed. Skeo also developed agendas and facilitation tips for staff focus groups on internal culture, hiring, retention, and promotion at CBP, and guidance on incorporating DEIJ into workgroup work plans. This work should be explicitly acknowledged in the recommendations of this report to the Chesapeake Executive Council. It is insufficient and inaccurate to suggest in this report that the CBP has yet to strategically evaluate how to support this distributed work. The CBP has taken great steps to identify gaps and challenges to implement this work, but lacks clear metrics and ownership from leadership to successfully carrying out its DEIJ goals.

- **Operationalizing DEIJ & Identifying Champions**
  The Bay restoration community is not immune to the broader environmental movement's institutional, systemic, and cultural challenges around race and ethnicity. It is well documented that leadership at the top should be "identified as champions" who are responsible for taking ownership of this work. Successful DEIJ outcomes depend on embracing both the administrative changes to policies and metrics, along with cultural changes within the organization to embrace DEIJ as a value integral to the organizational mission. The CBP's Diversity Workgroup has continued to take ownership of this work under limited guidance, direction, and resources from leadership. The Coalition's comments in response to the Draft DEIJ Strategy Implementation Plan included concerns for the high turnover rate in the Diversity Workgroup staffer and coordinator positions. We specified recommendations in that comment letter with best practices to distribute this work in a more manageable manner across the CBP. As champions, leadership at the CBP should take ownership of this work. As DEIJ continues to be operationalized across programming, CBP leadership must work alongside staff, grantees, and the Diversity Workgroup to ensure staff feel supported and that the work load is spread equitably across the CBP and Partnership.

    - This report should also recognize that the CBP is actively taking steps to implement the DEIJ Strategy Implementation Plan, which includes hiring a contractor. It should also recognize the large amount of work that is currently underway to operationalize DEIJ through the Diversity Workgroup and include this in the Current Opportunities section. The CBP has laid the foundation to integrate equity and inclusion within the Program and we encourage the Beyond 2025 Steering Committee to further address how this priority will become integral to the Partnerships' culture and operations. The contractor and the Beyond 2025 Steering Committee should work together to clearly define what type of specific financial, technical, and capacity support is needed to implement this work moving forward.

- **Leadership Transition**
  We recognize that the CBP is going through a period of leadership transition. We are concerned that efforts to properly implement principles of DEIJ with the staff will be lost if leadership does not step up and take responsibility for this work. The Director of the CBP and top leadership should be accountable for the needs of the directives that come up in the Beyond 2025 work related to DEIJ and other outcomes. See our comments below on "Visionary Leadership" (p.15).

- **Increased Resources**
  While we agree there should be increased investments to advance the climate change and DEIJ outcomes, more often than not, the work to prioritize DEIJ simply requires behavior change. This supports our comments above to identify CBP leadership as champions for driving organizational change and operationalizing DEIJ across the CBP. In addition to the Coalition's comment letter on the Draft DEIJ Strategy Implementation Plan, we strongly support investigating network theory and other coordination

models to determine how to best structure this work. One additional resource that the CBP can utilize to institutionalize DEIJ is the DEIJ In Action Guide, a 62-page document of recommendations for how organizations should develop and implement an internal and external DEIJ plan. The action guide includes many recommendations that do not require funding or dedicated resources to carry out. The DEIJ Action Guide is a customized guide and was the first effort of its kind created within the Chesapeake Bay watershed restoration community. It was created by the Coalition, in partnership with the Chesapeake Bay Funders Network, Chesapeake Bay Trust, and Skeo Solutions in recognition that the Chesapeake Bay movement lacks guidance on how to best support DEIJ efforts in the environmental community.

    - **Funding Prioritization:** Oftentimes, restoration projects are prioritized in communities that have dedicated support, infrastructure, and resources to implement these projects. In order to meet clean water needs in low-income and BIPOC communities, it is imperative for the CBP to develop strategies and processes to prioritize restoration projects in those communities that promote climate resiliency, green infrastructure, and public health. These projects should be done with direct input from communities of color.

    - **Project Prioritization:** CBP staff, GIT's, grantees, and workgroups should prioritize using tools such as the Chesapeake Bay Environmental Justice and Equity Dashboard as a means to identify opportunities to implement their work.

    - We strongly agree that the CBP should fund critical projects outside of the GIT-funding process. And that providing a better accounting of federal and state resources contributing to the outcomes that could help address the funding shortfall by allowing partners to strategically align efforts and decrease inefficiencies. The Campbell Foundation recently shared an "Overview of Recent Federal Funding & Opportunities for the Chesapeake Region", a well-documented list of federal funding available to advance restoration and environmental justice goals. We encourage the CBP to utilize this resource as a starting point to provide better accounting of federal resources. In addition, the Coalition's comment letter on the "Draft Strategy Implementation Plan" outlines several examples of actions to leverage funding across the Bay Program.

- **Address DEIJ and Climate Resiliency as Standalone Outcomes**
  Climate change and DEIJ should each be addressed as standalone outcomes. We discourage the PSC from combining recommendations for other outcomes moving forward.

III. Forest Buffers & Wetlands

Forest Buffers and Wetlands are rightfully noted as two "keystone outcomes" which aid in progressing the other 29 outcomes of the *Watershed Agreement.* As the first ecological line of defense in many of our Chesapeake communities, buffer and wetland outcomes should be prioritized as a focus on changes to programming, funding, partnerships, and implementation.

Forest Buffers & Wetlands Recommendations:

- The report mentions many opportunities to remove barriers to accelerate adaptation of forest buffer and wetland implementation across the watershed. With a host of opportunities around implementation, dedicated funding, organizational capacity, landowner outreach and engagement, tracking and verification, the CBP has an opportunity to better organize and streamline opportunities to re-define restoration systems. This change-making work starts with the Partnership, and will involve every sector and partner in creating the long-range vision for Forest Buffer and Wetland restoration, and how each sector is engaged in achieving these goals. An updated *Watershed Agreement* provides an opportunity for the CBP to align long-range visions with annualized implementation steps, and must include all of the sectors involved in the various pieces of this work.

- **Dedicated Funding and Capacity** are two issues that need to be addressed at the same time, and as the first step toward accelerated implementation of Forest Buffers and Wetlands. There must be dedicated funding that is also accessible to build the capacity of organizations to do this work over the next 5+ years. Aligning federal and other dollars to achieve the goals of both upfront outreach and engagement with landowners and organizational capacity to administer these programs (from planning to planting to maintenance), is a critical first step for the CBP to take.

    - The Beyond 2025 Steering Committee should consider the current systems of Forest Buffer and Wetlands, and determine the gap areas to accelerate this work. This is a conversation, with immediate implementation opportunities, that should be addressed prior to 2025. The CBP has the opportunity to better align the intent of grants with long-range impact in regards to building organizational capacity.

    - **Outreach and Engagement** continues to be a critical priority for the efforts of the larger restoration movement, as we move toward goals of broadening the tent of constituents engaged and active in this work. It is noted in the report that long-lasting and trustworthy relationships with landowners is a challenge. Dedicated funding to build the capacity of organizations is essential to ensuring this happens consistently over time. This is also an opportunity to build the capacity of organizations that do not have a direct responsibility for on-the-ground implementation, but are representative of a community that could be a focus area for these restoration efforts. It is important to think beyond the groups doing on-the-ground work, and recognize the need to bring community-based groups into the effort to help accelerate this work. This could also help assist with engaging more diverse communities in this work.

    - **Dedicated Funding** must be allocated to the maintenance of Forest Buffer and Wetland restoration efforts, or we will not achieve the end goal. CBP jurisdictions should require a portion of any type of on-the-ground grant funding to be required to go toward maintenance for at least three years. It should be noted that Wetland restoration efforts often require federal permits, which come with mandatory maintenance and inspection requirements, the costs of which are not currently included in CBP and partner grants. This is an area of accountability that the CBP and funders can work toward immediately.

    - In Maryland alone, the Blackwater National Wildlife Refuge loses approximately 300 acres of tidal wetlands a year, more than 5,000 acres since its establishment in the 1930's. This staggering figure demands that we prioritize areas of restoration, pairing all types of restoration efforts in areas that have an upstream opportunity to function on an ecosystem level, improving downstream conditions. Wetlands are being lost daily through the land development process, and those areas serve as the first intervention during large rain storm events, and their restoration should be prioritized in urban and suburban areas. Wetlands can be enhanced during the development process, which provides an opportunity to leverage private capital into the restoration system in a new way. So much of the future of the health of the Chesapeake hangs in the balance of how and where we develop, and the next *Watershed Agreement* should aggressively provide recommendations for making larger systems-change at the local government level in regards to restoration opportunities.

XII. Toxic Contaminants Goal Outcome

We urge the Partnership to continue its focus on this important goal of ensuring the Bay and its rivers are free from the effects of toxic contamination and expand upon the associated outcomes to develop a more holistic approach. Toxic contamination is a whole system issue. From individual to institutional application of pesticides, herbicides, chemical fertilizers; extraction, transport, distribution and combustion of fossil fuels; overtaxed wastewater treatment systems and chemical leaks, spills, fires and even the firefighting foam all contain health harming and even carcinogenic compounds. The report acknowledges the significant challenges because of the limited data from monitoring and significant number of toxic compounds to research. However, because of the pervasive and bioaccumulative nature of (per-and polyfluoroalkyl substances) PFAS, (polychlorinated biphenyl) PCBs, mercury and many other well-studied contaminants like lead that went unnamed in the report, it should

spur action far beyond tracking. Our communities and waterways are plagued by toxic contaminants and these impacts warrant as strong a response from state and federal leaders as possible. Our streams, rivers, wells, groundwater, drinking water, and the entire Chesapeake Bay watershed ecosystem are in dire need of both mitigation and pollution prevention. Numerous additional *Watershed Agreement* goals and outcomes will also be elevated by taking a stronger and more active stance in addressing toxics.

Toxic Contaminants Policy and Prevention Recommendations:

- **Oversight:** We urge EPA to provide additional oversight of permits that contribute disproportionately to the public's exposure to toxic contaminants. States may not possess the research, analytical, or permitting expertise that EPA has and may be unaware of the ability, authority, or obligation to introduce permit limits or conditions designed to reduce the exposure of communities or waterways to toxic contaminants.

- **Regional Information Sharing:** Cross-jurisdiction coordination and knowledge sharing is essential. For each toxic contaminant of focus, there should be a mechanism for jurisdictions, municipalities, and other stakeholders to share policy approaches, lessons learned, and recommendations so programs can benefit from collective learning. We urge EPA to convene greater information sharing sessions regarding state monitoring for a variety of toxic contaminants, including certainly PFAS, but also other emerging public health threats found in wastewater, sewage and industrial sludge, stormwater from industrial, municipal, and transportation sources, and even in air, soil, and dust. We continue to be highly concerned about the persistent problem of PCBs, heavy metals, PAHs, oil, pesticides, and other organic chemicals. The public, policymakers, and regulators are starved for data to help elucidate the greatest sources of toxic loading to waters and exposure of pathways for humans.

- **Human Health:** The toxic contaminants goal specifies the elimination of toxic contaminants due to effects on both living resources and human health. However, there are no recommendations related to human health. More work is needed to identify communities disproportionately impacted by toxic contaminants through the consumption of contaminated organisms as well as proximity to known polluting sources like fossil fuel burning power plants and major highways. Furthermore, there should be coordinated educational workshops to increase public knowledge of the impacts of toxic contaminants on human health and the risks of consuming contaminated organisms.

- **Wildlife Health Recommendation**: Incorporate policy outcomes for population and health of indicator species of restoration such as Brook Trout, Black Ducks, and Blue Crabs as it relates to toxic contaminant bioaccumulation.

Toxic Contaminants Research Outcome and Recommendations:

- **Specific Measures to Assess Progress**: We applaud the increased focus on the emerging issue of PFAS and urge the Partnership to develop a more holistic approach that includes baselines, tangible goals, and metrics to evaluate PFAS, PCBs, mercury and other known but unnamed toxics, as well as metrics to measure progress and success.

- **Guidance for Local Jurisdictions**: We recognize the challenges enumerated about local jurisdictions having limited funds and may divert resources from PCB to PFAS research and mitigation. Toxic contamination and its long-term impact on both human and ecosystem food web health is so critical that guidance on the allocation of resources will be necessary to ensure that local jurisdictions are able to continue and even add to the number of contaminants that are being tested for at once for residents on municipal sewage and wastewater treatment, aquifer and private well testing.

- **Address Sources of Toxics Contamination**: Fossil fuel contamination is not acknowledged in this report and has already been widely researched, studied and documented. As an example, lead and mercury scrubbed from air in coal burning are discharged into water sources and the coal ash leaches into the soil in legacy pollution sites and runs off with uncapped landfills. Furthermore, monitoring for even the most stringent regulations is being done by the permit applicant. There is a need for

accountability for noncompliance and EPA enforcement for current permit holders as well as decommissioning plants.

- **Pollutant Co-removal**: While research related to the occurrence, concentrations, and effects of contaminants is fundamental, more pollutant co-removal research is needed. Specifically, more research is needed to identify strategies and best management practices that remove multiple toxins, including but not limited to PCBs, PFAS, and mercury. This approach will also optimize the limited funding to address a greater number of toxins.

- **Incorporate Indicator Species:** Choose indicator species for tracking health impacts from existing public health data. Measure toxics in indicator species of restoration health such as Brook Trout, Black Ducks, and Blue Crabs.

- **Science Communication**: There is a need to communicate the science to stakeholders with actionable policy steps. It is imperative that the occurrence, concentrations, sources and effects of contaminants are communicated to policymakers so state and local policies can be leveraged to reduce contaminant loading at the source.

XIII. Climate Adaptation Outcome

The climate is changing far more rapidly than our ability to adapt to it, including in the particular context of the Bay TMDL and the Partners' ability to develop adequate adaptation programs. As the Partnership is acutely aware, staffing capacity in the agencies has long been an issue even to simply meet the needs of the existing statutory obligations, most of which were born of an era where climate change was not widely recognized as a problem. Considering the amount of work required to update existing programs and policies or create new ones that are capable of integrating climate considerations into water quality and ecosystem restoration efforts, it is clear that each of the jurisdictional Partners will need a significant infusion of staff and resources.

Climate Adaptation Recommendations:

- Create a toolkit and provide training for state and local governments with existing resources to address climate change adaptation, including planning and assessment tools, climate adaptation and mitigation strategies, and a list of federal grant opportunities.

- Develop communication tools for state lawmakers, such as an educational factsheet, on the impacts of climate change to local water quality and restoration efforts that emphasizes the urgency to devise and implement the necessary adaptation resources and programs.

- Develop a baseline understanding of what climate change planning efforts and projects are currently in place. Identify current work and gaps to meet the outcome. Survey local governments on their perspectives, efforts, barriers, and needs in addressing climate change and sea level rise.

- Clearly define and create metrics for the jurisdictions as to what qualifies as climate adaptations. When appropriate, align metrics to the co-benefits of BMPs that count towards TMDL nutrient and sediment reductions.

- Emphasize and prioritize the need for greater investment in frontline communities using existing or new funding streams in order to address the disproportionate environmental, health, and climate risks faced by some communities (e.g., abundant and pervasive fossil fuel toxic contamination of air, water and soil, urban heat islands, flooding, increased exposure from greater amounts and intensities of runoff). The CBP has an existing mapping tool, the Chesapeake Bay Environmental Justice and Equity Dashboard, to help in prioritizing resources and efforts. Training and use of this tool should be encouraged across the watershed.

RECOMMENDATIONS BEYOND 2025

Progress to improve the health of the Bay is happening at a much slower rate than anticipated. When the *Watershed Agreement* was signed, the goal was to "restore, enhance and protect a network of land and water habitats to support fish and wildlife, and to afford other public benefits, including water quality, recreational uses and scenic value across the watershed". While this goal is still at the core of our work, the landscape of the watershed has already shifted. Between 1980 and 2017, the Bay watersheds' population rose 43%, from 12.7 million people to 18.2 million people. In addition to population growth, ongoing threats from climate change, hazardous pollution from the fossil fuel industry, development, urban sprawl, plastic pollution, environmental racism, pollution from the Conowingo Dam, and nonpoint source pollution are becoming more prevalent. Additionally, the restoration effort has not been immune to impacts from the recent economic crisis and public health pandemic.

The CESR report made it very clear- the Bay we know now will not look like the past. It noted that climate change could be offsetting our nutrient reduction progress in a major way. Warmer water holds less oxygen, and rainfall has increased, washing more nutrients off the land and into the Bay. The report also concluded that it is unclear that achieving nutrient reduction by itself would improve aquatic life. Especially, in deeper parts of the Chesapeake Bay and without new technology. The report suggests that different approaches, new strategies and resource allocations are needed to address ongoing pressures from our changing world. We need creative thinking and a vision for the watershed that is modern and holistic. It must consider the many environmental, social, and economic challenges we will face in 2025 and beyond. In addition to these pressures, the Supreme Court's *Sackett v. EPA* ruling poses serious ramifications to wetlands, groundwater, and surface waterways throughout the Chesapeake Bay watershed. Federal rollbacks on environmental laws and regulations undermine the progress we have made to restore the watershed, and place increased responsibility on each state to ensure adequate protection of wetlands and ephemeral water bodies that are no longer subject to federal jurisdiction.

VISIONARY LEADERSHIP

We recognize that the CBP and Partnership are experiencing a leadership transition. Several key senior positions are vacant and/or will be soon. These include the EPA CBP Director, EPA CBP Partnerships and Accountability Branch Chief, United States Geological Service CBP Coordinator, EPA Region 3 Deputy Administrator, and the National Oceanic and Atmospheric Administration (NOAA) Chesapeake Bay Office Director. We are especially concerned about the CBP Director vacancy and the soon to be vacant NOAA Chesapeake Bay Office Director. These positions are essential to effectively accelerate Bay restoration goals to 2025 and beyond in a timely manner.

- **CBP Director**: Without a permanent Director, the CBP suffers from lack of leadership, inadequate accountability, and a dearth of executive management. Therefore, it is essential that the next CBP Director be a strong and widely respected thought leader who is familiar with the unique nature of the Partnership and the complexities that impact Chesapeake restoration work.

- **Reaching 2025 Working Group:** The NOAA Chesapeake Bay Office Director is currently leading the Reaching 2025 Working Group that drafted this report. The CBP has yet to announce how this transition will be handled and who will direct this work in the absence of the NOAA Chesapeake Bay Office Director. Given the immediate urgency, limited resources, and time constraints to accelerate toward the 2025 deadline, we are very concerned about the Reaching 2025 Working Group's capacity in the absence of the NOAA Chesapeake Bay Office Director. The CBP should reassess the capacity of this group and provide staff and the Partnership with the necessary resources to ensure the Reaching 2025 Working Group has sufficient support and resources to successfully carry out the remaining duties in the Chesapeake Executive Council's charge on *Charting a Course to 202*5.

  The next person leading the Reaching 2025 Working Group should have available capacity to ensure that public comments in response to this report are incorporated into the final recommendations to the Chesapeake Executive Council. This person should also have the capacity to ensure the final recommendations from this report are integrated and prioritized in the Beyond 2025 Steering Committee's

work. This leadership position will play a critical role to help set the course and inform the best approaches and strategies needed to complete the remaining outcomes in the *Watershed Agreement*.

Recruiting visionary leaders for these vacancies should be a top priority of the CBP. As we continue to address challenges to restore the watershed, it is necessary to recruit leaders who can not only motivate and inspire the Partnership, but ones who have demonstrated experience driving strategic action, problem solving, leading a diversity of stakeholders, creating change, and addressing complex environmental challenges. As we look beyond 2025, we need thoughtful leaders who represent the future of clean water, embody principles of DEIJ, and embrace collaboration. They must be able to anticipate challenges to effectively support and empower staff and the Partnership. These leaders will be called upon by a large community of partners and the Chesapeake Executive Council to set the course and steer the direction of our clean water movement in face of environmental threats. We need individuals in all of the positions identified who are dedicated to Bay restoration and can hit the ground running.

CENTERING PARTNERSHIP

The Choose Clean Water Coalition staff was a member of the Reaching 2025 Working Group, and we were honored to represent the voices of the nonprofit Chesapeake Bay restoration and conservation community. As one of few members of the Partnership on the Working Group, the Coalition is made up of over 285 nonprofits and community groups who are actively implementing Chesapeake Small Watershed Grants and Innovative Nutrient and Sediment Reduction Grants in every jurisdiction across the watershed. Our members are the practitioners working on the ground implementing conservation practices that directly support the goals in the *Watershed Agreement*.

We and our members are a vital and critical resource who possess firsthand experience, knowledge, and expertise working with farmers, community groups, local governments, and stakeholders to advance our collective restoration goals. Stakeholder involvement has been a hallmark of the CBP Partnership for forty years and should not be abandoned or forgotten in its 40th year. Working together supports the Principles of the *Chesapeake Bay Agreement*, which states that the Partnership will seek collaboration, represent the interest of the people, operate with transparency, seek consensus, and engage the public. Actively involving stakeholders and members of the Coalition early and often in decision making is the best path forward to get stronger support and buy-in for policies developed together. Given this, the Coalition is very disappointed that the public was only given 30-days to provide public comment on this report.

The charge from the Chesapeake Executive Council was provided to the PSC on October 11, 2022, which was almost a year ago. As partners in this work, we do not want to delay progress to reach our 2025 goals. However, the CBP should be centering the Partnership in this work and provide meaningful opportunities to move our collective clean water goals forward. In undertaking the charge, the PSC was asked by the Chesapeake Executive Council to consider Partnership, and to "have systems of evaluation and decision-making to engage meaningful action". A 30-day comment period is not a sufficient time frame for the public to "engage in meaningful action". We urge the CBP to provide no less than 60-days to solicit public comment on matters related to *Charting a Course to 2025* and beyond. Moving forward, better planning is needed and should be prioritized to engage the public. After forty years of working to restore the Bay watershed, an additional 30-days should not impede our progress.

We are very concerned that the makeup of the Beyond 2025 Steering Committee is not representative of the organizations who make up the Partnership. Although the Beyond 2025 Steering Committee meetings are open to the public, it is imperative that the organizations who help to meet the goals in the Chesapeake Bay Agreement through on the ground restoration and community engagement across the watershed have a voice in the decision making. We urge the Partnership to provide for meaningful public participation and engagement by:

- Creating at least two voting, at-large advisory member positions on the Beyond 2025 Steering Committee. These positions should have equal representation and decision-making power as the other Beyond 2025 Steering Committee members. These seats should have the same authority, roles, opportunities, and expectations and should not be viewed as "lesser than" by the CBP and Partnership.

This approach is in-line with CBP's public commitment to creating not only a diverse, but equitable and inclusive partnership;

- And exploring additional opportunities outside of public meetings and comment periods to authentically engage and gather input from stakeholders who are directly involved with this work. This should include the hosting of intentional opportunities to solicit feedback from the public, targeting specific communities to solicit public input from, and physically hosting engagement opportunities outside of EPA and CBP offices.

REVISE THE CHESAPEAKE BAY AGREEMENT

As we approach the 2025 deadline and beyond, a clear pathway and tangible outcomes are needed to continue the extraordinary progress we have made to restore the rivers, streams, habitats, and landscapes throughout the Chesapeake Bay watershed. While EPA is required to have most of the activities in the *Chesapeake Bay Agreement* in place by December 31, 2025, the overall agreement will expire April 30, 2027. Time is of the essence, and all recent reports, feedback, and analysis point to a restructuring of the approach to the restoration effort. We urge the CBP and the Beyond 2025 Steering Committee to begin a process to revise the *Chesapeake Bay Agreement*. However, it cannot simply extend deadlines to the existing goals as presented in the *2014 Chesapeake Bay Agreement*, but rather should change the way we fundamentally approach our restoration and conservation work to focus on outcomes.

Public comments and final recommendations from this report should be used to inform the revision of a new Chesapeake Bay Agreement. This process should be led with inclusivity, transparency, and with partnership in mind. There should be clear and actionable steps that assign responsibility and leadership to specific members of the CBP and Partnership, with new accountability plans that ensure the Partners work together to hold each other accountable, especially as it relates to the additional challenges posed by climate change, development/land use, population growth, racial injustice, and more.

For too long, Bay restoration efforts have primarily focused on water quality indicators that are difficult to understand and grasp. We need to shift our focus to improving people's lives - identifying projects and practices that will advance the health of communities, local economies, and public recreation. We have an exciting and extraordinary opportunity to re-envision, craft, and implement the policies and practices that will allow us to leave a legacy of clean water to future generations. The CBP and the Partnership should capitalize on this moment to inspire and reinvigorate communities by prioritizing clean water projects and programs that provide investments and support into disadvantaged and marginalized communities. A revision of the Chesapeake Bay Agreement should look beyond restoration. The CESR report made it clear, the Bay of the future will not look like the past. Therefore, it should be created with, and for, people. Let us use this moment to enable communities to turn their vision of a future Chesapeake Bay into a reality.

SUMMARY

We appreciate the opportunity to comment on the report, *Charting a Course to 2025* and urge you to consider the recommendations we have provided. We request a written response to our letter that addresses its major themes and recommendations and ask that all comments submitted during this public comment period are shared publicly. We urge you to consider these recommendations and all public comments in the work leading up to 2025 and for the Beyond 2025 Steering Committee to consider our recommendations as the PSC prepares their final report to the Chesapeake Executive Council in 2024.

We applaud the CBP and efforts to best address and integrate new science and restoration strategies leading up to 2025. In doing so, there is a greater need to prioritize partnership in this work. The charge from the Chesapeake Executive Council identified partnership as priority to accelerate our 2025 goal. However, a 30-day comment period is not sufficient for the public to "engage in meaningful action" as the charge laid out. There needs to be greater transparency on how the CBP and Beyond 2025 Working Group will address gaps in this work. The wildlife who thrive and the livelihood of communities who call the watershed their home depend on it.

The Partnership includes many members of the Coalition who have contributed to the success of Bay restoration for more than forty years. We welcome the opportunity to collaborate and work together as we approach 2025 and beyond. Your leadership is imperative to meet the goals of the *Watershed Agreement*. The undersigned members of the Coalition thank you for your consideration of these recommendations to help guide the CBP and the Partnership in strengthening its roadmap to meet our collective watershed goals. With questions, please contact Kristin Reilly at 443-759-3409 or reillyk@nwf.org.

Sincerely,

Alice Ferguson Foundation
Alliance for the Chesapeake Bay
Alliance for the Shenandoah Valley
American Chestnut Land Trust
American Rivers
Annapolis Green
Audubon Mid-Atlantic
Audubon Society of Northern Virginia
Blue Water Baltimore
Canaan Valley Institute
Catoctin Land Trust
Chapman Forest Foundation
Chesapeake Bay Foundation
Chesapeake Conservancy
Chesapeake Legal Alliance
Clean Fairfax Council
Clean Water Action
Coalition for Smarter Growth
Conservation Voters of Pennsylvania
Defensores de la Cuenca
Delaware Nature Society
Delaware-Otsego Audubon Society
Earth Force
Eastern Pennsylvania Coalition for Abandoned Mine Reclamation
Elks Run Watershed Group
Environmental Policy Innovation Center
Friends of Dyke Marsh
Friends of Nanticoke River
Friends of Quincy Run
Friends of Sligo Creek
Friends of St Clements Bay
Friends of the Chemung River Watershed
Friends of the Middle River
Friends of the Rappahannock
Friends of the Shenandoah River
Interfaith Partners for the Chesapeake
Izaak Walton League of America
James River Association
Lackawanna River Conservation Association
Lancaster Clean Water Partners
Lancaster County Conservancy
Lancaster Farmland Trust
Loudoun Wildlife Conservancy
Lower Susquehanna Riverkeeper Association
Lynnhaven River NOW
Maryland Conservation Council
Maryland League of Conservation Voters

Maryland Pesticide Education Network
Mattawoman Watershed Society
Mid-Atlantic Youth Anglers & Outdoors Partners
Mountain Lakes Preservation Alliance
National Aquarium
National Parks Conservation Association
National Wildlife Federation
Nature Forward
Otsego County Conservation Association
Pasa Sustainable Agriculture
PennFuture
Phillips Wharf Environmental Center
Piedmont Environmental Council
Potomac Conservancy
Potomac Riverkeeper Network
Potomac Valley Audubon Society
Rivanna Conservation Alliance
Rock Creek Conservancy
Rockbridge Area Conservation Council
Shenandoah Riverkeeper
ShoreRivers
Sierra Club - Virginia Chapter
Sleepy Creek Watershed Association
Southeast Rural Community Assistance Project
Southern Maryland Audubon Society
St. Mary's River Watershed Association
Surfrider Foundation – DC Chapter
Surfrider Foundation- Virginia Chapter
Sweet Springs Resort Park Foundation Inc.
Sweet Springs Watershed Association
The Wetland Trust, Inc.
Virginia Aquarium and Marine Science Center
Virginia Conservation Network
Virginia Interfaith Power and Light
Virginia League of Conservation Voters
Waterkeepers Chesapeake
West Virginia Highlands Conservancy
West Virginia Rivers Coalition
Wild Virginia

Charting a Course to 2025

A Report and Recommendations for the Chesapeake Executive Council on How to Best Address and Integrate New Science and Restoration Strategies Leading up to 2025

Posted on July 21, 2023

Photo by Will Parson/Chesapeake Bay Program

Chesapeake Bay Program
Science. Restoration. Partnership.

Acknowledgements

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Table of Contents

Executive Summary

In October 2022, the Chesapeake Executive Council charged the Principals' Staff Committee with recommending a critical path forward that prioritizes and outlines the next steps for meeting the goals and outcomes of the Chesapeake Bay Watershed Agreement leading up to and beyond 2025. The Executive Council Charge to the Principals' Staff Committee: Charting a Course to 2025 and Beyond asked the Principals' Staff Committee to report back to the Executive Council at their 2023 annual meeting with recommendations on how to best address and integrate new science and restoration strategies leading up to 2025.

Signed in 2014, the most recent *Watershed Agreement* has several outcomes with a target date for completion of 2025. As a first step toward developing these recommendations, the charge asked for a snapshot describing the progress that each outcome was making in attaining their goals, including the remaining work to be completed and gaps to be addressed.

To address this need, each Chesapeake Bay Program outcome lead was asked to prepare a one to two-page overview of their outcome's status, including information on what helped that outcome to progress since the signing of the 2014 *Watershed Agreement*, challenges that have hindered its advancement and what is needed to help stay the course or accelerate progress to 2025. This assessment revealed that 17 are on track, two are uncertain pending upcoming data updates and 12 are off track and will not meet their 2025 goals.

The Executive Council charge calls for a deeper look at several specific topics including how emerging science, monitoring and analysis can help address existing and growing challenges, a review of how the partnership has addressed issues related to the Total Maximum Daily Load requirements and related Watershed Implementation Plans, diversity, equity, inclusion and justice (DEIJ) and climate change and a similar review of the Forest Buffers and Wetlands outcomes. Considered '"keystone" outcomes, the Chesapeake Bay Program's Management Board agreed to focus attention on the implementation of forest buffers and wetlands in 2021 because they provide significant conservation and restoration benefits in themselves as well as to many of the other *Watershed Agreement* outcomes. Each of these subsequent sections include further detail on the challenges, current opportunities and recommendations on how to best progress to 2025.

Information contained in these additional sections were thoughtfully provided from a variety of subject matter experts across the Chesapeake Bay Program. A list of these subject matter experts is provided on the "Acknowledgements" page of this report. Additionally, efforts in outlining and creating this document were aided by the Reaching 2025 Steering Committee, consisting of representatives from the watershed jurisdictions, federal agencies, non-governmental organizations and advisory committees.

Common Findings and Recommendations

The following findings and recommendations were assessed from the 31 outcome attainability templates and subsequent sections on the Chesapeake Bay Total Maximum Daily Load (Bay

TMDL)/Phase III Watershed Implementation Plans (WIPs), Emerging Science/Monitoring, Climate Change/DEIJ and Forest Buffers/Wetlands.

These recommendations are provided to the Chesapeake Executive Council on how to best address and integrate new science and restoration strategies leading up to 2025. Where that is not possible in the given timeframe, these recommendations should be considered in discussions that shape the direction of the Chesapeake Bay Program beyond 2025.

Outcome Attainability

Significant progress has been made over the past nine years toward achieving the 31 outcomes of the *Watershed Agreement.* As a result of this hard work, 17 outcomes are on track to be completed by 2025 and two remain uncertain while additional data is analyzed this summer. A number of patterns have emerged among these successful and unsuccessful outcomes leading to the following observations.

- Quantitative and qualitative outcomes can be effective. The latter often serving as a precursor for the former. However, successful qualitative outcomes require concrete milestones and measures of progress or milestones to evaluate their effectiveness.
- Successful quantifiable outcomes have clear geographic and numerical targets, measures of success, accounting systems and monitoring protocols in place. It may be impossible to achieve quantitative success without these in place.
- Jurisdictional and federal commitments, costs, roles and responsibilities must be clear. The success of many quantitative outcomes is driven by a federal champion and/or coordinator looking across the jurisdictions, in coordination with one or more state or non-governmental champions or coordinators for regional relevance and legitimacy.
- Ambitious outcomes are inspiring and can help drive change, but they must be established with a reasonable understanding of the costs, commitments and who is responsible for them.
- Outcome efforts must operate at the appropriate scale in order to make progress. For those large or nearly all encompassing in scope, such as climate change or diversity, establishing or modifying outcomes to focus on manageable pieces of these challenges, while maintaining a sense of their place in the broader context, could generate meaningful progress. Efforts should focus on high-impact actions and avoid implementation of many small, disconnected projects that can dilute staff and financial resources.
- Working with local communities, governments and non-profit organizations helps to identify high-priority geographies and match outcomes with local partner interests. Identifying priority geographies to implement measures to achieve outcomes and matching those with local partners would accelerate progress.
- The Chesapeake Bay Program is a distributed network centered on the Environmental Protection Agency (EPA). The EPA is the only Chesapeake Bay Program partner to have a mandate, staff and funding to work across all partnership issues. However, their annual funding is modest compared to the total annual investment in the region, and it is highly constrained. A

mechanism to match Chesapeake Bay Program needs with staff support and funding from across the partnership should be instituted through the Management Board.

Chesapeake Bay Total Maximum Daily Load/Phase III Watershed Implementation Plans

Partners of the Chesapeake Bay Program, particularly the seven jurisdictions, have made notable progress toward ensuring the necessary practices are in place to meet the Bay TMDL. To date, these actions have reached 49% of the nitrogen, 64% of the phosphorus and 100% of the sediment reduction goals. Additionally, many of the important components needed for the 2025 Watershed Implementation Plan (WIPs) Outcome to be successful are in place, including targeting mechanisms, tracking systems, roles, responsibilities, cost estimates and implementation plans. Key challenges related to climate change, the trapping capacity of the Conowingo Dam reservoir and fertilizer application modeling discrepancies have been identified and quantified, and commitments to address them are in place. While it is clear that the 2025 WIP Outcome will not be achieved by 2025, the partnership has made incredible strides in decreasing the amount of nutrient and sediment pollution that reaches the Bay, and that should be celebrated.

As the Bay TMDL calls for 100% of practices to be in place to meet pollutant reduction goals by 2025, the majority of the Bay Program's resources are focused on implementing measures to achieve these water quality standards. However, it is now understood that all these practices will not be in place by 2025, and if they were, they would not be sufficient to achieve the desired water quality and habitat benefits. This is due to three factors. Implementation, sufficient regulatory and voluntary measures not being in place to incentivize compliance in the non-point source sector; the lag-time associated with the implementation of BMPs and the water quality standards attainment needed for deep waters of the Bay; and that these deeper waters are not as relevant to the living resources like fish, shellfish and their habitats. Furthermore, these issues are exacerbated by climate change and increasing development pressures throughout the watershed.

- Non-point source pollution is where future reduction efforts will need to be focused. Moving toward 2025, expand the existing conversation around how to address pollution from nonpoint sources.
- Increase understanding of desired system response resulting from best management practice (BMP) implementation (dissolved oxygen, water clarity/SAV, chlorophyll *a*, living resources, etc.) using tools such as high-resolution land use and land cover data and high frequency water column monitoring.
- Target BMP implementation in high-impact areas throughout the watershed to improve local conditions, and in the culturally, ecologically and economically important shallow water areas of the Bay; prioritize resources in these locations.
- Draw on recent Scientific and Technical Advisory Committee analyses such as: Rising Watershed and Bay Water Temperatures—Ecological Implications and Management Responses, Increasing

Effectiveness and Reducing the Cost of Nonpoint Source Best Management Practice Implementation: Is Targeting the Answer and Achieving Water Quality Goals in the Chesapeake Bay: A Comprehensive Evaluation of System Response to implement non-point source strategies geographically based targeting to improve conditions for living resources of the Bay.

- Evaluate the discrepancies in the fertilizer application estimates generated by the Chesapeake Assessment Scenario Tool (CAST) and update Bay TMDL compliance accordingly.
- Craft succinct messaging acknowledging the partnership will not meet their water quality goals by 2025 but affirming efforts will continue to make progress.
- The Environmental Protection Agency will continue to provide oversight and support to the jurisdictions as we collectively look for ways to accelerate implementation progress, particularly in the nonpoint sector.
- Maintain a focus on addressing increased loads attributed to climate change and population growth, and implement the Conowingo Watershed Implementation Plan.

Emerging Science, Monitoring and Analysis

Science, monitoring and Analysis are the foundation of all the work of the Chesapeake Bay Program. They provide insights on water quality, climate change, contaminants and living resources, while enhancing our modeling tools. Over the past 5 years, spatial resolution has improved in land use mapping, spatial and temporal improvements have been implemented for shallow tidal water quality monitoring as well. Finer scale modeling is opening up new insights into the expected living resource response to CBP water quality management actions. Recent analytical work has identified trends in the data coming from the monitoring and modeling networks. These analyses have increased attention on the need to protect and restore key habitats such as marshes, submerged aquatic vegetation, and oyster reefs; along with associated living resources. They suggest more focus on living resources and their habitats would be improve the Chesapeake Bay Program's ability to achieve its goals and strengthen public support.

- Continue to investigate long-term funding sources to maintain Bay Program monitoring networks, support modeling efforts and finalize new water quality monitoring network developments funded in response to the Principals' Staff Committee Monitoring Review report recommendations.
- Evaluate satellite-based and other new technologies such as machine learning opportunities, for a more comprehensive monitoring and analysis of Chesapeake Bay ecosystem.
- Incorporate recommendations from Scientific and Technical Advisory Committee (STAC) reports.
    - The Comprehensive Evaluation of System Response, which suggests shifting the emphasis of science and monitoring from tracking water quality standards attainment in the deep trenches of the Bay, to focusing on improving conditions in culturally, ecologically and economically important places in the watershed with an increased focus on shallow-water areas beyond 2025.

    - Recommendations from the Rising Watershed and Bay Water Temperatures report demonstrates that warming waters will make it more difficult for the Bay Program to meet its water quality and living resources goals, and recommends that the partnership incorporate water temperature considerations more explicitly into its goals, outcomes and management strategies.
- Implement high-resolution monitoring and modeling in prioritized areas to provide feedback on living resources and habitat conditions. This can lead to improved indicators linking environmental change and living resource responses that can be integrated with existing synthesis products and used to evaluate the vulnerability of key species and habitats to guide management.
- Enhance capacity building and community engagement strategies to develop a collective vision resulting in scientifically informed conservation and restoration practices that achieve the Watershed Agreement outcomes in prioritized geographies.
- Incorporate more social information and data (e.g., population, languages spoken, household income) into geospatial products to foster increased understanding of the demographics and vulnerabilities of communities across the watershed in order to build relationships, better target communications and increase engagement opportunities.

Climate Change and Diversity, Equity, Inclusion and Justice (DEIJ)

The 2014 *Watershed Agreement* formally recognized both the importance of addressing the growing impacts of climate change, as well as the critical need to engage all residents of the Chesapeake Bay watershed in the restoration effort. These cross-cutting issues received an increase focus in 2020 and 2021 with the signing of Executive Council directives that highlighted their importance and called on new actions to be taken to accelerate progress. While both the Climate Resiliency and Diversity workgroups are making tangible progress in meeting the Climate Adaptation, Climate Monitoring and Assessment and Diversity outcomes, the directives did not provide funding or staffing support to be appropriately addressed. Climate and DEIJ are cross-cutting initiatives that the current Bay Program structure is not sufficiently set up to address.

- Identify champions to take responsibility for leading and coordinating these efforts. Often, champions include a federal representative along with someone from a jurisdiction, or in some cases, a nonprofit. They contribute and advocate for catalyzing funding, staff and resources. Effective GITs and workgroups often have sustained funding from a partner committed to the work (e.g., Environmental Literacy outcomes are supported through NOAA's Bay Watershed Education and Training Program).
- To move the work of the climate and DEIJ directives and other cross-cutting initiatives forward, the Bay Program must strategically evaluate how to support this sort of distributed work. Network theory and other coordination models should be used to determine how best to structure this work. Leadership level support and sufficient staff resources should be identified to promote systemic change within the Chesapeake Bay Program to effectively include and

amplify diverse voices and participants in our work; and to ensure the partnership considers and addresses the impacts of climate change effectively.

- Climate change and DEIJ were identified as the high priority actions for the Executive Council, but resources did not follow to address these issues despite increasing budgets. One necessary action is to fund critical projects outside of the GIT-funding process. In addition, providing a better accounting of federal and state resources contributing to the outcomes could help address the funding shortfall by allowing partners to strategically align efforts, thereby increasing efficiencies.

Forest Buffers and Wetlands

Achieving the targets of the Forest Buffers and Wetlands outcomes are crucial to meeting the partnership's water quality goals. Both provide a wealth of ecosystem benefits to the people who live, work and recreate within the watershed. In order to generate the substantial progress that is needed to meet these goals, fundamental change is needed to accelerate the implementation rate.

- Support effective, flexible buffer and wetland programs to limit or eliminate out-of-pocket costs for landowners, provide maintenance, fund practices on a rolling basis and limit eligibility requirements.
- Build and retain staff capacity to scale-up implementation of both buffers and wetlands and offer high-quality technical and maintenance services.
- Cultivate partnerships to support sustained funding and to coordinate outreach and technical assistance efforts.
- Develop more strategic approaches and increase capacity for outreach and engagement. These could include:
    - Encourage time and effort to cultivate relationships with private landowners to understand their barriers to wetlands and forest buffers.
    - Develop targeted communications materials for different audiences (e.g., landowners, policymakers, agricultural technical service providers) that emphasize the value and co-benefits of forest buffers and wetlands using case studies and success stories.
    - Ensure messages are in easily understood terms, spread frequently and through a variety of communications mediums to ensure all audiences are being reached.
- Expand tracking and reporting to ensure all forest buffers and wetlands are appropriately accounted for and verified. In particular, develop a strategy to conduct outreach to nonprofits, state agencies and other entities to ensure they know how to report their work to the new wetlands tracking tool that will be available in fall 2023. Additionally, review current tracking systems to make sure everything is working normally and being reported accurately.
- Establish clear geographic and numerical targets, measures of success, accounting systems and monitoring protocols for tidal wetland restoration.
- Explore additional funding options to enhance data collection and ensure the wetlands tracker remains upgraded.

Chesapeake Bay TMDL & Phase III WIPs

The Chesapeake Bay Total Maximum Daily Load (Bay TMDL) was established by the U.S. Environmental Protection Agency (EPA) in 2010 to reduce the amount of nutrients and sediment flowing into the Chesapeake Bay from its tributaries. The Bay TMDL recognized the Chesapeake Bay Program goal of having all pollutant reduction practices in place by 2025 that will eventually result in attainment of water quality standards. Under the Accountability Framework, jurisdictions and EPA agreed to develop two-year milestones, to identify and track actions being made to reduce nitrogen, phosphorus and sediment loads to the Bay.

The jurisdictions developed watershed implementation plans (WIPs) to help them determine how they will meet their pollutant reduction goals. Phase I WIPs were developed in 2010, with Phase II WIPs put into place in 2012. The Phase III WIPs were developed in 2018 to describe how the jurisdictions intended to meet their pollutant reduction targets by 2025. The Chesapeake Bay Program acknowledges that the partnership will not meet their 2025 targets, but has made incredible progress along this journey. Specifically, 100% of sediment reductions are estimated to be met by 2025, along with 49% of nitrogen reductions and 64% of phosphorus reductions.

Specific progress made by the jurisdictions in implementing their Phase III WIPs is reported on the *ChesapeakeProgress* website. As of 2021, computer simulations show that between 2009—the Bay TMDL baseline—and 2021 credited management actions are estimated to result in a 14% overall nitrogen decrease from 297.8 million pounds in 2009 to 257.53 million pounds in 2021, meeting 49% of the goal to reduce nitrogen by 2025. Those actions also decreased overall phosphorus 14% from 17.2 million pounds in 2009 to 14.7 million pounds in 2021, meeting 64% of the goal to reduce phosphorus by 2025. Finally, overall sediment is estimated to have decreased 4% from 18.9 billion pounds in 2009 to 18.1 billion pounds in 2021, meeting 100% of the goal to reduce sediment by 2025. These computer simulations show the following jurisdiction-specific breakdown of overall pollutant reductions between 2009 and 2021:

- **Delaware**: Has not met its pollutant reduction targets for nitrogen, phosphorus or sediment. Reported BMPs have achieved 20% of nitrogen, 52% of phosphorus and 63% of sediment goals.
- **District of Columbia**: Has met its targets for all three pollutants. Reported BMPs have achieved 100% of the nitrogen, phosphorus and sediment targets.
- **Maryland**: Has not met its pollutant reduction targets for nitrogen or phosphorus, but did meet its sediment goal. Reported BMPs have achieved 58% of nitrogen, 74% of phosphorus and 100% of sediment reductions.
- **New York:** Has not met its pollutant reduction targets for nitrogen, phosphorus or sediment. Reported BMPs have achieved 69% of nitrogen, 76% of phosphorus and 21% of sediment reductions.

- **Pennsylvania**: Has not met its pollutant reduction targets for nitrogen, phosphorus or sediment. Reported BMPs achieved 22% of nitrogen, 48% of phosphorus and 45% of sediment reductions.
- **Virginia**: Has not met its pollutant reduction targets for nitrogen or phosphorus, but has met its target for sediment. Currently, installed BMPs have achieved 75% of nitrogen, 68% of phosphorus and 100% of its sediment reductions.
- **West Virginia**: Has met its targets for all three pollutants. Reported BMPs have achieved 100% of the nitrogen, phosphorus and sediment targets.

The following challenges have been identified as impeding the jurisdictions' progress in meeting their Phase III WIP targets:

- **Climate change**: Impacts from a changing climate are increasing the flow and delivery of nutrients and sediment into the Chesapeake Bay. Projections have estimated that the partnership will need to account for additional nutrient pollutant reductions to meet applicable water quality standards. In December 2020, the Principals' Staff Committee reached consensus that the jurisdictions would be expected to account for additional nutrient and sediment loads due to 2025 climate change conditions in an addendum to their Phase III WIPs and/or their two-year milestones beginning in 2022.
- **Conowingo Dam**: Between 2014-2016, the partnership became aware that the reservoir behind the Conowingo Dam was filling more quickly than anticipated, and its trapping capacity for sediment and nutrients were being impacted by sediment transport and scouring events, leading to an increase in pollutants flowing into the Chesapeake Bay. In late 2017, the Principals' Staff Committee agreed to address the additional pollutant loads resulting from the Conowingo Dam's lack of trapping capacity through a separate WIP. The final Conowingo WIP was approved by the Principals' Staff Committee in September 2021 and the first two-year milestones for the Conowingo WIP were submitted to EPA in January 2022. While the Conowingo WIP has not yet been implemented, funding has been committed by Maryland, New York and Pennsylvania for implementation purposes.
- **Chesapeake Assessment Scenario Tool (CAST):** Concerns have been raised about the validity of data and information that is used in CAST, which is one part of the Chesapeake Bay Program's suite of modeling tools, to assess the jurisdictions' progress toward meeting their 2025 targets. In August 2022, the Principals' Staff Committee set a path forward to address these concerns:
    - Address new and unaccounted pollutant loads post-2025.
    - Develop a short-term, interim resolution for fertilizer data concerns before moving forward with updating the current version of CAST, as well as a long-term resolution for the Phase 7 model.
    - Update the process for incorporating data into CAST to include additional safeguards to prevent data analysis errors and to assess the reasonability of modeling results after partnership protocols are applied.
- **Pollution from non-point sources**: Stormwater and agriculture runoff are two of the fastest growing sources of pollutants flowing into the Chesapeake Bay. Although some stormwater and agriculture sources are regulated via the federal Clean Water Act permitting program, many are not. With over 83,000 farms, increasing development and more frequent and heavier rainfall

occurring from climate change, controlling pollutants from nonpoint sources remains a significant challenge.

- **Staff capacity and technical assistance**: These are the two largest needs identified by the jurisdictions in meeting their 2025 pollutant reduction goals. New funding sources are often targeted to implementation projects, but not the technical assistance to support th ojects or the administrative support to apply for and manage the funding. It is not possible to use funding for technical assistance or capacity building if the money is only slated for one to a few years, making partners reluctant to hire additional staff. Additionally, due to various factors, many environmental, agricultural and natural resource agencies have lost a considerable number of staff and resources which needs to be supplemented in order to fully implement their Phase III WIP commitments.
- **BMP verification process**: The BMP Verification Ad-hoc Action Team has worked to address various issues related to verification, but BMP verification remains a significant challenge across the partnership. Some of these include restricted access to certain federal data, minimal resources to conduct BMP verification and issues with access to operations. The most com n concern is whether to prioritize limited state technical capacity to verify existing BMPs or implement new BMPs.
- **Miscellaneous**: The Covid-19 pandemic, and recent avian flu outbreak, has impacted partners' ability to work directly with landowners, and limited access to BMP implementation and verification. Additionally, recent inflationary pressures have impacted partners, most notably with respect to the cost of materials and labor to implement BMPs, as well as to maintain these BMPs and our monitoring networks. Current CAST cost estimates may not reflect current costs due to inflation.

While the above points are listed as challenges, many of them are also opportunities that can lead to the acceleration of progress. For example, limited staff to oversee the influx of new funding from the Bipartisan Infrastructure Investments and Jobs Act and Inflation Reduction Act, among others, is impacting the jurisdictions' ability to spend the money in an efficient and effective manner. However**,** the increase has allowed for more BMPs to be implemented and technical assistance to be expanded. The new funding typically has specific new and/or different requirements on how and where it can be used in order to be eligible to take advantage of it. But increased outreach activities are leading to opportunities to leverage available resources to fund the implementation of nonpoint source BMPs.

The increased funding has also led to a larger allocation of resources to existing grant programs, such as the Chesapeake Bay Stewardship Fund, which includes the Pennsylvania Most Effective Basins program. The Most Effective Basins program funds projects that will accelerate the implementation of cost-effective agricultural BMPs. The Chesapeake Bay Stewardship Fund is managed by the National Fish and Wildlife Foundation but funded by the EPA.

Thanks to the consistent reporting of jurisdictional progress through the two-year milestones, we are able to note incremental progress in achieving the pollutant reduction targets of the Phase III WIPs and identify areas that may need improvement. Although the overall water quality goals will not be met by

2025, the partnership continues to make steady progress in reducing pollutant loads flowing into the Chesapeake Bay.

The following actions will be taken over the next two years to help accelerate progress for each jurisdiction's Phase III WIPs goals:

- Expand the existing conversation around how to address pollution from nonpoint sources.
- Begin the conversation around how to include new scientific findings and monitoring results beyond 2025 that will impact the partnership's commitment to meeting the goals of the Phase III WIPs and Bay TMDL moving forward. Some of these new findings include reports developed by the Bay Program's Scientific and Technical Advisory Committee, such as the *Rising Watershed and Bay Water Temperatures—Ecological Implications and Management Responses*, *Increasing Effectiveness and Reducing the Cost of Nonpoint Source Best Management Practice Implementation: Is Targeting the Answer* and *Achieving Water Quality Goals in the Chesapeake Bay: A Comprehensive Evaluation of System Response*. The Phase 7 suite of modeling tools is currently in development and will incorporate as much as this new science as possible.
- Craft succinct messaging that acknowledges that the partnership will not meet their water quality goals by 2025 but affirm that we will not take our foot off the gas toward making progress, even though new efforts to increase progress will not be introduced before 2025. Messaging will also account for successes toward meeting the Bay TMDL, as well as acknowledge the significant conservation practices adopted by different sectors across the watershed (e.g., agriculture, wastewater).
- Begin the discussion around new, innovative approaches to meet the jurisdictions' Phase III WIP goals that can be considered beyond 2025.
- The Environmental Protection Agency will continue to provide oversight and support to the jurisdictions as we collectively look for ways to accelerate implementation progress, particularly in the nonpoint sector.

Emerging Science, Monitoring and Analysis

Science, monitoring and analysis are essential to assess the status and variability of water quality and living resources throughout the Chesapeake Bay watershed. Monitoring networks provide insights on key parameters such as water quality, climate change, contaminants and living resources. Monitoring data is also required to build, operate and enhance the partnership's suite of modeling tools. These models are used to develop pollutant reduction strategies and to make predictions about current and future ecosystem conditions that inform living resource management. Research and data analysis reveal trends over time and quantify the responses of living resources to changes in the ecosystem.

Challenges

Science, monitoring and analysis needs are tracked by the Chesapeake Bay Program through the Scientific, Technical Assessment and Reporting Team (STAR) Strategic Science and Research Framework (SSRF) database, as well as the assessment of the partnership's current monitoring networks, prepared for the Principals' Staff Committee (PSC) in 2022. The SSRF and monitoring assessment reveal the following challenges:

- Monitoring is insufficient at the spatial and temporal scopes required to support the assessments needed for many Bay Program outcomes.
- More research is needed to analyze monitoring data and understand how changes in water quality and environmental conditions are affecting habitat quality and the abundance and distribution of ecologically and commercially important species.
- Funding is not sufficient to provide additional capacity to develop metrics, indicators and sampling designs, or to analyze monitoring data and address priority research questions.

Current Opportunities

Despite existing challenges, the Chesapeake Bay Program monitors 19 physical, chemical and biological characteristics throughout the year in the Bay and its tributaries. These specific networks include tidal and nontidal monitoring networks, as well as monitoring of submerged aquatic vegetation (SAV), benthic communities and land use.

- **Tidal Water Quality Monitoring Program**: The current tidal monitoring network has 154 active stations throughout the Chesapeake Bay, whose data informs the annual tidal water quality assessment that gauges the health of the Bay. Some of the parameters measured include water temperature, salinity levels, nutrients and dissolved oxygen.
- **Non-Tidal Monitoring**: The non-tidal monitoring network has 123 active stations throughout the Chesapeake Bay watershed, which includes River Input Monitoring (RIM) stations located on the nine largest rivers in the watershed. Data measured for the nontidal network includes, but is not limited to, pollutant loads and trends.

- **SAV Monitoring**: The monitoring of underwater grasses uses a three-tiered approach. This approach consists of the annual Bay-wide aerial survey, the SAV Watchers Program, which engages local watershed groups and volunteers and the SAV Sentinel Site Program. This combination of monitoring efforts allows for the best estimation of SAV acreage and density, while collecting detailed habitat and water quality data and providing educational volunteer opportunities to communities at the same time.
- **Chesapeake Bay Benthic Macroinvertebrate Monitoring:** Benthic species monitoring provides an excellent snapshot of environmental conditions in the Bay and its tidal tributaries, focused on the summer season. Benthic species in the Chesapeake Bay tidal waters include clams, worms, oysters and mussels who live at the bottom of the Bay and cannot easily move—if at all—to escape stressors like unhealthy water quality conditions.
- **Community Science Efforts**: The Chesapeake Monitoring Cooperative (CMC) is a regional partnership that provides technical, logistical and outreach support to volunteers and watershed organizations for the integration of volunteer-based and nontraditional water quality and benthic macroinvertebrate monitoring data into the Chesapeake Bay Program. Currently, over 100 non-traditional, community and volunteer-based monitoring groups are involved with water quality and macroinvertebrate monitoring. Over 800,000 data points have been recorded in the CMC's Chesapeake Data Explorer.
- **Land Use and Land Cover Monitoring Network**: High-resolution (i.e., one-meter by one-meter) land use and land cover data for each county in the watershed is used to show how the Chesapeake landscape is changing. The data is remapped every four years to monitor changes in tree canopy, map wildlife habitat and ecologically sensitive lands, and determine where environmental restoration can provide the highest benefit. This information has recently been used to inform the Land Use Methods and Metrics Outcome and to develop the Tree Canopy Status and Change Fact Sheets.

The partnership's monitoring networks are taking advantage of current funding opportunities, including those appropriated through the Infrastructure Investment and Jobs Act, to meet their needs and enhance understanding of the Bay ecosystem. Recent advances in geospatial analysis, high-resolution monitoring (spatially and temporally) and biological and physical modeling will allow new management paradigms to emerge to address well known conservation challenges including those emerging with climate change and increased development pressure. Some examples include:

- Land Use Land Cover Data Project.
- Targeted shallow-water and habitat suitability modeling.
- Development of the 4D Interpolator (model to assess Bay and tidal water quality criteria).
- Ecological thresholds (e.g., shoreline hardening, impervious surfaces, temperature).
- High frequency hypoxia sensors.
- Expanded use of satellite data for monitoring and machine learning for data analysis.

Additionally, increased focus on local engagement, social science, living resources and geographic targeting are preparing the Bay Program for the best way to integrate emerging science findings beyond 2025. Highlights of these efforts include:

- **Local Engagement and Education**: Regional partnerships with federal and state governments, nonprofits and local communities are critical to finding collaborative solutions that support both Chesapeake Bay restoration and the people that live, work and recreate within its watershed.
- **Social Science**: When the 2014 *Chesapeake Bay Watershed Agreement* was signed, it was the first time that signatory partners recognized the importance of including all residents of the watershed in helping with the restoration of the Bay. While a broad social science strategy is not yet in place across the partnership, efforts to utilize social science tools to advance the *Watershed Agreement* outcomes have taken place. For example, in fall 2020, the University of Maryland Center for Environmental Science completed *Enhancing Chesapeake Bay Partnership Activities by Integrating Social Science*. This roadmap set out to learn about the goals of social science integration within the partnership and evaluated some of the current social science efforts that could inform and advance those goals by offering detailed recommendations.
- **Data Analysis and Synthesis**: Progress is being made where federal and state agencies have focused their research funding and data analysis capacity with the needs of the Bay Program. These agencies have also modified their grant programs to increase the number of grantees that have been historically underrepresented in the environmental and marine science fields. Additionally, efforts are underway to better synthesize the abundance of scientific data and knowledge to communicate a more comprehensive story about how the ecosystem is changing and the implications of these changes. A few examples are highlighted below.
    - By aligning research funding with the outcomes of the Watershed Agreement, NOAA has helped to improve habitat suitability models and provide a better understanding of climate and other environmental variability impacts on fish species and their habitats. This research has also resulted in the quantification of ecosystem services provided by restored oyster reefs and other habitats, including the economic returns that restoration activities provide communities.
    - The U.S. Geological Survey is working to expand data analysis efforts to support GITs and workgroups by:
        - Developing a more strategic, science-based approach to better target federal and state resources to the places and activities that will accelerate progress for multiple outcomes. This effort is presented in a data hub containing a collection of maps and applications that can evaluate restoration and landscape initiatives that are relative to the goals and outcomes of the Watershed Agreement.
            - Understanding the factors that are affecting stream health, fish habitat and aquatic conditions.
            - Characterizing the risks to coastal ecosystems and their implications for waterbirds.
            - Informing prioritization for land protection and maintenance of healthy watersheds.

- NOAA is drawing on research findings and data analysis to develop seasonal summaries of water quality parameters found within the Chesapeake. The reports look at water temperature, dissolved oxygen and salinity levels compared to their average, and note how any potential anomalies are impacting the living resources of the Bay. These summaries are intended to contribute to ecosystem-based management and use data from the Chesapeake Bay Interpretive Buoy System, as well as the NOAA CoastWatch satellite program.

Recommendations on Progressing to 2025

To ensure science, monitoring and data analysis continue to provide critical support in the implementation of the Watershed Agreement outcomes through 2025 and that emerging science is considered and integrated in the Bay Program's work, the following recommendations are offered:

- Continue to investigate long-term funding sources to maintain Bay Program monitoring networks, support modeling efforts and complete new water quality monitoring network developments funded in response to the PSC Monitoring Review Report recommendations.
- Evaluate satellite-based and other new technologies such as machine learning opportunities, for a more comprehensive monitoring and analysis of Chesapeake Bay ecosystem.
- Incorporate recommendations from STAC reports.
  - The *Comprehensive Evaluation of System Response*, which suggests shifting the emphasis of science and monitoring from tracking water quality standards attainment in the deep trenches of the Bay, to focusing on improving conditions in culturally, ecologically and economically important places in the watershed with an increased focus on shallow-water areas beyond 2025.
  - Recommendations from the *Rising Watershed and Bay Water Temperatures* report demonstrates that warming waters will make it more difficult for the Bay Program to meet its water quality and living resources goals, and recommends that the partnership incorporate water temperature considerations more explicitly into its goals, outcomes and management strategies.
- Implement high-resolution monitoring and modeling in prioritized areas to provide feedback on living resources and habitat conditions. This can lead to improved indicators linking environmental change and living resource responses that can be integrated with existing synthesis products and used to evaluate the vulnerability of key species and habitats to guide management.
- Enhance capacity building and community engagement strategies to develop a collective vision resulting in scientifically informed conservation and restoration practices that achieve the Watershed Agreement outcomes in prioritized geographies.
- Incorporate more social information and data (e.g., population, languages spoken, household income) into geospatial products to foster increased understanding of the demographics and vulnerabilities of communities across the watershed in order to build relationships, better target communications and increase engagement opportunities.

Climate Change and Diversity, Equity, Inclusion and Justice

The 2014 *Chesapeake Bay Watershed Agreement* included outcomes for Diversity, Climate Adaptation, and Climate Monitoring and Assessment. However, as implementation of the Watershed Agreement progressed, the Chesapeake Bay Program recognized that these outcomes did not fully address the broad nature of these cross-cutting issues.

To expand and better define these bodies of work, the Chesapeake Bay Program released a diversity, equity, inclusion and justice (DEIJ) strategy in April 2020, *Restoration from the Inside Out: A Diversity, Equity, Inclusion and Justice Strategy for the Chesapeake Bay Program*, that was followed later that year by a *Statement in Support of Diversity, Equity, Inclusion and Justice*, signed by the Executive Council. The statement commits to strengthening DEIJ throughout the partnership with an emphasis on engaging, recruiting and retaining an ethnically and racially diverse staff and leadership, fostering an inclusive workplace and ensuring long-term relationships with underrepresented organizations and communities that result in informed and mutually beneficial decisions and outcomes. In December 2021, the Chesapeake Bay Program, with input from partners and the public, released the DEIJ Implementation Plan, which presents a roadmap for advancing the recommendations in the strategy.

In 2021, the Executive Council signed a directive in reference to climate change, *Collective Action for Climate Change*. This directive acknowledges the consequences that a changing climate is bringing to the Chesapeake Bay watershed, particularly acknowledging those habitats, peoples, communities and industries that are disproportionately impacted. It explicitly states that while every jurisdiction is taking steps to combat climate impacts (e.g., rising water and air temperatures, sea level rise, saltwater intrusion, shift in the range of species), to address these issues through the entire Bay watershed requires a collaborative response. The directive addresses the threats of climate change in all aspects of the partnership's work, prioritizes communities and habitats most vulnerable to ever-increasing risks, seeks to apply the best scientific, modeling, monitoring and planning capabilities of the Bay Program, and connects Bay restoration goals with emerging opportunities in climate adaptation, mitigation and resilience. The partnership released the Climate Change Directive Work Plan to support this work in July 2022.

Challenges

Despite the effort to accelerate work in these two critical areas, large-scale progress has been challenging. Several key challenges are shared across the two bodies of work, including:

- **Insufficient Capacity**: The directives for climate and DEIJ are ambitious, far reaching and appropriate, but they are not sufficiently or consistently supported. The capacity of the workgroups is limited to advancing the outcomes of the *Watershed Agreement*. This leaves the important work outlined in the directives without dedicated support or leadership.

- **Lack of Coordination**: Beyond the workgroups, the partnership is making additional progress on meeting the objectives of the directives, but in an uncoordinated, unaccountable and undocumented manner. The Chesapeake Bay Program operates through Goal Implementation Teams (GITs) and their respective workgroups, which are largely siloed without the necessary structure to work towards cross-cutting outcomes like DEIJ and climate. While good work is happening within these teams, limited capacity exists for tracking and coordinating this work. Individual state and federal agencies, as well as non-profit partners, are advancing critical work on climate and DEIJ issues across the watershed. This results in inefficiencies, missed opportunities and a lack of understanding about the breadth of work occurring.
- **Inadequate Resource Commitment**: There is insufficient funding to meet the scale of the climate and DEIJ expectations established under the directives and *Watershed Agreement*. Without a shared understanding of how Chesapeake Bay Program grant funding is being applied towards the outcomes at the state level, and with no federal funding partner, the primary funding available to support the DEIJ and climate work is through the GIT-funding process. This competitive pool of funds only allows for small-scale projects that don't move the needle forward at the pace needed to meet the expectations outlined in the directives.
- **Diversity Indicator**: A challenge specific to the Diversity outcome is its misalignment with the indicators tracked by the Bay Program. There is a need for new indicators to measure success of partnership efforts to identify stakeholder groups not currently represented in the leadership, decision-making or implementation of current conservation and restoration activities, as well as a need to create meaningful opportunities and programs to recruit and engage these groups in Bay Program efforts. The full picture of progress requires measuring success both within the partnership itself as well as with external audiences and stakeholders.

Current Opportunities

The Diversity and Climate Resiliency workgroups are making progress toward the outcomes included in the *Watershed Agreement*. In some cases, this also advances the work of the directive.

The Climate Resiliency Workgroup was successful in moving a handful of projects forward by identifying those considered to be high-priority based on the partnership's interest. This allowed the workgroup to lead collaboration across multiple GITs and stakeholders resulting in the following specific deliverables:

- Creation of targeting criteria for marsh adaptation and green infrastructure projects.
- Inclusion of climate impacts (sea level rise) in the Bay Program's suite of modeling tools.
- Development of temperature and precipitation indicators.
- Completion of the Scientific and Technical Advisory Committee (STAC) sponsored report, *Rising Watershed and Bay Water Temperatures—Ecological Implications and Management Responses*.

Similarly, the Diversity Workgroup undertook the following opportunities to make progress toward the Diversity outcome:

- Presenting and hosting partnership-wide training, webinars and guest speakers on DEI.

- Establishment of memorandums of understanding (MOUs) with regional Historically Black Colleges and Universities (HBCUs).
- Training and coordination to ensure more equitable grant funding and offerings.
- Establishment of the Workforce Action Team and associated workforce landscape assessment with the Education Workgroup.
- Launching of the C-StREAM summer internship program with the Chesapeake Research Consortium to engage underrepresented or first-generation college students in environmental research and management internships within Chesapeake Bay Program partner organizations.

Recommendations on Progressing to 2025

The following recommendations are provided to address cross-cutting priorities in the Chesapeake Bay Program, as well as to meet the current priorities of the Diversity and Climate Resiliency workgroups.

- **Identify Champions**: Champions who take responsibility for leading and coordinating outcomes are critical. Often they include a federal representative along with someone from a jurisdiction, or in some cases, a nonprofit. Champions often contribute and advocate for catalyzing funding, staff and resources. Effective GITs and workgroups often have sustained funding from a partner committed to the work (e.g., Environmental Literacy outcomes are supported through NOAA's Bay Watershed Education and Training Program).
- **Provide Cross-Outcome Coordination** move the work of the climate and DEIJ directives and other cross-cutting initiatives forward, the Bay Program must strategically evaluate how to support this sort of distributed work. Network theory and other coordination models should be used to determine how best to structure this work. Leadership level support and sufficient staff resources should be identified to promote systemic change within the Chesapeake Bay Program to effectively include and amplify diverse voices and participants in our work; and to ensure the partnership considers and addresses the impacts of climate change effectively.
- **Secure Adequate Funding**: Progress takes investment. Climate change and DEIJ were identified as the high priority actions for the Executive Council, but resources did not follow to address these issues despite increasing budgets. One necessary action is to fund critical projects outside of the GIT-funding process. In addition, providing a better accounting of federal and state resources contributing to the outcomes could help address the funding shortfall by allowing partners to strategically align efforts, thereby increasing efficiencies.

Forest Buffers & Wetlands

While each of the 31 outcomes of the Chesapeake Bay Watershed Agreement are vital to improving the health of our local waterways and the Chesapeake Bay, it is possible that no two outcomes are more critical to improving water quality, climate resiliency and habitat than forest buffers and wetlands.

The Chesapeake Bay Program has recognized the importance of both outcomes since its inception. Both habitats were included as objectives for restoration in the 1987 *Chesapeake Bay Agreement*—"Protect, enhance and restore wetlands, coastal sand dunes, forest buffers and other shoreline and riverine systems important to water quality and habitat."

The achievement of the forest buffers and wetlands outcomes are critical to meeting the Bay Program's water quality goals. In fact, 10% of planned nitrogen reductions are estimated to come from forest buffer plantings alone. Both provide a wealth of ecosystem benefits to the people that live, work and recreate within the watershed. Wetlands provide habitat for a diversity of terrestrial and aquatic species, while recharging groundwater and helping to stabilize climatic influences. Forest buffers help to cool air and stream temperatures, benefiting brook trout and other types of fish, and help support healthy stream ecosystems. Both habitats provide crucial barriers between nutrient and sediment pollutants flowing off the land and into nearby waterways, helping to reduce the impacts of storms and flooding on downstream communities. Work undertaken to further these "keystone outcomes" aids in progressing the other 29 of the *Watershed Agreement*.

Fundamental changes are needed to generate the significant increase in project implementation rates required to meet the goals set in the outcomes for both forest buffers and wetlands. The Forest Buffers and Wetlands outcomes are unique in that they require changes to land use and cover. As the majority of the land in the watershed is privately owned, it will take willing landowners and effective incentives to achieve these outcomes. Numerous efforts to accelerate these outcomes have been implemented over the past several years to varying degrees of success. In 2022, stakeholders for each outcome were brought together for a series of workshops to discuss restoration efforts, review barriers to implementation, and develop strategies and action plans for increasing progress.

Challenges

The process for funding, implementing and maintaining each outcome is complex with several barriers to accelerating implementation.

- **Implementation programs**: New, innovative programs are needed to accelerate progress in reaching buffer and wetlands goals. Existing cost-share programs can be challenging for some landowners to navigate, with complex requirements and high out-of-pocket costs for landowners. Flexible, turnkey programs resulting in no cost solutions for landowners have proven to be successful in helping with forest buffer implementation. New models should also

be considered in how to effectively distribute funding and where needed, to compensate landowners for the conversion of productive land to buffers or wetlands.

- **Dedicated funding**: The current increase in federal funding for environmental restoration has provided significant advances but often, these funds are not targeted to forest buffers and wetlands. Grant programs often do not account for the myriad of needs required for successful plantings and restoration of wetlands and forest buffers. Funding is needed to conduct ongoing maintenance to ensure plantings perform their ecosystem functions, as well as for the long-term capacity to conduct these extended maintenance operations (particularly for wetlands, which tend to be multi-year restoration efforts). Funding agreements eventually expire and in the case of restoration projects that take multiple years, like wetlands, it is critical to ensure uninterrupted funding.
- **Outreach and engagement**: Increased engagement and outreach with landowners is needed to further the forest buffers and wetlands outcomes. Streamlined communications in plain language is needed to emphasize the value of these practices, as implementation can result in trade-offs (e.g., shading out crops adjacent to buffers, future development capabilities, regulatory oversight for wetlands). Time and effort is needed to build long-lasting and trust-worthy relationships with these audiences.
- **Capacity**: While implementation funding has grown through such bills as the Inflation Reduction Act (IRA) and Infrastructure Investment and Jobs Act (IIJA), short-term grants can make it challenging for organizations to support an increase in staff. There is simply not enough capacity, mainly at the state agency and NGO level, to develop and submit project proposals, produce and manage grants, review and issue project permits, and conduct the needed outreach, planting and maintenance required to meet the wetlands and forest buffers outcomes, as well as the goals in the jurisdictions' Phase III Watershed Implementation Plans (WIPs). For the forest buffer outcome, in areas where intensive outreach programs are in place, landowner demand to plant buffers has exceeded capacity for planting and maintenance, so inadequate capacity limits outcome progress. Additionally, retaining staff is as essential as building a new workforce, as it provides continuity and builds trust with landowners. Therefore, it is essential to support technical assistance positions that pay a fair wage, have job security and provide a good working environment.
- **Tracking and verification:** It is a challenge to accurately track, report and verify the acreage of forest buffers and wetlands restored. Due to the variety and complexity of our funding sources, the broad range of nonprofits working in this space and different mechanisms for tracking implementation in each jurisdiction, practices are not always reported. Best management practice (BMP) data entry, and verification issues within the Chesapeake Bay Assessment Scenario Tool (CAST), prevent the full accounting of riparian forest buffers and wetlands. For buffers, their credit in CAST expires after 15 years, meaning the jurisdictions will need to verify the plantings are still present and functioning as intended. In regard to wetlands, they are not currently counted in the model in urban areas, and wetland enhancement is not considered a BMP, making it unable to be tracked. The Wetlands Workgroup is cognizant of these challenges

and is developing a wetlands tracking tool that will help with reporting and is anticipated to be available in fall 2023.

- **Emerging threats**: Although forest buffers and wetlands are critical practices for increasing the resilience of ecosystems and communities to climate change, climate change can impose challenges for successfully establishing forest buffers and wetlands. Land subsidence, marsh migration, flooding, drought and increases in air and water temperature are just some of the ways in which a changing climate is impacting buffers and wetlands. Moving forward, practitioners will need to incorporate climate change considerations into species selection, site design and maintenance planning.

Current Opportunities

Despite these challenges, both outcomes have several ongoing activities that are helping them to achieve success.

- In 2022, the Chesapeake Riparian Forest Buffer Leadership Workshop and Restoring Wetlands of the Chesapeake Bay Watershed Workshop, convened professionals from across the watershed to strategize on how to accelerate progress toward these outcomes.
    - Chesapeake Riparian Forest Buffer 2022 Leadership Workshop Summary and Next Steps
    - Restoring Wetlands of the Chesapeake Bay Watershed Workshop Action Plan
- As an outcome of the Chesapeake Riparian Forest Buffer Leadership Workshop, each of the jurisdictions developed their own riparian forest buffer action strategies to identify ways in which they can uniquely progress buffer implementation over the next 5-10 years.
- A reorganization of the Wetlands Workgroup recently occurred, to focus efforts on both non-tidal and tidal wetland restoration and enhancement. Even though the outcome as currently written doesn't reflect non-tidal and tidal wetlands individually, this shift allows workgroup members to prepare for how they would like to address changes in the outcome post-2025.
- Both outcomes have worked across other Chesapeake Bay Program GITs, workgroups and advisory committees to fill information and data gaps. Some of this work includes recent Scientific and Technical Advisory Committee (STAC) reports like, *Rising Watershed and Bay Water Temperatures—Ecological Implications and Management Responses* and workshops, *Evaluating an Improved Systems Approach to Crediting: Consideration of Wetland Ecosystem Services*.
- A growing momentum to expand existing flexible and effective buffer programs to complement current CREP funding.
- GIT-funded projects, like *Maintaining Riparian Forests in Stream Corridor Restoration*, emphasize the important role that forest buffers play in overall stream ecosystem health, and the in-progress, *Mapping Non-Tidal Wetlands in Areas with Outdated Wetlands Maps*, develops a new approach to cost-effectively model the location of non-tidal vegetated wetlands.

Accelerate Progress to 2025

While the forest buffers and wetlands outcomes will not be met by 2025, the following strategies will help to accelerate progress over the next two years:

- Establish clear geographic and numerical targets, measures of success, accounting systems and monitoring protocols for tidal wetland restoration.
- Support effective, flexible buffer and wetland programs to limit or eliminate out-of-pocket costs for landowners, provide maintenance, fund practices on a rolling basis and limit eligibility requirements.
- Build and retain staff capacity to scale-up implementation of both buffers and wetlands and offer high-quality technical and maintenance services.
- Cultivate partnerships to support sustained funding and to coordinate outreach and technical assistance efforts.
- Develop more strategic approaches and increase capacity for outreach and engagement. These could include:
    - Encourage time and effort to cultivate relationships with private landowners to understand their barriers to wetlands and forest buffers.
    - Develop targeted communications materials for different audiences (e.g., landowners, policymakers, agricultural technical service providers) that emphasize the value and co-benefits of forest buffers and wetlands using case studies and success stories.
    - Ensure messages are in easily understood terms, spread frequently and through a variety of communications mediums to ensure all audiences are being reached.
- Expand tracking and reporting to ensure all forest buffers and wetlands are appropriately accounted for and verified. In particular, develop a strategy to conduct outreach to nonprofits, state agencies and other entities to ensure they know how to report their work to the new wetlands tracking tool that will be available in fall 2023. Additionally, review current tracking systems to make sure everything is working normally and being reported accurately.
- Explore additional funding options to enhance data collection and ensure the wetlands tracker remains upgraded.

Outcome Attainability

The Executive Council charge calls for updates on the attainability of the 31 outcomes of the *Chesapeake Bay Watershed Agreement* in reaching their goals. These snapshots provide an overview of their current status, challenges toward meeting their goals, opportunities to date and recommendations on accelerating progress toward 2025. This assessment found that 17 of our outcomes are considered to be on course, 12 are off course and two are uncertain pending data updates later on in 2023.

Please note that some outcomes in the *Watershed Agreement* do not have a set completion date of 2025, but rather have a different target or are asked to continually show progress.

	
Blue Crab Abundance Outcome	Wetlands Outcome
Blue Crab Management Outcome (Completed)	Black Duck Outcome
Oysters Outcome	Brook Trout Outcome
Forage Fish Outcome	Submerged Aquatic Vegetation Outcome
Fish Habitat Outcome	Forest Buffers Outcome
Stream Health Outcome	Tree Canopy Outcome
2017 Watershed Implementation Plans (WIPs) Outcome (Complete)	2025 Watershed Implementation Plans (WIPS) Outcome
Fish Passage Outcome	Diversity Outcome
Water Quality Standards Attainment and Monitoring Outcome	Toxic Contaminants Policy and Prevention Outcome
Local Leadership Outcome	Toxic Contaminants Research Outcome
Protected Lands Outcome	Students Outcome
Land Use Methods and Metrics Development Outcome	Climate Adaptation Outcome
Land Use Options and Evaluations Outcome	
Public Access Outcome	
Sustainable Schools Outcome	
Environmental Literacy Planning Outcome	
Climate Monitoring and Assessment Outcome	

Outlook Uncertain:

The outlook of the Healthy Watersheds Outcome and the Stewardship Outcome are considered uncertain pending additional analysis this summer.

Sustainable Fisheries Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Protect, restore and enhance finfish, shellfish and other living resources, their habitats and ecological relationships to sustain all fisheries and provide for a balanced ecosystem in the watershed and Bay."

Photo by Carlin Stiehll/Chesapeake Bay Program

Blue Crab Abundance Outcome

OUTLOOK ON COURSE

Outcome

Maintain a sustainable blue crab population based on a target of 196* million adult females. Refine population targets through 2025 based on best available science.
**The original target of 215 million was revised in November 2020 based on the best available science as outlined in the outcome language.*

Status

The abundance of adult female blue crabs in the Chesapeake Bay has not fallen below the threshold of 72.5 million since 2014, which indicates a sustainable population based on the management framework derived from the 2011 benchmark stock assessment, which was last updated in 2020. The female exploitation rate, or the percentage removed from the population in a year, has not exceeded the threshold of 37% since 2007, suggesting that actions to manage the female blue crab population have been effective. The Blue Crab Abundance Outcome is on course and expected to be met by 2025.

What has helped achieve success since 2014?

- The jurisdictions adopted new female-specific management reference points (the target and threshold numbers for abundance and harvest) in November 2020 based on the 2017 Blue Crab Stock Assessment Update, which included more recent survey and harvest data.
- A Goal Implementation Team funded report and related science workshop were conducted to better understand factors that affect blue crab abundance and recruitment, and to inform fishery management.
- In 2021, the Chesapeake Bay Stock Assessment Committee (CBSAC) created a Blue Crab Harvest Reporting document to record each jurisdiction's efforts to track blue crab harvest and provide recommendations for improving the accuracy of commercial and recreational harvest data.

What challenges have hindered progress?

- Additional science and research to improve the stock assessment model such as characterization of model uncertainty and bias.
- Research/monitoring to quantify the impact of environmental conditions (e.g., water temperature, oxygen concentrations) and climate change (e.g., coastal currents/flow, shifting distributions) on blue crab recruitment and abundance.

If on course, what is needed to continue current trajectory?

- Complete a new benchmark stock assessment and identify management reference points based on the model results.
- Fund research that will address data gaps identified in the science workshop, including ecosystem drivers of blue crab population.

Blue Crab Management Outcome

OUTLOOK
COMPLETED

Outcome

Manage for a stable and productive crab fishery including working with the industry, recreational crabbers and other stakeholders to improve commercial and recreational harvest accountability. By 2018, evaluate the establishment of a Bay-wide, allocation-based management framework with annual levels set by the jurisdictions for the purpose of accounting for and adjusting harvest by each jurisdiction.

Status

The Chesapeake Bay's commercial and recreational blue crab fisheries are managed by the State of Maryland, the Commonwealth of Virginia and the Potomac River Fisheries Commission, based on guidance from the 2011 Chesapeake Bay Stock Assessment. The management framework uses female-specific reference points (target and threshold numbers) to indicate the sustainability of the blue crab population and inform management decisions. In 2017, Maryland, Virginia and the Potomac River Fisheries Commission decided to maintain use of this framework rather than moving to a new, allocation-based framework. This decision was guided by constituent feedback and the perspectives of the agencies that manage the fishery. The Blue Crab Management Outcome is completed.

What has helped achieve success since 2014?

- The completion of an assessment that evaluated the need for a framework that would allocate an annual total allowable catch of male and female blue crabs. The assessment took into consideration feedback from constituents, the Maryland Tidal Fisheries Advisory Commission, the Potomac River Fisheries Commission and the Virginia Crab Management Advisory Committee.
- An agreed-upon and functioning female-specific management framework in conjunction with a partnership of blue crab management agencies, industry stakeholders and scientists working together to better understand the blue crab population and fishery.
- Prioritization of ongoing efforts to improve estimates of blue crab harvest and other sources of mortality.

What challenges have hindered progress?

- This outcome is completed.

Oysters Outcome

OUTLOOK ON COURSE

Outcome

Continually increase finfish and shellfish habitat and water quality benefits from restored oyster populations. Restore native oyster habitat and populations in 10 tributaries by 2025 and ensure their protection.

Status

Ten tributaries have been selected for large-scale oyster restoration in Maryland and Virginia. In 2020, Virginia added an 11th bonus tributary in the Elizabeth River). Seven of the original 10 tributaries are considered to be restored and are in the monitoring and evaluation phase. This work constitutes the largest oyster restoration project in the world. The Oysters Outcome is on course and will be met by 2025, although monitoring and evaluation of some of the restoration sites will continue past 2025.

What has helped achieve success since 2014?

- Developing a strong framework upfront, that includes science, planning, common goal setting, success criteria and partner development.
- A strong commitment to monitoring, allowing partners to track success relative to well-established criteria.
- Collaborating and sharing information with a broad array of stakeholders and interested parties, ensuring they are engaged during the planning process and implementation phase.
- Consistent federal and state funding for construction and hatchery support.
- University of Maryland's Horn Point oyster production facility produced over five billion oyster larvae to support restoration.
- Research into the ecosystem services provided by restored reefs and its associated economic impact helped make the case for continued funding.

What challenges have hindered progress?

- Operating at a globally unprecedented scale required risk, novel thinking and significant resources (approximately $100M).
- Poor water quality, sedimentation, disease and, in some places, low natural recruitment from other oysters.
- Continued reef stewardship is key, including maintaining the areas as oyster sanctuaries (non-harvest status) and ensuring sufficient water quality to allow for thriving oyster populations.
- Construction issues on a few reefs have resulted in the need for modification or removal.
- Not all communities are supportive of the restoration effort.

If on course, what is needed to continue current trajectory?

- Continued commitment by the states (Maryland and Virginia) to allow the construction and protection of non-harvest (sanctuary) oyster reefs.
- Continued funding and technical support from a wide range of partners, including federal agencies, state agencies, NGOs and academics.
- Continued support for reef monitoring and tracking progress toward the '10 tributaries' outcome.

Forage Fish Outcome

OUTLOOK ON COURSE

Outcome

Continually improve the partnership's capacity to understand the role of forage fish populations in the Chesapeake Bay. By 2016, develop a strategy for assessing the forage fish base available as food for predatory species in the Chesapeake Bay.

Status

In 2020, the Forage Action Team developed an Indicator Development Plan that prioritized seven indicators that could be developed with existing data and have clear management applications. Four of these indicators are currently under development or ready for development and will help provide insight into the status of forage species in the Bay. The Forage Fish Outcome is on course.

What has helped achieve success since 2014?

- A 2014 Scientific and Technical Advisory Committee workshop and report, *Assessing the Chesapeake Bay Forage Base*.
- GIT-funded research that developed a suite of forage indicators and consumption profiles for representative predators in the Chesapeake Bay and investigated environmental drivers of forage population trends.
- NOAA-funded research developing habitat suitability models for key forage species.
- The Indicator Development Plan, which prioritized indicators to describe the status of forage species.

What challenges have hindered progress?

- Completing the development of forage status and trends indicators.
- The ability to clearly communicate to policy-makers the need for strategies to manage forage species as they are an ecosystem factor that could impact currently-managed species such as striped bass.
- Developing science-based management strategies to mitigate the impacts of habitat loss, shoreline development, dissolved oxygen and pollution on forage species.
- Including more focused surveys in under-sampled shallow water to enhance assessments.

If on course, what is needed to continue current trajectory?

- Develop Chesapeake Bay specific striped bass prey consumption estimates and condition index.
- Complete indicator development, publish a synthesis of indicators and implication on forage status and trends, and integrate the indicators into NOAA's seasonal summaries and State of the Ecosystem Reports.

Fish Habitat Outcome

OUTLOOK ON COURSE

Outcome

Continually improve effectiveness of fish habitat conservation and restoration efforts by identifying and characterizing critical spawning, nursery and forage areas within the Bay and tributaries for important fish and shellfish, and use existing and new tools to integrate information and conduct assessments to inform restoration and conservation efforts.

Status

Several assessments of tidal and non-tidal fish habitats across the Chesapeake Bay watershed have been conducted and are ongoing. These habitat studies also have the potential to inform shoreline restoration management. Additional studies have linked environmental variability to fish populations, resulting in adjustments to fishery management risk assessments. The Fish Habitat Outcome is on course.

What has helped achieve success since 2014?

- Developing a greater understanding of the requirements and threats to Chesapeake Bay fish species through research and literature review.
- Publishing an inventory of tools, maps and datasets related to fish habitat.
- Development of a fish habitat assessment tool to support government agencies, non-profits and local community members engaged in the conservation and restoration of fish habitat.
- Prioritizing fish habitat stressors including, shoreline hardening, impervious surfaces, forest buffer loss, temperature increases and low dissolved oxygen.
- Establishing shoreline hardening thresholds and related impacts on forage fish.

What challenges have hindered progress?

- Communicating and including fish habitat considerations in Watershed Implementation Plans, fisheries management and other local planning processes.
- A mismatch in fish habitat team member expertise, capacity and constituent needs.
- Difficulty finding team members willing to lead specific projects.

If on course, what is needed to continue current trajectory?

- Successfully endorse and receive funding for partners to implement innovative fish habitat enhancement projects such as co-locating oysters and submerged aquatic vegetation.
- Provide technical support for fish habitat restoration projects applying for Bipartisan Infrastructure Law, Inflation Reduction Act and other funding sources.
- Develop a fish and habitat risk assessment that draws from recently completed research, habitat assessments and water quality observations to evaluate the linkages between changing Bay conditions and aquatic living resources.

Vital Habitats Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Restore, enhance and protect a network of land and water habitats to support fish and wildlife, and to afford other public benefits, including water quality, recreational uses and scenic value across the watershed."

Photo by Will Parson/Chesapeake Bay Program

Wetlands Outcome

Outcome

Continually increase the capacity of wetlands to provide water quality and habitat benefits throughout the watershed. Create or reestablish 85,000 acres of tidal and non-tidal wetlands and enhance function of an additional 150,000 acres of degraded wetlands by 2025. These activities may occur in any land use (including urban), but primarily occur in agricultural or natural (undeveloped) landscapes.

Status

In-between 2010 and 2021, initial data from the National Environmental Information Exchange Network (NEIEN) showed that 16,000 acres of wetlands were created or restored on agricultural lands, representing an 18.8% achievement of the 85,000-acre goal. The rate of this gain in wetlands acreage is not currently adequate to achieve the outcome target. While progress shows that wetlands are being restored and created across the watershed, the total acres of wetlands are also decreasing due to land subsidence, climate change and development pressures. At this time, wetlands acreage accounting is problematic, in part, due to the inability to accurately track loss or gains in wetlands across the watershed and assess whether our activities are yielding the desired progress. The Wetlands Workgroup will refine the outcome to recognize the effect of climate change, development and water quality on outcome achievement. Additionally, the workgroup will develop achievable targets specific to tidal and nontidal wetlands. The Wetlands Outcome is off track and will not meet 2025.

What has helped achieve success since 2014?

- The development of a new wetlands accounting system is near completion.
- Many projects funded under the Bay Program's Goal Implementation Team (GIT) funding process.
- The development of communications products for decision-makers.
- Collaboration with other GITs, workgroups and organizations on reports, workshops and meetings to discuss barriers to wetland implementation and identify innovative approaches to achieve multiple *Watershed Agreement* goals and outcomes.
- Both tidal and nontidal wetlands have been approved as best management practices (BMPs).
- The Wetlands Action Workshop and Plan.
- Science and Technical Advisory Committee workshops related to wetlands ecosystem crediting and the influence of water temperature rise.
- Bipartisan Infrastructure Law has created opportunities for increased wetlands funding for strategic planning, capacity and implementation.
- Collaboration between partners within jurisdictions.
- Department of Defense (DOD) Readiness and Environmental Protection Integration and Sentinel Landscape Program Partnership that have leveraged DoD funds for off-base wetland protection and conservation.

What challenges have hindered progress?

- Incomplete or unavailable tracking information to assess progress toward restoring, creating or enhancing wetlands.
- A lack of capacity and support for workgroup members and staff, including no workgroup chair(s), resulting in a year and half without a workgroup meeting.

- A prolonged vacancy in the Wetlands Workgroup staffer position.
- Lack of capacity (including grant writing/management, outreach to landowners, project design and construction, post-construction monitoring, etc.) within government agencies NGOs, and the private sector.
- Climate change and land subsidence.
- There are still challenges among the partnership in agreement on definitions for enhancement; additionally, since enhancement is not a best management practice, the National Environmental Exchange Network does not provide a way to track it.
- Lack of jurisdictional representatives on the Wetlands Workgroup; those that attend often cannot speak to all the programs in their jurisdiction that cover wetlands.
- A significant amount of Wetlands Workgroup time was spent on wetland verification with the Best Management Practice Verification Ad-Hoc Action Team and GIS wetland mapping.
- Matching fund challenges to take advantage of cost-share restoration programs.

If off course, what is needed to accelerate progress?

- Significant engagement and building long-term capacity to implement wetland projects across localities, state and federal sectors, NGOs and industry.
- Address preferential implementation of stream projects (or other best management practices) for Bay TMDL crediting, including resulting resource trade-offs and unintended consequences.
- Develop and implement effective incentives for the agriculture community for implementation.
- Supporting capacity for jurisdictions and partners with the needs related to wetland projects: permitting, complex design and construction.
- Address the challenges related to the cost of restoring and/or enhancing tidal wetlands, particularly in the face of sea level rise projections and land use competitions when the landscape is highly valued as a working waterfront, urban/suburban or private waterfront property.

Black Duck Outcome

OUTLOOK OFF COURSE

Outcome

By 2025, restore, enhance, and preserve wetland habitats that support a wintering population of 100,000 Black Ducks, a species representative of the health of tidal marshes across the watershed. Refine population targets through 2025 based on best available science.

Status

The Black Duck Outcome was developed using data provided by the Atlantic Coast Joint Venture's Black Duck Decision Support Tool (DST). In 2017, the tool estimated that an additional 151,272 acres of wetland habitat were necessary to support a wintering population of 100,000 Black Ducks. This acreage is in addition to the established baseline of 566,477 acres. A recent update to the tool allowed sufficient and insufficient watersheds to be identified, along with their conservation status, indicating where additional protection, restoration or enhancement is needed. Since the Black Duck Outcome is dependent on the Wetlands Outcome, and the Wetlands Outcome is off course, the Black Duck Outcome is also off course and will not be met by 2025. The migratory nature of the Black Duck lifecycle allows external factors outside of the Chesapeake Bay watershed to influence the population and climate change impacts are shifting the species range. Because of this there is little that the current outcome can do to actually benefit the Black Duck population. In fact, Black Duck populations have been stable since the 1960's. We believe that the outcome will need to be revised in 2025, broadened to represent the population of wintering waterfowl under climate change, sea level rise and subsidence scenarios. The Black Duck Outcome is off course and will not be met by 2025.

What has helped achieve success since 2014?

- Completion of the Black Duck DST provided a trackable habitat-based outcome to work towards the 100,000 Black Duck population goal.
- Continued updates to the Black Duck DST have identified areas where there is sufficient and insufficient wetland quantity and quality to support the desired population of Black Ducks.
- The completion of the bioenergetics modeling for the refuges in the face of sea-level rise and land-use changes, which showed the importance of underwater grasses as a food resource for wintering Black Ducks.
- Conservation and protection of coastal lands, particularly marsh migration corridors, to allow for future Black Duck habitat.

What challenges have hindered progress?

- The Mid-Winter Waterfowl Survey never provided population estimates for waterfowl species as described in the original outcome. The Mid-Winter Waterfowl survey monitors trends in waterfowl populations but not Black Ducks specifically. As a result, it has never been possible to count the number of Black Ducks in the Chesapeake Bay watershed, which is why the outcome was modified to a habitat-based outcome.
- In terms of value to Black Ducks, not all habitat conservation is equal. It is uncertain whether the number of acres of wetlands restored under the Wetlands Outcome are quality habitat for Black Duck.
- Present efforts for wetland restoration do not prioritize Black Ducks.
- It has been a challenge to collect the necessary data for the outcome.

- Degraded habitat conditions due to climate impacts, shoreline disturbance and food availability.

If off course, what is needed to accelerate progress?

- An increase of implementation projects that focus on Black Duck habitat conservation.
- Increased funding for wetland restoration and capacity in workgroup members and staff.
- The development of a tracking system that collects the acres of restored Black Duck habitat.

Stream Health Outcome

OUTLOOK ON COURSE

Outcome

Continually improve stream health and function throughout the watershed. Improve health and function of ten percent of stream miles above the 2008 baseline for the watershed.

Status

The 2008 baseline for the Stream Health Outcome indicator is the six-year interval between 2006 and 2011, and progress is measured in successive six-year intervals. The indicator, known as the Chesapeake Basin-wide Index of Biotic Integrity (Chessie BIBI), is calculated from stream macroinvertebrate data collected and shared by federal, state, local and community monitoring programs. Statistical estimates based on the data indicate about 61.7% of stream miles in the watershed likely supported healthy communities during the baseline period. Estimates rose 6.1% to 67.8% in the subsequent six-year interval (2012—2017). While there is no guarantee this improving trend will persist or be detectable in the upcoming six-year interval (2018—2023), this trend appears to be moving in the desired direction.

The Stream Health Workgroup is currently implementing a plan to develop additional metric(s) to complement the Chessie BIBI. These metrics are intended to be established over the next five years and are necessary to understand and communicate how streams respond to management actions. These additional metrics will help us view how stream health is changing on a smaller timescale than the Chessie BIBI, which will be useful in monitoring responses to management actions and other local and watershed-wide changes. The Workgroup developed a three-phase plan to identify primary stressors to stream health and function, identify best watershed management actions to reduce those stressors and develop non-biologic indicators of stream health. Work has just begun on the final phase of this plan to identify appropriate metrics that may be used as indicators. The Stream Health Outcome is on course.

What has helped achieve success since 2014?

- Assembly and management of a standardized database for the shared stream macroinvertebrate data.
- Cumulative effects of multiple actions over decades undertaken under the auspices of the Clean Water Act that have improved stream water quality and reduced loss/degradation of existing streams from direct and indirect impacts.
- Funding to identify the extent in which management actions improve stream health and the multiple stressors that impact it.
- Funding to establish the baseline for the Stream Health Outcome indicator.
- Studies, research and tools developed by partners, including looking at the impact of climate change on freshwater streams and Maryland's stream temperature Total Maximum Daily Load.

What challenges have hindered progress?

- Funding is not guaranteed to complete the Workgroup's long-term plan to create one or more non-biological metrics to complement the Chessie BIBI in assessing stream health.
- Inconsistent funding causes delays in progress on logic and action plan items.
- Inconsistent or absent participation from state representatives on the Workgroup.

- Gaps in the monitoring data's spatial and temporal coverage make it difficult to directly estimate percentages of healthy streams in the pre-baseline (2000-2005), baseline (2006-2011) and first interval (2012-2017) periods.
- Stream health is complex and multivariate, thus reliance on a single indicator (Chessie BIBI) may miss key components of overall stream health and have limited our ability to track overall changes.

If on course, what is needed to continue current trajectory?

- Continued funding for data management and Chessie BIBI analysis and to expand stream biological monitoring efforts in poorly sampled regions of the watershed.
- Habitat preservation throughout the watershed for high quality streams and sensitive natural areas.
- Expanded focus from TMDL and water quality improvements to more holistic watershed improvements by identifying stressors to stream health and prioritizing management actions to reduce those stressors.
- Beyond 2025, the outcome will be reevaluated to account for climate change and population growth while continuing to improve stream health as measured by the Chessie BIBI scores.

Brook Trout Outcome

OUTLOOK OFF COURSE

Outcome

Restore and sustain naturally reproducing brook trout populations in Chesapeake Bay headwater streams, with an eight percent increase in occupied habitat by 2025.

Status

Changes in land use and climate continue to have significant detrimental impacts on brook trout habitat. The resources available to mitigate these impacts are insufficient to adequately sustain and restore brook trout populations at the necessary scale to achieve the outcome. A more accurate and comprehensive system to document gains and losses in brook trout habitat is being developed as current data are incomplete. An assessment completed by the Eastern Brook Trout Joint Venture in 2015 showed that wild brook trout occupy 33,200 square kilometers of habitat within the Chesapeake Bay watershed. This includes the streams they share with brown trout and/or rainbow trout. There are 13,500 square kilometers of "wild brook trout only" streams, which was the baseline established for this outcome. Intervention and continued data support are needed to increase the rate of implementation and monitoring of conservation and restoration activities. The Brook Trout Outcome is off course and will not be met by 2025.

What has helped achieve success since 2014?

- Science and management efforts to better understand landscape-scale impacts, climate change, brook trout genetics, groundwater effects on stream temperature and direct stressors.
- Gains in brook trout occupancy resulting from workgroup members and other stakeholder action such as reintroduction, connecting fragmented habitats and mitigating stressors.
- Prioritizing 10 "Priority Level 1" regions (sub-watersheds with the best chance for sustaining wild brook trout populations) for brook trout conservation in the watershed.
- The availability of several decision support tools, such as the Trout Unlimited Eastern Brook Trout Conservation Portfolio and the Riparian Restoration for Climate Change Resilience Tool.
- Public outreach and awareness of threats to brook trout habitat.
- Funding from the National Fish and Wildlife Foundation and other sources which have provided the opportunity for much-needed brook trout research, monitoring efforts and tool development and upkeep.

What challenges have hindered progress?

- There is a limited capacity to implement and coordinate actions at the scale necessary to overcome the detrimental impacts to brook trout habitat throughout the watershed.
- Difficulties in developing cross-Goal Implementation Team collaborations and developing synergies across common goals and objectives.
- A lack of staffing resources to collect and analyze data that is necessary to track progress toward the outcome.
- Funding is not adequate to restore and sustain brook trout populations across the watershed, which is necessary to overcome the detrimental impacts to their habitat.
- The COVID-19 pandemic contributed to delays in some activities.
- Each state is unique, there is no one-size fits all approach.
- Impacts of land use and climate change provide damaging effects to brook trout habitat.

If off course, what is needed to accelerate progress?

- Increase resources and capacity to implement and coordinate actions at the scale necessary to overcome the detrimental impacts to brook trout habitat throughout the watershed. More specifically, each state should have dedicated funding for:
    - New staff and funding for an aggressive Aquatic Organism Passage Program partnering with state departments of transportation.
    - Land conservation to protect high-quality brook trout watersheds, groundwater spring sources and floodplains through fee acquisition or conservation easements.
    - Staff and resources for habitat improvements (e.g., large wood additions, riparian plantings).
- The Brook Trout Workgroup will reassess the outcome, lessons learned from managers and practitioners, and recent research results to provide a more relevant outcome and metrics for post-2025. This will include evaluating the impact of likely climate and land-use change scenarios.

Fish Passage Outcome

OUTLOOK ON COURSE

Outcome

Continually increase access to habitat to support sustainable migratory fish populations in the Chesapeake Bay watershed's freshwater rivers and streams. By 2025, restore historical fish migration routes by opening an additional 132 miles every two years to fish passage. Restoration success will be indicated by the consistent presence of alewife, blueback herring, American shad, hickory shad, American eel and brook trout, to be monitored in accordance with available agency resources and collaboratively developed methods.*

**In January 2020, the outcome was modified from the original language.*

Status

During the reporting period including 2020-2021, 32.6 additional stream miles were opened to fish passage, less than the two-year target of 132 miles. This target, set in accordance with the best available science, was established in January of 2020 after the Fish Passage Workgroup reached the goal set in the *2014 Chesapeake Bay Watershed Agreement* in 2016.

While the miles opened from 2020-2021 fall well below the biennial target and overall opened miles have declined over the past few years, the Fish Passage Workgroup does not expect this to be an ongoing trend. The workgroup is working on additional projects with a focus on identifying and correcting undersized and poorly constructed stream crossings that have created fish blockage. This new focus is expected to result in some fluctuations in progress toward the biennial target of 132 fish passage miles. However, based on the expected trajectory of this work and since the current rate of miles added averages 619 miles every two years, the fluctuations in miles added are expected to continue to average above the biennial target. The Fish Passage Outcome is on course and expected to be met by 2025.

What has helped achieve success since 2014?

- Dam removals and culvert replacements.
- Workgroup members have worked with dam safety programs to highlight dam removal benefits, such as public safety, reduced liability and resilience.
- The development of the guidance document, "Recommendations for Aquatic Organism Passage at Maryland Road-Stream Crossings (2021)".
- The U.S. Army Corps of Engineers released guidance on mitigation crediting for dam removals and other river obstructions.
- Collaboration with partners, including county and local governments helps more projects succeed.

What challenges have hindered progress?

- Many dams are privately owned and owners are unwilling to pursue removal.
- The COVID-19 pandemic largely halted all fish passage activities and likely will affect outcome progress for 2020 and 2021.
- Inconsistencies with how fish passage projects are being tracked, so the outcome has been under-reporting progress across the watershed.

- More road safety assessments need to be funded, along with determining the presence of target aquatic species.
- Cost and complexity of many remaining dam removal projects has slowed progress.

If on course, what is needed to continue current trajectory?

- Several projects are underway and are expected to be completed by 2025.
- Workgroup partners must take advantage of the available infrastructure grants.
- Grants already submitted or near submittal, must be funded.
- Broaden workgroup engagement to include federal and state departments of transportation.
- Funding from the Infrastructure Investment and Jobs Act will be used to expand the dam removal and culvert initiatives while addressing resilience.

Submerged Aquatic Vegetation (SAV) Outcome

OUTLOOK OFF COURSE

Outcome

Sustain and increase the habitat benefits of submerged aquatic vegetation (SAV) in the Chesapeake Bay. Achieve and sustain the ultimate outcome of 185,000 acres of SAV Bay-wide necessary for a restored Bay. Progress toward this ultimate outcome will be measured against a target of 90,000 acres by 2017 and 130,000 acres by 2025.

Status

Between 2014 and 2018, SAV expanded by almost 33,000 acres in the Chesapeake Bay, reaching approximately 108,000 acres in 2018, the highest acreage recorded since Bay-wide surveys began in 1984. Because of this record increase, SAV acreage exceeded the 2017 target of 90,000 acres between 2015--2018. Between 2018 and 2019, however, over 44,000 acres were lost, approximately one-third of the Bay's SAV. This loss has been attributed to degraded water clarity following two years of above-normal precipitation and subsequent high flows. Since that time, SAV has slowly begun to rebound, with the most recent data, collected in 2022, showing 76,462 acres of SAV throughout the Bay and its tidal tributaries. Additional years of increased acreage will help clarify whether this recent gain is the start of a new positive trend, but it is unlikely that the interim goal of 130,000 acres will be reached by 2025. The interim goal of 130,000 acres remains attainable in the future if additional management actions are taken to ensure long-term and consistent improvements in water clarity and shallow water habitat protection. The SAV Workgroup, however, recommends reevaluating the ultimate SAV acreage goal of 185,000 acres to determine if it should be updated. This goal was based on historical SAV distribution in Chesapeake Bay and conditions that may not be met again in the future given the projected effects of climate change. The SAV Outcome is off course and will not be met by 2025.

What has helped achieve success since 2014?

- Management solutions, including the Chesapeake Bay Total Maximum Daily Load (Bay TMDL), have contributed to overall SAV recovery. Most notably, nutrient reductions allocated by the Bay TMDL facilitated the expansion of widgeon grass (*Ruppia maritima*) in the mid and lower Bay.
- Methods to collect, process and store SAV seeds have improved, and direct, small-scale, SAV restoration efforts have contributed to SAV acreage in years of SAV expansion.
- Collaboration with riverkeepers, watershed groups and other partners to implement the Chesapeake Bay SAV Watchers program has contributed to community engagement and understanding of SAV habitat value.
- Increased research and monitoring have contributed to an improved understanding of SAV ecology, restoration and the effects of climate change impacts.

What challenges have hindered progress?

- The Bay TMDL has reduced nutrient and sediment pollution and has contributed to overall SAV recovery in Chesapeake Bay. Watershed Implementation Plans (WIPs), however, are behind schedule, so reductions have been inadequate to consistently improve water clarity to the extent necessary for Bay-wide SAV goal attainment.

- Climate change impacts—including increased water temperature, episodic heat events and increased volume and intensity of precipitation—have also hindered progress toward attainment of the 2025 interim SAV goal. Specifically, rising water temperatures and isolated heat events have contributed to the consistent loss of eelgrass (*Zostera marina)*, a heat-intolerant species, in the lower Bay. Widgeongrass, a heat-tolerant species, has now expanded to become the most abundant species of SAV in the mid and lower Bay. While widgeongrass expansions facilitated by nutrient reductions have fueled many of the Bay-wide SAV recovery trends documented, its vulnerability to chronic and episodic influxes of nutrient-loaded watershed run-off (mostly from springtime precipitation events) hinders consistent and lasting gains in SAV acreage over time.
- Existing statutes, regulations and policies related to protecting SAV in Chesapeake Bay are inadequate in providing effective protection of existing and recovering SAV.
- The competition for shallow water habitat among multiple program goals has led to shallow water use conflicts and habitat trade-offs that have impacted SAV recovery potential in Chesapeake Bay.
- Inadequate staffing, training and funding have hindered the ability of Bay Program partners to conduct research, enforce laws and regulations, review permit applications for projects that impact SAV and directly restore SAV to the extent necessary to meet the needs of the outcome.

If off course, what is needed to accelerate progress?

- SAV is dependent on good water quality conditions to recover, expand and thrive. Two recent studies concluded that under projected climate conditions and current Bay TMDL nutrient reduction allocations, SAV in the Chesapeake Bay may continue a modest recovery but not reach its ultimate acreage goal. Nutrient and sediment reductions *beyond* those currently allocated in the Bay TMDL, however, would mitigate climate impacts and accelerate SAV recovery in the Bay.
- An improved understanding of how climate change and human actions will affect the health and benefits provided by each of the Bay's SAV communities (freshwater, brackish and high salinity) is needed. This community-specific understanding of both patterns and processes could be obtained by funding the SAV Sentinel Site Program and would allow resource managers to tailor management strategies to each community, protecting and restoring SAV throughout the Bay more effectively.
- Significant financial investments have proven effective for habitat and species restoration throughout the Chesapeake Bay (i.e., *Crassostrea virginica*, eastern oysters). To accelerate progress toward SAV goal attainment, similar investments for SAV restoration are necessary to expand research and upscale direct SAV planting capacity.
- Horned pondweed (*Zannichellia palustris)* grows abundantly in the mid-Bay but is not captured in the Bay-wide aerial monitoring program because it deteriorates before that portion of the Bay is surveyed. An expanded monitoring effort would improve our understanding of the distribution and abundance of this species in the mid-Bay, contribute its abundance to the SAV acreage goal, and facilitate improved protection and conservation of the habitat and ecosystem services it provides.
- An approach or analysis that employs structured decision making to manage habitat trade-offs and shallow-water use conflicts equitably and effectively, would provide a framework for how and when to allow for trade-offs that impact SAV and, ideally, accelerate progress toward SAV goal attainment.

Forest Buffers Outcome

OUTLOOK OFF COURSE

Outcome

Continually increase the capacity of forest buffers to provide water quality and habitat benefits throughout the Chesapeake Bay watershed. Restore 900 miles of riparian forest buffers per year and conserve existing buffers until at least 70% of riparian areas in the watershed are forested.

Status

The pace and scale of forest buffer implementation across the watershed is inadequate to meet the ambitious goals set in the 2014 Chesapeake Bay Watershed Agreement or in the Watershed Implementation Plans (WIPs) put in place by the seven jurisdictions. The Chesapeake Bay Program has not met its goal for riparian forest buffers since 2002, often achieving less than 10% on an annual basis. To meet the goals laid out in the Phase III WIPs, over 3,000 miles of forest buffers would need to be planted between 2022 and 2025. The Forest Buffers Outcome is off course and will not be met by 2025.

What has helped achieve success since 2014?

- Increased implementation of flexible buffer programs that have been popular with landowners.
- Development of state Riparian Forest Buffer Action Strategies to help identify pathways to accelerate implementation over the next 5-10 years.
- Additional state and federal funding available for tree planting initiatives.
- Ongoing work to fill information gaps, including the Scientific and Technical Advisory Committee's *Rising Watershed and Bay Water Temperatures* report and the Goal Implementation Team-funded *Maintaining Forests in Stream Restoration* project.

What challenges have hindered progress?

- Insufficient capacity for technical assistance, planting and maintenance. Much more technical assistance is needed to find, recruit and assist landowners.
- Inconsistencies in funding and program delivery, particularly in relation to Conservation Reserve Enhancement Program (CREP).
- Conserving mature forest buffers. Additional buffer conservation easement programs are needed to incentivize permanent conservation of forest buffers.
- Constraints with nursery supply to ensure the quality and quantity of tree stock will be available to meet ambitious planting goals.

If off course, what is needed to accelerate progress?

- Support sustained investments in effective, standalone flexible buffer programs (both existing and new programs).
- Additional consistent, coordinated leadership across the watershed to ensure efficient, dedicated and sustainable programs are in place.
- Build and retain capacity in staff, contractors and outreach.
- Track and maintain accountability for implementing the recently developed state Riparian Forest Buffer Action Strategies.
- Improved verification of buffers, including developing more cost-effective approaches.
- Leverage the benefits of riparian forest buffers for increasing climate resiliency in the watershed as the Bay Program addresses climate change effects.

Tree Canopy Outcome

OUTLOOK OFF COURSE

Outcome

Continually increase urban tree canopy to provide air quality, water quality and habitat benefits throughout the Chesapeake Bay watershed. Expand urban tree canopy by 2,400 acres by 2025.

Status

The most recent tree canopy data shows a net loss of over 25,000 acres of tree canopy across the Chesapeake Bay watershed. While it may take 10-15 years for tree plantings to be reflected in the aerial imagery used for producing the land use/land cover data, the 8,300 acres planted so far are not enough to mitigate the losses. Much effort is needed to reverse the trend of net losses and achieve the net gain specified in the outcome. The Tree Canopy Outcome is off course and will not be met by 2025.

What has helped achieve success since 2014?

- The development and release of high-resolution land use/land cover change data for the period 2013-2014 and 2017-2018 to more accurately track tree canopy gain and loss.
- In the past two years, urban tree canopy has gained national and global attention as a key arena for building equity and climate resilience in communities.
- Vital state and local programs in place to assist with tree plantings and management.

What challenges have hindered progress?

- The need to develop or strengthen new local and state policies that help conserve and maintain canopy where possible.
- Addressing tree inequity will require substantial resource investments in community-based solutions, robust and inclusive community engagement efforts and deliberate policy/program/funding adjustments to ensure these communities receive first priority in financial and technical assistance.
- Constraints with nursery supply to ensure the quality and quantity of tree stock will be available to meet ambitious tree planting goals.
- The need to fund, train and maintain a robust, well-trained workforce to meet scaled-up tree planting and maintenance needs.
- The lack of capacity and investment in programs varies widely across the watershed.

If off course, what is needed to accelerate progress?

- Implement Chesapeake Bay Program and jurisdictional action plans developed as a result of the recommendations from the 2023 Chesapeake Tree Canopy Funding & Policy Roundtable (expected completion date of summer 2023).
- Incorporate credits and incentives for forest and tree conservation and maintenance actions in the next (post-2025) Chesapeake Bay Total Maximum Daily Load implementation framework (in addition to planting).
- Invest in coordinated tree canopy workforce and nursery supply pathways to scale up implementation, with diversity, equity, inclusion and justice as the central focus.
- Expand tree canopy communication, outreach and training resources to help build local government and community support for tree conservation, maintenance and planting
- Leverage the benefits of tree canopy for increasing climate resiliency in the watershed as the Bay Program addresses climate change effects.

Water Quality Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Reduce pollutants to achieve the water quality necessary to support the aquatic living resources of the Bay and its tributaries and protect human health."

Photo by Will Parson/Chesapeake Bay Program

2017 Watershed Implementation Plans (WIPs) Outcome

OUTLOOK
COMPLETED

Outcome

By 2017, have practices and controls in place that are expected to achieve 60 percent of the nutrient and sediment load reductions necessary to achieve applicable water quality standards compared to 2009 levels.

Status

Watershed Implementation Plans (WIPs), created by the seven Bay watershed jurisdictions as part of the Chesapeake Bay Program's Accountability Framework and serving (the Phase I WIPs) as a large part of the basis for the Chesapeake Bay "pollution diet" or Total Maximum Daily Load (TMDL), are instrumental in the restoration of tidal water quality and meeting the 2017 and 2025 WIP outcomes. Improving water quality will support other restoration goals and benefit human health.

While the Chesapeake Bay Program partnership has met its 2017 pollutant reduction targets for phosphorus and sediment, it fell short of its pollutant reduction target for nitrogen by 15 million pounds. According to the Chesapeake Bay Program's Watershed Model Phase 5.3.2, controls put in place in the Chesapeake Bay watershed between 2009 and 2017 lowered nitrogen loads 11%, phosphorus loads 21% and sediment loads 10%. This outcome was established as a midpoint assessment from the 2009 baseline and the 2025 goal described in the Bay TMDL. The 2017 WIP Outcome is considered to be complete.

What has helped achieve success since 2014?

- Completion of Phase I WIPs and Phase II WIPs in 2010 and 2012, respectively, that outlined steps the seven Bay watershed jurisdictions committed to take to reduce nitrogen, phosphorus and sediment from flowing into the Bay.
- The additional implementation and verification of best management practices, especially in the agricultural sector, following the Bay Program partnership adoption of a BMP Verification Framework in 2014.
- Additional resources and technical support allocated to implementing the Bay TMDL from state and local governments.
- Steps taken to meet the wastewater sector's pollutant reduction goals a decade early.

What challenges have hindered progress?

- While this outcome is completed, challenges remain in reducing nitrogen loads, particularly from nonpoint sources.

What is needed to continue current trajectory?

- This outcome is completed.

2025 Watershed Implementation Plans (WIPs) Outcome

Outcome

By 2025, have all practices and controls in place to achieve applicable water quality (i.e., dissolved oxygen, water clarity/submerged aquatic vegetation and chlorophyll *a*) standards, as articulated in the Chesapeake Bay Total Maximum Daily Load.

Status

As of 2021, best management practices (BMPs) are in place to reduce 49% of nitrogen, 64% of phosphorus and 100% of sediment loads necessary for the Chesapeake Bay to attain applicable tidal water quality standards for dissolved oxygen, water clarity/submerged aquatic vegetation (SAV) and chlorophyll a. While management actions are sufficient to meet the sediment reduction target by 2025, they are not for the nitrogen and phosphorus reduction targets. Approximately 41 million pounds of nitrogen and 1.4 million pounds of phosphorus remain to be reduced. The 2025 WIP Outcome is off course and will not be met by 2025.

What has helped achieve success since 2014?

- The goal of reducing sediment loads to 18,587 million pounds annually was met as of 2021 due to the implementation of BMPs.
- An increase in federal funding from sources such as the Infrastructure Investment and Jobs Act is helping to expand BMP implementation and support the maintenance and growth of the Bay Program's long-term tidal and nontidal monitoring networks.
- Additional federal and state funding has helped to grow outreach opportunities and offer technical assistance for state and local entities throughout the watershed to fund nonpoint source BMP adoption and implementation.
- Enhanced financial and technical support for agricultural BMP implementation, tracking and reporting.
- Increased levels of engagement from local stakeholders to target resources and build capacity in meeting water quality goals, particularly in local waters.
- Continued efforts by local and state governments to reduce nutrient and sediment pollution from wastewater treatment facilities, regulated stormwater systems and nonpoint sources.

What challenges have hindered progress?

- The COVID-19 pandemic impacted the ability to work directly with landowners and limited access to BMP implementation and verification.
- An outbreak of the avian flu in 2022 limited interaction with the agriculture community.
- Climate change impacts that increase flow and pollution delivery above historic baseline conditions have impacted the amount of nitrogen and phosphorus that jurisdictions must reduce in order to meet their water quality goals.
- The reservoir located behind the Conowingo Dam reached trapping capacity much earlier than anticipated, resulting in additional nitrogen, phosphorus and sediment loads to the Bay during higher flow events compared with historic conditions of the Susquehanna River.

- Rising inflation rates led to substantial increases in costs for the materials and labor needed to implement, maintain and operate BMPs and monitoring networks.
- New funding is often targeted to direct implementation and often does not address increased technical assistance and workforce development needs to administer new funds or programs.
- Insufficient capacity to meet technical assistance and outreach needs across all sectors and levels of government.

If off course, what is needed to accelerate progress?

- Define the vision for what represents an acceleration of progress above present rates.
- Greater focus on implementation of non-point source practices and controls that result in on-the-ground nutrient reductions across the watershed to accelerate progress in agricultural and unregulated developed areas, and continuing to develop best practices ensuring all installed BMPs are captured and reported in appropriate jurisdictional tracking systems.
- Greater targeting of BMPs that are known to be more effective in reducing nutrient loads in areas that have the greatest impact. This likely includes better coordination around, and use of, existing targeting tools, as well as the evaluation of existing federal and state programs to improve efficiencies to better target and implement highly effective BMPs.
- Acknowledgement of programs that deliver high-quality results may improve awareness of strategies that already work effectively. However, new incentives and innovative approaches will be essential to accelerate the rate of progress above current levels, including: (a) improved coordination between implementation and monitoring partners/programs to understand how to adapt management approaches that increase efficiency to reduce nitrogen loads and restore water quality and living resources and (b) more discussion to promote success stories, share lessons learned and foster new innovative approaches (e.g., pay for performance).
- Continue to account for, and adapt to, using new data, analyses and science to increase the effectiveness of management efforts, such as creating new policies, developing effective incentive programs and actively pursuing adaptive management actions in timely, decision-making processes.
- Improve accounting for evolving climate change impacts and address the impacts that human growth and livestock increases have on our progress to achieving reduction goals.
- Government and non-government organizations implementing BMPs need support for workforce development, technical assistance, outreach, grant management, etc., in order to accommodate the increase in grant funding. The implementation of BMPs lags behind funding because there is a significant capacity gap in implementing projects.
- There is continual need to sustain and grow investments in monitoring networks to assess effectiveness of implementation, as well as the resulting impacts on nitrogen, phosphorus and sediment reduction targets, as well as the Bay response to dissolved oxygen, clarity/SAV and chlorophyll *a*.

Water Quality Standards Attainment and Monitoring Outcome

OUTLOOK ON COURSE

Outcome

Continually improve our capacity to monitor and assess the effects of the management actions being taken to implement the Chesapeake Bay Total Maximum Daily Load (Bay TMDL) and improve water quality. Use monitoring results to report annual progress being made in attaining water quality standards and trends in reducing nutrients and sediment in the watershed.

Status

The Water Quality Standards Attainment and Monitoring Outcome uses monitoring results to report annual progress made in attaining water quality standards for clean water goals defined by dissolved oxygen, water clarity (partly by underwater grass abundance) and chlorophyll a (a measure of algae growth) in the tidal waters of the Chesapeake Bay and its tidal tributaries; and status and trends in reducing nutrients and sediments delivered to the Chesapeake Bay from its surrounding watershed. During the 2018-2020 assessment period, an estimated 29.6% of the Chesapeake Bay and its tidal tributaries met clean water goals. Long-term monitoring results (1985—2022) reveal that the health of the Bay's water quality was estimated as achieving 25% of goal conditions in the mid-1980s and reached a high of 42% before the most recent decline, attributed to effects of pollution delivered with elevated river flows recorded in 2018, the highest on record since 1937, and additional high flows in 2019. In the watershed, less than 50% of the 123 non-tidal monitoring network stations show improving trends in the reduction of nitrogen and phosphorus loads for the period 2011-2020. The Chesapeake Bay Program has made significant new investments in monitoring infrastructure and analysis tools necessary to support water quality criteria assessments, but currently lacks the capacity to fully assess the attainment of tidal water quality standards. The Water Quality Standards Attainment and Monitoring Outcome is currently on course.

What has helped achieve success since 2014?

- The investment of Bay Program partners in retrieving, analyzing and communicating monitoring information. The prioritization of staff time also helped with these advances.
- *Enhancing the Chesapeake Bay Program Monitoring Networks* report and effort. The report outlined recommendations and provided cost estimates needed to address network gaps, data shortfalls, maintenance and enhancements of core networks, as well as development of new monitoring networks.
- Development of the Bay Program's Strategic Science and Research Framework to identify and assess short-and-long-term science needs of the partnership.
- The availability of robust, repeatable, approved and published data collection protocols, sound Quality Assurance/Quality Control procedures and associated documentation, and extensive data and metadata management to support the integrity of datasets.
- The work of the Chesapeake Monitoring Cooperative (CMC) in providing technical assistance to non-traditional monitoring partners that can be used to augment the state-collected datasets for regulatory assessments.
- Development of the tributary summaries to communicate changes in water quality patterns and factors affecting those changes to technical managers and planners.
- Progress in analyzing and communicating factors impacting water quality.

What challenges have hindered progress?

- Core monitoring funding did not adjust for inflation leading to reduced data collections.
- Historically, a lack of technological capacity to effectively collect the necessary water quality data across space, in sufficient temporal resolution, robust to Bay conditions and cost-effective, to create a full accounting of dissolved oxygen data necessary to assess water quality standards for the tidal Bay.
- A delay in in-person, streamside field audits due to the COVID-19 pandemic.
- A lack of complete criteria assessment protocols, that can be instituted in the near term, that make use of readily available continuous monitoring datasets.
- A lack of criteria assessment protocols that consider expanding impacts from climate change such as effects on dissolved oxygen saturation as a function of increased Bay water temperature.
- The limited use of watershed and Bay water quality monitoring results in making timely and effective management decisions that can accelerate progress towards Bay health goals.
- Numeric thresholds for chlorophyll *a* that address aquatic life impacts presently only apply to seven of the 92 segments in Chesapeake Bay's tidal waters. An effective numeric translation of the narrative chlorophyll criteria based on harmful algal bloom characterization has not been developed by the partnership, even though states' water quality standards include this goal.
- Research and publications regarding new technologies are just beginning to address challenges that, once overcome, can support improved water quality assessment and tracking.
- *Enhancing the Chesapeake Bay Program Monitoring Networks A Report to the Principals' Staff Committee* estimated that $5.4 million would be needed in the first year to fulfill the recommendations to enhance the Bay Program's core networks. Over $4 million has been allocated to meet these recommendations, but more funding is needed to support those remaining, and a strategic plan is needed to secure sustainable funding for these enhancements, as funding from the Infrastructure Investment and Jobs Act is only available for five years.

If off course, what is needed to continue current trajectory?

- Maintain support for development, testing and implementation of the new 4-dimensional (4D) interpolator, which will help assess dissolved oxygen criteria in the Bay.
- Developing, finalizing and approving new monitoring protocols that use newly available technologies including vertical water quality monitoring arrays, 4D interpolator, and satellite image data collection with Artificial Intelligence/Machine Learning algorithms supporting data access, image acquisition, data characterization and summary specifically for dissolved oxygen, SAV, chlorophyll *a* assessment.
- Support is needed for updated tidal Bay study design plans to chart the timing and location of deployments of new monitoring arrays and nearshore sensors.
- Greater support for analysis, dissemination and communication of reporting results and relevant lessons to diverse partners and audiences.
- Engage community science groups on monitoring that contributes to calibration and verification of aerial and satellite based SAV assessment, confirmation of harmful algal bloom locations and adds data supporting Bay health assessments of dissolved oxygen, temperature and salinity.
- Continued research is needed for characterizing harmful algal blooms with satellite-based resources in order to create effective translations of narrative chlorophyll a criterion into quantitative assessment criteria.

Toxic Contaminants Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Ensure that the Bay and its rivers are free of effects of toxic contaminants on living resources and human health."

Photo by Will Parson/Chesapeake Bay Program

Toxic Contaminants Policy and Prevention Outcome

OUTLOOK OFF COURSE

Outcome

Continually improve practices and controls that reduce and prevent the effects of toxic contaminants below levels that harm aquatic systems and humans. Build on existing programs to reduce the amount and effects of polychlorinated biphenyls (PCBs) in the Bay and watershed. Use research findings to evaluate the implementation of additional policies, programs and practices for other contaminants that need to be further reduced or eliminated.

Status

The number of tidal segments in the Chesapeake Bay that are considered to be partially or fully impaired by toxic contaminants has seen an increase with each biennial data update from2010-2018. In 2018, the estimate reached a high of 84%, but in 2020, the percentage saw a slight reduction. However, for the first time, the number included state-listed impairment for per-and-polyfluoroalkyl (PFAS). Chesapeake Bay Program partners are working to advance remediation efforts of polychlorinated biphenyls (PCBs) in local areas by expanding existing state programs to implement local Total Maximum Daily Loads (TMDLs). Despite these efforts, along with making upgrades to wastewater treatment plants and implementing land-based best management practices (BMPs), water quality in the Chesapeake Bay and its tidal tributaries continues to fall short of healthy standards. The Toxic Contaminants Policy and Prevention Outcome is off course.

What has helped achieve success since 2014?

- Municipal Separate Stormwater System (MS4) permits in some local areas in the watershed have begun to include requirements to identify and address PCB sources where there is a PCB TMDL.
- Ongoing sediment remediation activities in some parts of the watershed including the Anacostia, Patapsco and Middle rivers.
- The priority to upgrade wastewater treatment plants across the watershed.

What challenges have hindered progress?

- The lack of available staff time to participate in cross-jurisdiction PCB coordination.
- Studies on the efficiency of removing stormwater best management practices continues to be limited.
- Many jurisdictional WIPs do not address co-benefits for contaminant reduction or have a way to quantify the reduction.
- An appropriate method to link toxic contaminant BMP science with stakeholder planning tools has not been identified.
- The implementation of management actions under local TMDLs is limited and jurisdictions have to balance emphasis on PCBs with other pollutants of concern.
- Limited PCB monitoring data exists for unregulated and National Pollutant Discharge Elimination System (NPDES) regulated stormwater.

If off course, what is needed to accelerate progress?

- The partnership needs to apply its collective expertise in pollutant-based TMDLs to accelerate the reduction of bioavailable PCBs.
- An improved understanding of the presence of PCB s in biosolids is needed because of emerging information on the quantity that is being reapplied to the landscape through the application of biosolids.
- State and federal commitments to achieving PCB TMDLs needs to fall under an accountability and progress framework similar to that which is used for nitrogen, phosphorus and sediment.
- Jurisdiction coordination and sharing of best practices and interstate information is needed to advance PCB TMDLs.

Toxic Contaminants Research Outcome

Outcome

Continually increase our understanding of the impacts and mitigation options for toxic contaminants. Develop a research agenda and further characterize the occurrence, concentrations, sources and effects of mercury, polychlorinated biphenyls (PCBs) and other contaminants of emerging and widespread concern. In addition, identify which best management practices might provide multiple benefits of reducing nutrient and sediment pollution as well as toxic contaminants in waterways.

Status

This outcome considers research related to many different types of toxic contaminants but lacks specific measures to assess progress. While progress has been made on determining the occurrence, concentrations, sources and effects of mercury, PCBs and PFAS, the ability to characterize the concentrations of other contaminants and where they may be occurring has been limited. The Toxic Contaminants Workgroup is beginning to develop a coordinated approach on how to assess levels of PFAS in the Bay, which is being detected throughout the watershed. Recently, thanks to collaboration with stakeholders and the incorporation of local Total Maximum Daily Loads (TMDLs) into stormwater permits, progress has been made in addressing the impacts of mercury across the watershed, and other contaminants of interest at the local level. The Toxic Contaminants Research Outcome is off course.

What has helped achieve success since 2014?

- Research undertaken to understand per-and-polyfluoroalkyl substances (PFAS), microplastics and endocrine disrupting compounds in the Chesapeake Bay watershed.
- Scientific and Technical Advisory Committee (STAC) workshops on emerging urban and agricultural contaminants including entire workshops on PFAS and microplastics in the Chesapeake watershed.
- Papers published by Bay Program partners (e.g., U.S. Geological Survey papers on PCBs in wastewater and biosolids, and occurrence of emerging contaminants in the Potomac and Shenandoah watersheds).

What challenges have hindered progress?

- The significant number of toxic contaminants that require research.
- There is not much emphasis on addressing co-benefits for the reduction of contaminants in jurisdictional Watershed Implementation Plans (WIPs), which decreases the overall reasons to prioritize.
- Increased emphasis on PFAS has required some jurisdictions to reprioritize monitoring of other contaminants, such as PCBs.
- The absence of watershed-wide monitoring programs creates challenges with assessing status and trends regarding impact from toxic contaminants.
- Barriers to collaborative efforts with Bay Program Goal Implementation Teams (GITs) and workgroups that share interests with the Toxic Contaminants Workgroup.

If off course, what is needed to accelerate progress?

- Allocation of federal and state resources to conduct research on sources, effects and allocation of monitoring dollars to measure occurrence and concentrations.
- Improved ability to communicate and engage the academic and monitoring communities on science-based questions the partnership needs answers to and the resources needed to complete such research.
- Coordination across the partnership on the impact of toxic contaminants on the living resources of the Chesapeake Bay watershed.

Healthy Watersheds Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Sustain state-identified healthy waters and watersheds recognized for their high quality and/or high ecological value."

Photo by Will Parson/Chesapeake Bay Program with aerial support by Southwings

Healthy Watersheds Outcome

OUTLOOK UNCERTAIN

Outcome

100 percent of state-identified currently healthy waters and watersheds remain healthy.

Status

The Healthy Watersheds Goal Implementation Team has developed the Chesapeake Healthy Watersheds Assessment framework to provide information on the current condition, level of protection and whether or not watershed catchments are potentially vulnerable or resilient. This helps jurisdictions to detect signals of change in state-identified healthy watersheds and beyond (provided the data to inform the assessment is updated over time). The Healthy Watersheds Outcome is currently uncertain.

What has helped achieve success since 2014?

- The development of new data and tools that help characterize and provide context for healthy watersheds, such as the Chesapeake Healthy Watersheds Assessment, Chesapeake Bay Phase 6 Land Use Viewer, Chesapeake Bay Watershed Data Dashboard, CBP Land Use/Land Cover Data Project, Land Use Methods and Metrics indicators on impervious cover and change, and the Chesapeake Bay Environmental Justice and Equity Dashboard.
- Projects that enhance focus on communications, such as the Chesapeake Forest Restoration Strategy, Conservation Land-Use Policy Toolkit and Resource Lands Assessment.
- Increasing knowledge at a local-scale through the development of such tools as the Local Government Guide to the Chesapeake Bay, Improved Technical Service Delivery to Landowners, Targeted Outreach for Green Infrastructure, Chesapeake Watershed Finance Intensive workshops, Maryland Healthy Watershed Assessment and the automation of Chesapeake Protected Lands data.

What challenges have hindered progress?

- The amount, type and way in which land use occurs is the biggest factor impacting healthy watersheds.
- A wide range of natural and human factors, such as climate change and invasive species.
- Ensuring local governments and decision-makers have the best available information—and understand it—to make land use decisions.
- Projects necessary for assessing the spectrum of watershed health and vulnerability on a Chesapeake Bay regional scale are in progress and are expected in late 2023.
- Lack of support, effective communication, coordination and leadership from Chesapeake Bay Program partners and the Healthy Watersheds Goal Implementation Team (HWGIT) at the state and local level to protect healthy watersheds.
- The HWGIT Coordinator has been leading a multiyear healthy watershed assessment effort due to limited state capacity to report whether we've lost or gained any healthy waters since the *Watershed Agreement* was signed.
    - Existing reporting through the integrated monitoring reports under section 305b and 303d of the Clean Water Act may help inform reporting and progress tracking.
    - It is the intent that the Chesapeake Healthy Watersheds Assessment be used as a proxy to determine the spectrum of watershed health and vulnerability and be updated regularly when new data is available.

- Measures to protect healthy watersheds vary across—and sometimes within—watershed jurisdictions.
- Meeting the Healthy Watersheds Outcome is dependent on the participation of related workgroups and their work/products.

If uncertain, what would need to be done before 2025 to classify as on course/off course and can this be done in that timeframe?

- Completion of the Chesapeake Healthy Watershed Assessment 2.0 in August 2023 and committing to update the assessment with the best available input data as available, and consider additional watersheds identified by the assessment, as healthy in addition to state-identified healthy watersheds, to augment state efforts.
- Continued development and application of the Land Use Method and Metrics Outcome and continued support for high resolution land use/land cover data.
- Investigation and development of indicator(s) related to watershed health and vulnerability.
- Update the Watershed Protection Map.
- Implementation of the Scientific and Technical Advisory Committee report, *Rising Watershed and Bay Water Temperatures—Ecological Implications and Management Responses*.
- Strengthen local commitment and capacity to understand the spectrum of watershed health and vulnerability and increase local capacity to protect healthy watersheds.

Stewardship Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Increase the number and the diversity of local stewards and local governments that actively support and carry out the conservation and restoration activities that achieve healthy local streams, rivers and a vibrant Chesapeake Bay."

Photo by Will Parson/Chesapeake Bay Program

Stewardship Outcome

OUTLOOK UNCERTAIN

Outcome

Increase the number and diversity of trained and mobilized volunteers who have the knowledge and skills needed to enhance the health of their local watersheds.*
**In October 2022, the outcome was modified from the original language*.

Status

A quantitative target has not been established for the Stewardship Outcome. In 2021, a baseline indicator was developed using data from the 2017 Stewardship Index. Resources are now needed to prioritize programmatic efforts and build desired behaviors. The next survey to update the data is expected to be conducted in 2023 with data available in early spring 2024. Information on the extent of progress toward the Stewardship Outcome will be available after that analysis and comparison to 2017 data has been completed. If this shows an increase in stewardship, then the Outcome can be considered as on course, but it remains uncertain until this data is obtained.

What has helped achieve success since 2014?

- Multiple partners continue to implement on-the-ground stewardship activities, as well as launch regionally focused behavior change and social science projects.
- Efforts are underway to increase the capacity and application of social science approaches into the work of the Chesapeake Bay Program including the establishment of a new staff position to focus on social science.
- The launch of the Chesapeake Behavior Change website has enabled behavior change practitioners to learn more about behavior change methodology, access residential stewardship behavior adoption rates and learn more about stewardship campaigns in their watershed
- The partnership completed the *Enhancing Chesapeake Bay Partnership Activities by Integrating Social Science* report in 2023 which includes recommendations for fuller integration of social sciences within the partnership.
- Sharing stewardship data as an indicator for Chesapeake Bay health as part of the University of Maryland Center for Environmental Science Chesapeake Bay Report Card helps to bring attention to the importance of, and progress toward, stewardship within the watershed and highlights where we might focus attention to improve actions.

What challenges have hindered progress?

- It is necessary to collect information from stakeholders on their motivations, values and attitudes in order to design programs and policies that align with their needs, to be most effective. However, federal survey restrictions and financial constraints limit utilizing surveys to collect quantitative and qualitative data from stakeholders.
- The raw data collected in the Stewardship Index is too complex for most practitioners to use.
- More attention and resources are needed to focus on programmatic efforts and to get back on track with building desired behavior as guided by the standard ladder of engagement.
- Limited coordination with the Diversity Workgroup and other workgroups that rely on individual stewardship actions.

If uncertain, what would need to be done before 2025 to classify as on course/off course and can this be done in that timeframe?

- Complete the second data collection of individual residential stewardship behaviors and data analysis to update stewardship indicators to show change in stewardship behaviors from 2017 to 2023.
- Increase capacity to implement social science assessment and build broader engagement in social sciences within the partnership by increasing funding for social science project implementation and additional social science staff expertise.
- Provide training and guidance resources, identify potential funding support and other means to build capacity among the partnership to engage in behavior change to advance goals that require individual action.
- Build relationships with trusted sources and behavior change practitioners that engage at the local level to build their capacity to utilize effective behavior change campaigns.
- Continue to interact with other workgroups across the Chesapeake Bay Program that rely on individual actions to achieve outcomes.

Local Leadership Outcome

OUTLOOK ON COURSE

Outcome

Continually increase the knowledge and capacity of local officials on issues related to water resources and in the implementation of economic and policy incentives that will support local conservation actions.

Status

In 2022, a survey was distributed to local leaders across the Chesapeake Bay watershed and results showed that many officials have a solid understanding of watershed basics. However, many lack knowledge about water resource regulations, particularly at the federal level. Newly elected officials and those from smaller communities were the groups that indicated the greatest need for further knowledge and capacity on issues related to water resources. Since 2019, efforts by the Local Leadership Workgroup have engaged more than 2,000 local officials directly (through peer-to-peer learning exchanges, roundtable discussions and conference panels) and more than 20,000 indirectly (through newsletters, magazine articles and blogs). Additionally, over 900 local planners attended webinars and conference sessions, activating an additional network who can support the increase of local officials' knowledge and capacity. The Local Leadership Outcome is on course.

What has helped achieve success since 2014?

- The development of editable educational modules tailored toward issues relevant to local leaders.
- Enhanced partnerships with trusted sources, like local government associations, council of governments and local planner networks.
- The distribution and analysis of a baseline survey to expand understanding of local officials' knowledge and capacity for water resources.
- Expansion of peer to peer learning exchanges create an opportunity for experiential learning.

What challenges have hindered progress?

- Continued turnover of local officials makes engagement an ongoing challenge.
- Local governments lack the capacity to access state and federal funding.
- Existing local infrastructure was not designed to handle current and future climate change conditions, leaving local officials struggling to adapt.
- Labor shortages, capacity, supply chain issues and needed training are ongoing issues.

If on course, what is needed to continue current trajectory?

- Expanded use of editable educational modules, including tailoring at state and regional levels.
- Continued partnership with trusted sources, like local government associations, council of governments and local planner networks, with an additional focus on smaller, regional partners.
- Connecting local governments with technical assistance and capacity building opportunities.

Diversity Outcome

OUTLOOK OFF COURSE

Outcome

Identify stakeholder groups not currently represented in the leadership, decision-making or implementation of current conservation and restoration activities and create meaningful opportunities and programs to recruit and engage these groups in the partnership's efforts.*
**In January 2020, the outcome was modified from the original language.*

Status

The Diversity Outcome is off course in part due to a need for more timely, consistent and comprehensive analysis and tracking of diversity progress across the Bay Program. The current indicator is inward-facing, looking at the makeup of the Bay Program staff and leadership. In 2016, 2019 and 2022, a diversity survey was disseminated to the partnership, with intent to continue every three years. The most recent survey experienced a larger pool of voluntary responses overall and indicated a slight increase in the percentage of respondents who self-identified as people of color in the Bay Program compared to previous years; however, the data shows no statistically significant change in racial or ethnic diversity among the three surveys, averaging slightly less than 15%. The Workgroup strives to improve accuracy of the measurement method including reviewing the survey tool as well as the process for collecting and analyzing the data.

Based on the most recent analysis, we have learned that individuals recruited to partnership roles in the last 10 years are twice as likely to be people of color than those who have been involved for 11 years or more. That the LGBTQIA+ population is more than twice as prevalent in the last five years' recruits as it was in older cohorts. Finally, female representation has increased over time; accounting consistently for more than half of participants recruited over the past 20 years.

A full understanding of outcome achievement requires the development of additional indicators that look at other important factors. Both the Diversity Outcome specifically, and the Stewardship Goal more broadly, include involvement of other stakeholders and members of the public in decision-making and carrying out conservation and restoration activities. Progress toward this key component has not been tracked using a numeric indicator, therefore additional metric(s) should be explored for the future, determining an effective methodology for measuring success toward the overall intent of the goal and outcome. The Diversity Outcome is off course.

What has helped achieve success since 2014?

- Development of the *Diversity, Equity, Inclusion and Justice (DEIJ) Strategy* and *Implementation Plan*.
- The signing of the *DEIJ Directive* by the Chesapeake Executive Council in 2020.
- Increasing awareness of stakeholder perceptions and needs through internal and Goal Implementation Team (GIT) funded projects.
- Significant changes in DEIJ policy at the federal and state levels.
- Incorporation of a diversity question in the Strategy Review System materials that will ensure all GITs and workgroups are taking DEIJ considerations into account in their work.
- DEIJ considerations have been incorporated into funding opportunities through the Bay Program along with several other federal and jurisdictional grant programs. The Diversity Workgroup facilitated a series of workshops in 2023 to further share best practices among funders and to foster communication among funders and community-facing grant applicants.

- Establishment of several Memorandum of Understanding (MOUs) with Historically Black Colleges and Universities (HBCUs) in the region to provide ready means for working together on research, workforce development and other opportunities.
- Creation of the C-StREAM internship program with the Chesapeake Research Consortium, to encourage and support underrepresented students interested in environmental careers.
- In 2022, the Chesapeake Bay Program Governance Document was revised to provide more guidance on DEIJ considerations when making appointments to participate in the Program at various levels of responsibility.
- Ongoing training, workshops, webinars and peer guidance across the partnership.

What challenges have hindered progress?

- Turnover in staffing, leadership and membership of the Diversity Workgroup.
- The indicator is inadequate, relying on self-reporting and only measures part of the outcome.
- Survey results are not readily actionable due to lack of alignment with DEIJ Implementation Plan or a clear organizational structure where impact can be made.
- The Diversity Workgroup operates with limited resources, capacity and authority; inability to effectively track recruitment and retention data; and inability to address structural changes necessary to implement DEIJ best practices—especially regarding hiring practices and pathways. With no means for substantive influence on Bay Program partners' policies and operations, the Workgroup can only offer guidance.
- Lack of understanding and guidance about how underrepresented communities and organizations can participate in the Bay Program meaningfully and effectively, and what is appropriate within the structure of the partnership for engaging with community-based organizations.
- Bay Program partners lack experience and knowledge to incorporate DEIJ principles into their work.
- Disruptions and subsequent work life changes due to the COVID-19 pandemic.

If off course, what is needed to accelerate progress?

- Clarity on the functions of the Bay Program from leadership, along with a skilled analysis of opportunities for systemic change within the partnership to best include and amplify diverse voices and participants in Bay Program work.
- Commitment of action from Bay Program leaders on a short set of recommended high-impact DEIJ actions for beyond 2025 regarding hiring and other practices (to be identified).
- Built-in, ongoing guidance on DEIJ practices across the partnership—in the form of at least one position dedicated to serving as an internal "consultant" to help steer GITs and Workgroups, assure continual training for staff and partners and lead development of improved systemic processes.
- Coordinated demographic data collection from signatories and mandated employee surveys similar to the Federal Employee Viewpoint Survey.
- Reevaluation of Diversity Workgroup structure and capability to achieve desired outcomes within current limitations.

Land Conservation Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Conserve treasured landscapes in order to maintain water quality and habitat; sustain working forests, farms and maritime communities; and conserve lands of cultural, indigenous and community value."

Photo by Will Parson/Chesapeake Bay Program

Protected Lands Outcome

OUTLOOK ON COURSE

Outcome

By 2025, protect an additional two million acres of lands throughout the watershed—currently identified as high-conservation priorities at the federal, state or local level—including 225,000 acres of wetlands and 695,000 acres of forest land of highest value for maintaining water quality.

Status

Through early 2019, nearly 1.36 million of acres of land has been permanently protected across the Chesapeake Bay watershed since 2010. This marks an achievement of 68% of the Protected Lands Outcome target. In 2021 the Chesapeake Executive Council Directive No. 21-1: Collective Action for Climate Change called for protecting 30% of the watershed by 2030. This represents an additional 2.4 million acres above the 2025 goal. Work continues to strive for 30% as an ambitious target. The Protected Lands Outcome is on course and will be met by 2025.

What has helped achieve success since 2014?

- A strong and growing network of conservation-minded partners through the Chesapeake Conservation Partnership.
- Voluntary jurisdictional coordination with federal agencies on land conservation priorities has increased steadily with the implementation of Executive Order 13508: Chesapeake Protection and Restoration.
- Increased funding from the private sector, including donors, foundations and landowners, has presented an enhanced opportunity for stewardship. In recent years there has also been an increase in federal funding that supports land conservation.
- A rise in the protection of culturally valuable lands.
- Articulating conservation values through the lens of health, safety and welfare has helped to increase public support.

What challenges have hindered progress?

- Definitional, attitudinal and political messaging.
- Difficulties with the generational transfers of land ownership.
- Limited personnel and programmatic capacity to administer and manage funding for land conservation. The field is also experiencing organizational turnover and overall workforce development needs.
- Competition, on a nationwide scale, for federal and state funding for land conservation.
- As populations have increased, so have development pressures and competition from new transportation and energy infrastructure including industrial solar.
- Climate change has impacted ecologically and culturally significant places, as well as shifted native species patterns and contributed to land loss through erosion, flooding and increased precipitation.

If on course, what is needed to continue current trajectory?

- Managing and leveraging of diverse funding pools.
- Integration and coordination of conservation data.
- Maintaining the capacity level of conservation land trusts.

Land Use Methods and Metrics Development Outcome

OUTLOOK ON COURSE

Outcome

Continually improve our knowledge of land conversion and the associated impacts throughout the watershed. By December 2021, develop a watershed-wide methodology and local-level metrics for characterizing the rate of farmland, forest and wetland conversion, measuring the extent and rate of change in impervious surface coverage and quantifying the potential impacts of land conversion to water quality, healthy watersheds and communities. Launch a public awareness campaign to share this information with local governments, elected officials and stakeholders.*
**In January 2020, the outcome was modified from the original language*.

Status

The Land Use Methods and Metrics Development Outcome developed an impervious surface cover indicator in 2023, describing the amount of the watershed that is covered by impervious surfaces, the changes in impervious cover time and the types of impervious cover that contribute most to land changes. The metrics described in outcome language will be reassessed in 2024 using data from 2021-2022. The Land Use Methods and Metrics Outcome is on course.

What has helped achieve success since 2014?

- Continued funding support for monitoring land use and land cover metrics.
- Development of the high-resolution land use and land cover datasets and change tool.
- Close coordination with other outcomes, workgroups and advisory committees.

What challenges have hindered progress?

- Translating the land use and land cover change data into a form that is understood and actionable for communities.
- Continually updating existing high-resolution land cover and land use datasets during each four-year remapping phase.
- The need for a methodology to quantify the impacts of changes in land use on communities and the environment.
- The current strategy for reducing the rate of land conservation through land use planning is passive and lacks sufficient incentives.

If on course, what is needed to continue current trajectory?

- Funding for a new cooperative agreement and Bay Program staff to continue robust land cover, land use monitoring and develop change products.
- Clear charge for the Land Use Workgroup and/or other appropriate workgroups to directly work with pilot communities (e.g., local governments) to develop meaningful uses for land use data in local planning and stormwater management.
- Direct communication with jurisdictions on how they can incentivize land use planning at the state level using land use data.

etter identification of the cross connections with other outcomes.

Land Use Options Evaluations Outcome

Outcome

By the end of 2017, with the direct involvement of local governments or their representatives, evaluate policy options, incentives and planning tools that could assist them in continually improving their capacity to reduce the rate of conversion of agricultural lands, forests and wetlands as well as the rate of changing landscapes from more natural lands that soak up pollutants to those that are paved over, hardscaped or otherwise impervious. Strategies should be developed for supporting local governments' and others' efforts in reducing these rates by 2025 and beyond.

Status

This outcome is focused on developing and implementing strategies to increase the capacity of local governments and others to reduce land conversion of natural land cover types to impervious surfaces. Various efforts listed in the below section have helped this outcome to progress. However, with this qualitative outcome, there are challenges in assessing the degree to which efforts are helping to reduce the rate of land conversion, but the development of the local government engagement strategy and the communication of available land use data and tools are expected to lead toward meeting the outcome. The Land Use Options Evaluation Outcome is on course and will be met by 2025.

What has helped achieve success since 2014?

- Collaboration on projects and products with related workgroups.
- The number of non-governmental organizations that are focused on future land changes.
- Development of high-resolution land use/land cover and change products help to characterize the extent and rate of land use change.
- Existing policy drivers, such as the Bay TMDL and Executive Order 13508 Chesapeake Bay Protection and Restoration.

What challenges have hindered progress?

- Lack of coordination and clear communication with Chesapeake Bay Program partners in conveying the need and purpose in communicating and engaging with local planners.
- The need to continue to work with professional communicators and subject matter experts to translate data and analysis into materials and resources for those to utilize at the local and jurisdictional level to influence the rate of land conversion to development, especially considering population and land use change trends.
- Efforts to minimize future land change impacts are sometimes neglected given the need to reduce effects from existing land conversion.
- The need for better information on the benefits of land conservation and smart growth in language that is compelling for local governments and outlines the positive impacts on communities.
- Competition with economic development objectives.
- Local governments' need for technical assistance.
- Insufficient funding to complete the evaluation component of this outcome.

If on course, what is needed to continue current trajectory?

- An upcoming Goal Implementation Team funding project to help make land use and land use change data actionable and operational at the community level in areas vulnerable to habitat loss, will help engage with local and state organizations.
- Several obstacles remain in effectively communicating and illustrating the application of resources. While staff have been able to manage and champion land use resources, tools and information, there is more need to communicate how planning for and protecting stable hydrology will reduce erosion and its associated sediment and nutrients to downstream areas, including the Bay, while also reducing local flooding and improving drinking water quality and quantity. A more coordinated effort is needed, including:
    - A quantified cost analysis of the long-term economic effects of property damage from flooding along with increased drinking water treatment costs from altered hydrology due to land use change is needed so that people can get an idea of why this is important.
    - A benefit analysis of the preservation and restoration of green infrastructure such as floodplain connectivity and wetlands as well as recharge areas that protect and maintain stable hydrology and clean, full aquifers through time. Ultimately, our goal should be to inform land use planning and conservation decisions with information that will engender more sustainable decisions.
- Additional needs in communication, translation and engagement:
    - Translate, format, package and flow information through to trusted sources.
    - Determine how to effectively engage locals directly.
    - Improve how DEIJ and climate considerations are accounted for in the Land Use Options Evaluation Outcome.

Public Access Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Expand public access to the Bay and its tributaries through existing and new local, state and federal parks, refuges, reserves, trails and partner sites."

Photo by Will Parson/Chesapeake Bay Program

Public Access Outcome

OUTLOOK ON COURSE

Outcome

By 2025, add 300 new public access sites, with a strong emphasis on providing opportunities for boating, swimming and fishing, where feasible.

Status

Between 2011 and 2021, partners have opened an average of approximately 21 sites per year, bringing the total of new public access sites in the watershed to 237. This marks a 79% achievement of the goal to add 300 new public access sites by 2025. The long-term data trend has been positive, but public access site development remains largely opportunistic. There are limited sources of dedicated funding for new access projects and the accomplishments of the past may not predict future trajectory. The Public Access Outcome is on course and will be met by 2025.

What has helped achieve success since 2014?

- The committed efforts of the jurisdictions, partners and members of the Public Access Workgroup has ensured progress of the public access goal thus far.
- The sharing of best practices and learning among workgroup members.
- The creation of programs and passage of legislation that highlights outdoor recreation and infrastructure investment has increased public awareness of the importance of public water access.
- A recent Goal Implementation Team (GIT) funded project to understand the benefits and barriers to public access.

What challenges have hindered progress?

- Increased demand for public access sites has highlighted the need for increased ADA accessibility, and resulted in the overuse and degradation of some sites, as well as delayed maintenance and construction at others.
- Creation of new sites is often delayed in order to address a backlog of maintenance at existing sites.
- Funding for operations and maintenance of existing public access sites is limited and most federal and state grant programs require matching funds, which smaller jurisdictions struggle to secure.
- Inflation and supply chain issues have caused the cost of materials and labor to rise.
- Delayed maintenance and environmental impacts have negatively impacted some existing public access sites.
- The workgroup has limited influence to change available funding or budgets for projects.

If on course, what is needed to continue current trajectory?

- Continued commitment by the jurisdictions and federal agencies.
- The creation of 16 new sites per year would ensure that the 2025 target is met.
- In order to accelerate progress, additional funding, staffing and planning would be required.

Environmental Literacy Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Enable every student in the region to graduate with the knowledge and skills to act responsibly to protect and restore their local watershed."

Photo by Will Parson/Chesapeake Bay Program

Student Outcome

Outcome

Continually increase students' age-appropriate understanding of the watershed through participation in teacher-supported meaningful watershed educational experiences and rigorous, inquiry-based instruction, with a target of at least one meaningful watershed educational experience in elementary, middle and high school depending on available resources.

Status

The Environmental Literacy Indicator Tool (ELIT) was distributed in 2015, 2017, 2019 and 2022 to collect data related to student participation in Meaningful Watershed Educational Experiences (MWEEs). The COVID-19 pandemic had a tremendous impact on K-12 education, and implications related to significant learning loss and social-emotional setbacks are still being felt across school districts. Data collection scheduled for 2021 instead took place in 2022 to assess where the region stands in the wake of these impacts on education systems. The status of the 2022 ELIT Report shows a decline in system-wide MWEEs across the board. The Student Outcome is off course.

- Thirty-five percent of responding school districts in the watershed have a MWEE in place throughout the school system (system-wide MWEE) at the elementary grade level and 35% have some MWEEs (not yet system-wide). There has been a trend of progressive increases in the number of school districts reporting that no MWEEs were available in the elementary level (18% in 2015 to 30% in 2022).
- Thirty-five percent of responding school districts in the watershed have system-wide MWEEs in place at middle school grade levels and 41% have some MWEEs (not yet system-wide). Since 2015, there has been a progressive decrease in the rate of system-wide MWEEs (43% in 2015 to 35% in 2022).
- Twenty-nine percent of responding school districts in the watershed have system-wide MWEEs in place at high school grade levels and 44% have some MWEEs (not yet system-wide). Between 2015 and 2019, ELIT collection demonstrated an increase in system-wide MWEEs from 31% to 35%, however post-COVID this percentage dropped to 29%. Additionally, the percentage of no MWEEs occurring in high school rose significantly from 22% to 27% between 2019 and 2022.

What has helped achieve success since 2014?

- New tools have been developed to support school districts and environmental literacy providers (environmental educators not part of the school system who support school programming) in developing their understanding for designing and implementing MWEEs, including: the revised Educator's Guide to the MWEE, Environmental Literacy Model Tool and Environmental Literacy Audit Tool, a series of state-specific versions of the Facilitator's Guide to MWEE Training and a MWEE 101 and 201 online course with continued learning credits. Specifically, more than 1,600 educators have taken the MWEE 101 course.
- A community of practice for MWEE practitioners started in 2019 and has brought together educators for more than 30 conversations and webinars sharing best practices for MWEE implementation.
- Federal, regional and state grant programs have adopted the MWEE Guide and other key MWEE resources within their funding specifications (Notice of Funding Opportunities and Request for

Proposals) which has strengthened understanding of MWEEs for the applicants and improved their proposed MWEE efforts.
- Biennial Environmental Literacy Forums have brought together nearly hundreds of practitioners to train on resources such as the Facilitator's Guide to MWEE Training and the District Environmental Literacy Planning Toolkit.

What challenges have hindered progress?

- Teacher and administrator turnover is a challenge and has been exacerbated by the exodus of teaching professionals during and after the COVID-19 upheaval of the educational system.
- COVID-19 impeded efforts to implement MWEEs with full fidelity, and drew time and resources away from environmental education programming.
- COVID-19 also limited progress in working with other systems of influence including pre-service teacher programs, district and school administrator professional development and superintendent awareness and advocacy, among others, as competing challenges put a damper on our ability to attract the attention of those in educational leadership positions and higher education.
- Low availability of sustainable funding mechanisms to support MWEEs beyond grant funding.
- An increasing emphasis on math, reading and English language arts in elementary schools has diminished science and social studies education, which is where MWEEs often occur. This trend was exacerbated by COVID-19 when test scores revealed significant learning loss in these foundational subject areas.

If off course, what is needed to accelerate progress?

- Identification of an established program leader in each school district and community partnerships with environmental education providers (identified as a best practice 2022 ELIT report).
- Continued funding for NOAA's Bay Watershed Education and Training (B-WET) Program, Chesapeake Bay Trust's Environmental Education Grant Program and other state/regional funding to catalyze the development of MWEEs. Additionally, models of school districts identifying sustainable funding sources to support MWEEs long-term are needed.
- Activation of intra-state networks and non-formal partners in reaching districts that currently have no MWEEs or are not reporting on ELIT.
- Continued support from state leaders in elevating MWEEs, as exemplified by Pennsylvania in the re-write and explicit inclusion of MWEEs in their new learning standards regime.
- A renewed emphasis on aligning the environmental education community towards MWEE programming that directly meets the needs of school districts.

Sustainable Schools Outcome

OUTLOOK ON COURSE

Outcome

Continually increase the number of schools in the region that reduce the impact of their buildings and grounds on their local watershed, environment and human health through best practices, including student-led protection and restoration projects.

Status

Certified sustainable schools include public and charter schools within the Chesapeake Bay watershed that have been recognized as sustainable by the following programs: U.S. Green Ribbon Schools, National Wildlife Federation Eco-Schools USA (Bronze, Silver and Green Flag status), Maryland Green Schools, Pennsylvania Pathways to Green Schools and Virginia Naturally Schools. The most recent data from 2021, shows that 597 schools in the watershed are currently certified by one of these programs. This represents a 19% increase above the 2015 baseline of 501 schools. However, this data shows a decrease from the 2019 reporting. This is speculated to be due to lack of recertification paperwork being submitted during the COVID-19 pandemic and less project work being possible during prolonged school shutdowns.

While this outcome does not have a specific numerical target to meet by 2025, it is anticipated that the number of sustainable schools throughout the watershed will continue to exceed the 2015 baseline. The Sustainable Schools Outcome is on course.

What has helped achieve success since 2014?

- COVID relief funding provided additional grants to school districts to invest in outdoor learning infrastructure (e.g., Queen Anne's County Public Schools).
- Connecting sustainable school initiatives to Meaningful Watershed Educational Experience (MWEE) efforts to increase funding available to support projects.
- Connecting facilities managers to their curriculum specialist counterparts in school districts to better connect school operations to student learning.
- A subset of Environmental Literacy Workgroup members gathered to coordinate and share lessons learned at the regional level about sustainable schools efforts. Post-COVID, reconvening of a rejuvenated Sustainable Schools team and recruitment of additional partners dedicated to the outcome.
- Connecting sustainable schools conversations to emerging priorities around climate action in districts where this is a priority.

What challenges have hindered progress?

- Sustainability projects are not typically seen as necessary and their implementation is continually slowed by competing priorities. Student involvement in such projects can be used to address the learning losses associated with the COVID-19 pandemic but are often seen as superfluous.
- The educational community was negatively impacted by the COVID-19 pandemic, which continues to affect school operations and staff turnover.

- In an effort to address the health concerns associated with the COVID-19 pandemic, previously reusable items (e.g., lunch trays and water bottles) were replaced with disposable versions, representing a setback to sustainable practices.
- Relative to other environmental literacy outcomes, the implementation of sustainable school actions has received somewhat limited workgroup attention, resulting in slower progress since the last reporting cycle. Those who provide most attention to these actions are more likely specialists representing green schools-type programs. Steps are being taken to remedy this, including the establishment of a reinvigorated Sustainable Schools team and the 2023 Environmental Literacy Leadership Summit will have sustainable schools as a main topic of focus.
- There are ongoing challenges involving states and counties that do not already have an interest in sustainable schools. As is the trend across the Bay Program, the vast majority of progress on sustainable schools has been achieved in relatively limited areas of Maryland and Virginia.

If on course, what is needed to continue current trajectory?

- Increase focus on "High Impact Actions" that will more dramatically reduce harmful effects to the environment. This includes, where possible:
    - Transitioning to clean energy to reduce greenhouse gas emissions.
    - Implementing environmentally beneficial landscaping techniques to reduce pesticide and fertilizer use.
    - Increasing tree canopy cover and natural grounds while reducing artificial surfaces to improve sustainability and stormwater infiltration, while reducing heat of play and learning areas.
- Focus the next biennial Environmental Literacy Leadership Summit, planned for fall 2023, on sustainable schools as the main topic. This will bring the topic to front of mind for stakeholders and provide a means for collaboration where best practices, success stories and critical information can be shared to advance the outcome.
- Actively increase involvement of facilities managers, who are best equipped to address the "High Impact Actions."
- Increasing Chesapeake Bay Program involvement in existing sustainable schools organizations and efforts. Assist in the proliferation of existing and emerging sustainable schools plans and best practices.
- Find new strategies to engage geographic areas that are currently underrepresented in sustainable school conversations.

Environmental Literacy Planning Outcome

OUTLOOK ON COURSE

Outcome

Each participating Bay jurisdiction should develop a comprehensive and systemic approach to environmental literacy for all students in the region that includes policies, practices and voluntary metrics that support the environmental literacy Goals and Outcomes of this Agreement.

Status

The Environmental Literacy Indicator Tool (ELIT) was distributed in 2015, 2017, 2019 and 2022 to collect data related to school district preparedness to implement environmental education. The COVID-19 pandemic had a tremendous impact on K-12 education and implications related to significant learning loss and social-emotional setbacks are still being felt across school districts. Data collection scheduled for 2021 instead took place in 2022 to assess where the region stands in the wake of these impacts on education systems. The status of the 2022 ELIT Report shows positive trends for this indicator as follows:

- The majority of responding Local Education Agencies (LEA) in the watershed (54%) are somewhat prepared to implement high quality environmental education and an additional 23% of districts are well prepared. Preparedness varied a great deal between the states with Maryland having majority of its districts scoring as well prepared (73%).
- The percentage of LEAs scoring as well prepared to implement environmental education decreased slightly in 2022 down to 23% from a height of 26% in 2019. Previously, this indicator had shown steady increases from 2015 to 2019.
- The data suggests that establishing an environmental education leader, connecting with community partners and integrating environmental education across the curriculum, are areas less-prepared districts can emulate toward making strides for greater preparedness.

The Environmental Literacy Planning Outcome is on course and will be met by 2025.

What has helped achieve success since 2014?

- Aligned state efforts have been key to advancing environmental literacy. Major efforts include the incorporation of environmental literacy (including elements of the Meaningful Watershed Educational Experience framework) in the new Pennsylvania learning standards for science; the completion of a new Environmental Literacy Framework for Maryland; and the new Seal for Excellence for Science and the Environment in Virginia.
- The National Oceanic and Atmospheric Administration (NOAA), Pisces Foundation and Chesapeake Bay Trust have supported the development of strong, intentional environmental literacy networks in each state that works towards meeting state priorities, including the outcomes of the *Chesapeake Bay Watershed Agreement*. These state networks are connected at the watershed level through the Regional Outdoor Learning Network.
- The biennial Chesapeake Bay Environmental Literacy Leadership Summit allows education leaders from around the watershed to share environmental literacy planning successes and challenges from their respective states. The 2021 summit focused on the five dual themes of increasing climate education and ensuring equity in environmental education. One key to

success has been having a Principals' Staff Committee (PSC)-level state partner work with the Chesapeake Bay Program to host the event; this ensures alignment with state priorities.
- Development of the District Environmental Literacy Planning Toolkit which houses a set of materials and best practices to aid school district efforts to create equitable, sustainable and systemic environmental literacy programs.
- Biennial Environmental Literacy Forums that train environmental educators and school district leaders in key environmental literacy principles using new tools and guides.
- Development of state-specific guides, templates and examples for educator professional development, district level environmental literacy plans and MWEE programming.
- Training series with non-profit partners who serve as "network weavers" in the states, working with school districts to facilitate the development of environmental literacy plans and programming.

What challenges have hindered progress?

- The focus of administrators has been centered on the continued challenges related to Covid-19 recovery, including learning loss and social-emotional problems in students.
- Teacher and administrator turnover is a challenge and has been exacerbated by the exodus of teaching professionals during and after the COVID-19 upheaval of the educational system.
- COVID-19 limited district and school administrator professional development and superintendent awareness and advocacy, as competing challenges limited our ability to attract the attention of those in educational leadership positions and higher education.
- Lack of dedicated school district personnel focused on the development and implementation of environmental literacy programs.

What is needed to continue current trajectory?

- Identification of an established program leader in each school district and community partnerships with environmental education providers (identified as best practices in the 2022 ELIT report).
- Growth of state environmental literacy networks.
- Continued support from PSC-level state partners to work with the Chesapeake Bay Program to host the biennial Chesapeake Bay Environmental Literacy Leadership Summit.
- Sustained funding for the Chesapeake Bay Trust Environmental Education Grant Program, National Oceanic and Atmospheric Administration's Bay Watershed Education and Training (B-WET) Program, and related state funding programs to support school district efforts to develop and implement environmental literacy programming and fund program implementation.

Climate Resiliency Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Increase the resiliency of the Chesapeake Bay watershed, including its living resources, habitats, public infrastructure and communities, to withstand adverse impacts from changing environmental and climate conditions."

Photo by Will Parson/Chesapeake Bay Program

Climate Adaptation Outcome

OUTLOOK OFF COURSE

Outcome

Continually pursue, design and construct restoration and protection projects to enhance the resiliency of Bay and aquatic ecosystems from the impacts of coastal erosion, coastal flooding, more intense and more frequent storms and sea level rise.

Status

While new restoration and protection projects are being developed and implemented, metrics for tracking and measuring the success of these projects to enhance resiliency (e.g., carbon sequestration, flood reduction, shoreline protection, habitat preservation) to coastal climate change impacts have not yet been developed. Given the urgency demonstrated by climate change trends and projections, it is critical to establish metrics to measure resilience successes to both assess progress toward this outcome and inform future management decisions. Past efforts to track progress in improving resilience have been too broad in scope, and we still need research and methodologies that support metric development for measuring resilience effectiveness in both the short- and long-term. Currently, the Climate Resiliency Workgroup has narrowed the scope of their work to focus on nature-based strategies (e.g., living shorelines, tidal wetlands, forest buffers); the workgroup assists with bringing partners together to develop adaptation projects, targeting project locations using the best available data and connecting partners with funding for both project design and implementation. In their 2023-2024 Logic and Action Plan, the workgroup prioritized supporting efforts to identify strategies to track progress in enhancing resiliency of the Bay and aquatic ecosystems from climate change impacts, which includes learning how partners are defining resiliency and measuring the efficacy of nature-based strategies. The workgroup must define what it means to enhance resiliency through nature-based strategies and develop methods and metrics to track success of these strategies. The Climate Adaptation Outcome is off course.

What has helped achieve success since 2014?

- Collaboration with other Chesapeake Bay Program Goal Implementation Teams (GITs) and workgroups on projects and efforts.
- Narrowing the scope of the outcome to focus on nature-based adaptation strategies (e.g., marsh migration, green/natural infrastructure).
- Federal, state, nonprofits and academic partners involved in the partnership are actively generating prominent climate change information through funding and implementing climate resilience research and projects.
- Many of the jurisdictions and federal agencies in the watershed have developed their own standalone climate change adaptation plans and resilience metrics, or have established advisory bodies to guide efforts and oversee projects.
- Local governments and communities are employing new and creative strategies to further adaptation opportunities.

What challenges have hindered progress?

- There is a lack of understanding or agreement from stakeholders on what constitutes resiliency, including what key actions to take to support management approaches.
- A variety of stakeholders have differing goals, making it challenging to have adequate resources to facilitate meaningful connections across all groups.

- There is a lack of capacity and dedicated human capital to fill research gaps, translate science, develop proposals and manage projects, and incorporate climate change considerations into programs, plans, processes or projects.
- The ability of governments and institutions to respond to climate change is still limited by legislature, policy, regulations and other authorities.
- Since there is variability across the watershed in how different systems respond to resiliency efforts, it is challenging to develop consistent guidance.

If off course, what is needed to accelerate progress?

This outcome is currently categorized as off-course because the way it is currently written is unattainable to be met by 2025 and should be refined for beyond 2025. The following bullets will assist in narrowing the scope of the outcome so that it is trackable and manageable within the purview of the Chesapeake Bay Program's current natural resource goals, however we are recommending that the Beyond 2025 discussions focus on updating the outcome language to make it attainable:

- Implement strategic targeting of adaptation projects based on maximizing benefits and persistence/longevity.
- Establish common definitions, metrics and monitoring to account for and evaluate efficacy of restoration and adaptation projects related to natural resource goals.
- Explore options for a climate resilience adaptation clearinghouse to track adaptation efforts (e.g., research and implementation) occurring within the watershed to understand the extent of efforts.
- Provide technical assistance, community engagement and capacity building to assist Bay partners in developing large-scale and/or high impact restoration and protection projects that can enhance resiliency of the Bay and aquatic ecosystems from coastal climate change impacts.

Climate Monitoring and Assessment Outcome

OUTLOOK ON COURSE

Outcome

Continually monitor and assess the trends and likely impacts of changing climatic and sea level conditions on the Chesapeake Bay ecosystem, including the effectiveness of restoration and protection policies, programs and projects.

Status

Progress continues on assessing climate change trends related to physical changes, including temperature, precipitation and sea level rise, in connection with programs. The language in this outcome does not provide a target or goal to meet. Furthermore, climate change is an ever-evolving issue, with new challenges and opportunities presenting themselves continually. As such, the Climate Resiliency Workgroup is focused on continually exploring new ways to monitor and assess the trends and impacts of climate change and will be faced with new challenges and impediments to overcome, so that we can continue to provide the Chesapeake Bay Program and our partners with data and information to assist in building climate resilience. In order for the outcome to stay on course, these recommendations require review and implementation by their respective partner programs (e.g., state natural resource agencies, federal agencies, local governments). The Climate Monitoring and Assessment Outcome is on course.

What has helped achieve success since 2014?

- Collaboration between Chesapeake Bay Program Goal Implementation Teams (GITs) and workgroups on incorporating climate change considerations in addressing the impacts of climate change on water quality, habitats and living resource outcomes.
- The Chesapeake Bay Program has an abundance of environmental monitoring resources that provide data to track climate change impacts, with two climate change Indicators (i.e., total annual precipitation and average air temperature) regularly maintained and updated on Chesapeake Progress.
- The Chesapeake Bay Program Modeling Team, with advisory support from the Climate Resiliency Workgroup and the Scientific and Technical Advisory Committee (STAC), incorporated climate change considerations and projections into the Bay Program's suite of modeling tools. The modeled outputs provide insights into climate change effects on nutrient and suspended sediment loads in the Bay and provide information on how to accommodate the projected changes. The jurisdictions utilized these outputs in the development of their Phase III Watershed Implementation Plans (WIPs) beginning in 2021.

What challenges have hindered progress?

- The scientific capabilities needed to estimate, project, model and monitor ecosystem changes and impacts as a result of climate change are complex and resource intensive.
- Climate change impacts are exacerbated by non-climate stressors such as land subsidence, land use change, development and growth.
- Climate change impacts vary across the watershed, presenting challenges in data consistency and comparability across the region.

- Differing rules and regulations across agencies and organizations make it difficult to share or provide open access to monitoring data.
- The development of a monitoring program to detect ecosystem changes, and inform program and project responses is a complex undertaking.
- Lack of consistent long-term funding for indicator development and monitoring needs.
- Partnership support is needed to support all monitoring and assessment needs, including the commitment of technical analysts and long-term data providers to inform model improvements and climate change indicators.
- There is a lack of staffing resources to undertake resource-intensive data analysis to inform climate change indicators.
- A coordinated effort toward improving the integration of modeling and monitoring tools that include climate parameters and future climate change projections is needed to improve understanding of how climate change will impact habitat and living resource goals in the *Chesapeake Bay Watershed Agreement*.

If on course, what is needed to accelerate progress?

Increasing capacity to support the prioritized list of climate change indicators, which includes the development of several new indicators. These indicators are time and staff resource intensive (beyond the capacity of current staff), so it will be important to build partnerships with organizations that can commit to being long-term data providers and assist with the indicator analysis.

- Continue supporting existing, in addition to, expanding long-term monitoring networks to provide needed data to assess climate change trends and impacts to the Chesapeake Bay's ecosystems.
- Continue to work with Chesapeake Bay Program Modeling team to incorporate climate change into modeling efforts and collaborate with Chesapeake Bay Program living resource outcomes to connect these models with current and future efforts (e.g., assessing striped bass habitat and SAV under changing climate and water quality conditions).
- Optimize use of the indicators and available resources, through establishing the purpose of the indicator with potential end-users to make the level of effort worthwhile. This includes getting support from other workgroups in connecting the climate change indicators with relevant ecological impacts to natural resource outcomes.
- Ensure adequate dedicated climate staff support is in place to continue progress.

Charting a Course to 2025

A Report and Recommendations for the Chesapeake Executive Council on How to Best Address and Integrate New Science and Restoration Strategies Leading up to 2025

Posted on July 21, 2023

Photo by Will Parson/Chesapeake Bay Program

Chesapeake Bay Program
Science. Restoration. Partnership.

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Table of Contents

Executive Summary

In October 2022, the Chesapeake Executive Council charged the Principals' Staff Committee with recommending a critical path forward that prioritizes and outlines the next steps for meeting the goals and outcomes of the Chesapeake Bay Watershed Agreement leading up to and beyond 2025. The Executive Council Charge to the Principals' Staff Committee: Charting a Course to 2025 and Beyond asked the Principals' Staff Committee to report back to the Executive Council at their 2023 annual meeting with recommendations on how to best address and integrate new science and restoration strategies leading up to 2025.

Signed in 2014, the most recent *Watershed Agreement* has several outcomes with a target date for completion of 2025. As a first step toward developing these recommendations, the charge asked for a snapshot describing the progress that each outcome was making in attaining their goals, including the remaining work to be completed and gaps to be addressed.

To address this need, each Chesapeake Bay Program outcome lead was asked to prepare a one to two-page overview of their outcome's status, including information on what helped that outcome to progress since the signing of the 2014 *Watershed Agreement*, challenges that have hindered its advancement and what is needed to help stay the course or accelerate progress to 2025. This assessment revealed that 17 are on track, two are uncertain pending upcoming data updates and 12 are off track and will not meet their 2025 goals.

The Executive Council charge calls for a deeper look at several specific topics including how emerging science, monitoring and analysis can help address existing and growing challenges, a review of how the partnership has addressed issues related to the Total Maximum Daily Load requirements and related Watershed Implementation Plans, diversity, equity, inclusion and justice (DEIJ) and climate change and a similar review of the Forest Buffers and Wetlands outcomes. Considered '"keystone" outcomes, the Chesapeake Bay Program's Management Board agreed to focus attention on the implementation of forest buffers and wetlands in 2021 because they provide significant conservation and restoration benefits in themselves as well as to many of the other *Watershed Agreement* outcomes. Each of these subsequent sections include further detail on the challenges, current opportunities and recommendations on how to best progress to 2025.

Information contained in these additional sections were thoughtfully provided from a variety of subject matter experts across the Chesapeake Bay Program. A list of these subject matter experts is provided on the "Acknowledgements" page of this report. Additionally, efforts in outlining and creating this document were aided by the Reaching 2025 Steering Committee, consisting of representatives from the watershed jurisdictions, federal agencies, non-governmental organizations and advisory committees.

Common Findings and Recommendations

The following findings and recommendations were assessed from the 31 outcome attainability templates and subsequent sections on the Chesapeake Bay Total Maximum Daily Load (Bay

TMDL)/Phase III Watershed Implementation Plans (WIPs), Emerging Science/Monitoring, Climate Change/DEIJ and Forest Buffers/Wetlands.

These recommendations are provided to the Chesapeake Executive Council on how to best address and integrate new science and restoration strategies leading up to 2025. Where that is not possible in the given timeframe, these recommendations should be considered in discussions that shape the direction of the Chesapeake Bay Program beyond 2025.

Outcome Attainability

Significant progress has been made over the past nine years toward achieving the 31 outcomes of the *Watershed Agreement.* As a result of this hard work, 17 outcomes are on track to be completed by 2025 and two remain uncertain while additional data is analyzed this summer. A number of patterns have emerged among these successful and unsuccessful outcomes leading to the following observations.

- Quantitative and qualitative outcomes can be effective. The latter often serving as a precursor for the former. However, successful qualitative outcomes require concrete milestones and measures of progress or milestones to evaluate their effectiveness.
- Successful quantifiable outcomes have clear geographic and numerical targets, measures of success, accounting systems and monitoring protocols in place. It may be impossible to achieve quantitative success without these in place.
- Jurisdictional and federal commitments, costs, roles and responsibilities must be clear. The success of many quantitative outcomes is driven by a federal champion and/or coordinator looking across the jurisdictions, in coordination with one or more state or non-governmental champions or coordinators for regional relevance and legitimacy.
- Ambitious outcomes are inspiring and can help drive change, but they must be established with a reasonable understanding of the costs, commitments and who is responsible for them.
- Outcome efforts must operate at the appropriate scale in order to make progress. For those large or nearly all encompassing in scope, such as climate change or diversity, establishing or modifying outcomes to focus on manageable pieces of these challenges, while maintaining a sense of their place in the broader context, could generate meaningful progress. Efforts should focus on high-impact actions and avoid implementation of many small, disconnected projects that can dilute staff and financial resources.
- Working with local communities, governments and non-profit organizations helps to identify high-priority geographies and match outcomes with local partner interests. Identifying priority geographies to implement measures to achieve outcomes and matching those with local partners would accelerate progress.
- The Chesapeake Bay Program is a distributed network centered on the Environmental Protection Agency (EPA). The EPA is the only Chesapeake Bay Program partner to have a mandate, staff and funding to work across all partnership issues. However, their annual funding is modest compared to the total annual investment in the region, and it is highly constrained. A

mechanism to match Chesapeake Bay Program needs with staff support and funding from across the partnership should be instituted through the Management Board.

Chesapeake Bay Total Maximum Daily Load/Phase III Watershed Implementation Plans

Partners of the Chesapeake Bay Program, particularly the seven jurisdictions, have made notable progress toward ensuring the necessary practices are in place to meet the Bay TMDL. To date, these actions have reached 49% of the nitrogen, 64% of the phosphorus and 100% of the sediment reduction goals. Additionally, many of the important components needed for the 2025 Watershed Implementation Plan (WIPs) Outcome to be successful are in place, including targeting mechanisms, tracking systems, roles, responsibilities, cost estimates and implementation plans. Key challenges related to climate change, the trapping capacity of the Conowingo Dam reservoir and fertilizer application modeling discrepancies have been identified and quantified, and commitments to address them are in place. While it is clear that the 2025 WIP Outcome will not be achieved by 2025, the partnership has made incredible strides in decreasing the amount of nutrient and sediment pollution that reaches the Bay, and that should be celebrated.

As the Bay TMDL calls for 100% of practices to be in place to meet pollutant reduction goals by 2025, the majority of the Bay Program's resources are focused on implementing measures to achieve these water quality standards. However, it is now understood that all these practices will not be in place by 2025, and if they were, they would not be sufficient to achieve the desired water quality and habitat benefits. This is due to three factors. Implementation, sufficient regulatory and voluntary measures not being in place to incentivize compliance in the non-point source sector; the lag-time associated with the implementation of BMPs and the water quality standards attainment needed for deep waters of the Bay; and that these deeper waters are not as relevant to the living resources like fish, shellfish and their habitats. Furthermore, these issues are exacerbated by climate change and increasing development pressures throughout the watershed.

- Non-point source pollution is where future reduction efforts will need to be focused. Moving toward 2025, expand the existing conversation around how to address pollution from nonpoint sources.
- Increase understanding of desired system response resulting from best management practice (BMP) implementation (dissolved oxygen, water clarity/SAV, chlorophyll *a*, living resources, etc.) using tools such as high-resolution land use and land cover data and high frequency water column monitoring.
- Target BMP implementation in high-impact areas throughout the watershed to improve local conditions, and in the culturally, ecologically and economically important shallow water areas of the Bay; prioritize resources in these locations.
- Draw on recent Scientific and Technical Advisory Committee analyses such as: Rising Watershed and Bay Water Temperatures—Ecological Implications and Management Responses, Increasing

Effectiveness and Reducing the Cost of Nonpoint Source Best Management Practice Implementation: Is Targeting the Answer and Achieving Water Quality Goals in the Chesapeake Bay: A Comprehensive Evaluation of System Response to implement non-point source strategies geographically based targeting to improve conditions for living resources of the Bay.

- Evaluate the discrepancies in the fertilizer application estimates generated by the Chesapeake Assessment Scenario Tool (CAST) and update Bay TMDL compliance accordingly.
- Craft succinct messaging acknowledging the partnership will not meet their water quality goals by 2025 but affirming efforts will continue to make progress.
- The Environmental Protection Agency will continue to provide oversight and support to the jurisdictions as we collectively look for ways to accelerate implementation progress, particularly in the nonpoint sector.
- Maintain a focus on addressing increased loads attributed to climate change and population growth, and implement the Conowingo Watershed Implementation Plan.

Emerging Science, Monitoring and Analysis

Science, monitoring and Analysis are the foundation of all the work of the Chesapeake Bay Program. They provide insights on water quality, climate change, contaminants and living resources, while enhancing our modeling tools. Over the past 5 years, spatial resolution has improved in land use mapping, spatial and temporal improvements have been implemented for shallow tidal water quality monitoring as well. Finer scale modeling is opening up new insights into the expected living resource response to CBP water quality management actions. Recent analytical work has identified trends in the data coming from the monitoring and modeling networks. These analyses have increased attention on the need to protect and restore key habitats such as marshes, submerged aquatic vegetation, and oyster reefs; along with associated living resources. They suggest more focus on living resources and their habitats would be improve the Chesapeake Bay Program's ability to achieve its goals and strengthen public support.

- Continue to investigate long-term funding sources to maintain Bay Program monitoring networks, support modeling efforts and finalize new water quality monitoring network developments funded in response to the Principals' Staff Committee Monitoring Review report recommendations.
- Evaluate satellite-based and other new technologies such as machine learning opportunities, for a more comprehensive monitoring and analysis of Chesapeake Bay ecosystem.
- Incorporate recommendations from Scientific and Technical Advisory Committee (STAC) reports.
    - The Comprehensive Evaluation of System Response, which suggests shifting the emphasis of science and monitoring from tracking water quality standards attainment in the deep trenches of the Bay, to focusing on improving conditions in culturally, ecologically and economically important places in the watershed with an increased focus on shallow-water areas beyond 2025.

    - Recommendations from the Rising Watershed and Bay Water Temperatures report demonstrates that warming waters will make it more difficult for the Bay Program to meet its water quality and living resources goals, and recommends that the partnership incorporate water temperature considerations more explicitly into its goals, outcomes and management strategies.
- Implement high-resolution monitoring and modeling in prioritized areas to provide feedback on living resources and habitat conditions. This can lead to improved indicators linking environmental change and living resource responses that can be integrated with existing synthesis products and used to evaluate the vulnerability of key species and habitats to guide management.
- Enhance capacity building and community engagement strategies to develop a collective vision resulting in scientifically informed conservation and restoration practices that achieve the Watershed Agreement outcomes in prioritized geographies.
- Incorporate more social information and data (e.g., population, languages spoken, household income) into geospatial products to foster increased understanding of the demographics and vulnerabilities of communities across the watershed in order to build relationships, better target communications and increase engagement opportunities.

Climate Change and Diversity, Equity, Inclusion and Justice (DEIJ)

The 2014 *Watershed Agreement* formally recognized both the importance of addressing the growing impacts of climate change, as well as the critical need to engage all residents of the Chesapeake Bay watershed in the restoration effort. These cross-cutting issues received an increase focus in 2020 and 2021 with the signing of Executive Council directives that highlighted their importance and called on new actions to be taken to accelerate progress. While both the Climate Resiliency and Diversity workgroups are making tangible progress in meeting the Climate Adaptation, Climate Monitoring and Assessment and Diversity outcomes, the directives did not provide funding or staffing support to be appropriately addressed. Climate and DEIJ are cross-cutting initiatives that the current Bay Program structure is not sufficiently set up to address.

- Identify champions to take responsibility for leading and coordinating these efforts. Often, champions include a federal representative along with someone from a jurisdiction, or in some cases, a nonprofit. They contribute and advocate for catalyzing funding, staff and resources. Effective GITs and workgroups often have sustained funding from a partner committed to the work (e.g., Environmental Literacy outcomes are supported through NOAA's Bay Watershed Education and Training Program).
- To move the work of the climate and DEIJ directives and other cross-cutting initiatives forward, the Bay Program must strategically evaluate how to support this sort of distributed work. Network theory and other coordination models should be used to determine how best to structure this work. Leadership level support and sufficient staff resources should be identified to promote systemic change within the Chesapeake Bay Program to effectively include and

amplify diverse voices and participants in our work; and to ensure the partnership considers and addresses the impacts of climate change effectively.

- Climate change and DEIJ were identified as the high priority actions for the Executive Council, but resources did not follow to address these issues despite increasing budgets. One necessary action is to fund critical projects outside of the GIT-funding process. In addition, providing a better accounting of federal and state resources contributing to the outcomes could help address the funding shortfall by allowing partners to strategically align efforts, thereby increasing efficiencies.

Forest Buffers and Wetlands

Achieving the targets of the Forest Buffers and Wetlands outcomes are crucial to meeting the partnership's water quality goals. Both provide a wealth of ecosystem benefits to the people who live, work and recreate within the watershed. In order to generate the substantial progress that is needed to meet these goals, fundamental change is needed to accelerate the implementation rate.

- Support effective, flexible buffer and wetland programs to limit or eliminate out-of-pocket costs for landowners, provide maintenance, fund practices on a rolling basis and limit eligibility requirements.
- Build and retain staff capacity to scale-up implementation of both buffers and wetlands and offer high-quality technical and maintenance services.
- Cultivate partnerships to support sustained funding and to coordinate outreach and technical assistance efforts.
- Develop more strategic approaches and increase capacity for outreach and engagement. These could include:
    - Encourage time and effort to cultivate relationships with private landowners to understand their barriers to wetlands and forest buffers.
    - Develop targeted communications materials for different audiences (e.g., landowners, policymakers, agricultural technical service providers) that emphasize the value and co-benefits of forest buffers and wetlands using case studies and success stories.
    - Ensure messages are in easily understood terms, spread frequently and through a variety of communications mediums to ensure all audiences are being reached.
- Expand tracking and reporting to ensure all forest buffers and wetlands are appropriately accounted for and verified. In particular, develop a strategy to conduct outreach to nonprofits, state agencies and other entities to ensure they know how to report their work to the new wetlands tracking tool that will be available in fall 2023. Additionally, review current tracking systems to make sure everything is working normally and being reported accurately.
- Establish clear geographic and numerical targets, measures of success, accounting systems and monitoring protocols for tidal wetland restoration.
- Explore additional funding options to enhance data collection and ensure the wetlands tracker remains upgraded.

Chesapeake Bay TMDL & Phase III WIPs

The Chesapeake Bay Total Maximum Daily Load (Bay TMDL) was established by the U.S. Environmental Protection Agency (EPA) in 2010 to reduce the amount of nutrients and sediment flowing into the Chesapeake Bay from its tributaries. The Bay TMDL recognized the Chesapeake Bay Program goal of having all pollutant reduction practices in place by 2025 that will eventually result in attainment of water quality standards. Under the Accountability Framework, jurisdictions and EPA agreed to develop two-year milestones, to identify and track actions being made to reduce nitrogen, phosphorus and sediment loads to the Bay.

The jurisdictions developed watershed implementation plans (WIPs) to help them determine how they will meet their pollutant reduction goals. Phase I WIPs were developed in 2010, with Phase II WIPs put into place in 2012. The Phase III WIPs were developed in 2018 to describe how the jurisdictions intended to meet their pollutant reduction targets by 2025. The Chesapeake Bay Program acknowledges that the partnership will not meet their 2025 targets, but has made incredible progress along this journey. Specifically, 100% of sediment reductions are estimated to be met by 2025, along with 49% of nitrogen reductions and 64% of phosphorus reductions.

Specific progress made by the jurisdictions in implementing their Phase III WIPs is reported on the *ChesapeakeProgress* website. As of 2021, computer simulations show that between 2009—the Bay TMDL baseline—and 2021 credited management actions are estimated to result in a 14% overall nitrogen decrease from 297.8 million pounds in 2009 to 257.53 million pounds in 2021, meeting 49% of the goal to reduce nitrogen by 2025. Those actions also decreased overall phosphorus 14% from 17.2 million pounds in 2009 to 14.7 million pounds in 2021, meeting 64% of the goal to reduce phosphorus by 2025. Finally, overall sediment is estimated to have decreased 4% from 18.9 billion pounds in 2009 to 18.1 billion pounds in 2021, meeting 100% of the goal to reduce sediment by 2025. These computer simulations show the following jurisdiction-specific breakdown of overall pollutant reductions between 2009 and 2021:

- **Delaware**: Has not met its pollutant reduction targets for nitrogen, phosphorus or sediment. Reported BMPs have achieved 20% of nitrogen, 52% of phosphorus and 63% of sediment goals.
- **District of Columbia**: Has met its targets for all three pollutants. Reported BMPs have achieved 100% of the nitrogen, phosphorus and sediment targets.
- **Maryland**: Has not met its pollutant reduction targets for nitrogen or phosphorus, but did meet its sediment goal. Reported BMPs have achieved 58% of nitrogen, 74% of phosphorus and 100% of sediment reductions.
- **New York:** Has not met its pollutant reduction targets for nitrogen, phosphorus or sediment. Reported BMPs have achieved 69% of nitrogen, 76% of phosphorus and 21% of sediment reductions.

- **Pennsylvania**: Has not met its pollutant reduction targets for nitrogen, phosphorus or sediment. Reported BMPs achieved 22% of nitrogen, 48% of phosphorus and 45% of sediment reductions.
- **Virginia**: Has not met its pollutant reduction targets for nitrogen or phosphorus, but has met its target for sediment. Currently, installed BMPs have achieved 75% of nitrogen, 68% of phosphorus and 100% of its sediment reductions.
- **West Virginia**: Has met its targets for all three pollutants. Reported BMPs have achieved 100% of the nitrogen, phosphorus and sediment targets.

The following challenges have been identified as impeding the jurisdictions' progress in meeting their Phase III WIP targets:

- **Climate change**: Impacts from a changing climate are increasing the flow and delivery of nutrients and sediment into the Chesapeake Bay. Projections have estimated that the partnership will need to account for additional nutrient pollutant reductions to meet applicable water quality standards. In December 2020, the Principals' Staff Committee reached consensus that the jurisdictions would be expected to account for additional nutrient and sediment loads due to 2025 climate change conditions in an addendum to their Phase III WIPs and/or their two-year milestones beginning in 2022.
- **Conowingo Dam**: Between 2014-2016, the partnership became aware that the reservoir behind the Conowingo Dam was filling more quickly than anticipated, and its trapping capacity for sediment and nutrients were being impacted by sediment transport and scouring events, leading to an increase in pollutants flowing into the Chesapeake Bay. In late 2017, the Principals' Staff Committee agreed to address the additional pollutant loads resulting from the Conowingo Dam's lack of trapping capacity through a separate WIP. The final Conowingo WIP was approved by the Principals' Staff Committee in September 2021 and the first two-year milestones for the Conowingo WIP were submitted to EPA in January 2022. While the Conowingo WIP has not yet been implemented, funding has been committed by Maryland, New York and Pennsylvania for implementation purposes.
- **Chesapeake Assessment Scenario Tool (CAST):** Concerns have been raised about the validity of data and information that is used in CAST, which is one part of the Chesapeake Bay Program's suite of modeling tools, to assess the jurisdictions' progress toward meeting their 2025 targets. In August 2022, the Principals' Staff Committee set a path forward to address these concerns:
    - Address new and unaccounted pollutant loads post-2025.
    - Develop a short-term, interim resolution for fertilizer data concerns before moving forward with updating the current version of CAST, as well as a long-term resolution for the Phase 7 model.
    - Update the process for incorporating data into CAST to include additional safeguards to prevent data analysis errors and to assess the reasonability of modeling results after partnership protocols are applied.
- **Pollution from non-point sources**: Stormwater and agriculture runoff are two of the fastest growing sources of pollutants flowing into the Chesapeake Bay. Although some stormwater and agriculture sources are regulated via the federal Clean Water Act permitting program, many are not. With over 83,000 farms, increasing development and more frequent and heavier rainfall

occurring from climate change, controlling pollutants from nonpoint sources remains a significant challenge.

- **Staff capacity and technical assistance**: These are the two largest needs identified by the jurisdictions in meeting their 2025 pollutant reduction goals. New funding sources are often targeted to implementation projects, but not the technical assistance to support the projects or the administrative support to apply for and manage the funding. It is not possible to use funding for technical assistance or capacity building if the money is only slated for one to a few years, making partners reluctant to hire additional staff. Additionally, due to various factors, many environmental, agricultural and natural resource agencies have lost a considerable number of staff and resources which needs to be supplemented in order to fully implement their Phase III WIP commitments.
- **BMP verification process**: The BMP Verification Ad-hoc Action Team has worked to address various issues related to verification, but BMP verification remains a significant challenge across the partnership. Some of these include restricted access to certain federal data, minimal resources to conduct BMP verification and issues with access to operations. The most common concern is whether to prioritize limited state technical capacity to verify existing BMPs or implement new BMPs.
- **Miscellaneous**: The Covid-19 pandemic, and recent avian flu outbreak, has impacted partners' ability to work directly with landowners, and limited access to BMP implementation and verification. Additionally, recent inflationary pressures have impacted partners, most notably with respect to the cost of materials and labor to implement BMPs, as well as to maintain these BMPs and our monitoring networks. Current CAST cost estimates may not reflect current costs due to inflation.

While the above points are listed as challenges, many of them are also opportunities that can lead to the acceleration of progress. For example, limited staff to oversee the influx of new funding from the Bipartisan Infrastructure Investments and Jobs Act and Inflation Reduction Act, among others, is impacting the jurisdictions' ability to spend the money in an efficient and effective manner. However**,** the increase has allowed for more BMPs to be implemented and technical assistance to be expanded. The new funding typically has specific new and/or different requirements on how and where it can be used in order to be eligible to take advantage of it. But increased outreach activities are leading to opportunities to leverage available resources to fund the implementation of nonpoint source BMPs.

The increased funding has also led to a larger allocation of resources to existing grant programs, such as the Chesapeake Bay Stewardship Fund, which includes the Pennsylvania Most Effective Basins program. The Most Effective Basins program funds projects that will accelerate the implementation of cost-effective agricultural BMPs. The Chesapeake Bay Stewardship Fund is managed by the National Fish and Wildlife Foundation but funded by the EPA.

Thanks to the consistent reporting of jurisdictional progress through the two-year milestones, we are able to note incremental progress in achieving the pollutant reduction targets of the Phase III WIPs and identify areas that may need improvement. Although the overall water quality goals will not be met by

2025, the partnership continues to make steady progress in reducing pollutant loads flowing into the Chesapeake Bay.

The following actions will be taken over the next two years to help accelerate progress for each jurisdiction's Phase III WIPs goals:

- Expand the existing conversation around how to address pollution from nonpoint sources.
- Begin the conversation around how to include new scientific findings and monitoring results beyond 2025 that will impact the partnership's commitment to meeting the goals of the Phase III WIPs and Bay TMDL moving forward. Some of these new findings include reports developed by the Bay Program's Scientific and Technical Advisory Committee, such as the *Rising Watershed and Bay Water Temperatures—Ecological Implications and Management Responses*, *Increasing Effectiveness and Reducing the Cost of Nonpoint Source Best Management Practice Implementation: Is Targeting the Answer* and *Achieving Water Quality Goals in the Chesapeake Bay: A Comprehensive Evaluation of System Response*. The Phase 7 suite of modeling tools is currently in development and will incorporate as much as this new science as possible.
- Craft succinct messaging that acknowledges that the partnership will not meet their water quality goals by 2025 but affirm that we will not take our foot off the gas toward making progress, even though new efforts to increase progress will not be introduced before 2025. Messaging will also account for successes toward meeting the Bay TMDL, as well as acknowledge the significant conservation practices adopted by different sectors across the watershed (e.g., agriculture, wastewater).
- Begin the discussion around new, innovative approaches to meet the jurisdictions' Phase III WIP goals that can be considered beyond 2025.
- The Environmental Protection Agency will continue to provide oversight and support to the jurisdictions as we collectively look for ways to accelerate implementation progress, particularly in the nonpoint sector.

Emerging Science, Monitoring and Analysis

Science, monitoring and analysis are essential to assess the status and variability of water quality and living resources throughout the Chesapeake Bay watershed. Monitoring networks provide insights on key parameters such as water quality, climate change, contaminants and living resources. Monitoring data is also required to build, operate and enhance the partnership's suite of modeling tools. These models are used to develop pollutant reduction strategies and to make predictions about current and future ecosystem conditions that inform living resource management. Research and data analysis reveal trends over time and quantify the responses of living resources to changes in the ecosystem.

Challenges

Science, monitoring and analysis needs are tracked by the Chesapeake Bay Program through the Scientific, Technical Assessment and Reporting Team (STAR) Strategic Science and Research Framework (SSRF) database, as well as the assessment of the partnership's current monitoring networks, prepared for the Principals' Staff Committee (PSC) in 2022. The SSRF and monitoring assessment reveal the following challenges:

- Monitoring is insufficient at the spatial and temporal scopes required to support the assessments needed for many Bay Program outcomes.
- More research is needed to analyze monitoring data and understand how changes in water quality and environmental conditions are affecting habitat quality and the abundance and distribution of ecologically and commercially important species.
- Funding is not sufficient to provide additional capacity to develop metrics, indicators and sampling designs, or to analyze monitoring data and address priority research questions.

Current Opportunities

Despite existing challenges, the Chesapeake Bay Program monitors 19 physical, chemical and biological characteristics throughout the year in the Bay and its tributaries. These specific networks include tidal and nontidal monitoring networks, as well as monitoring of submerged aquatic vegetation (SAV), benthic communities and land use.

- **Tidal Water Quality Monitoring Program**: The current tidal monitoring network has 154 active stations throughout the Chesapeake Bay, whose data informs the annual tidal water quality assessment that gauges the health of the Bay. Some of the parameters measured include water temperature, salinity levels, nutrients and dissolved oxygen.
- **Non-Tidal Monitoring**: The non-tidal monitoring network has 123 active stations throughout the Chesapeake Bay watershed, which includes River Input Monitoring (RIM) stations located on the nine largest rivers in the watershed. Data measured for the nontidal network includes, but is not limited to, pollutant loads and trends.

- **SAV Monitoring**: The monitoring of underwater grasses uses a three-tiered approach. This approach consists of the annual Bay-wide aerial survey, the SAV Watchers Program, which engages local watershed groups and volunteers and the SAV Sentinel Site Program. This combination of monitoring efforts allows for the best estimation of SAV acreage and density, while collecting detailed habitat and water quality data and providing educational volunteer opportunities to communities at the same time.
- **Chesapeake Bay Benthic Macroinvertebrate Monitoring:** Benthic species monitoring provides an excellent snapshot of environmental conditions in the Bay and its tidal tributaries, focused on the summer season. Benthic species in the Chesapeake Bay tidal waters include clams, worms, oysters and mussels who live at the bottom of the Bay and cannot easily move—if at all—to escape stressors like unhealthy water quality conditions.
- **Community Science Efforts**: The Chesapeake Monitoring Cooperative (CMC) is a regional partnership that provides technical, logistical and outreach support to volunteers and watershed organizations for the integration of volunteer-based and nontraditional water quality and benthic macroinvertebrate monitoring data into the Chesapeake Bay Program. Currently, over 100 non-traditional, community and volunteer-based monitoring groups are involved with water quality and macroinvertebrate monitoring. Over 800,000 data points have been recorded in the CMC's Chesapeake Data Explorer.
- **Land Use and Land Cover Monitoring Network**: High-resolution (i.e., one-meter by one-meter) land use and land cover data for each county in the watershed is used to show how the Chesapeake landscape is changing. The data is remapped every four years to monitor changes in tree canopy, map wildlife habitat and ecologically sensitive lands, and determine where environmental restoration can provide the highest benefit. This information has recently been used to inform the Land Use Methods and Metrics Outcome and to develop the Tree Canopy Status and Change Fact Sheets.

The partnership's monitoring networks are taking advantage of current funding opportunities, including those appropriated through the Infrastructure Investment and Jobs Act, to meet their needs and enhance understanding of the Bay ecosystem. Recent advances in geospatial analysis, high-resolution monitoring (spatially and temporally) and biological and physical modeling will allow new management paradigms to emerge to address well known conservation challenges including those emerging with climate change and increased development pressure. Some examples include:

- Land Use Land Cover Data Project.
- Targeted shallow-water and habitat suitability modeling.
- Development of the 4D Interpolator (model to assess Bay and tidal water quality criteria).
- Ecological thresholds (e.g., shoreline hardening, impervious surfaces, temperature).
- High frequency hypoxia sensors.
- Expanded use of satellite data for monitoring and machine learning for data analysis.

Additionally, increased focus on local engagement, social science, living resources and geographic targeting are preparing the Bay Program for the best way to integrate emerging science findings beyond 2025. Highlights of these efforts include:

- **Local Engagement and Education**: Regional partnerships with federal and state governments, nonprofits and local communities are critical to finding collaborative solutions that support both Chesapeake Bay restoration and the people that live, work and recreate within its watershed.
- **Social Science**: When the 2014 *Chesapeake Bay Watershed Agreement* was signed, it was the first time that signatory partners recognized the importance of including all residents of the watershed in helping with the restoration of the Bay. While a broad social science strategy is not yet in place across the partnership, efforts to utilize social science tools to advance the *Watershed Agreement* outcomes have taken place. For example, in fall 2020, the University of Maryland Center for Environmental Science completed *Enhancing Chesapeake Bay Partnership Activities by Integrating Social Science*. This roadmap set out to learn about the goals of social science integration within the partnership and evaluated some of the current social science efforts that could inform and advance those goals by offering detailed recommendations.
- **Data Analysis and Synthesis**: Progress is being made where federal and state agencies have focused their research funding and data analysis capacity with the needs of the Bay Program. These agencies have also modified their grant programs to increase the number of grantees that have been historically underrepresented in the environmental and marine science fields. Additionally, efforts are underway to better synthesize the abundance of scientific data and knowledge to communicate a more comprehensive story about how the ecosystem is changing and the implications of these changes. A few examples are highlighted below.
    - By aligning research funding with the outcomes of the Watershed Agreement, NOAA has helped to improve habitat suitability models and provide a better understanding of climate and other environmental variability impacts on fish species and their habitats. This research has also resulted in the quantification of ecosystem services provided by restored oyster reefs and other habitats, including the economic returns that restoration activities provide communities.
    - The U.S. Geological Survey is working to expand data analysis efforts to support GITs and workgroups by:
        - Developing a more strategic, science-based approach to better target federal and state resources to the places and activities that will accelerate progress for multiple outcomes. This effort is presented in a data hub containing a collection of maps and applications that can evaluate restoration and landscape initiatives that are relative to the goals and outcomes of the Watershed Agreement.
            - Understanding the factors that are affecting stream health, fish habitat and aquatic conditions.
            - Characterizing the risks to coastal ecosystems and their implications for waterbirds.
            - Informing prioritization for land protection and maintenance of healthy watersheds.

- NOAA is drawing on research findings and data analysis to develop seasonal summaries of water quality parameters found within the Chesapeake. The reports look at water temperature, dissolved oxygen and salinity levels compared to their average, and note how any potential anomalies are impacting the living resources of the Bay. These summaries are intended to contribute to ecosystem-based management and use data from the Chesapeake Bay Interpretive Buoy System, as well as the NOAA CoastWatch satellite program.

Recommendations on Progressing to 2025

To ensure science, monitoring and data analysis continue to provide critical support in the implementation of the Watershed Agreement outcomes through 2025 and that emerging science is considered and integrated in the Bay Program's work, the following recommendations are offered:

- Continue to investigate long-term funding sources to maintain Bay Program monitoring networks, support modeling efforts and complete new water quality monitoring network developments funded in response to the PSC Monitoring Review Report recommendations.
- Evaluate satellite-based and other new technologies such as machine learning opportunities, for a more comprehensive monitoring and analysis of Chesapeake Bay ecosystem.
- Incorporate recommendations from STAC reports.
  - The *Comprehensive Evaluation of System Response*, which suggests shifting the emphasis of science and monitoring from tracking water quality standards attainment in the deep trenches of the Bay, to focusing on improving conditions in culturally, ecologically and economically important places in the watershed with an increased focus on shallow-water areas beyond 2025.
  - Recommendations from the *Rising Watershed and Bay Water Temperatures* report demonstrates that warming waters will make it more difficult for the Bay Program to meet its water quality and living resources goals, and recommends that the partnership incorporate water temperature considerations more explicitly into its goals, outcomes and management strategies.
- Implement high-resolution monitoring and modeling in prioritized areas to provide feedback on living resources and habitat conditions. This can lead to improved indicators linking environmental change and living resource responses that can be integrated with existing synthesis products and used to evaluate the vulnerability of key species and habitats to guide management.
- Enhance capacity building and community engagement strategies to develop a collective vision resulting in scientifically informed conservation and restoration practices that achieve the Watershed Agreement outcomes in prioritized geographies.
- Incorporate more social information and data (e.g., population, languages spoken, household income) into geospatial products to foster increased understanding of the demographics and vulnerabilities of communities across the watershed in order to build relationships, better target communications and increase engagement opportunities.

Climate Change and Diversity, Equity, Inclusion and Justice

The 2014 *Chesapeake Bay Watershed Agreement* included outcomes for Diversity, Climate Adaptation, and Climate Monitoring and Assessment. However, as implementation of the Watershed Agreement progressed, the Chesapeake Bay Program recognized that these outcomes did not fully address the broad nature of these cross-cutting issues.

To expand and better define these bodies of work, the Chesapeake Bay Program released a diversity, equity, inclusion and justice (DEIJ) strategy in April 2020, *Restoration from the Inside Out: A Diversity, Equity, Inclusion and Justice Strategy for the Chesapeake Bay Program*, that was followed later that year by a *Statement in Support of Diversity, Equity, Inclusion and Justice*, signed by the Executive Council. The statement commits to strengthening DEIJ throughout the partnership with an emphasis on engaging, recruiting and retaining an ethnically and racially diverse staff and leadership, fostering an inclusive workplace and ensuring long-term relationships with underrepresented organizations and communities that result in informed and mutually beneficial decisions and outcomes. In December 2021, the Chesapeake Bay Program, with input from partners and the public, released the DEIJ Implementation Plan, which presents a roadmap for advancing the recommendations in the strategy.

In 2021, the Executive Council signed a directive in reference to climate change, *Collective Action for Climate Change*. This directive acknowledges the consequences that a changing climate is bringing to the Chesapeake Bay watershed, particularly acknowledging those habitats, peoples, communities and industries that are disproportionately impacted. It explicitly states that while every jurisdiction is taking steps to combat climate impacts (e.g., rising water and air temperatures, sea level rise, saltwater intrusion, shift in the range of species), to address these issues through the entire Bay watershed requires a collaborative response. The directive addresses the threats of climate change in all aspects of the partnership's work, prioritizes communities and habitats most vulnerable to ever-increasing risks, seeks to apply the best scientific, modeling, monitoring and planning capabilities of the Bay Program, and connects Bay restoration goals with emerging opportunities in climate adaptation, mitigation and resilience. The partnership released the Climate Change Directive Work Plan to support this work in July 2022.

Challenges

Despite the effort to accelerate work in these two critical areas, large-scale progress has been challenging. Several key challenges are shared across the two bodies of work, including:

- **Insufficient Capacity**: The directives for climate and DEIJ are ambitious, far reaching and appropriate, but they are not sufficiently or consistently supported. The capacity of the workgroups is limited to advancing the outcomes of the *Watershed Agreement*. This leaves the important work outlined in the directives without dedicated support or leadership.

- **Lack of Coordination**: Beyond the workgroups, the partnership is making additional progress on meeting the objectives of the directives, but in an uncoordinated, unaccountable and undocumented manner. The Chesapeake Bay Program operates through Goal Implementation Teams (GITs) and their respective workgroups, which are largely siloed without the necessary structure to work towards cross-cutting outcomes like DEIJ and climate. While good work is happening within these teams, limited capacity exists for tracking and coordinating this work. Individual state and federal agencies, as well as non-profit partners, are advancing critical work on climate and DEIJ issues across the watershed. This results in inefficiencies, missed opportunities and a lack of understanding about the breadth of work occurring.
- **Inadequate Resource Commitment**: There is insufficient funding to meet the scale of the climate and DEIJ expectations established under the directives and *Watershed Agreement*. Without a shared understanding of how Chesapeake Bay Program grant funding is being applied towards the outcomes at the state level, and with no federal funding partner, the primary funding available to support the DEIJ and climate work is through the GIT-funding process. This competitive pool of funds only allows for small-scale projects that don't move the needle forward at the pace needed to meet the expectations outlined in the directives.
- **Diversity Indicator**: A challenge specific to the Diversity outcome is its misalignment with the indicators tracked by the Bay Program. There is a need for new indicators to measure success of partnership efforts to identify stakeholder groups not currently represented in the leadership, decision-making or implementation of current conservation and restoration activities, as well as a need to create meaningful opportunities and programs to recruit and engage these groups in Bay Program efforts. The full picture of progress requires measuring success both within the partnership itself as well as with external audiences and stakeholders.

Current Opportunities

The Diversity and Climate Resiliency workgroups are making progress toward the outcomes included in the *Watershed Agreement*. In some cases, this also advances the work of the directive.

The Climate Resiliency Workgroup was successful in moving a handful of projects forward by identifying those considered to be high-priority based on the partnership's interest. This allowed the workgroup to lead collaboration across multiple GITs and stakeholders resulting in the following specific deliverables:

- Creation of targeting criteria for marsh adaptation and green infrastructure projects.
- Inclusion of climate impacts (sea level rise) in the Bay Program's suite of modeling tools.
- Development of temperature and precipitation indicators.
- Completion of the Scientific and Technical Advisory Committee (STAC) sponsored report, *Rising Watershed and Bay Water Temperatures—Ecological Implications and Management Responses*.

Similarly, the Diversity Workgroup undertook the following opportunities to make progress toward the Diversity outcome:

- Presenting and hosting partnership-wide training, webinars and guest speakers on DEI.

- Establishment of memorandums of understanding (MOUs) with regional Historically Black Colleges and Universities (HBCUs).
- Training and coordination to ensure more equitable grant funding and offerings.
- Establishment of the Workforce Action Team and associated workforce landscape assessment with the Education Workgroup.
- Launching of the C-StREAM summer internship program with the Chesapeake Research Consortium to engage underrepresented or first-generation college students in environmental research and management internships within Chesapeake Bay Program partner organizations.

Recommendations on Progressing to 2025

The following recommendations are provided to address cross-cutting priorities in the Chesapeake Bay Program, as well as to meet the current priorities of the Diversity and Climate Resiliency workgroups.

- **Identify Champions**: Champions who take responsibility for leading and coordinating outcomes are critical. Often they include a federal representative along with someone from a jurisdiction, or in some cases, a nonprofit. Champions often contribute and advocate for catalyzing funding, staff and resources. Effective GITs and workgroups often have sustained funding from a partner committed to the work (e.g., Environmental Literacy outcomes are supported through NOAA's Bay Watershed Education and Training Program).
- **Provide Cross-Outcome Coordination**: To move the work of the climate and DEIJ directives and other cross-cutting initiatives forward, the Bay Program must strategically evaluate how to support this sort of distributed work. Network theory and other coordination models should be used to determine how best to structure this work. Leadership level support and sufficient staff resources should be identified to promote systemic change within the Chesapeake Bay Program to effectively include and amplify diverse voices and participants in our work; and to ensure the partnership considers and addresses the impacts of climate change effectively.
- **Secure Adequate Funding**: Progress takes investment. Climate change and DEIJ were identified as the high priority actions for the Executive Council, but resources did not follow to address these issues despite increasing budgets. One necessary action is to fund critical projects outside of the GIT-funding process. In addition, providing a better accounting of federal and state resources contributing to the outcomes could help address the funding shortfall by allowing partners to strategically align efforts, thereby increasing efficiencies.

Forest Buffers & Wetlands

While each of the 31 outcomes of the Chesapeake Bay Watershed Agreement are vital to improving the health of our local waterways and the Chesapeake Bay, it is possible that no two outcomes are more critical to improving water quality, climate resiliency and habitat than forest buffers and wetlands.

The Chesapeake Bay Program has recognized the importance of both outcomes since its inception. Both habitats were included as objectives for restoration in the 1987 *Chesapeake Bay Agreement*—"Protect, enhance and restore wetlands, coastal sand dunes, forest buffers and other shoreline and riverine systems important to water quality and habitat."

The achievement of the forest buffers and wetlands outcomes are critical to meeting the Bay Program's water quality goals. In fact, 10% of planned nitrogen reductions are estimated to come from forest buffer plantings alone. Both provide a wealth of ecosystem benefits to the people that live, work and recreate within the watershed. Wetlands provide habitat for a diversity of terrestrial and aquatic species, while recharging groundwater and helping to stabilize climatic influences. Forest buffers help to cool air and stream temperatures, benefiting brook trout and other types of fish, and help support healthy stream ecosystems. Both habitats provide crucial barriers between nutrient and sediment pollutants flowing off the land and into nearby waterways, helping to reduce the impacts of storms and flooding on downstream communities. Work undertaken to further these "keystone outcomes" aids in progressing the other 29 of the *Watershed Agreement*.

Fundamental changes are needed to generate the significant increase in project implementation rates required to meet the goals set in the outcomes for both forest buffers and wetlands. The Forest Buffers and Wetlands outcomes are unique in that they require changes to land use and cover. As the majority of the land in the watershed is privately owned, it will take willing landowners and effective incentives to achieve these outcomes. Numerous efforts to accelerate these outcomes have been implemented over the past several years to varying degrees of success. In 2022, stakeholders for each outcome were brought together for a series of workshops to discuss restoration efforts, review barriers to implementation, and develop strategies and action plans for increasing progress.

Challenges

The process for funding, implementing and maintaining each outcome is complex with several barriers to accelerating implementation.

- **Implementation programs**: New, innovative programs are needed to accelerate progress in reaching buffer and wetlands goals. Existing cost-share programs can be challenging for some landowners to navigate, with complex requirements and high out-of-pocket costs for landowners. Flexible, turnkey programs resulting in no cost solutions for landowners have proven to be successful in helping with forest buffer implementation. New models should also

be considered in how to effectively distribute funding and where needed, to compensate landowners for the conversion of productive land to buffers or wetlands.

- **Dedicated funding**: The current increase in federal funding for environmental restoration has provided significant advances but often, these funds are not targeted to forest buffers and wetlands. Grant programs often do not account for the myriad of needs required for successful plantings and restoration of wetlands and forest buffers. Funding is needed to conduct ongoing maintenance to ensure plantings perform their ecosystem functions, as well as for the long-term capacity to conduct these extended maintenance operations (particularly for wetlands, which tend to be multi-year restoration efforts). Funding agreements eventually expire and in the case of restoration projects that take multiple years, like wetlands, it is critical to ensure uninterrupted funding.
- **Outreach and engagement**: Increased engagement and outreach with landowners is needed to further the forest buffers and wetlands outcomes. Streamlined communications in plain language is needed to emphasize the value of these practices, as implementation can result in trade-offs (e.g., shading out crops adjacent to buffers, future development capabilities, regulatory oversight for wetlands). Time and effort is needed to build long-lasting and trust-worthy relationships with these audiences.
- **Capacity**: While implementation funding has grown through such bills as the Inflation Reduction Act (IRA) and Infrastructure Investment and Jobs Act (IIJA), short-term grants can make it challenging for organizations to support an increase in staff. There is simply not enough capacity, mainly at the state agency and NGO level, to develop and submit project proposals, produce and manage grants, review and issue project permits, and conduct the needed outreach, planting and maintenance required to meet the wetlands and forest buffers outcomes, as well as the goals in the jurisdictions' Phase III Watershed Implementation Plans (WIPs). For the forest buffer outcome, in areas where intensive outreach programs are in place, landowner demand to plant buffers has exceeded capacity for planting and maintenance, so inadequate capacity limits outcome progress. Additionally, retaining staff is as essential as building a new workforce, as it provides continuity and builds trust with landowners. Therefore, it is essential to support technical assistance positions that pay a fair wage, have job security and provide a good working environment.
- **Tracking and verification:** It is a challenge to accurately track, report and verify the acreage of forest buffers and wetlands restored. Due to the variety and complexity of our funding sources, the broad range of nonprofits working in this space and different mechanisms for tracking implementation in each jurisdiction, practices are not always reported. Best management practice (BMP) data entry, and verification issues within the Chesapeake Bay Assessment Scenario Tool (CAST), prevent the full accounting of riparian forest buffers and wetlands. For buffers, their credit in CAST expires after 15 years, meaning the jurisdictions will need to verify the plantings are still present and functioning as intended. In regard to wetlands, they are not currently counted in the model in urban areas, and wetland enhancement is not considered a BMP, making it unable to be tracked. The Wetlands Workgroup is cognizant of these challenges

and is developing a wetlands tracking tool that will help with reporting and is anticipated to be available in fall 2023.

- **Emerging threats**: Although forest buffers and wetlands are critical practices for increasing the resilience of ecosystems and communities to climate change, climate change can impose challenges for successfully establishing forest buffers and wetlands. Land subsidence, marsh migration, flooding, drought and increases in air and water temperature are just some of the ways in which a changing climate is impacting buffers and wetlands. Moving forward, practitioners will need to incorporate climate change considerations into species selection, site design and maintenance planning.

Current Opportunities

Despite these challenges, both outcomes have several ongoing activities that are helping them to achieve success.

- In 2022, the Chesapeake Riparian Forest Buffer Leadership Workshop and Restoring Wetlands of the Chesapeake Bay Watershed Workshop, convened professionals from across the watershed to strategize on how to accelerate progress toward these outcomes.
    - Chesapeake Riparian Forest Buffer 2022 Leadership Workshop Summary and Next Steps
    - Restoring Wetlands of the Chesapeake Bay Watershed Workshop Action Plan
- As an outcome of the Chesapeake Riparian Forest Buffer Leadership Workshop, each of the jurisdictions developed their own riparian forest buffer action strategies to identify ways in which they can uniquely progress buffer implementation over the next 5-10 years.
- A reorganization of the Wetlands Workgroup recently occurred, to focus efforts on both non-tidal and tidal wetland restoration and enhancement. Even though the outcome as currently written doesn't reflect non-tidal and tidal wetlands individually, this shift allows workgroup members to prepare for how they would like to address changes in the outcome post-2025.
- Both outcomes have worked across other Chesapeake Bay Program GITs, workgroups and advisory committees to fill information and data gaps. Some of this work includes recent Scientific and Technical Advisory Committee (STAC) reports like, *Rising Watershed and Bay Water Temperatures—Ecological Implications and Management Responses* and workshops, *Evaluating an Improved Systems Approach to Crediting: Consideration of Wetland Ecosystem Services*.
- A growing momentum to expand existing flexible and effective buffer programs to complement current CREP funding.
- GIT-funded projects, like *Maintaining Riparian Forests in Stream Corridor Restoration*, emphasize the important role that forest buffers play in overall stream ecosystem health, and the in-progress, *Mapping Non-Tidal Wetlands in Areas with Outdated Wetlands Maps*, develops a new approach to cost-effectively model the location of non-tidal vegetated wetlands.

Accelerate Progress to 2025

While the forest buffers and wetlands outcomes will not be met by 2025, the following strategies will help to accelerate progress over the next two years:

- Establish clear geographic and numerical targets, measures of success, accounting systems and monitoring protocols for tidal wetland restoration.
- Support effective, flexible buffer and wetland programs to limit or eliminate out-of-pocket costs for landowners, provide maintenance, fund practices on a rolling basis and limit eligibility requirements.
- Build and retain staff capacity to scale-up implementation of both buffers and wetlands and offer high-quality technical and maintenance services.
- Cultivate partnerships to support sustained funding and to coordinate outreach and technical assistance efforts.
- Develop more strategic approaches and increase capacity for outreach and engagement. These could include:
    - Encourage time and effort to cultivate relationships with private landowners to understand their barriers to wetlands and forest buffers.
    - Develop targeted communications materials for different audiences (e.g., landowners, policymakers, agricultural technical service providers) that emphasize the value and co-benefits of forest buffers and wetlands using case studies and success stories.
    - Ensure messages are in easily understood terms, spread frequently and through a variety of communications mediums to ensure all audiences are being reached.
- Expand tracking and reporting to ensure all forest buffers and wetlands are appropriately accounted for and verified. In particular, develop a strategy to conduct outreach to nonprofits, state agencies and other entities to ensure they know how to report their work to the new wetlands tracking tool that will be available in fall 2023. Additionally, review current tracking systems to make sure everything is working normally and being reported accurately.
- Explore additional funding options to enhance data collection and ensure the wetlands tracker remains upgraded.

Outcome Attainability

The Executive Council charge calls for updates on the attainability of the 31 outcomes of the *Chesapeake Bay Watershed Agreement* in reaching their goals. These snapshots provide an overview of their current status, challenges toward meeting their goals, opportunities to date and recommendations on accelerating progress toward 2025. This assessment found that 17 of our outcomes are considered to be on course, 12 are off course and two are uncertain pending data updates later on in 2023.

Please note that some outcomes in the *Watershed Agreement* do not have a set completion date of 2025, but rather have a different target or are asked to continually show progress.

	
Blue Crab Abundance Outcome	Wetlands Outcome
Blue Crab Management Outcome (Completed)	Black Duck Outcome
Oysters Outcome	Brook Trout Outcome
Forage Fish Outcome	Submerged Aquatic Vegetation Outcome
Fish Habitat Outcome	Forest Buffers Outcome
Stream Health Outcome	Tree Canopy Outcome
2017 Watershed Implementation Plans (WIPs) Outcome (Complete)	2025 Watershed Implementation Plans (WIPS) Outcome
Fish Passage Outcome	Diversity Outcome
Water Quality Standards Attainment and Monitoring Outcome	Toxic Contaminants Policy and Prevention Outcome
Local Leadership Outcome	Toxic Contaminants Research Outcome
Protected Lands Outcome	Students Outcome
Land Use Methods and Metrics Development Outcome	Climate Adaptation Outcome
Land Use Options and Evaluations Outcome	
Public Access Outcome	
Sustainable Schools Outcome	
Environmental Literacy Planning Outcome	
Climate Monitoring and Assessment Outcome	

Outlook Uncertain:

The outlook of the Healthy Watersheds Outcome and the Stewardship Outcome are considered uncertain pending additional analysis this summer.

Sustainable Fisheries Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Protect, restore and enhance finfish, shellfish and other living resources, their habitats and ecological relationships to sustain all fisheries and provide for a balanced ecosystem in the watershed and Bay."

Photo by Carlin Stiehll/Chesapeake Bay Program

Blue Crab Abundance Outcome

OUTLOOK ON COURSE

Outcome

Maintain a sustainable blue crab population based on a target of 196* million adult females. Refine population targets through 2025 based on best available science.
**The original target of 215 million was revised in November 2020 based on the best available science as outlined in the outcome language.*

Status

The abundance of adult female blue crabs in the Chesapeake Bay has not fallen below the threshold of 72.5 million since 2014, which indicates a sustainable population based on the management framework derived from the 2011 benchmark stock assessment, which was last updated in 2020. The female exploitation rate, or the percentage removed from the population in a year, has not exceeded the threshold of 37% since 2007, suggesting that actions to manage the female blue crab population have been effective. The Blue Crab Abundance Outcome is on course and expected to be met by 2025.

What has helped achieve success since 2014?

- The jurisdictions adopted new female-specific management reference points (the target and threshold numbers for abundance and harvest) in November 2020 based on the 2017 Blue Crab Stock Assessment Update, which included more recent survey and harvest data.
- A Goal Implementation Team funded report and related science workshop were conducted to better understand factors that affect blue crab abundance and recruitment, and to inform fishery management.
- In 2021, the Chesapeake Bay Stock Assessment Committee (CBSAC) created a Blue Crab Harvest Reporting document to record each jurisdiction's efforts to track blue crab harvest and provide recommendations for improving the accuracy of commercial and recreational harvest data.

What challenges have hindered progress?

- Additional science and research to improve the stock assessment model such as characterization of model uncertainty and bias.
- Research/monitoring to quantify the impact of environmental conditions (e.g., water temperature, oxygen concentrations) and climate change (e.g., coastal currents/flow, shifting distributions) on blue crab recruitment and abundance.

If on course, what is needed to continue current trajectory?

- Complete a new benchmark stock assessment and identify management reference points based on the model results.
- Fund research that will address data gaps identified in the science workshop, including ecosystem drivers of blue crab population.

Blue Crab Management Outcome

OUTLOOK
COMPLETED

Outcome

Manage for a stable and productive crab fishery including working with the industry, recreational crabbers and other stakeholders to improve commercial and recreational harvest accountability. By 2018, evaluate the establishment of a Bay-wide, allocation-based management framework with annual levels set by the jurisdictions for the purpose of accounting for and adjusting harvest by each jurisdiction.

Status

The Chesapeake Bay's commercial and recreational blue crab fisheries are managed by the State of Maryland, the Commonwealth of Virginia and the Potomac River Fisheries Commission, based on guidance from the 2011 Chesapeake Bay Stock Assessment. The management framework uses female-specific reference points (target and threshold numbers) to indicate the sustainability of the blue crab population and inform management decisions. In 2017, Maryland, Virginia and the Potomac River Fisheries Commission decided to maintain use of this framework rather than moving to a new, allocation-based framework. This decision was guided by constituent feedback and the perspectives of the agencies that manage the fishery. The Blue Crab Management Outcome is completed.

What has helped achieve success since 2014?

- The completion of an assessment that evaluated the need for a framework that would allocate an annual total allowable catch of male and female blue crabs. The assessment took into consideration feedback from constituents, the Maryland Tidal Fisheries Advisory Commission, the Potomac River Fisheries Commission and the Virginia Crab Management Advisory Committee.
- An agreed-upon and functioning female-specific management framework in conjunction with a partnership of blue crab management agencies, industry stakeholders and scientists working together to better understand the blue crab population and fishery.
- Prioritization of ongoing efforts to improve estimates of blue crab harvest and other sources of mortality.

What challenges have hindered progress?

- This outcome is completed.

Oysters Outcome

OUTLOOK ON COURSE

Outcome

Continually increase finfish and shellfish habitat and water quality benefits from restored oyster populations. Restore native oyster habitat and populations in 10 tributaries by 2025 and ensure their protection.

Status

Ten tributaries have been selected for large-scale oyster restoration in Maryland and Virginia. In 2020, Virginia added an 11th bonus tributary in the Elizabeth River). Seven of the original 10 tributaries are considered to be restored and are in the monitoring and evaluation phase. This work constitutes the largest oyster restoration project in the world. The Oysters Outcome is on course and will be met by 2025, although monitoring and evaluation of some of the restoration sites will continue past 2025.

What has helped achieve success since 2014?

- Developing a strong framework upfront, that includes science, planning, common goal setting, success criteria and partner development.
- A strong commitment to monitoring, allowing partners to track success relative to well-established criteria.
- Collaborating and sharing information with a broad array of stakeholders and interested parties, ensuring they are engaged during the planning process and implementation phase.
- Consistent federal and state funding for construction and hatchery support.
- University of Maryland's Horn Point oyster production facility produced over five billion oyster larvae to support restoration.
- Research into the ecosystem services provided by restored reefs and its associated economic impact helped make the case for continued funding.

What challenges have hindered progress?

- Operating at a globally unprecedented scale required risk, novel thinking and significant resources (approximately $100M).
- Poor water quality, sedimentation, disease and, in some places, low natural recruitment from other oysters.
- Continued reef stewardship is key, including maintaining the areas as oyster sanctuaries (non-harvest status) and ensuring sufficient water quality to allow for thriving oyster populations.
- Construction issues on a few reefs have resulted in the need for modification or removal.
- Not all communities are supportive of the restoration effort.

If on course, what is needed to continue current trajectory?

- Continued commitment by the states (Maryland and Virginia) to allow the construction and protection of non-harvest (sanctuary) oyster reefs.
- Continued funding and technical support from a wide range of partners, including federal agencies, state agencies, NGOs and academics.
- Continued support for reef monitoring and tracking progress toward the '10 tributaries' outcome.

Forage Fish Outcome

OUTLOOK ON COURSE

Outcome

Continually improve the partnership's capacity to understand the role of forage fish populations in the Chesapeake Bay. By 2016, develop a strategy for assessing the forage fish base available as food for predatory species in the Chesapeake Bay.

Status

In 2020, the Forage Action Team developed an Indicator Development Plan that prioritized seven indicators that could be developed with existing data and have clear management applications. Four of these indicators are currently under development or ready for development and will help provide insight into the status of forage species in the Bay. The Forage Fish Outcome is on course.

What has helped achieve success since 2014?

- A 2014 Scientific and Technical Advisory Committee workshop and report, *Assessing the Chesapeake Bay Forage Base*.
- GIT-funded research that developed a suite of forage indicators and consumption profiles for representative predators in the Chesapeake Bay and investigated environmental drivers of forage population trends.
- NOAA-funded research developing habitat suitability models for key forage species.
- The Indicator Development Plan, which prioritized indicators to describe the status of forage species.

What challenges have hindered progress?

- Completing the development of forage status and trends indicators.
- The ability to clearly communicate to policy-makers the need for strategies to manage forage species as they are an ecosystem factor that could impact currently-managed species such as striped bass.
- Developing science-based management strategies to mitigate the impacts of habitat loss, shoreline development, dissolved oxygen and pollution on forage species.
- Including more focused surveys in under-sampled shallow water to enhance assessments.

If on course, what is needed to continue current trajectory?

- Develop Chesapeake Bay specific striped bass prey consumption estimates and condition index.
- Complete indicator development, publish a synthesis of indicators and implication on forage status and trends, and integrate the indicators into NOAA's seasonal summaries and State of the Ecosystem Reports.

Fish Habitat Outcome

OUTLOOK ON COURSE

Outcome

Continually improve effectiveness of fish habitat conservation and restoration efforts by identifying and characterizing critical spawning, nursery and forage areas within the Bay and tributaries for important fish and shellfish, and use existing and new tools to integrate information and conduct assessments to inform restoration and conservation efforts.

Status

Several assessments of tidal and non-tidal fish habitats across the Chesapeake Bay watershed have been conducted and are ongoing. These habitat studies also have the potential to inform shoreline restoration management. Additional studies have linked environmental variability to fish populations, resulting in adjustments to fishery management risk assessments. The Fish Habitat Outcome is on course.

What has helped achieve success since 2014?

- Developing a greater understanding of the requirements and threats to Chesapeake Bay fish species through research and literature review.
- Publishing an inventory of tools, maps and datasets related to fish habitat.
- Development of a fish habitat assessment tool to support government agencies, non-profits and local community members engaged in the conservation and restoration of fish habitat.
- Prioritizing fish habitat stressors including, shoreline hardening, impervious surfaces, forest buffer loss, temperature increases and low dissolved oxygen.
- Establishing shoreline hardening thresholds and related impacts on forage fish.

What challenges have hindered progress?

- Communicating and including fish habitat considerations in Watershed Implementation Plans, fisheries management and other local planning processes.
- A mismatch in fish habitat team member expertise, capacity and constituent needs.
- Difficulty finding team members willing to lead specific projects.

If on course, what is needed to continue current trajectory?

- Successfully endorse and receive funding for partners to implement innovative fish habitat enhancement projects such as co-locating oysters and submerged aquatic vegetation.
- Provide technical support for fish habitat restoration projects applying for Bipartisan Infrastructure Law, Inflation Reduction Act and other funding sources.
- Develop a fish and habitat risk assessment that draws from recently completed research, habitat assessments and water quality observations to evaluate the linkages between changing Bay conditions and aquatic living resources.

Vital Habitats Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Restore, enhance and protect a network of land and water habitats to support fish and wildlife, and to afford other public benefits, including water quality, recreational uses and scenic value across the watershed."

Photo by Will Parson/Chesapeake Bay Program

Wetlands Outcome

OUTLOOK OFF COURSE

Outcome

Continually increase the capacity of wetlands to provide water quality and habitat benefits throughout the watershed. Create or reestablish 85,000 acres of tidal and non-tidal wetlands and enhance function of an additional 150,000 acres of degraded wetlands by 2025. These activities may occur in any land use (including urban), but primarily occur in agricultural or natural (undeveloped) landscapes.

Status

In-between 2010 and 2021, initial data from the National Environmental Information Exchange Network (NEIEN) showed that 16,000 acres of wetlands were created or restored on agricultural lands, representing an 18.8% achievement of the 85,000-acre goal. The rate of this gain in wetlands acreage is not currently adequate to achieve the outcome target. While progress shows that wetlands are being restored and created across the watershed, the total acres of wetlands are also decreasing due to land subsidence, climate change and development pressures. At this time, wetlands acreage accounting is problematic, in part, due to the inability to accurately track loss or gains in wetlands across the watershed and assess whether our activities are yielding the desired progress. The Wetlands Workgroup will refine the outcome to recognize the effect of climate change, development and water quality on outcome achievement. Additionally, the workgroup will develop achievable targets specific to tidal and nontidal wetlands. The Wetlands Outcome is off track and will not meet 2025.

What has helped achieve success since 2014?

- The development of a new wetlands accounting system is near completion.
- Many projects funded under the Bay Program's Goal Implementation Team (GIT) funding process.
- The development of communications products for decision-makers.
- Collaboration with other GITs, workgroups and organizations on reports, workshops and meetings to discuss barriers to wetland implementation and identify innovative approaches to achieve multiple *Watershed Agreement* goals and outcomes.
- Both tidal and nontidal wetlands have been approved as best management practices (BMPs).
- The Wetlands Action Workshop and Plan.
- Science and Technical Advisory Committee workshops related to wetlands ecosystem crediting and the influence of water temperature rise.
- Bipartisan Infrastructure Law has created opportunities for increased wetlands funding for strategic planning, capacity and implementation.
- Collaboration between partners within jurisdictions.
- Department of Defense (DOD) Readiness and Environmental Protection Integration and Sentinel Landscape Program Partnership that have leveraged DoD funds for off-base wetland protection and conservation.

What challenges have hindered progress?

- Incomplete or unavailable tracking information to assess progress toward restoring, creating or enhancing wetlands.
- A lack of capacity and support for workgroup members and staff, including no workgroup chair(s), resulting in a year and half without a workgroup meeting.

- A prolonged vacancy in the Wetlands Workgroup staffer position.
- Lack of capacity (including grant writing/management, outreach to landowners, project design and construction, post-construction monitoring, etc.) within government agencies NGOs, and the private sector.
- Climate change and land subsidence.
- There are still challenges among the partnership in agreement on definitions for enhancement; additionally, since enhancement is not a best management practice, the National Environmental Exchange Network does not provide a way to track it.
- Lack of jurisdictional representatives on the Wetlands Workgroup; those that attend often cannot speak to all the programs in their jurisdiction that cover wetlands.
- A significant amount of Wetlands Workgroup time was spent on wetland verification with the Best Management Practice Verification Ad-Hoc Action Team and GIS wetland mapping.
- Matching fund challenges to take advantage of cost-share restoration programs.

If off course, what is needed to accelerate progress?

- Significant engagement and building long-term capacity to implement wetland projects across localities, state and federal sectors, NGOs and industry.
- Address preferential implementation of stream projects (or other best management practices) for Bay TMDL crediting, including resulting resource trade-offs and unintended consequences.
- Develop and implement effective incentives for the agriculture community for implementation.
- Supporting capacity for jurisdictions and partners with the needs related to wetland projects: permitting, complex design and construction.
- Address the challenges related to the cost of restoring and/or enhancing tidal wetlands, particularly in the face of sea level rise projections and land use competitions when the landscape is highly valued as a working waterfront, urban/suburban or private waterfront property.

Black Duck Outcome

OUTLOOK OFF COURSE

Outcome

By 2025, restore, enhance, and preserve wetland habitats that support a wintering population of 100,000 Black Ducks, a species representative of the health of tidal marshes across the watershed. Refine population targets through 2025 based on best available science.

Status

The Black Duck Outcome was developed using data provided by the Atlantic Coast Joint Venture's Black Duck Decision Support Tool (DST). In 2017, the tool estimated that an additional 151,272 acres of wetland habitat were necessary to support a wintering population of 100,000 Black Ducks. This acreage is in addition to the established baseline of 566,477 acres. A recent update to the tool allowed sufficient and insufficient watersheds to be identified, along with their conservation status, indicating where additional protection, restoration or enhancement is needed. Since the Black Duck Outcome is dependent on the Wetlands Outcome, and the Wetlands Outcome is off course, the Black Duck Outcome is also off course and will not be met by 2025. The migratory nature of the Black Duck lifecycle allows external factors outside of the Chesapeake Bay watershed to influence the population and climate change impacts are shifting the species range. Because of this there is little that the current outcome can do to actually benefit the Black Duck population. In fact, Black Duck populations have been stable since the 1960's. We believe that the outcome will need to be revised in 2025, broadened to represent the population of wintering waterfowl under climate change, sea level rise and subsidence scenarios. The Black Duck Outcome is off course and will not be met by 2025.

What has helped achieve success since 2014?

- Completion of the Black Duck DST provided a trackable habitat-based outcome to work towards the 100,000 Black Duck population goal.
- Continued updates to the Black Duck DST have identified areas where there is sufficient and insufficient wetland quantity and quality to support the desired population of Black Ducks.
- The completion of the bioenergetics modeling for the refuges in the face of sea-level rise and land-use changes, which showed the importance of underwater grasses as a food resource for wintering Black Ducks.
- Conservation and protection of coastal lands, particularly marsh migration corridors, to allow for future Black Duck habitat.

What challenges have hindered progress?

- The Mid-Winter Waterfowl Survey never provided population estimates for waterfowl species as described in the original outcome. The Mid-Winter Waterfowl survey monitors trends in waterfowl populations but not Black Ducks specifically. As a result, it has never been possible to count the number of Black Ducks in the Chesapeake Bay watershed, which is why the outcome was modified to a habitat-based outcome.
- In terms of value to Black Ducks, not all habitat conservation is equal. It is uncertain whether the number of acres of wetlands restored under the Wetlands Outcome are quality habitat for Black Duck.
- Present efforts for wetland restoration do not prioritize Black Ducks.
- It has been a challenge to collect the necessary data for the outcome.

- Degraded habitat conditions due to climate impacts, shoreline disturbance and food availability.

If off course, what is needed to accelerate progress?

- An increase of implementation projects that focus on Black Duck habitat conservation.
- Increased funding for wetland restoration and capacity in workgroup members and staff.
- The development of a tracking system that collects the acres of restored Black Duck habitat.

Stream Health Outcome

OUTLOOK ON COURSE

Outcome

Continually improve stream health and function throughout the watershed. Improve health and function of ten percent of stream miles above the 2008 baseline for the watershed.

Status

The 2008 baseline for the Stream Health Outcome indicator is the six-year interval between 2006 and 2011, and progress is measured in successive six-year intervals. The indicator, known as the Chesapeake Basin-wide Index of Biotic Integrity (Chessie BIBI), is calculated from stream macroinvertebrate data collected and shared by federal, state, local and community monitoring programs. Statistical estimates based on the data indicate about 61.7% of stream miles in the watershed likely supported healthy communities during the baseline period. Estimates rose 6.1% to 67.8% in the subsequent six-year interval (2012—2017). While there is no guarantee this improving trend will persist or be detectable in the upcoming six-year interval (2018—2023), this trend appears to be moving in the desired direction.

The Stream Health Workgroup is currently implementing a plan to develop additional metric(s) to complement the Chessie BIBI. These metrics are intended to be established over the next five years and are necessary to understand and communicate how streams respond to management actions. These additional metrics will help us view how stream health is changing on a smaller timescale than the Chessie BIBI, which will be useful in monitoring responses to management actions and other local and watershed-wide changes. The Workgroup developed a three-phase plan to identify primary stressors to stream health and function, identify best watershed management actions to reduce those stressors and develop non-biologic indicators of stream health. Work has just begun on the final phase of this plan to identify appropriate metrics that may be used as indicators. The Stream Health Outcome is on course.

What has helped achieve success since 2014?

- Assembly and management of a standardized database for the shared stream macroinvertebrate data.
- Cumulative effects of multiple actions over decades undertaken under the auspices of the Clean Water Act that have improved stream water quality and reduced loss/degradation of existing streams from direct and indirect impacts.
- Funding to identify the extent in which management actions improve stream health and the multiple stressors that impact it.
- Funding to establish the baseline for the Stream Health Outcome indicator.
- Studies, research and tools developed by partners, including looking at the impact of climate change on freshwater streams and Maryland's stream temperature Total Maximum Daily Load.

What challenges have hindered progress?

- Funding is not guaranteed to complete the Workgroup's long-term plan to create one or more non-biological metrics to complement the Chessie BIBI in assessing stream health.
- Inconsistent funding causes delays in progress on logic and action plan items.
- Inconsistent or absent participation from state representatives on the Workgroup.

- Gaps in the monitoring data's spatial and temporal coverage make it difficult to directly estimate percentages of healthy streams in the pre-baseline (2000-2005), baseline (2006-2011) and first interval (2012-2017) periods.
- Stream health is complex and multivariate, thus reliance on a single indicator (Chessie BIBI) may miss key components of overall stream health and have limited our ability to track overall changes.

If on course, what is needed to continue current trajectory?

- Continued funding for data management and Chessie BIBI analysis and to expand stream biological monitoring efforts in poorly sampled regions of the watershed.
- Habitat preservation throughout the watershed for high quality streams and sensitive natural areas.
- Expanded focus from TMDL and water quality improvements to more holistic watershed improvements by identifying stressors to stream health and prioritizing management actions to reduce those stressors.
- Beyond 2025, the outcome will be reevaluated to account for climate change and population growth while continuing to improve stream health as measured by the Chessie BIBI scores.

Brook Trout Outcome

OUTLOOK OFF COURSE

Outcome

Restore and sustain naturally reproducing brook trout populations in Chesapeake Bay headwater streams, with an eight percent increase in occupied habitat by 2025.

Status

Changes in land use and climate continue to have significant detrimental impacts on brook trout habitat. The resources available to mitigate these impacts are insufficient to adequately sustain and restore brook trout populations at the necessary scale to achieve the outcome. A more accurate and comprehensive system to document gains and losses in brook trout habitat is being developed as current data are incomplete. An assessment completed by the Eastern Brook Trout Joint Venture in 2015 showed that wild brook trout occupy 33,200 square kilometers of habitat within the Chesapeake Bay watershed. This includes the streams they share with brown trout and/or rainbow trout. There are 13,500 square kilometers of "wild brook trout only" streams, which was the baseline established for this outcome. Intervention and continued data support are needed to increase the rate of implementation and monitoring of conservation and restoration activities. The Brook Trout Outcome is off course and will not be met by 2025.

What has helped achieve success since 2014?

- Science and management efforts to better understand landscape-scale impacts, climate change, brook trout genetics, groundwater effects on stream temperature and direct stressors.
- Gains in brook trout occupancy resulting from workgroup members and other stakeholder action such as reintroduction, connecting fragmented habitats and mitigating stressors.
- Prioritizing 10 "Priority Level 1" regions (sub-watersheds with the best chance for sustaining wild brook trout populations) for brook trout conservation in the watershed.
- The availability of several decision support tools, such as the Trout Unlimited Eastern Brook Trout Conservation Portfolio and the Riparian Restoration for Climate Change Resilience Tool.
- Public outreach and awareness of threats to brook trout habitat.
- Funding from the National Fish and Wildlife Foundation and other sources which have provided the opportunity for much-needed brook trout research, monitoring efforts and tool development and upkeep.

What challenges have hindered progress?

- There is a limited capacity to implement and coordinate actions at the scale necessary to overcome the detrimental impacts to brook trout habitat throughout the watershed.
- Difficulties in developing cross-Goal Implementation Team collaborations and developing synergies across common goals and objectives.
- A lack of staffing resources to collect and analyze data that is necessary to track progress toward the outcome.
- Funding is not adequate to restore and sustain brook trout populations across the watershed, which is necessary to overcome the detrimental impacts to their habitat.
- The COVID-19 pandemic contributed to delays in some activities.
- Each state is unique, there is no one-size fits all approach.
- Impacts of land use and climate change provide damaging effects to brook trout habitat.

If off course, what is needed to accelerate progress?

- Increase resources and capacity to implement and coordinate actions at the scale necessary to overcome the detrimental impacts to brook trout habitat throughout the watershed. More specifically, each state should have dedicated funding for:
    - New staff and funding for an aggressive Aquatic Organism Passage Program partnering with state departments of transportation.
    - Land conservation to protect high-quality brook trout watersheds, groundwater spring sources and floodplains through fee acquisition or conservation easements.
    - Staff and resources for habitat improvements (e.g., large wood additions, riparian plantings).
- The Brook Trout Workgroup will reassess the outcome, lessons learned from managers and practitioners, and recent research results to provide a more relevant outcome and metrics for post-2025. This will include evaluating the impact of likely climate and land-use change scenarios.

Fish Passage Outcome

OUTLOOK ON COURSE

Outcome

Continually increase access to habitat to support sustainable migratory fish populations in the Chesapeake Bay watershed's freshwater rivers and streams. By 2025, restore historical fish migration routes by opening an additional 132 miles every two years to fish passage. Restoration success will be indicated by the consistent presence of alewife, blueback herring, American shad, hickory shad, American eel and brook trout, to be monitored in accordance with available agency resources and collaboratively developed methods.*

**In January 2020, the outcome was modified from the original language.*

Status

During the reporting period including 2020-2021, 32.6 additional stream miles were opened to fish passage, less than the two-year target of 132 miles. This target, set in accordance with the best available science, was established in January of 2020 after the Fish Passage Workgroup reached the goal set in the *2014 Chesapeake Bay Watershed Agreement* in 2016.

While the miles opened from 2020-2021 fall well below the biennial target and overall opened miles have declined over the past few years, the Fish Passage Workgroup does not expect this to be an ongoing trend. The workgroup is working on additional projects with a focus on identifying and correcting undersized and poorly constructed stream crossings that have created fish blockage. This new focus is expected to result in some fluctuations in progress toward the biennial target of 132 fish passage miles. However, based on the expected trajectory of this work and since the current rate of miles added averages 619 miles every two years, the fluctuations in miles added are expected to continue to average above the biennial target. The Fish Passage Outcome is on course and expected to be met by 2025.

What has helped achieve success since 2014?

- Dam removals and culvert replacements.
- Workgroup members have worked with dam safety programs to highlight dam removal benefits, such as public safety, reduced liability and resilience.
- The development of the guidance document, "Recommendations for Aquatic Organism Passage at Maryland Road-Stream Crossings (2021)".
- The U.S. Army Corps of Engineers released guidance on mitigation crediting for dam removals and other river obstructions.
- Collaboration with partners, including county and local governments helps more projects succeed.

What challenges have hindered progress?

- Many dams are privately owned and owners are unwilling to pursue removal.
- The COVID-19 pandemic largely halted all fish passage activities and likely will affect outcome progress for 2020 and 2021.
- Inconsistencies with how fish passage projects are being tracked, so the outcome has been under-reporting progress across the watershed.

- More road safety assessments need to be funded, along with determining the presence of target aquatic species.
- Cost and complexity of many remaining dam removal projects has slowed progress.

If on course, what is needed to continue current trajectory?

- Several projects are underway and are expected to be completed by 2025.
- Workgroup partners must take advantage of the available infrastructure grants.
- Grants already submitted or near submittal, must be funded.
- Broaden workgroup engagement to include federal and state departments of transportation.
- Funding from the Infrastructure Investment and Jobs Act will be used to expand the dam removal and culvert initiatives while addressing resilience.

Submerged Aquatic Vegetation (SAV) Outcome

OUTLOOK OFF COURSE

Outcome

Sustain and increase the habitat benefits of submerged aquatic vegetation (SAV) in the Chesapeake Bay. Achieve and sustain the ultimate outcome of 185,000 acres of SAV Bay-wide necessary for a restored Bay. Progress toward this ultimate outcome will be measured against a target of 90,000 acres by 2017 and 130,000 acres by 2025.

Status

Between 2014 and 2018, SAV expanded by almost 33,000 acres in the Chesapeake Bay, reaching approximately 108,000 acres in 2018, the highest acreage recorded since Bay-wide surveys began in 1984. Because of this record increase, SAV acreage exceeded the 2017 target of 90,000 acres between 2015--2018. Between 2018 and 2019, however, over 44,000 acres were lost, approximately one-third of the Bay's SAV. This loss has been attributed to degraded water clarity following two years of above-normal precipitation and subsequent high flows. Since that time, SAV has slowly begun to rebound, with the most recent data, collected in 2022, showing 76,462 acres of SAV throughout the Bay and its tidal tributaries. Additional years of increased acreage will help clarify whether this recent gain is the start of a new positive trend, but it is unlikely that the interim goal of 130,000 acres will be reached by 2025. The interim goal of 130,000 acres remains attainable in the future if additional management actions are taken to ensure long-term and consistent improvements in water clarity and shallow water habitat protection. The SAV Workgroup, however, recommends reevaluating the ultimate SAV acreage goal of 185,000 acres to determine if it should be updated. This goal was based on historical SAV distribution in Chesapeake Bay and conditions that may not be met again in the future given the projected effects of climate change. The SAV Outcome is off course and will not be met by 2025.

What has helped achieve success since 2014?

- Management solutions, including the Chesapeake Bay Total Maximum Daily Load (Bay TMDL), have contributed to overall SAV recovery. Most notably, nutrient reductions allocated by the Bay TMDL facilitated the expansion of widgeon grass (*Ruppia maritima*) in the mid and lower Bay.
- Methods to collect, process and store SAV seeds have improved, and direct, small-scale, SAV restoration efforts have contributed to SAV acreage in years of SAV expansion.
- Collaboration with riverkeepers, watershed groups and other partners to implement the Chesapeake Bay SAV Watchers program has contributed to community engagement and understanding of SAV habitat value.
- Increased research and monitoring have contributed to an improved understanding of SAV ecology, restoration and the effects of climate change impacts.

What challenges have hindered progress?

- The Bay TMDL has reduced nutrient and sediment pollution and has contributed to overall SAV recovery in Chesapeake Bay. Watershed Implementation Plans (WIPs), however, are behind schedule, so reductions have been inadequate to consistently improve water clarity to the extent necessary for Bay-wide SAV goal attainment.

- Climate change impacts—including increased water temperature, episodic heat events and increased volume and intensity of precipitation—have also hindered progress toward attainment of the 2025 interim SAV goal. Specifically, rising water temperatures and isolated heat events have contributed to the consistent loss of eelgrass (*Zostera marina)*, a heat-intolerant species, in the lower Bay. Widgeongrass, a heat-tolerant species, has now expanded to become the most abundant species of SAV in the mid and lower Bay. While widgeongrass expansions facilitated by nutrient reductions have fueled many of the Bay-wide SAV recovery trends documented, its vulnerability to chronic and episodic influxes of nutrient-loaded watershed run-off (mostly from springtime precipitation events) hinders consistent and lasting gains in SAV acreage over time.
- Existing statutes, regulations and policies related to protecting SAV in Chesapeake Bay are inadequate in providing effective protection of existing and recovering SAV.
- The competition for shallow water habitat among multiple program goals has led to shallow water use conflicts and habitat trade-offs that have impacted SAV recovery potential in Chesapeake Bay.
- Inadequate staffing, training and funding have hindered the ability of Bay Program partners to conduct research, enforce laws and regulations, review permit applications for projects that impact SAV and directly restore SAV to the extent necessary to meet the needs of the outcome.

If off course, what is needed to accelerate progress?

- SAV is dependent on good water quality conditions to recover, expand and thrive. Two recent studies concluded that under projected climate conditions and current Bay TMDL nutrient reduction allocations, SAV in the Chesapeake Bay may continue a modest recovery but not reach its ultimate acreage goal. Nutrient and sediment reductions *beyond* those currently allocated in the Bay TMDL, however, would mitigate climate impacts and accelerate SAV recovery in the Bay.
- An improved understanding of how climate change and human actions will affect the health and benefits provided by each of the Bay's SAV communities (freshwater, brackish and high salinity) is needed. This community-specific understanding of both patterns and processes could be obtained by funding the SAV Sentinel Site Program and would allow resource managers to tailor management strategies to each community, protecting and restoring SAV throughout the Bay more effectively.
- Significant financial investments have proven effective for habitat and species restoration throughout the Chesapeake Bay (i.e., *Crassostrea virginica*, eastern oysters). To accelerate progress toward SAV goal attainment, similar investments for SAV restoration are necessary to expand research and upscale direct SAV planting capacity.
- Horned pondweed (*Zannichellia palustris)* grows abundantly in the mid-Bay but is not captured in the Bay-wide aerial monitoring program because it deteriorates before that portion of the Bay is surveyed. An expanded monitoring effort would improve our understanding of the distribution and abundance of this species in the mid-Bay, contribute its abundance to the SAV acreage goal, and facilitate improved protection and conservation of the habitat and ecosystem services it provides.
- An approach or analysis that employs structured decision making to manage habitat trade-offs and shallow-water use conflicts equitably and effectively, would provide a framework for how and when to allow for trade-offs that impact SAV and, ideally, accelerate progress toward SAV goal attainment.

Forest Buffers Outcome

OUTLOOK OFF COURSE

Outcome

Continually increase the capacity of forest buffers to provide water quality and habitat benefits throughout the Chesapeake Bay watershed. Restore 900 miles of riparian forest buffers per year and conserve existing buffers until at least 70% of riparian areas in the watershed are forested.

Status

The pace and scale of forest buffer implementation across the watershed is inadequate to meet the ambitious goals set in the 2014 Chesapeake Bay Watershed Agreement or in the Watershed Implementation Plans (WIPs) put in place by the seven jurisdictions. The Chesapeake Bay Program has not met its goal for riparian forest buffers since 2002, often achieving less than 10% on an annual basis. To meet the goals laid out in the Phase III WIPs, over 3,000 miles of forest buffers would need to be planted between 2022 and 2025. The Forest Buffers Outcome is off course and will not be met by 2025.

What has helped achieve success since 2014?

- Increased implementation of flexible buffer programs that have been popular with landowners.
- Development of state Riparian Forest Buffer Action Strategies to help identify pathways to accelerate implementation over the next 5-10 years.
- Additional state and federal funding available for tree planting initiatives.
- Ongoing work to fill information gaps, including the Scientific and Technical Advisory Committee's *Rising Watershed and Bay Water Temperatures* report and the Goal Implementation Team-funded *Maintaining Forests in Stream Restoration* project.

What challenges have hindered progress?

- Insufficient capacity for technical assistance, planting and maintenance. Much more technical assistance is needed to find, recruit and assist landowners.
- Inconsistencies in funding and program delivery, particularly in relation to Conservation Reserve Enhancement Program (CREP).
- Conserving mature forest buffers. Additional buffer conservation easement programs are needed to incentivize permanent conservation of forest buffers.
- Constraints with nursery supply to ensure the quality and quantity of tree stock will be available to meet ambitious planting goals.

If off course, what is needed to accelerate progress?

- Support sustained investments in effective, standalone flexible buffer programs (both existing and new programs).
- Additional consistent, coordinated leadership across the watershed to ensure efficient, dedicated and sustainable programs are in place.
- Build and retain capacity in staff, contractors and outreach.
- Track and maintain accountability for implementing the recently developed state Riparian Forest Buffer Action Strategies.
- Improved verification of buffers, including developing more cost-effective approaches.
- Leverage the benefits of riparian forest buffers for increasing climate resiliency in the watershed as the Bay Program addresses climate change effects.

Tree Canopy Outcome

OUTLOOK OFF COURSE

Outcome

Continually increase urban tree canopy to provide air quality, water quality and habitat benefits throughout the Chesapeake Bay watershed. Expand urban tree canopy by 2,400 acres by 2025.

Status

The most recent tree canopy data shows a net loss of over 25,000 acres of tree canopy across the Chesapeake Bay watershed. While it may take 10-15 years for tree plantings to be reflected in the aerial imagery used for producing the land use/land cover data, the 8,300 acres planted so far are not enough to mitigate the losses. Much effort is needed to reverse the trend of net losses and achieve the net gain specified in the outcome. The Tree Canopy Outcome is off course and will not be met by 2025.

What has helped achieve success since 2014?

- The development and release of high-resolution land use/land cover change data for the period 2013-2014 and 2017-2018 to more accurately track tree canopy gain and loss.
- In the past two years, urban tree canopy has gained national and global attention as a key arena for building equity and climate resilience in communities.
- Vital state and local programs in place to assist with tree plantings and management.

What challenges have hindered progress?

- The need to develop or strengthen new local and state policies that help conserve and maintain canopy where possible.
- Addressing tree inequity will require substantial resource investments in community-based solutions, robust and inclusive community engagement efforts and deliberate policy/program/funding adjustments to ensure these communities receive first priority in financial and technical assistance.
- Constraints with nursery supply to ensure the quality and quantity of tree stock will be available to meet ambitious tree planting goals.
- The need to fund, train and maintain a robust, well-trained workforce to meet scaled-up tree planting and maintenance needs.
- The lack of capacity and investment in programs varies widely across the watershed.

If off course, what is needed to accelerate progress?

- Implement Chesapeake Bay Program and jurisdictional action plans developed as a result of the recommendations from the 2023 Chesapeake Tree Canopy Funding & Policy Roundtable (expected completion date of summer 2023).
- Incorporate credits and incentives for forest and tree conservation and maintenance actions in the next (post-2025) Chesapeake Bay Total Maximum Daily Load implementation framework (in addition to planting).
- Invest in coordinated tree canopy workforce and nursery supply pathways to scale up implementation, with diversity, equity, inclusion and justice as the central focus.
- Expand tree canopy communication, outreach and training resources to help build local government and community support for tree conservation, maintenance and planting
- Leverage the benefits of tree canopy for increasing climate resiliency in the watershed as the Bay Program addresses climate change effects.

Water Quality Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Reduce pollutants to achieve the water quality necessary to support the aquatic living resources of the Bay and its tributaries and protect human health."

Photo by Will Parson/Chesapeake Bay Program

2017 Watershed Implementation Plans (WIPs) Outcome

OUTLOOK
COMPLETED

Outcome

By 2017, have practices and controls in place that are expected to achieve 60 percent of the nutrient and sediment load reductions necessary to achieve applicable water quality standards compared to 2009 levels.

Status

Watershed Implementation Plans (WIPs), created by the seven Bay watershed jurisdictions as part of the Chesapeake Bay Program's Accountability Framework and serving (the Phase I WIPs) as a large part of the basis for the Chesapeake Bay "pollution diet" or Total Maximum Daily Load (TMDL), are instrumental in the restoration of tidal water quality and meeting the 2017 and 2025 WIP outcomes. Improving water quality will support other restoration goals and benefit human health.

While the Chesapeake Bay Program partnership has met its 2017 pollutant reduction targets for phosphorus and sediment, it fell short of its pollutant reduction target for nitrogen by 15 million pounds. According to the Chesapeake Bay Program's Watershed Model Phase 5.3.2, controls put in place in the Chesapeake Bay watershed between 2009 and 2017 lowered nitrogen loads 11%, phosphorus loads 21% and sediment loads 10%. This outcome was established as a midpoint assessment from the 2009 baseline and the 2025 goal described in the Bay TMDL. The 2017 WIP Outcome is considered to be complete.

What has helped achieve success since 2014?

- Completion of Phase I WIPs and Phase II WIPs in 2010 and 2012, respectively, that outlined steps the seven Bay watershed jurisdictions committed to take to reduce nitrogen, phosphorus and sediment from flowing into the Bay.
- The additional implementation and verification of best management practices, especially in the agricultural sector, following the Bay Program partnership adoption of a BMP Verification Framework in 2014.
- Additional resources and technical support allocated to implementing the Bay TMDL from state and local governments.
- Steps taken to meet the wastewater sector's pollutant reduction goals a decade early.

What challenges have hindered progress?

- While this outcome is completed, challenges remain in reducing nitrogen loads, particularly from nonpoint sources.

What is needed to continue current trajectory?

- This outcome is completed.

2025 Watershed Implementation Plans (WIPs) Outcome

Outcome

By 2025, have all practices and controls in place to achieve applicable water quality (i.e., dissolved oxygen, water clarity/submerged aquatic vegetation and chlorophyll *a*) standards, as articulated in the Chesapeake Bay Total Maximum Daily Load.

Status

As of 2021, best management practices (BMPs) are in place to reduce 49% of nitrogen, 64% of phosphorus and 100% of sediment loads necessary for the Chesapeake Bay to attain applicable tidal water quality standards for dissolved oxygen, water clarity/submerged aquatic vegetation (SAV) and chlorophyll a. While management actions are sufficient to meet the sediment reduction target by 2025, they are not for the nitrogen and phosphorus reduction targets. Approximately 41 million pounds of nitrogen and 1.4 million pounds of phosphorus remain to be reduced. The 2025 WIP Outcome is off course and will not be met by 2025.

What has helped achieve success since 2014?

- The goal of reducing sediment loads to 18,587 million pounds annually was met as of 2021 due to the implementation of BMPs.
- An increase in federal funding from sources such as the Infrastructure Investment and Jobs Act is helping to expand BMP implementation and support the maintenance and growth of the Bay Program's long-term tidal and nontidal monitoring networks.
- Additional federal and state funding has helped to grow outreach opportunities and offer technical assistance for state and local entities throughout the watershed to fund nonpoint source BMP adoption and implementation.
- Enhanced financial and technical support for agricultural BMP implementation, tracking and reporting.
- Increased levels of engagement from local stakeholders to target resources and build capacity in meeting water quality goals, particularly in local waters.
- Continued efforts by local and state governments to reduce nutrient and sediment pollution from wastewater treatment facilities, regulated stormwater systems and nonpoint sources.

What challenges have hindered progress?

- The COVID-19 pandemic impacted the ability to work directly with landowners and limited access to BMP implementation and verification.
- An outbreak of the avian flu in 2022 limited interaction with the agriculture community.
- Climate change impacts that increase flow and pollution delivery above historic baseline conditions have impacted the amount of nitrogen and phosphorus that jurisdictions must reduce in order to meet their water quality goals.
- The reservoir located behind the Conowingo Dam reached trapping capacity much earlier than anticipated, resulting in additional nitrogen, phosphorus and sediment loads to the Bay during higher flow events compared with historic conditions of the Susquehanna River.

- Rising inflation rates led to substantial increases in costs for the materials and labor needed to implement, maintain and operate BMPs and monitoring networks.
- New funding is often targeted to direct implementation and often does not address increased technical assistance and workforce development needs to administer new funds or programs.
- Insufficient capacity to meet technical assistance and outreach needs across all sectors and levels of government.

If off course, what is needed to accelerate progress?

- Define the vision for what represents an acceleration of progress above present rates.
- Greater focus on implementation of non-point source practices and controls that result in on-the-ground nutrient reductions across the watershed to accelerate progress in agricultural and unregulated developed areas, and continuing to develop best practices ensuring all installed BMPs are captured and reported in appropriate jurisdictional tracking systems.
- Greater targeting of BMPs that are known to be more effective in reducing nutrient loads in areas that have the greatest impact. This likely includes better coordination around, and use of, existing targeting tools, as well as the evaluation of existing federal and state programs to improve efficiencies to better target and implement highly effective BMPs.
- Acknowledgement of programs that deliver high-quality results may improve awareness of strategies that already work effectively. However, new incentives and innovative approaches will be essential to accelerate the rate of progress above current levels, including: (a) improved coordination between implementation and monitoring partners/programs to understand how to adapt management approaches that increase efficiency to reduce nitrogen loads and restore water quality and living resources and (b) more discussion to promote success stories, share lessons learned and foster new innovative approaches (e.g., pay for performance).
- Continue to account for, and adapt to, using new data, analyses and science to increase the effectiveness of management efforts, such as creating new policies, developing effective incentive programs and actively pursuing adaptive management actions in timely, decision-making processes.
- Improve accounting for evolving climate change impacts and address the impacts that human growth and livestock increases have on our progress to achieving reduction goals.
- Government and non-government organizations implementing BMPs need support for workforce development, technical assistance, outreach, grant management, etc., in order to accommodate the increase in grant funding. The implementation of BMPs lags behind funding because there is a significant capacity gap in implementing projects.
- There is continual need to sustain and grow investments in monitoring networks to assess effectiveness of implementation, as well as the resulting impacts on nitrogen, phosphorus and sediment reduction targets, as well as the Bay response to dissolved oxygen, clarity/SAV and chlorophyll *a*.

Water Quality Standards Attainment and Monitoring Outcome

OUTLOOK ON COURSE

Outcome

Continually improve our capacity to monitor and assess the effects of the management actions being taken to implement the Chesapeake Bay Total Maximum Daily Load (Bay TMDL) and improve water quality. Use monitoring results to report annual progress being made in attaining water quality standards and trends in reducing nutrients and sediment in the watershed.

Status

The Water Quality Standards Attainment and Monitoring Outcome uses monitoring results to report annual progress made in attaining water quality standards for clean water goals defined by dissolved oxygen, water clarity (partly by underwater grass abundance) and chlorophyll a (a measure of algae growth) in the tidal waters of the Chesapeake Bay and its tidal tributaries; and status and trends in reducing nutrients and sediments delivered to the Chesapeake Bay from its surrounding watershed. During the 2018-2020 assessment period, an estimated 29.6% of the Chesapeake Bay and its tidal tributaries met clean water goals. Long-term monitoring results (1985—2022) reveal that the health of the Bay's water quality was estimated as achieving 25% of goal conditions in the mid-1980s and reached a high of 42% before the most recent decline, attributed to effects of pollution delivered with elevated river flows recorded in 2018, the highest on record since 1937, and additional high flows in 2019. In the watershed, less than 50% of the 123 non-tidal monitoring network stations show improving trends in the reduction of nitrogen and phosphorus loads for the period 2011-2020. The Chesapeake Bay Program has made significant new investments in monitoring infrastructure and analysis tools necessary to support water quality criteria assessments, but currently lacks the capacity to fully assess the attainment of tidal water quality standards. The Water Quality Standards Attainment and Monitoring Outcome is currently on course.

What has helped achieve success since 2014?

- The investment of Bay Program partners in retrieving, analyzing and communicating monitoring information. The prioritization of staff time also helped with these advances.
- *Enhancing the Chesapeake Bay Program Monitoring Networks* report and effort. The report outlined recommendations and provided cost estimates needed to address network gaps, data shortfalls, maintenance and enhancements of core networks, as well as development of new monitoring networks.
- Development of the Bay Program's Strategic Science and Research Framework to identify and assess short-and-long-term science needs of the partnership.
- The availability of robust, repeatable, approved and published data collection protocols, sound Quality Assurance/Quality Control procedures and associated documentation, and extensive data and metadata management to support the integrity of datasets.
- The work of the Chesapeake Monitoring Cooperative (CMC) in providing technical assistance to non-traditional monitoring partners that can be used to augment the state-collected datasets for regulatory assessments.
- Development of the tributary summaries to communicate changes in water quality patterns and factors affecting those changes to technical managers and planners.
- Progress in analyzing and communicating factors impacting water quality.

What challenges have hindered progress?

- Core monitoring funding did not adjust for inflation leading to reduced data collections.
- Historically, a lack of technological capacity to effectively collect the necessary water quality data across space, in sufficient temporal resolution, robust to Bay conditions and cost-effective, to create a full accounting of dissolved oxygen data necessary to assess water quality standards for the tidal Bay.
- A delay in in-person, streamside field audits due to the COVID-19 pandemic.
- A lack of complete criteria assessment protocols, that can be instituted in the near term, that make use of readily available continuous monitoring datasets.
- A lack of criteria assessment protocols that consider expanding impacts from climate change such as effects on dissolved oxygen saturation as a function of increased Bay water temperature.
- The limited use of watershed and Bay water quality monitoring results in making timely and effective management decisions that can accelerate progress towards Bay health goals.
- Numeric thresholds for chlorophyll *a* that address aquatic life impacts presently only apply to seven of the 92 segments in Chesapeake Bay's tidal waters. An effective numeric translation of the narrative chlorophyll criteria based on harmful algal bloom characterization has not been developed by the partnership, even though states' water quality standards include this goal.
- Research and publications regarding new technologies are just beginning to address challenges that, once overcome, can support improved water quality assessment and tracking.
- *Enhancing the Chesapeake Bay Program Monitoring Networks A Report to the Principals' Staff Committee* estimated that $5.4 million would be needed in the first year to fulfill the recommendations to enhance the Bay Program's core networks. Over $4 million has been allocated to meet these recommendations, but more funding is needed to support those remaining, and a strategic plan is needed to secure sustainable funding for these enhancements, as funding from the Infrastructure Investment and Jobs Act is only available for five years.

If off course, what is needed to continue current trajectory?

- Maintain support for development, testing and implementation of the new 4-dimensional (4D) interpolator, which will help assess dissolved oxygen criteria in the Bay.
- Developing, finalizing and approving new monitoring protocols that use newly available technologies including vertical water quality monitoring arrays, 4D interpolator, and satellite image data collection with Artificial Intelligence/Machine Learning algorithms supporting data access, image acquisition, data characterization and summary specifically for dissolved oxygen, SAV, chlorophyll *a* assessment.
- Support is needed for updated tidal Bay study design plans to chart the timing and location of deployments of new monitoring arrays and nearshore sensors.
- Greater support for analysis, dissemination and communication of reporting results and relevant lessons to diverse partners and audiences.
- Engage community science groups on monitoring that contributes to calibration and verification of aerial and satellite based SAV assessment, confirmation of harmful algal bloom locations and adds data supporting Bay health assessments of dissolved oxygen, temperature and salinity.
- Continued research is needed for characterizing harmful algal blooms with satellite-based resources in order to create effective translations of narrative chlorophyll a criterion into quantitative assessment criteria.

Toxic Contaminants Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Ensure that the Bay and its rivers are free of effects of toxic contaminants on living resources and human health."

Photo by Will Parson/Chesapeake Bay Program

Toxic Contaminants Policy and Prevention Outcome

OUTLOOK OFF COURSE

Outcome

Continually improve practices and controls that reduce and prevent the effects of toxic contaminants below levels that harm aquatic systems and humans. Build on existing programs to reduce the amount and effects of polychlorinated biphenyls (PCBs) in the Bay and watershed. Use research findings to evaluate the implementation of additional policies, programs and practices for other contaminants that need to be further reduced or eliminated.

Status

The number of tidal segments in the Chesapeake Bay that are considered to be partially or fully impaired by toxic contaminants has seen an increase with each biennial data update from2010-2018. In 2018, the estimate reached a high of 84%, but in 2020, the percentage saw a slight reduction. However, for the first time, the number included state-listed impairment for per-and-polyfluoroalkyl (PFAS). Chesapeake Bay Program partners are working to advance remediation efforts of polychlorinated biphenyls (PCBs) in local areas by expanding existing state programs to implement local Total Maximum Daily Loads (TMDLs). Despite these efforts, along with making upgrades to wastewater treatment plants and implementing land-based best management practices (BMPs), water quality in the Chesapeake Bay and its tidal tributaries continues to fall short of healthy standards. The Toxic Contaminants Policy and Prevention Outcome is off course.

What has helped achieve success since 2014?

- Municipal Separate Stormwater System (MS4) permits in some local areas in the watershed have begun to include requirements to identify and address PCB sources where there is a PCB TMDL.
- Ongoing sediment remediation activities in some parts of the watershed including the Anacostia, Patapsco and Middle rivers.
- The priority to upgrade wastewater treatment plants across the watershed.

What challenges have hindered progress?

- The lack of available staff time to participate in cross-jurisdiction PCB coordination.
- Studies on the efficiency of removing stormwater best management practices continues to be limited.
- Many jurisdictional WIPs do not address co-benefits for contaminant reduction or have a way to quantify the reduction.
- An appropriate method to link toxic contaminant BMP science with stakeholder planning tools has not been identified.
- The implementation of management actions under local TMDLs is limited and jurisdictions have to balance emphasis on PCBs with other pollutants of concern.
- Limited PCB monitoring data exists for unregulated and National Pollutant Discharge Elimination System (NPDES) regulated stormwater.

If off course, what is needed to accelerate progress?

- The partnership needs to apply its collective expertise in pollutant-based TMDLs to accelerate the reduction of bioavailable PCBs.
- An improved understanding of the presence of PCB s in biosolids is needed because of emerging information on the quantity that is being reapplied to the landscape through the application of biosolids.
- State and federal commitments to achieving PCB TMDLs needs to fall under an accountability and progress framework similar to that which is used for nitrogen, phosphorus and sediment.
- Jurisdiction coordination and sharing of best practices and interstate information is needed to advance PCB TMDLs.

Toxic Contaminants Research Outcome

Outcome

Continually increase our understanding of the impacts and mitigation options for toxic contaminants. Develop a research agenda and further characterize the occurrence, concentrations, sources and effects of mercury, polychlorinated biphenyls (PCBs) and other contaminants of emerging and widespread concern. In addition, identify which best management practices might provide multiple benefits of reducing nutrient and sediment pollution as well as toxic contaminants in waterways.

Status

This outcome considers research related to many different types of toxic contaminants but lacks specific measures to assess progress. While progress has been made on determining the occurrence, concentrations, sources and effects of mercury, PCBs and PFAS, the ability to characterize the concentrations of other contaminants and where they may be occurring has been limited. The Toxic Contaminants Workgroup is beginning to develop a coordinated approach on how to assess levels of PFAS in the Bay, which is being detected throughout the watershed. Recently, thanks to collaboration with stakeholders and the incorporation of local Total Maximum Daily Loads (TMDLs) into stormwater permits, progress has been made in addressing the impacts of mercury across the watershed, and other contaminants of interest at the local level. The Toxic Contaminants Research Outcome is off course.

What has helped achieve success since 2014?

- Research undertaken to understand per-and-polyfluoroalkyl substances (PFAS), microplastics and endocrine disrupting compounds in the Chesapeake Bay watershed.
- Scientific and Technical Advisory Committee (STAC) workshops on emerging urban and agricultural contaminants including entire workshops on PFAS and microplastics in the Chesapeake watershed.
- Papers published by Bay Program partners (e.g., U.S. Geological Survey papers on PCBs in wastewater and biosolids, and occurrence of emerging contaminants in the Potomac and Shenandoah watersheds).

What challenges have hindered progress?

- The significant number of toxic contaminants that require research.
- There is not much emphasis on addressing co-benefits for the reduction of contaminants in jurisdictional Watershed Implementation Plans (WIPs), which decreases the overall reasons to prioritize.
- Increased emphasis on PFAS has required some jurisdictions to reprioritize monitoring of other contaminants, such as PCBs.
- The absence of watershed-wide monitoring programs creates challenges with assessing status and trends regarding impact from toxic contaminants.
- Barriers to collaborative efforts with Bay Program Goal Implementation Teams (GITs) and workgroups that share interests with the Toxic Contaminants Workgroup.

If off course, what is needed to accelerate progress?

- Allocation of federal and state resources to conduct research on sources, effects and allocation of monitoring dollars to measure occurrence and concentrations.
- Improved ability to communicate and engage the academic and monitoring communities on science-based questions the partnership needs answers to and the resources needed to complete such research.
- Coordination across the partnership on the impact of toxic contaminants on the living resources of the Chesapeake Bay watershed.

Healthy Watersheds Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Sustain state-identified healthy waters and watersheds recognized for their high quality and/or high ecological value."

Photo by Will Parson/Chesapeake Bay Program with aerial support by Southwings

Healthy Watersheds Outcome

OUTLOOK UNCERTAIN

Outcome

100 percent of state-identified currently healthy waters and watersheds remain healthy.

Status

The Healthy Watersheds Goal Implementation Team has developed the Chesapeake Healthy Watersheds Assessment framework to provide information on the current condition, level of protection and whether or not watershed catchments are potentially vulnerable or resilient. This helps jurisdictions to detect signals of change in state-identified healthy watersheds and beyond (provided the data to inform the assessment is updated over time). The Healthy Watersheds Outcome is currently uncertain.

What has helped achieve success since 2014?

- The development of new data and tools that help characterize and provide context for healthy watersheds, such as the Chesapeake Healthy Watersheds Assessment, Chesapeake Bay Phase 6 Land Use Viewer, Chesapeake Bay Watershed Data Dashboard, CBP Land Use/Land Cover Data Project, Land Use Methods and Metrics indicators on impervious cover and change, and the Chesapeake Bay Environmental Justice and Equity Dashboard.
- Projects that enhance focus on communications, such as the Chesapeake Forest Restoration Strategy, Conservation Land-Use Policy Toolkit and Resource Lands Assessment.
- Increasing knowledge at a local-scale through the development of such tools as the Local Government Guide to the Chesapeake Bay, Improved Technical Service Delivery to Landowners, Targeted Outreach for Green Infrastructure, Chesapeake Watershed Finance Intensive workshops, Maryland Healthy Watershed Assessment and the automation of Chesapeake Protected Lands data.

What challenges have hindered progress?

- The amount, type and way in which land use occurs is the biggest factor impacting healthy watersheds.
- A wide range of natural and human factors, such as climate change and invasive species.
- Ensuring local governments and decision-makers have the best available information—and understand it—to make land use decisions.
- Projects necessary for assessing the spectrum of watershed health and vulnerability on a Chesapeake Bay regional scale are in progress and are expected in late 2023.
- Lack of support, effective communication, coordination and leadership from Chesapeake Bay Program partners and the Healthy Watersheds Goal Implementation Team (HWGIT) at the state and local level to protect healthy watersheds.
- The HWGIT Coordinator has been leading a multiyear healthy watershed assessment effort due to limited state capacity to report whether we've lost or gained any healthy waters since the *Watershed Agreement* was signed.
    - Existing reporting through the integrated monitoring reports under section 305b and 303d of the Clean Water Act may help inform reporting and progress tracking.
    - It is the intent that the Chesapeake Healthy Watersheds Assessment be used as a proxy to determine the spectrum of watershed health and vulnerability and be updated regularly when new data is available.

- Measures to protect healthy watersheds vary across—and sometimes within—watershed jurisdictions.
- Meeting the Healthy Watersheds Outcome is dependent on the participation of related workgroups and their work/products.

If uncertain, what would need to be done before 2025 to classify as on course/off course and can this be done in that timeframe?

- Completion of the Chesapeake Healthy Watershed Assessment 2.0 in August 2023 and committing to update the assessment with the best available input data as available, and consider additional watersheds identified by the assessment, as healthy in addition to state-identified healthy watersheds, to augment state efforts.
- Continued development and application of the Land Use Method and Metrics Outcome and continued support for high resolution land use/land cover data.
- Investigation and development of indicator(s) related to watershed health and vulnerability.
- Update the Watershed Protection Map.
- Implementation of the Scientific and Technical Advisory Committee report, *Rising Watershed and Bay Water Temperatures—Ecological Implications and Management Responses*.
- Strengthen local commitment and capacity to understand the spectrum of watershed health and vulnerability and increase local capacity to protect healthy watersheds.

Stewardship Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Increase the number and the diversity of local stewards and local governments that actively support and carry out the conservation and restoration activities that achieve healthy local streams, rivers and a vibrant Chesapeake Bay."

Photo by Will Parson/Chesapeake Bay Program

Stewardship Outcome

OUTLOOK UNCERTAIN

Outcome

Increase the number and diversity of trained and mobilized volunteers who have the knowledge and skills needed to enhance the health of their local watersheds.*
**In October 2022, the outcome was modified from the original language*.

Status

A quantitative target has not been established for the Stewardship Outcome. In 2021, a baseline indicator was developed using data from the 2017 Stewardship Index. Resources are now needed to prioritize programmatic efforts and build desired behaviors. The next survey to update the data is expected to be conducted in 2023 with data available in early spring 2024. Information on the extent of progress toward the Stewardship Outcome will be available after that analysis and comparison to 2017 data has been completed. If this shows an increase in stewardship, then the Outcome can be considered as on course, but it remains uncertain until this data is obtained.

What has helped achieve success since 2014?

- Multiple partners continue to implement on-the-ground stewardship activities, as well as launch regionally focused behavior change and social science projects.
- Efforts are underway to increase the capacity and application of social science approaches into the work of the Chesapeake Bay Program including the establishment of a new staff position to focus on social science.
- The launch of the Chesapeake Behavior Change website has enabled behavior change practitioners to learn more about behavior change methodology, access residential stewardship behavior adoption rates and learn more about stewardship campaigns in their watershed
- The partnership completed the *Enhancing Chesapeake Bay Partnership Activities by Integrating Social Science* report in 2023 which includes recommendations for fuller integration of social sciences within the partnership.
- Sharing stewardship data as an indicator for Chesapeake Bay health as part of the University of Maryland Center for Environmental Science Chesapeake Bay Report Card helps to bring attention to the importance of, and progress toward, stewardship within the watershed and highlights where we might focus attention to improve actions.

What challenges have hindered progress?

- It is necessary to collect information from stakeholders on their motivations, values and attitudes in order to design programs and policies that align with their needs, to be most effective. However, federal survey restrictions and financial constraints limit utilizing surveys to collect quantitative and qualitative data from stakeholders.
- The raw data collected in the Stewardship Index is too complex for most practitioners to use.
- More attention and resources are needed to focus on programmatic efforts and to get back on track with building desired behavior as guided by the standard ladder of engagement.
- Limited coordination with the Diversity Workgroup and other workgroups that rely on individual stewardship actions.

If uncertain, what would need to be done before 2025 to classify as on course/off course and can this be done in that timeframe?

- Complete the second data collection of individual residential stewardship behaviors and data analysis to update stewardship indicators to show change in stewardship behaviors from 2017 to 2023.
- Increase capacity to implement social science assessment and build broader engagement in social sciences within the partnership by increasing funding for social science project implementation and additional social science staff expertise.
- Provide training and guidance resources, identify potential funding support and other means to build capacity among the partnership to engage in behavior change to advance goals that require individual action.
- Build relationships with trusted sources and behavior change practitioners that engage at the local level to build their capacity to utilize effective behavior change campaigns.
- Continue to interact with other workgroups across the Chesapeake Bay Program that rely on individual actions to achieve outcomes.

Local Leadership Outcome

OUTLOOK ON COURSE

Outcome

Continually increase the knowledge and capacity of local officials on issues related to water resources and in the implementation of economic and policy incentives that will support local conservation actions.

Status

In 2022, a survey was distributed to local leaders across the Chesapeake Bay watershed and results showed that many officials have a solid understanding of watershed basics. However, many lack knowledge about water resource regulations, particularly at the federal level. Newly elected officials and those from smaller communities were the groups that indicated the greatest need for further knowledge and capacity on issues related to water resources. Since 2019, efforts by the Local Leadership Workgroup have engaged more than 2,000 local officials directly (through peer-to-peer learning exchanges, roundtable discussions and conference panels) and more than 20,000 indirectly (through newsletters, magazine articles and blogs). Additionally, over 900 local planners attended webinars and conference sessions, activating an additional network who can support the increase of local officials' knowledge and capacity. The Local Leadership Outcome is on course.

What has helped achieve success since 2014?

- The development of editable educational modules tailored toward issues relevant to local leaders.
- Enhanced partnerships with trusted sources, like local government associations, council of governments and local planner networks.
- The distribution and analysis of a baseline survey to expand understanding of local officials' knowledge and capacity for water resources.
- Expansion of peer to peer learning exchanges create an opportunity for experiential learning.

What challenges have hindered progress?

- Continued turnover of local officials makes engagement an ongoing challenge.
- Local governments lack the capacity to access state and federal funding.
- Existing local infrastructure was not designed to handle current and future climate change conditions, leaving local officials struggling to adapt.
- Labor shortages, capacity, supply chain issues and needed training are ongoing issues.

If on course, what is needed to continue current trajectory?

- Expanded use of editable educational modules, including tailoring at state and regional levels.
- Continued partnership with trusted sources, like local government associations, council of governments and local planner networks, with an additional focus on smaller, regional partners.
- Connecting local governments with technical assistance and capacity building opportunities.

Diversity Outcome

OUTLOOK OFF COURSE

Outcome

Identify stakeholder groups not currently represented in the leadership, decision-making or implementation of current conservation and restoration activities and create meaningful opportunities and programs to recruit and engage these groups in the partnership's efforts.*
**In January 2020, the outcome was modified from the original language.*

Status

The Diversity Outcome is off course in part due to a need for more timely, consistent and comprehensive analysis and tracking of diversity progress across the Bay Program. The current indicator is inward-facing, looking at the makeup of the Bay Program staff and leadership. In 2016, 2019 and 2022, a diversity survey was disseminated to the partnership, with intent to continue every three years. The most recent survey experienced a larger pool of voluntary responses overall and indicated a slight increase in the percentage of respondents who self-identified as people of color in the Bay Program compared to previous years; however, the data shows no statistically significant change in racial or ethnic diversity among the three surveys, averaging slightly less than 15%. The Workgroup strives to improve accuracy of the measurement method including reviewing the survey tool as well as the process for collecting and analyzing the data.

Based on the most recent analysis, we have learned that individuals recruited to partnership roles in the last 10 years are twice as likely to be people of color than those who have been involved for 11 years or more. That the LGBTQIA+ population is more than twice as prevalent in the last five years' recruits as it was in older cohorts. Finally, female representation has increased over time; accounting consistently for more than half of participants recruited over the past 20 years.

A full understanding of outcome achievement requires the development of additional indicators that look at other important factors. Both the Diversity Outcome specifically, and the Stewardship Goal more broadly, include involvement of other stakeholders and members of the public in decision-making and carrying out conservation and restoration activities. Progress toward this key component has not been tracked using a numeric indicator, therefore additional metric(s) should be explored for the future, determining an effective methodology for measuring success toward the overall intent of the goal and outcome. The Diversity Outcome is off course.

What has helped achieve success since 2014?

- Development of the *Diversity, Equity, Inclusion and Justice (DEIJ) Strategy* and *Implementation Plan*.
- The signing of the *DEIJ Directive* by the Chesapeake Executive Council in 2020.
- Increasing awareness of stakeholder perceptions and needs through internal and Goal Implementation Team (GIT) funded projects.
- Significant changes in DEIJ policy at the federal and state levels.
- Incorporation of a diversity question in the Strategy Review System materials that will ensure all GITs and workgroups are taking DEIJ considerations into account in their work.
- DEIJ considerations have been incorporated into funding opportunities through the Bay Program along with several other federal and jurisdictional grant programs. The Diversity Workgroup facilitated a series of workshops in 2023 to further share best practices among funders and to foster communication among funders and community-facing grant applicants.

- Establishment of several Memorandum of Understanding (MOUs) with Historically Black Colleges and Universities (HBCUs) in the region to provide ready means for working together on research, workforce development and other opportunities.
- Creation of the C-StREAM internship program with the Chesapeake Research Consortium, to encourage and support underrepresented students interested in environmental careers.
- In 2022, the Chesapeake Bay Program Governance Document was revised to provide more guidance on DEIJ considerations when making appointments to participate in the Program at various levels of responsibility.
- Ongoing training, workshops, webinars and peer guidance across the partnership.

What challenges have hindered progress?

- Turnover in staffing, leadership and membership of the Diversity Workgroup.
- The indicator is inadequate, relying on self-reporting and only measures part of the outcome.
- Survey results are not readily actionable due to lack of alignment with DEIJ Implementation Plan or a clear organizational structure where impact can be made.
- The Diversity Workgroup operates with limited resources, capacity and authority; inability to effectively track recruitment and retention data; and inability to address structural changes necessary to implement DEIJ best practices—especially regarding hiring practices and pathways. With no means for substantive influence on Bay Program partners' policies and operations, the Workgroup can only offer guidance.
- Lack of understanding and guidance about how underrepresented communities and organizations can participate in the Bay Program meaningfully and effectively, and what is appropriate within the structure of the partnership for engaging with community-based organizations.
- Bay Program partners lack experience and knowledge to incorporate DEIJ principles into their work.
- Disruptions and subsequent work life changes due to the COVID-19 pandemic.

If off course, what is needed to accelerate progress?

- Clarity on the functions of the Bay Program from leadership, along with a skilled analysis of opportunities for systemic change within the partnership to best include and amplify diverse voices and participants in Bay Program work.
- Commitment of action from Bay Program leaders on a short set of recommended high-impact DEIJ actions for beyond 2025 regarding hiring and other practices (to be identified).
- Built-in, ongoing guidance on DEIJ practices across the partnership—in the form of at least one position dedicated to serving as an internal "consultant" to help steer GITs and Workgroups, assure continual training for staff and partners and lead development of improved systemic processes.
- Coordinated demographic data collection from signatories and mandated employee surveys similar to the Federal Employee Viewpoint Survey.
- Reevaluation of Diversity Workgroup structure and capability to achieve desired outcomes within current limitations.

Land Conservation Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Conserve treasured landscapes in order to maintain water quality and habitat; sustain working forests, farms and maritime communities; and conserve lands of cultural, indigenous and community value."

Photo by Will Parson/Chesapeake Bay Program

Protected Lands Outcome

OUTLOOK ON COURSE

Outcome

By 2025, protect an additional two million acres of lands throughout the watershed—currently identified as high-conservation priorities at the federal, state or local level—including 225,000 acres of wetlands and 695,000 acres of forest land of highest value for maintaining water quality.

Status

Through early 2019, nearly 1.36 million of acres of land has been permanently protected across the Chesapeake Bay watershed since 2010. This marks an achievement of 68% of the Protected Lands Outcome target. In 2021 the Chesapeake Executive Council Directive No. 21-1: Collective Action for Climate Change called for protecting 30% of the watershed by 2030. This represents an additional 2.4 million acres above the 2025 goal. Work continues to strive for 30% as an ambitious target. The Protected Lands Outcome is on course and will be met by 2025.

What has helped achieve success since 2014?

- A strong and growing network of conservation-minded partners through the Chesapeake Conservation Partnership.
- Voluntary jurisdictional coordination with federal agencies on land conservation priorities has increased steadily with the implementation of Executive Order 13508: Chesapeake Protection and Restoration.
- Increased funding from the private sector, including donors, foundations and landowners, has presented an enhanced opportunity for stewardship. In recent years there has also been an increase in federal funding that supports land conservation.
- A rise in the protection of culturally valuable lands.
- Articulating conservation values through the lens of health, safety and welfare has helped to increase public support.

What challenges have hindered progress?

- Definitional, attitudinal and political messaging.
- Difficulties with the generational transfers of land ownership.
- Limited personnel and programmatic capacity to administer and manage funding for land conservation. The field is also experiencing organizational turnover and overall workforce development needs.
- Competition, on a nationwide scale, for federal and state funding for land conservation.
- As populations have increased, so have development pressures and competition from new transportation and energy infrastructure including industrial solar.
- Climate change has impacted ecologically and culturally significant places, as well as shifted native species patterns and contributed to land loss through erosion, flooding and increased precipitation.

If on course, what is needed to continue current trajectory?

- Managing and leveraging of diverse funding pools.
- Integration and coordination of conservation data.
- Maintaining the capacity level of conservation land trusts.

Land Use Methods and Metrics Development Outcome

OUTLOOK ON COURSE

Outcome

Continually improve our knowledge of land conversion and the associated impacts throughout the watershed. By December 2021, develop a watershed-wide methodology and local-level metrics for characterizing the rate of farmland, forest and wetland conversion, measuring the extent and rate of change in impervious surface coverage and quantifying the potential impacts of land conversion to water quality, healthy watersheds and communities. Launch a public awareness campaign to share this information with local governments, elected officials and stakeholders.*
**In January 2020, the outcome was modified from the original language*.

Status

The Land Use Methods and Metrics Development Outcome developed an impervious surface cover indicator in 2023, describing the amount of the watershed that is covered by impervious surfaces, the changes in impervious cover time and the types of impervious cover that contribute most to land changes. The metrics described in outcome language will be reassessed in 2024 using data from 2021-2022. The Land Use Methods and Metrics Outcome is on course.

What has helped achieve success since 2014?

- Continued funding support for monitoring land use and land cover metrics.
- Development of the high-resolution land use and land cover datasets and change tool.
- Close coordination with other outcomes, workgroups and advisory committees.

What challenges have hindered progress?

- Translating the land use and land cover change data into a form that is understood and actionable for communities.
- Continually updating existing high-resolution land cover and land use datasets during each four-year remapping phase.
- The need for a methodology to quantify the impacts of changes in land use on communities and the environment.
- The current strategy for reducing the rate of land conservation through land use planning is passive and lacks sufficient incentives.

If on course, what is needed to continue current trajectory?

- Funding for a new cooperative agreement and Bay Program staff to continue robust land cover, land use monitoring and develop change products.
- Clear charge for the Land Use Workgroup and/or other appropriate workgroups to directly work with pilot communities (e.g., local governments) to develop meaningful uses for land use data in local planning and stormwater management.
- Direct communication with jurisdictions on how they can incentivize land use planning at the state level using land use data.

Better identification of the cross connections with other outcomes.

Land Use Options Evaluations Outcome

Outcome

By the end of 2017, with the direct involvement of local governments or their representatives, evaluate policy options, incentives and planning tools that could assist them in continually improving their capacity to reduce the rate of conversion of agricultural lands, forests and wetlands as well as the rate of changing landscapes from more natural lands that soak up pollutants to those that are paved over, hardscaped or otherwise impervious. Strategies should be developed for supporting local governments' and others' efforts in reducing these rates by 2025 and beyond.

Status

This outcome is focused on developing and implementing strategies to increase the capacity of local governments and others to reduce land conversion of natural land cover types to impervious surfaces. Various efforts listed in the below section have helped this outcome to progress. However, with this qualitative outcome, there are challenges in assessing the degree to which efforts are helping to reduce the rate of land conversion, but the development of the local government engagement strategy and the communication of available land use data and tools are expected to lead toward meeting the outcome. The Land Use Options Evaluation Outcome is on course and will be met by 2025.

What has helped achieve success since 2014?

- Collaboration on projects and products with related workgroups.
- The number of non-governmental organizations that are focused on future land changes.
- Development of high-resolution land use/land cover and change products help to characterize the extent and rate of land use change.
- Existing policy drivers, such as the Bay TMDL and Executive Order 13508 Chesapeake Bay Protection and Restoration.

What challenges have hindered progress?

- Lack of coordination and clear communication with Chesapeake Bay Program partners in conveying the need and purpose in communicating and engaging with local planners.
- The need to continue to work with professional communicators and subject matter experts to translate data and analysis into materials and resources for those to utilize at the local and jurisdictional level to influence the rate of land conversion to development, especially considering population and land use change trends.
- Efforts to minimize future land change impacts are sometimes neglected given the need to reduce effects from existing land conversion.
- The need for better information on the benefits of land conservation and smart growth in language that is compelling for local governments and outlines the positive impacts on communities.
- Competition with economic development objectives.
- Local governments' need for technical assistance.
- Insufficient funding to complete the evaluation component of this outcome.

If on course, what is needed to continue current trajectory?

- An upcoming Goal Implementation Team funding project to help make land use and land use change data actionable and operational at the community level in areas vulnerable to habitat loss, will help engage with local and state organizations.
- Several obstacles remain in effectively communicating and illustrating the application of resources. While staff have been able to manage and champion land use resources, tools and information, there is more need to communicate how planning for and protecting stable hydrology will reduce erosion and its associated sediment and nutrients to downstream areas, including the Bay, while also reducing local flooding and improving drinking water quality and quantity. A more coordinated effort is needed, including:
    - A quantified cost analysis of the long-term economic effects of property damage from flooding along with increased drinking water treatment costs from altered hydrology due to land use change is needed so that people can get an idea of why this is important.
    - A benefit analysis of the preservation and restoration of green infrastructure such as floodplain connectivity and wetlands as well as recharge areas that protect and maintain stable hydrology and clean, full aquifers through time. Ultimately, our goal should be to inform land use planning and conservation decisions with information that will engender more sustainable decisions.
- Additional needs in communication, translation and engagement:
    - Translate, format, package and flow information through to trusted sources.
    - Determine how to effectively engage locals directly.
    - Improve how DEIJ and climate considerations are accounted for in the Land Use Options Evaluation Outcome.

Public Access Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Expand public access to the Bay and its tributaries through existing and new local, state and federal parks, refuges, reserves, trails and partner sites."

Photo by Will Parson/Chesapeake Bay Program

Public Access Outcome

OUTLOOK ON COURSE

Outcome

By 2025, add 300 new public access sites, with a strong emphasis on providing opportunities for boating, swimming and fishing, where feasible.

Status

Between 2011 and 2021, partners have opened an average of approximately 21 sites per year, bringing the total of new public access sites in the watershed to 237. This marks a 79% achievement of the goal to add 300 new public access sites by 2025. The long-term data trend has been positive, but public access site development remains largely opportunistic. There are limited sources of dedicated funding for new access projects and the accomplishments of the past may not predict future trajectory. The Public Access Outcome is on course and will be met by 2025.

What has helped achieve success since 2014?

- The committed efforts of the jurisdictions, partners and members of the Public Access Workgroup has ensured progress of the public access goal thus far.
- The sharing of best practices and learning among workgroup members.
- The creation of programs and passage of legislation that highlights outdoor recreation and infrastructure investment has increased public awareness of the importance of public water access.
- A recent Goal Implementation Team (GIT) funded project to understand the benefits and barriers to public access.

What challenges have hindered progress?

- Increased demand for public access sites has highlighted the need for increased ADA accessibility, and resulted in the overuse and degradation of some sites, as well as delayed maintenance and construction at others.
- Creation of new sites is often delayed in order to address a backlog of maintenance at existing sites.
- Funding for operations and maintenance of existing public access sites is limited and most federal and state grant programs require matching funds, which smaller jurisdictions struggle to secure.
- Inflation and supply chain issues have caused the cost of materials and labor to rise.
- Delayed maintenance and environmental impacts have negatively impacted some existing public access sites.
- The workgroup has limited influence to change available funding or budgets for projects.

If on course, what is needed to continue current trajectory?

- Continued commitment by the jurisdictions and federal agencies.
- The creation of 16 new sites per year would ensure that the 2025 target is met.
- In order to accelerate progress, additional funding, staffing and planning would be required.

Environmental Literacy Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Enable every student in the region to graduate with the knowledge and skills to act responsibly to protect and restore their local watershed."

Photo by Will Parson/Chesapeake Bay Program

Student Outcome

Outcome

Continually increase students' age-appropriate understanding of the watershed through participation in teacher-supported meaningful watershed educational experiences and rigorous, inquiry-based instruction, with a target of at least one meaningful watershed educational experience in elementary, middle and high school depending on available resources.

Status

The Environmental Literacy Indicator Tool (ELIT) was distributed in 2015, 2017, 2019 and 2022 to collect data related to student participation in Meaningful Watershed Educational Experiences (MWEEs). The COVID-19 pandemic had a tremendous impact on K-12 education, and implications related to significant learning loss and social-emotional setbacks are still being felt across school districts. Data collection scheduled for 2021 instead took place in 2022 to assess where the region stands in the wake of these impacts on education systems. The status of the 2022 ELIT Report shows a decline in system-wide MWEEs across the board. The Student Outcome is off course.

- Thirty-five percent of responding school districts in the watershed have a MWEE in place throughout the school system (system-wide MWEE) at the elementary grade level and 35% have some MWEEs (not yet system-wide). There has been a trend of progressive increases in the number of school districts reporting that no MWEEs were available in the elementary level (18% in 2015 to 30% in 2022).
- Thirty-five percent of responding school districts in the watershed have system-wide MWEEs in place at middle school grade levels and 41% have some MWEEs (not yet system-wide). Since 2015, there has been a progressive decrease in the rate of system-wide MWEEs (43% in 2015 to 35% in 2022).
- Twenty-nine percent of responding school districts in the watershed have system-wide MWEEs in place at high school grade levels and 44% have some MWEEs (not yet system-wide). Between 2015 and 2019, ELIT collection demonstrated an increase in system-wide MWEEs from 31% to 35%, however post-COVID this percentage dropped to 29%. Additionally, the percentage of no MWEEs occurring in high school rose significantly from 22% to 27% between 2019 and 2022.

What has helped achieve success since 2014?

- New tools have been developed to support school districts and environmental literacy providers (environmental educators not part of the school system who support school programming) in developing their understanding for designing and implementing MWEEs, including: the revised Educator's Guide to the MWEE, Environmental Literacy Model Tool and Environmental Literacy Audit Tool, a series of state-specific versions of the Facilitator's Guide to MWEE Training and a MWEE 101 and 201 online course with continued learning credits. Specifically, more than 1,600 educators have taken the MWEE 101 course.
- A community of practice for MWEE practitioners started in 2019 and has brought together educators for more than 30 conversations and webinars sharing best practices for MWEE implementation.
- Federal, regional and state grant programs have adopted the MWEE Guide and other key MWEE resources within their funding specifications (Notice of Funding Opportunities and Request for

Proposals) which has strengthened understanding of MWEEs for the applicants and improved their proposed MWEE efforts.
- Biennial Environmental Literacy Forums have brought together nearly hundreds of practitioners to train on resources such as the Facilitator's Guide to MWEE Training and the District Environmental Literacy Planning Toolkit.

What challenges have hindered progress?

- Teacher and administrator turnover is a challenge and has been exacerbated by the exodus of teaching professionals during and after the COVID-19 upheaval of the educational system.
- COVID-19 impeded efforts to implement MWEEs with full fidelity, and drew time and resources away from environmental education programming.
- COVID-19 also limited progress in working with other systems of influence including pre-service teacher programs, district and school administrator professional development and superintendent awareness and advocacy, among others, as competing challenges put a damper on our ability to attract the attention of those in educational leadership positions and higher education.
- Low availability of sustainable funding mechanisms to support MWEEs beyond grant funding.
- An increasing emphasis on math, reading and English language arts in elementary schools has diminished science and social studies education, which is where MWEEs often occur. This trend was exacerbated by COVID-19 when test scores revealed significant learning loss in these foundational subject areas.

If off course, what is needed to accelerate progress?

- Identification of an established program leader in each school district and community partnerships with environmental education providers (identified as a best practice 2022 ELIT report).
- Continued funding for NOAA's Bay Watershed Education and Training (B-WET) Program, Chesapeake Bay Trust's Environmental Education Grant Program and other state/regional funding to catalyze the development of MWEEs. Additionally, models of school districts identifying sustainable funding sources to support MWEEs long-term are needed.
- Activation of intra-state networks and non-formal partners in reaching districts that currently have no MWEEs or are not reporting on ELIT.
- Continued support from state leaders in elevating MWEEs, as exemplified by Pennsylvania in the re-write and explicit inclusion of MWEEs in their new learning standards regime.
- A renewed emphasis on aligning the environmental education community towards MWEE programming that directly meets the needs of school districts.

Sustainable Schools Outcome

OUTLOOK ON COURSE

Outcome

Continually increase the number of schools in the region that reduce the impact of their buildings and grounds on their local watershed, environment and human health through best practices, including student-led protection and restoration projects.

Status

Certified sustainable schools include public and charter schools within the Chesapeake Bay watershed that have been recognized as sustainable by the following programs: U.S. Green Ribbon Schools, National Wildlife Federation Eco-Schools USA (Bronze, Silver and Green Flag status), Maryland Green Schools, Pennsylvania Pathways to Green Schools and Virginia Naturally Schools. The most recent data from 2021, shows that 597 schools in the watershed are currently certified by one of these programs. This represents a 19% increase above the 2015 baseline of 501 schools. However, this data shows a decrease from the 2019 reporting. This is speculated to be due to lack of recertification paperwork being submitted during the COVID-19 pandemic and less project work being possible during prolonged school shutdowns.

While this outcome does not have a specific numerical target to meet by 2025, it is anticipated that the number of sustainable schools throughout the watershed will continue to exceed the 2015 baseline. The Sustainable Schools Outcome is on course.

What has helped achieve success since 2014?

- COVID relief funding provided additional grants to school districts to invest in outdoor learning infrastructure (e.g., Queen Anne's County Public Schools).
- Connecting sustainable school initiatives to Meaningful Watershed Educational Experience (MWEE) efforts to increase funding available to support projects.
- Connecting facilities managers to their curriculum specialist counterparts in school districts to better connect school operations to student learning.
- A subset of Environmental Literacy Workgroup members gathered to coordinate and share lessons learned at the regional level about sustainable schools efforts. Post-COVID, reconvening of a rejuvenated Sustainable Schools team and recruitment of additional partners dedicated to the outcome.
- Connecting sustainable schools conversations to emerging priorities around climate action in districts where this is a priority.

What challenges have hindered progress?

- Sustainability projects are not typically seen as necessary and their implementation is continually slowed by competing priorities. Student involvement in such projects can be used to address the learning losses associated with the COVID-19 pandemic but are often seen as superfluous.
- The educational community was negatively impacted by the COVID-19 pandemic, which continues to affect school operations and staff turnover.

- In an effort to address the health concerns associated with the COVID-19 pandemic, previously reusable items (e.g., lunch trays and water bottles) were replaced with disposable versions, representing a setback to sustainable practices.
- Relative to other environmental literacy outcomes, the implementation of sustainable school actions has received somewhat limited workgroup attention, resulting in slower progress since the last reporting cycle. Those who provide most attention to these actions are more likely specialists representing green schools-type programs. Steps are being taken to remedy this, including the establishment of a reinvigorated Sustainable Schools team and the 2023 Environmental Literacy Leadership Summit will have sustainable schools as a main topic of focus.
- There are ongoing challenges involving states and counties that do not already have an interest in sustainable schools. As is the trend across the Bay Program, the vast majority of progress on sustainable schools has been achieved in relatively limited areas of Maryland and Virginia.

If on course, what is needed to continue current trajectory?

- Increase focus on "High Impact Actions" that will more dramatically reduce harmful effects to the environment. This includes, where possible:
    - Transitioning to clean energy to reduce greenhouse gas emissions.
    - Implementing environmentally beneficial landscaping techniques to reduce pesticide and fertilizer use.
    - Increasing tree canopy cover and natural grounds while reducing artificial surfaces to improve sustainability and stormwater infiltration, while reducing heat of play and learning areas.
- Focus the next biennial Environmental Literacy Leadership Summit, planned for fall 2023, on sustainable schools as the main topic. This will bring the topic to front of mind for stakeholders and provide a means for collaboration where best practices, success stories and critical information can be shared to advance the outcome.
- Actively increase involvement of facilities managers, who are best equipped to address the "High Impact Actions."
- Increasing Chesapeake Bay Program involvement in existing sustainable schools organizations and efforts. Assist in the proliferation of existing and emerging sustainable schools plans and best practices.
- Find new strategies to engage geographic areas that are currently underrepresented in sustainable school conversations.

Environmental Literacy Planning Outcome

OUTLOOK ON COURSE

Outcome

Each participating Bay jurisdiction should develop a comprehensive and systemic approach to environmental literacy for all students in the region that includes policies, practices and voluntary metrics that support the environmental literacy Goals and Outcomes of this Agreement.

Status

The Environmental Literacy Indicator Tool (ELIT) was distributed in 2015, 2017, 2019 and 2022 to collect data related to school district preparedness to implement environmental education. The COVID-19 pandemic had a tremendous impact on K-12 education and implications related to significant learning loss and social-emotional setbacks are still being felt across school districts. Data collection scheduled for 2021 instead took place in 2022 to assess where the region stands in the wake of these impacts on education systems. The status of the 2022 ELIT Report shows positive trends for this indicator as follows:

- The majority of responding Local Education Agencies (LEA) in the watershed (54%) are somewhat prepared to implement high quality environmental education and an additional 23% of districts are well prepared. Preparedness varied a great deal between the states with Maryland having majority of its districts scoring as well prepared (73%).
- The percentage of LEAs scoring as well prepared to implement environmental education decreased slightly in 2022 down to 23% from a height of 26% in 2019. Previously, this indicator had shown steady increases from 2015 to 2019.
- The data suggests that establishing an environmental education leader, connecting with community partners and integrating environmental education across the curriculum, are areas less-prepared districts can emulate toward making strides for greater preparedness.

The Environmental Literacy Planning Outcome is on course and will be met by 2025.

What has helped achieve success since 2014?

- Aligned state efforts have been key to advancing environmental literacy. Major efforts include the incorporation of environmental literacy (including elements of the Meaningful Watershed Educational Experience framework) in the new Pennsylvania learning standards for science; the completion of a new Environmental Literacy Framework for Maryland; and the new Seal for Excellence for Science and the Environment in Virginia.
- The National Oceanic and Atmospheric Administration (NOAA), Pisces Foundation and Chesapeake Bay Trust have supported the development of strong, intentional environmental literacy networks in each state that works towards meeting state priorities, including the outcomes of the *Chesapeake Bay Watershed Agreement*. These state networks are connected at the watershed level through the Regional Outdoor Learning Network.
- The biennial Chesapeake Bay Environmental Literacy Leadership Summit allows education leaders from around the watershed to share environmental literacy planning successes and challenges from their respective states. The 2021 summit focused on the five dual themes of increasing climate education and ensuring equity in environmental education. One key to

success has been having a Principals' Staff Committee (PSC)-level state partner work with the Chesapeake Bay Program to host the event; this ensures alignment with state priorities.
- Development of the District Environmental Literacy Planning Toolkit which houses a set of materials and best practices to aid school district efforts to create equitable, sustainable and systemic environmental literacy programs.
- Biennial Environmental Literacy Forums that train environmental educators and school district leaders in key environmental literacy principles using new tools and guides.
- Development of state-specific guides, templates and examples for educator professional development, district level environmental literacy plans and MWEE programming.
- Training series with non-profit partners who serve as "network weavers" in the states, working with school districts to facilitate the development of environmental literacy plans and programming.

What challenges have hindered progress?

- The focus of administrators has been centered on the continued challenges related to Covid-19 recovery, including learning loss and social-emotional problems in students.
- Teacher and administrator turnover is a challenge and has been exacerbated by the exodus of teaching professionals during and after the COVID-19 upheaval of the educational system.
- COVID-19 limited district and school administrator professional development and superintendent awareness and advocacy, as competing challenges limited our ability to attract the attention of those in educational leadership positions and higher education.
- Lack of dedicated school district personnel focused on the development and implementation of environmental literacy programs.

What is needed to continue current trajectory?

- Identification of an established program leader in each school district and community partnerships with environmental education providers (identified as best practices in the 2022 ELIT report).
- Growth of state environmental literacy networks.
- Continued support from PSC-level state partners to work with the Chesapeake Bay Program to host the biennial Chesapeake Bay Environmental Literacy Leadership Summit.
- Sustained funding for the Chesapeake Bay Trust Environmental Education Grant Program, National Oceanic and Atmospheric Administration's Bay Watershed Education and Training (B-WET) Program, and related state funding programs to support school district efforts to develop and implement environmental literacy programming and fund program implementation.

Climate Resiliency Goal

CHESAPEAKE BAY WATERSHED AGREEMENT

"Increase the resiliency of the Chesapeake Bay watershed, including its living resources, habitats, public infrastructure and communities, to withstand adverse impacts from changing environmental and climate conditions."

Photo by Will Parson/Chesapeake Bay Program

Climate Adaptation Outcome

Outcome

Continually pursue, design and construct restoration and protection projects to enhance the resiliency of Bay and aquatic ecosystems from the impacts of coastal erosion, coastal flooding, more intense and more frequent storms and sea level rise.

Status

While new restoration and protection projects are being developed and implemented, metrics for tracking and measuring the success of these projects to enhance resiliency (e.g., carbon sequestration, flood reduction, shoreline protection, habitat preservation) to coastal climate change impacts have not yet been developed. Given the urgency demonstrated by climate change trends and projections, it is critical to establish metrics to measure resilience successes to both assess progress toward this outcome and inform future management decisions. Past efforts to track progress in improving resilience have been too broad in scope, and we still need research and methodologies that support metric development for measuring resilience effectiveness in both the short- and long-term. Currently, the Climate Resiliency Workgroup has narrowed the scope of their work to focus on nature-based strategies (e.g., living shorelines, tidal wetlands, forest buffers); the workgroup assists with bringing partners together to develop adaptation projects, targeting project locations using the best available data and connecting partners with funding for both project design and implementation. In their 2023-2024 Logic and Action Plan, the workgroup prioritized supporting efforts to identify strategies to track progress in enhancing resiliency of the Bay and aquatic ecosystems from climate change impacts, which includes learning how partners are defining resiliency and measuring the efficacy of nature-based strategies. The workgroup must define what it means to enhance resiliency through nature-based strategies and develop methods and metrics to track success of these strategies. The Climate Adaptation Outcome is off course.

What has helped achieve success since 2014?

- Collaboration with other Chesapeake Bay Program Goal Implementation Teams (GITs) and workgroups on projects and efforts.
- Narrowing the scope of the outcome to focus on nature-based adaptation strategies (e.g., marsh migration, green/natural infrastructure).
- Federal, state, nonprofits and academic partners involved in the partnership are actively generating prominent climate change information through funding and implementing climate resilience research and projects.
- Many of the jurisdictions and federal agencies in the watershed have developed their own standalone climate change adaptation plans and resilience metrics, or have established advisory bodies to guide efforts and oversee projects.
- Local governments and communities are employing new and creative strategies to further adaptation opportunities.

What challenges have hindered progress?

- There is a lack of understanding or agreement from stakeholders on what constitutes resiliency, including what key actions to take to support management approaches.
- A variety of stakeholders have differing goals, making it challenging to have adequate resources to facilitate meaningful connections across all groups.

- There is a lack of capacity and dedicated human capital to fill research gaps, translate science, develop proposals and manage projects, and incorporate climate change considerations into programs, plans, processes or projects.
- The ability of governments and institutions to respond to climate change is still limited by legislature, policy, regulations and other authorities.
- Since there is variability across the watershed in how different systems respond to resiliency efforts, it is challenging to develop consistent guidance.

If off course, what is needed to accelerate progress?

This outcome is currently categorized as off-course because the way it is currently written is unattainable to be met by 2025 and should be refined for beyond 2025. The following bullets will assist in narrowing the scope of the outcome so that it is trackable and manageable within the purview of the Chesapeake Bay Program's current natural resource goals, however we are recommending that the Beyond 2025 discussions focus on updating the outcome language to make it attainable:

- Implement strategic targeting of adaptation projects based on maximizing benefits and persistence/longevity.
- Establish common definitions, metrics and monitoring to account for and evaluate efficacy of restoration and adaptation projects related to natural resource goals.
- Explore options for a climate resilience adaptation clearinghouse to track adaptation efforts (e.g., research and implementation) occurring within the watershed to understand the extent of efforts.
- Provide technical assistance, community engagement and capacity building to assist Bay partners in developing large-scale and/or high impact restoration and protection projects that can enhance resiliency of the Bay and aquatic ecosystems from coastal climate change impacts.

Climate Monitoring and Assessment Outcome

OUTLOOK ON COURSE

Outcome

Continually monitor and assess the trends and likely impacts of changing climatic and sea level conditions on the Chesapeake Bay ecosystem, including the effectiveness of restoration and protection policies, programs and projects.

Status

Progress continues on assessing climate change trends related to physical changes, including temperature, precipitation and sea level rise, in connection with programs. The language in this outcome does not provide a target or goal to meet. Furthermore, climate change is an ever-evolving issue, with new challenges and opportunities presenting themselves continually. As such, the Climate Resiliency Workgroup is focused on continually exploring new ways to monitor and assess the trends and impacts of climate change and will be faced with new challenges and impediments to overcome, so that we can continue to provide the Chesapeake Bay Program and our partners with data and information to assist in building climate resilience. In order for the outcome to stay on course, these recommendations require review and implementation by their respective partner programs (e.g., state natural resource agencies, federal agencies, local governments). The Climate Monitoring and Assessment Outcome is on course.

What has helped achieve success since 2014?

- Collaboration between Chesapeake Bay Program Goal Implementation Teams (GITs) and workgroups on incorporating climate change considerations in addressing the impacts of climate change on water quality, habitats and living resource outcomes.
- The Chesapeake Bay Program has an abundance of environmental monitoring resources that provide data to track climate change impacts, with two climate change Indicators (i.e., total annual precipitation and average air temperature) regularly maintained and updated on Chesapeake Progress.
- The Chesapeake Bay Program Modeling Team, with advisory support from the Climate Resiliency Workgroup and the Scientific and Technical Advisory Committee (STAC), incorporated climate change considerations and projections into the Bay Program's suite of modeling tools. The modeled outputs provide insights into climate change effects on nutrient and suspended sediment loads in the Bay and provide information on how to accommodate the projected changes. The jurisdictions utilized these outputs in the development of their Phase III Watershed Implementation Plans (WIPs) beginning in 2021.

What challenges have hindered progress?

- The scientific capabilities needed to estimate, project, model and monitor ecosystem changes and impacts as a result of climate change are complex and resource intensive.
- Climate change impacts are exacerbated by non-climate stressors such as land subsidence, land use change, development and growth.
- Climate change impacts vary across the watershed, presenting challenges in data consistency and comparability across the region.

- Differing rules and regulations across agencies and organizations make it difficult to share or provide open access to monitoring data.
- The development of a monitoring program to detect ecosystem changes, and inform program and project responses is a complex undertaking.
- Lack of consistent long-term funding for indicator development and monitoring needs.
- Partnership support is needed to support all monitoring and assessment needs, including the commitment of technical analysts and long-term data providers to inform model improvements and climate change indicators.
- There is a lack of staffing resources to undertake resource-intensive data analysis to inform climate change indicators.
- A coordinated effort toward improving the integration of modeling and monitoring tools that include climate parameters and future climate change projections is needed to improve understanding of how climate change will impact habitat and living resource goals in the *Chesapeake Bay Watershed Agreement*.

If on course, what is needed to accelerate progress?

Increasing capacity to support the prioritized list of climate change indicators, which includes the development of several new indicators. These indicators are time and staff resource intensive (beyond the capacity of current staff), so it will be important to build partnerships with organizations that can commit to being long-term data providers and assist with the indicator analysis.

- Continue supporting existing, in addition to, expanding long-term monitoring networks to provide needed data to assess climate change trends and impacts to the Chesapeake Bay's ecosystems.
- Continue to work with Chesapeake Bay Program Modeling team to incorporate climate change into modeling efforts and collaborate with Chesapeake Bay Program living resource outcomes to connect these models with current and future efforts (e.g., assessing striped bass habitat and SAV under changing climate and water quality conditions).
- Optimize use of the indicators and available resources, through establishing the purpose of the indicator with potential end-users to make the level of effort worthwhile. This includes getting support from other workgroups in connecting the climate change indicators with relevant ecological impacts to natural resource outcomes.
- Ensure adequate dedicated climate staff support is in place to continue progress.

From:	Jason Dubow -MDP-
To:	Comments
Cc:	Chuck Boyd -MDP-; Deborah Herr Cornwell; Jason Dubow
Subject:	MD Planning comments: CBP Charting a Course to 2025 report
Date:	Wednesday, August 16, 2023 10:56:39 AM

Good morning,

The Maryland Department of Planning (as approved by MDP Secretary Rebecca Flora, AICP) has the following comments on the CBP *Charting a Course to 2025* report:

1. Maintaining and updating the CBP high-resolution land use/land cover data is essential for understanding how the Bay and its tributaries are being impacted by impervious cover and different land uses over time and in which sub-watersheds. With this understanding, state and local governments can respond with watershed-protective land use measures.

2. States should consider implementing land use mandates that maintain some development rights while also ensuring that our restoration progress is not continually lost to significant development outside of locally designated growth areas served by public sewer. Only with land use mandates will the Bay restoration effort be as cost-effective as possible. This is supported by the findings of the recent USGS publication at this link, "The Chesapeake Bay Land Change Model (CBLCM): Simulating future land use scenarios and potential impacts on water quality".

Sincerely,

-Jason

Jason Dubow, CC-P
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Maryland Department of Planning
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Please take our customer service survey.
Planning.Maryland.gov

Areas of concern related to the 2025 Watershed Implementation Plans (WIPs) Outcome

1. Chesapeake Bay Total Maximum Daily Load/Phase III Watershed Implementation Plans (Summary recommendations on Page 7)

This paragraph needs a major rewrite:

As the Bay TMDL calls for 100% of practices to be in place to meet pollutant reduction goals by 2025, the majority of the Bay Program's resources are focused on implementing measures to achieve these water quality standards. However, it is now understood that all these practices will not be in place by 2025, and if they were, they would not be sufficient to achieve the desired water quality and habitat benefits. This is due to three factors. Implementation, sufficient regulatory and voluntary measures not being in place to incentivize compliance in the non-point source sector; the lag-time associated with the implementation of BMPs and the water quality standards attainment needed for deep waters of the Bay; and that these deeper waters are not as relevant to the living resources like fish, shellfish and their habitats. Furthermore, these issues are exacerbated by climate change and increasing development pressures throughout the watershed.

Most importantly, it is erroneous or at least premature to say that even if we had practices in place by 2025 (including practices to offset 2025 climate and Conowingo infill) that they would be insufficient to achieve water quality benefits. Then, the "three factors" text doesn't ring true. Perhaps the "implementation" factor is ok for why planned practices won't be in place by 2025, but it doesn't support the "even if we did" part. The "lag time" factor is not valid because the 2025 goal is to have practices in place that would eventually achieve water quality standards, recognizing that there will be BMP maturity and system lags. The "deeper waters are not as relevant to living resources" factor is also troublesome in that the TMDL and our implementation planning intends to achieve existing water quality criteria for the different designated uses that were living resource based. Finally, this paragraph needs a closing statement defining the following bullets which are assumed to be recommendations for the Beyond 2025 effort.

2. There is an apparent disconnect between the recommendation in the outcome attainability snapshot (Pg.50) vs. the third bullet in the summary recommendation (Pg. 6). At a minimum, clarification of the recommendation(s) is needed.

This is the text from Pg. 50 under: If off course, what is needed to accelerate progress?

Greater targeting of BMPs that are known to be more effective in reducing nutrient loads in areas that have the greatest impact. This likely includes better coordination around, and use of, existing targeting tools, as well as the evaluation of existing federal and state programs to improve efficiencies to better target and implement highly effective BMPs.

This implies targeting practices in areas that have greatest impact in improving D.O. in the deep channel (i.e. Most Effective Basins) and/or do fine scale targeting (field or areas within fields) where the BMPs would be most effective.

The Pg.6 recommendation text is:

- ***Target BMP implementation in high-impact areas throughout the watershed to improve local conditions, and in the culturally, ecologically and economically important shallow water areas of the Bay; prioritize resources in these locations.***

This appears to be completely different from the snapshot recommendation in that it recommends targeting BMPs geographically where the loads are the highest and impacting local waters or estuary shallow waters, not areas most effective for deep channel D.O. improvement.

It is not clear if two distinct recommendations are intended.

If the Page 50 recommendation is intended, and if it includes targeting BMPs to "pollutant-leaky" areas at the field or subfield scale, then the committee may want to consider adding a clause for the Partnership to revise BMP crediting protocols that allow differential crediting i.e., extra credit for targeted BMPs and lesser credit for randomly located BMPs.

If the Page 6 recommendation is intended, please note that an implementation focus on local waters/shallow waters, depending upon location, may result in less progress with respect to the existing planning targets that are based upon BMP effectiveness in improving D.O. in the deep channel.

3. This is relevantly minor. The following snapshot recommendation for the 2025 Watershed Implementation Plans (WIPs) Outcome seems more suited to included in the Water Quality Standards Attainment and Monitoring outcome:

    - ***There is continual need to sustain and grow investments in monitoring networks to assess effectiveness of implementation, as well as the resulting impacts on nitrogen, phosphorus and sediment reduction targets, as well as the Bay response to dissolved oxygen, clarity/SAV and chlorophyll a.***

4. This Page 7 bulleted recommendation is not mentioned in the outcome snapshot "If off course, what is needed to accelerate progress?"

    - ***Evaluate the discrepancies in the fertilizer application estimates generated by the Chesapeake Assessment Scenario Tool (CAST) and update Bay TMDL compliance accordingly.***

    This specific issue does not seem worthy of call out given the high level, implementation based other recommendations. Perhaps it could be a new bullet included under "The following actions will be taken over the next two years to help accelerate progress for each jurisdiction's Phase III WIPs goals:" but it's value in accelerating progress is uncertain. For P6 CAST, the PSC directive to revise model inputs has been addressed and is nearly complete and the issue is slated to be further evaluated by the AMT for Phase 7. If the bullet is retained, suggest removing the words "and update Bay TMDL compliance".

5. The following bullet from Page 50 doesn't seem appropriate for: "If off course, what is needed to accelerate progress?"

- ***Improve accounting for evolving climate change impacts and address the impacts that human growth and livestock increases have on our progress to achieving reduction goals.***

It is something that we should do and something that we will do in our Phase 7 work – project people, land, animals and climate to 2035- but it is hard to see how this will accelerate progress.

UNIVERSITY of MARYLAND
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Clinical Law Program

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August 21, 2023

Chesapeake Bay Program
1750 Forest Drive
Suite 130
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By email: comments@chesapeakebay.net

Re: Comments on Principle Staff Committee report "Charting a Course to 2025"

The Chesapeake Bay Program has requested public comment on the recommendations to the Chesapeake Bay Executive Council contained in a report entitled "Charting a Course to 2025: A Report and Recommendations for the Chesapeake Executive Council on How to Best Address and Integrate New Science and Restoration Strategies Leading up to 2025" ("Charting a Course").[1] It is unclear why the Bay Program has made such a request because it is unclear what, if anything, the Bay Program will do with the public's comments and, given this late date, whether any recommendations will help achieve the goals identified in the Chesapeake Bay Agreement.

First, the request for comment was not issued via the Federal Register but in a Bay Program blog post that only select members of the public would see.[2] Thus, the range of comments will be narrow. Moreover, because the request is in furtherance of a "charge" to the Program by the Executive Council, the Bay Program is not obligated to read, respond to, or adopt any comments received.

Second, the solicitation only seeks comments on actions the Chesapeake Bay Program Partnership (the Bay Jurisdictions including the United States) should take between now and the end of 2025. Such a limitation cabins public comment to an equally narrow subset of recommendations that will not achieve the ultimate habitat and water quality goals of the Chesapeake Bay Agreement. Due to the inadequate actions of the Chesapeake Bay Partners to date, it is obvious that the goals set forth in the Chesapeake Bay Total Maximum Daily Load ("Bay TMDL") and many of the Chesapeake Bay Agreement goals will not be attained by 2025 no matter what the public suggests. See, "Achieving Water Quality Goals in the Chesapeake Bay: A Comprehensive Evaluation of System Response," May 2023 (CESR).[3] Due to the lack of progress, the Executive Council's charge to the Principal's Staff Committee recognizes

[1] https://www.chesapeakebay.net/what/publications/charting-a-course-to-2025
[2] Help the Chesapeake Bay Program chart our course to 2025, July 22, 2023.
[3] https://www.chesapeake.org/stac/wp-content/uploads/2023/05/CESR-Final-update.pdf

the need to plan beyond 2025. Given these limitations, the Bay Program's solicitation appears to be nothing more than going through the motions.

Despite these caveats, it is hoped that the Chesapeake Bay Program and Executive Council will seriously consider the public's recommendations and address the fundamental problem plaguing Bay restoration, the lack of true accountability; not just identifying failings but acting. See, EPA Office of the Inspector General report "The EPA Should Update Its Strategy, Goals, Deadlines, and Accountability Framework to Better Lead Chesapeake Bay Efforts," July 18, 2023 ("OIG Report").[4] While the Bay Jurisdictions are responsible for failing to provide sufficient funds, staff, and laws to meet their respective obligations, the Environmental Protection Agency is equally responsible for Bay Agreement and TMDL goals not being met.

As the Bay Program report states, only the District of Columbia and West Virginia have met all three of their Bay TMDL pollution reduction goals.[5] The other jurisdictions have had varying degrees of success meeting their obligations; however, none has met or is on track to meet its nitrogen reduction goal.[6] EPA has been aware of this problem for some time but most certainly by the 2017 Midpoint Assessment. Despite this lack of progress, EPA Region 3 has failed to abide by the Accountability Framework established in the Bay TMDL and used the tools granted it by Congress in the Clean Water Act to ensure that the failing jurisdictions meet their obligations. 33 U.S.C. § 1267(g).[7]

EPA's failure to act has had a cascading effect on the ability of the Bay Jurisdictions to meet their Bay Agreement goals concerning forest buffers and wetlands[8], brook trout,[9] submerged aquatic vegetation,[10] tree canopy,[11] 2025 WIP outcomes,[12] and

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[4] https://www.epa.gov/system/files/documents/2023-07/_epaoig_20230718-23-E-0023_0.pdf

[5] Charting a Course, pg. 10-11.

[6] Id. at 48.

[7] In repeated communications to the Bay Jurisdictions and in the 2010 Bay TMDL document EPA steadfastly maintained that it would hold the Bay Jurisdictions accountable using any one or all the eight listed "backstop actions." Chesapeake Bay TMDL, Section 7 Accountability Framework.

[8] CESR pg. 24, 45. "Fundamental changes are needed to generate the significant increase in project implementation rates required to meet the goals set in the outcomes for both forest buffers and wetlands." CESR, pg. 21.

[9] Id. pg. 39.

[10] Id. pg. 43-44.

[11] Id. pg. 46.

[12] Id. pg. 49. Forty-one million pounds of nitrogen and 1.4 million pounds of phosphorus need to be reduced. Although the report states that the 2017 WIP outcome has been met, this not entirely true as the Bay Partnership "fell short of its pollutant reduction target for nitrogen by 15 million pounds." Id. pg. 48.

water quality[13]. EPA's inaction led the Inspector General to recommend that Region 3 "[l]ead the Bay Program in developing a new approach to specifically address nonpoint source pollution", the overwhelming impediment to attaining Bay Agreement goals, and to work with the Bay Jurisdictions "to develop an assurance mechanism to hold jurisdictions accountable for achieving nonpoint source pollution reductions."[14] That Region 3 failed to accept the Inspector General's recommendations compounds the problem caused by a lack of action. Id.

The agency justifies its recalcitrance by steadfastly maintaining that its authority to act is bounded by discretion. That is, the Agency gets to decide when and how to exercise its "backstop" authority and no amount of failure can compel it to act.[15] Congress may have granted the agency discretion in certain circumstances; however, the failure of the Bay Program Partnership to even come close to meeting the goal for nitrogen militates in favor exercising that discretion immediately.[16]

The agency also claims that the Clean Water Act gives it little authority to address non-point source pollution and thus it is helpless to address the problem.[17] However, EPA neglects to identify several powers it does have that would address non-point source pollution other than designating non-point sources as point sources.[18] For example, the

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[13] Id. pg. 51 (In the 2018-2020 assessment period less than 30% of the Chesapeake Bay and its tidal tributaries met water quality goals).

[14] OIG Report, pg. 15.

[15] EPA has agreed to *consider* using some of its "backstop" authorities in response to a lawsuit by the Chesapeake Bay Foundation and four of the Bay Jurisdictions. https://www.federalregister.gov/documents/2023/04/21/2023-08510/proposed-settlement-agreement-clean-water-act-and-administrative-procedure-act-claims However, a quick perusal of the Settlement Agreement in *Chesapeake Bay Foundation, et al. v. EPA* shows the extent to which the agency clings to its "discretion."

[16] The CESR findings and implications bear this out, see, e.g., "… new approaches to water quality management will be required to adequately address uncertainty, changing future conditions, and response gaps;" "[e]xisting efforts to reduce nonpoint sources of nutrients are likely insufficient to achieve the TMDL;" "Making substantial progress in reducing nonpoint source discharges will require changes in program structures, incentives, and requirements." Pg. 76-77.

[17] EPA Region 3 Comments to the Draft Report, May 15, 2023, Appendix C to OIG Report.

[18] EPA Region 3 notes that it can designate non-point sources as point sources subject to permit terms and pollution discharge limits. Id. While EPA has agreed to undertake farm inspections in Pennsylvania to consider designating small animal farms as needing a permit and to consider using its residual designation authority to address urban stormwater pollution there, it is doing so on an extremely limited basis. See fn 15, Settlement Agreement in *Chesapeake Bay Foundation, et al. v. EPA*. A more robust effort throughout the watershed in both regards could do much to address non-point source pollution yet EPA continues to rest on its discretion.

agency could amend the Bay TMDL and transfer non-point source load allocations in selected river basins to point sources. Federal Action bullet 5, Bay TMDL Section 7-12. Many point sources such as wastewater treatment plants within the Bay watershed discharge at rates well below their waste load allocation so they could readily meet that reallocation. Moreover, those sources operate pursuant to enforceable pollution discharge elimination permits. By transferring pollution reductions to permitted point sources using state of the art technology the agency and states can ensure that reductions will be achieved.

In addition to these actions, EPA could also:

1. require that the Bay Jurisdictions amend their respective pollution discharge general permits to better address polluted stormwater runoff from urban and suburban areas, and construction sites as well as prevent the direct deposition of poultry and livestock fecal matter into Bay tributaries.[19]
2. establish finer-scale WLAs and LAs in the Chesapeake Bay TMDL: Establishing more specific allocations in the final December 2010 Chesapeake Bay TMDL than those proposed by the jurisdictions in their Phase I WIPs. Federal Action bullet 4.
3. amend its regulations to require stronger stormwater controls in urban and suburban areas to address the impacts of increased and more severe storm events due to climate change. CESR pg.
4. amend its regulations to require more effective Best Management Practices such as stream fencing and forested buffers on farms. CESR pg.
5. Amend its point source permitting to require livestock and poultry integrators to share responsibility for manure/litter management with producers. CESR pg. 85, 87.

In addition to EPA actions, the Bay Jurisdictions can make similar changes to their respective laws and regulations identified above. In this way, reliance on EPA discretion is avoided. Moreover, while not entirely clear, the U.S. Supreme Court decision in *Sackett v. EPA* appears to have severely curtailed federal Clean Water Act jurisdiction thereby limiting EPA's ability to regulate polluting activities on all Bay tributaries. Thus, Bay Jurisdictions are encouraged to evaluate the scope of their respective laws defining state "waters" to ensure that all waters within their borders implicated by the terms of the Bay Agreement and Bay TMDL are subject to state clean water laws.

Further, the Bay Program Partnership can collectively decide to redraft the Chesapeake Bay Agreement as an interstate compact ratified by Congress. See, Potomac

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If lack of funding and staffing are the true reasons for limiting its actions, the agency needs to drastically increase its funding and staffing allocations. The Executive Council should bring these issues to the attention of the EPA Administrator and Congress.

[19] Federal Action bullet 2, Bay TMDL Section 7-12; CESR pg. 42.

River Compact, Delaware River Basin Compact (see, Article 5), and Susquehanna River Basin Compact (see, Sections 3.5, 3.6, and 3.10).[20] By doing so, reliance on EPA to use its backstop authority is overcome and the Bay Partners have the individual right to require compliance with the Chesapeake Bay Agreement goals and outcomes.[21]

The Bay Partnership must address the continued destruction of forest land which greatly impedes the ability of the Partnership to attain nutrient reduction goals and to protect human health, especially those living in Environmental Justice communities. A recent Bay Program report has identified the unrelenting and staggering pace of forest destruction despite the Climate Adaptation, Diversity,[22] Forest Buffer and Wetlands, Brook Trout,[23] Tree Canopy outcomes of the Chesapeake Bay Agreement – outcomes that have existed for over 20 years.[24] The Bay Jurisdictions must do more locally to reduce the conversion of forest land to impervious surfaces and plant more trees if these outcomes are to ever be attained.

Conclusion

It was known in 2010, that attaining the Bay Agreement goals and outcomes would be difficult, especially the Bay TMDL water quality goals. Much progress has been made; significant reductions in nitrogen, phosphorus, and sediment have been achieved mostly through expensive upgrades to wastewater treatment plants. These achievements should not be discounted. However, the Bay Partnership was aware of the laws and regulations in place when the Bay Agreement was signed and that much effort would be necessary to address pollution from agriculture and urban/suburban stormwater. Unfortunately, little in that regard has changed since 2010. As the CESR report repeatedly notes, to continue on the same path will not result in restoration of the Bay or its tributaries. Significant changes in policy and regulation must occur. While alone none of the actions recommended here will achieve the Bay Agreement habitat and water

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[20] Arguably, the Chesapeake Bay Agreement as currently drafted is an interstate compact ratified by Congress in Clean Water Act section 117, 33 U.S.C. § 1267. Unfortunately, after the Chesapeake 2000 Agreement, the Bay Partnership chose to add a clause to the Bay Agreement that compliance with the goals and outcomes is voluntary and the Agreement does not supersede or override any other law or regulation. See, 2014 Chesapeake Bay Agreement as amended, pg. 18.

[21] If so amended, the terms of the Chesapeake Bay Agreement would have the same force as a law that is judicially enforceable. Cuyler v. Adams, 449 U.S. 433; 101 S. Ct. 703 (1981).

[22] Environmental Justice communities typically suffer from the lack of trees which provide cooling shade and help reduce harmful air pollution. https://www.americanforests.org/article/ceqs-new-environmental-justice-tool-integrates-tree-equity/

[23] Brook trout require cool clean water to survive and reproduce. Trees provide much needed shade and remove nutrients that can be harmful to water quality.

[24] https://www.chesapeakeprogress.com/abundant-life/tree-canopy

quality goals, the Executive Council is requested to begin the heavy lifting now and not wait until 2025.

Sincerely,

/s/

Jon A. Mueller
Visiting Associate Professor
University of Maryland Carey School of Law
(410) 706-0590
jmueller@law.umaryland.edu

From: Amy Jacobs
To: Comments
Cc: Nikki Rovner; Emily Knearl; Su Fanok; Evan Endres; Michelle Dietz; Mark Bryer
Subject: Comments on Charting a Course to 2025
Date: Monday, August 21, 2023 4:52:38 PM
Attachments: image001.png

Greetings,

On behalf of The Nature Conservancy, we are submitting the below comments on the document, "Charting a Course to 2025". We commend the authors on producing a document that incorporates input from a wide diversity of partners and focuses on opportunities and strategies to accelerate progress on goals where we are off-track. We also fully support how wetlands and riparian buffers were highlighted as key outcomes that can make a significant difference for the Chesapeake Bay watershed and should be prioritized for accelerating progress. Our team in the Chesapeake Bay has prioritized wetland and floodplain restoration as a key strategy in-line with the Chesapeake Bay goals and are advancing science-based approaches to increase landowner engagement and streamline restoration delivery to maximize the water quality, climate, and habitat outcomes. We have a team of on-the-ground practitioners delivering restoration to landowners and farmers across the watershed, scientists, government relations and policy specialists, marketing experts, and others and look forward to working with you to advance this work.

Comments Under the Forested Buffers and Wetlands Section

Current Opportunities (pg. 23)

1. Add bullet "As an outcome of the Restoring Wetlands of the Chesapeake Bay Watershed Workshop, NY, PA, DE, MD, VA, and DC created Wetland Action Plans to accelerate progress in their jurisdiction"
2. Clarify if this, "GIT-funded projects, like *Maintaining Riparian Forests in Stream Corridor Restoration*, emphasize the important role that forest buffers play in overall stream ecosystem health, and the in-progress, *Mapping Non-Tidal Wetlands in Areas with Outdated Wetlands Maps*, develops a new approach to cost-effectively model the location of non-tidal vegetated wetlands. " Is different from the methodology that was used to updated non-tidal wetlands in Pennsylvania several years ago and funded by CBP. If not, we should remove and make more general to be inclusive of both efforts.

Accelerating Progress Section (pg. 24):

1. Clarify which items it is intended to have the CBP lead versus which items it is expected that other groups should / will perform;
2. Add additional bullet to "Evaluate if there would be benefits to merging the Forested Buffer and Wetland goals (i.e. Restoring Natural Filters) to leverage existing efforts, resources, and capacity to accelerate progress on both goals."
3. Add bullet "Evaluate the benefit of implementing State-Based Wetland Workgroups responsible for engaging agencies, organizations, and landowners in a collective effort to advance State Wetland Action Plans".

If you have any questions please don't hesitate to reach out.

Regards,

Amy Jacobs

Amy Jacobs
Chesapeake Bay Agriculture Program Director

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pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

August 21, 2023

Rachel Felver
Chesapeake Bay Program
Alliance for the Chesapeake Bay
1750 Forest Drive, Suite 130
Annapolis, MD 21401

Dear Ms. Felver,

The Pennsylvania Department of Environmental Protection (PA DEP) coordinated with our partnering state agencies in the review of the draft *Charting a Course to 2025: A Report and Recommendations for the Chesapeake Executive Council on How to Best Address and Integrate New Science and Restoration Strategies Leading Up to 2025* (Reaching 2025 Report). We respectfully submit the following comments for consideration as the draft Reaching 2025 Report is finalized.

Overall Comments

The draft Reaching 2025 Report is well written and encompasses the discussion elements over the course of the last few years.

It is unclear if or how the Chesapeake Bay Program (CBP) will refine the 2025 goals in the next two-year period. The recommendation is to make the next steps more pronounced regarding the specific goals and outcomes and how those will be redefined.

Consistent application of proper nouns and abbreviations should be made throughout the document. For example, Chesapeake Bay Program should be used throughout (in some areas it says "Bay Program") or just abbreviated to CBP and carried throughout. Similar example with other terms, such as the IIJA or BIL - should be consistently applied across the document.

Throughout the document, some bullets should be converted to paragraphs because they are too long and include multiple thoughts and background information. For more effective communication, the bullets should consistently include brief recommendations that pull from the background information included in the introductions to the topics.

Page 4

- Formatting comment - recommend pushing the "Common Findings and Recommendations" header to the next page for ease of reading.
- Total Maximum Daily Load is spelled out for the first time here. Recommend noting the abbreviation here instead of below (last sentence, page 4).

Page 4, continued

- Second paragraph - "... progress that each outcome was making in attaining their goals..." is passive phrasing. Revise to state "... the progress the signatories are making towards attaining their goals for each outcome..."
- Third paragraph - Revise the middle of the first sentence to "... what helped the signatories to make progress on that outcome since the signing..., challenges that have hindered progress and what is needed to help signatories stay the course..."

Page 5

- Second to last bullet – "Working with local communities, governments and non-profit organizations helps to identify high-priority geographies and match outcomes with local partner interests. Identifying priority geographies to implement measures to achieve outcomes and matching those with local partners would accelerate programs." Pennsylvania agrees with this statement, has put this action item into practice, and has demonstrated positive outcomes. Through Pennsylvania's Countywide Action Plans (CAPs), and through using a Tiered approach to targeted resource delivery and focus areas, program and practice implementation has accelerated since the publication of Pennsylvania's Phase 3 Watershed Implementation Plan (WIP) in 2019 and final amended Phase 3 WIP in 2022. Pennsylvania partners have been working with the Chesapeake Conservancy to focus in on approximately 40 small agriculturally impaired catchments in an effort to improve and restore these local waterways, with an ultimate goal of delisting streams from the 303(d) impaired list. This also led to a reinvigorated Renaissance Watershed Initiative funding initiative through the PA DEP Growing Greener Plus grant program to further support targeted efforts in small catchments. More information regarding this precision conservation initiative in Pennsylvania can be found here: https://www.chesapeakeconservancy.org/precisonconservationinpa/conserve/

Page 6

- Revise the first sentence of the second full paragraph. The draft Reaching 2025 report states, "As the Bay TMDL calls for 100% of practices to be in place to meet pollutant reduction goals by 2025, the majority of the Bay Program's resources are focused on implementing measures to achieve these water quality standards." Instead, recommend revising to state "As the Bay TMDL calls for 100% of practices to be in place by 2025 to meet pollutant reduction goals at a later date, …"
- The statement, "…if they were, they would not be sufficient to achieve the desired water quality and habitat benefits" is unclear. Clarify the metric that is being used to determine if they are or are not "sufficient" (e.g. Chesapeake Bay TMDL).
- First bullet point – "Non-point source pollution is where future reduction efforts will need to be focused. Moving toward 2025, expand the existing conversation around how to address pollution from nonpoint sources." Since the focus will be on nonpoint sources, and more specifically the agricultural industry, this will be the prime opportunity to fully

engage the CBP with agricultural industry leaders and representatives. To that end, the Pennsylvania Department of Agriculture (PDA) sought support from jurisdictional partners and submitted a letter to EPA Regional Administrator Ortiz to recommend and seek support for the formation of an Agricultural Advisory Committee by the Executive Council at their 2023 meeting.

Page 7

- Second to last bullet, top section – revise to acknowledge the states' Nonpoint Source Management Programs. EPA should be able to provide a link to the relevant Nonpoint Source Management Program page for Region 3. The state contacts and links to each Nonpoint Source Management Plan is here: https://www.epa.gov/nps/contacts-nonpoint-source-nps-pollution-programs
- Under Emerging Science, Monitoring and Analysis section- in the sentence before the first bullet, delete the word "be" between "would" and "improve."

Page 8

- Under Climate Change heading , third line of text, add a "d" to "increase" to make it "increased" focus.
- Fourth line- change "called on" to "called for."
- The introduction to the Climate change and DEIJ section basically says, the Bay program has no funding or staff for DEIJ or climate change and that the program cannot handle a cross cutting initiative. "Climate and DEIJ are cross-cutting initiatives that the current Bay Program structure is not sufficiently set up to address." We should simply state that the DEIJ and Climate change goals need funding, staff, and coordination to be successfully addressed just like the other cross-cutting goals that we have worked on for over 40 years.
- The intro is also missing a segue sentence into the bulleted recommendations (the second bullet would work well as the missing segue).
- First bullet – revise to state "Plan for and implement…". To implement high resolution monitoring and modeling in prioritized areas takes coordination and planning. The same comment carries to page 17.

Page 9

- Most of these bullets under the Climate Change and DEIJ section seem like paragraphs. This document would be easier to read and digest if the background information was placed in the introduction to the issues and the bullets contained clear recommendations for quick reference (the recommendations can be discussed in the background section as well).
- First bullet – there is a need to first develop the project management strategy and cross-cut coordination approach before applying funding. Funding and resource needs should be included in the project scope so the CBP understands what can be accomplished in the

near- and long-term. This is true across any and all CBP priorities, not just Climate Change and DEIJ.

- First sentence below Forest Buffers and Wetlands – Recommend carrying the same sentence used in the first paragraph on page 21 over to page 9 to be consistent in including goals in addition to water quality.

Page 10

- The bullet points that state "Reported BMPs..." should say "Reported and credited BMPs" because states report BMPs that are not credited.
- First sentence - should highlight EO13508, which was the precursor and the directive to develop the TMDL.

Page 11

- Last bullet - Pollution from non-point sources. It is unclear what "fast growing" means in this context. Agriculture would not be considered a "fast growing" sector. Revise to state that the agriculture sector is changing due to market and economic forces.
- Last bullet – Pollution from non-point sources. Revise sentence that states "although some stormwater and agriculture sources are regulated via the federal Clean Water Act, many are not." Include statement regarding state regulatory requirements and programs that cover more than the federal Clean Water Act. More information regarding Pennsylvania's and other states' agriculture programs can be located here: https://www.epa.gov/chesapeake-bay-tmdl/epas-assessments-animal-agriculture-programs-chesapeake-bay-watershed
- Extreme weather events will continue to result in erratic nutrient and sediment loading.

Page 12

- Staff capacity and technical assistance – revise to more clearly state the challenges associated with workforce development, training, and transition / turnover of staff.
- BMP Verification process – highlight the USDA-EPA Task Force and the requisite report and recommendations as an outcome.
- First full paragraph - Infrastructure Investment and Jobs Act / Bipartisan Infrastructure Law - not only does it include requirements on how and where it can be used, but also additional reporting and procurement requirements.
- Bottom paragraph – "Thanks to consistent reporting of jurisdictional progress through the two-year milestones, we are able to note incremental progress in achieving the pollutant reduction targets of the Phase III WIPs, and identify areas that may need improvement." Recommend bringing this up to the top or highlighting it in some way.
- The last sentence on page 12 that continues on page 13 is misleading and mis-states the goal for 2025 which was to have all practices in place to result eventually in restored water quality, which recognizes that nature takes time to heal and natural processes occur at different rates. There was no expectation that water quality would be restored in 2025. "Although the overall water quality goals will not be met by 2025, the partnership

continues to make steady progress in reducing pollutant loads flowing into the Chesapeake Bay." It is important to accurately reflect the goal the partnership agreed to in 2010 and 2014.

Page 13

- First bullet point – Revise to add "…and coordinate with the EPA and states' Nonpoint Source Management Programs."
- Final bullet point - should describe at a high-level how EPA would continue to provide oversight and support.

Page 14

- Final bullet point - this is the first time that the Non-Tidal Network (NTN) River Input Monitoring (RIM) stations are mentioned. The importance of water quality monitoring trends (both short and long term) and the current data on those trends (improving, neutral, degrading) should be highlighted in the Executive Summary, as currently the Executive Summary is focused on modeled and credited goals and outcomes. The modeling tools are planning tools, and so there should be more of a balance between water quality monitoring and modeling results in the Reaching 2025 Report.

Page 15

- Submerged Aquatic Vegetation (SAV) – there is recent research that suggests improvements in SAV, which should be highlighted in the Executive Summary.
- Highlight the "Stream Health" improvements over time, based on the February 2023 Chessie BIBI report. https://www.potomacriver.org/news/press-release-good-news-for-the-bay/

Page 16

- In relation to how agencies have adjusted grant programs, Pennsylvania has made adjustments to our competitive state and federal grant programs (Growing Greener and Section 319 Nonpoint Source Management Programs, for example) to provide additional preference for projects that are in or positively impact Environmental Justice communities. For example, for the statewide 2022 Growing Greener Plus grant round, 47 applications were received for projects in EJ areas. The amount awarded to projects in EJ areas is equivalent to almost 45% statewide.

Page 17

- First bullet – revise to state "Plan for and implement…" To reflect that implementing high resolution monitoring and modeling in prioritized areas takes coordination and planning.

Page 19

- First bullet- move this sentence “Individual state and federal agencies, as well as non-profit partners, are advancing critical work on climate and DEIJ issues across the watershed.” to be the first sentence in the bullet.
- Draft a clearer recommendation to improve the structural deficiencies that impede these goals.

Page 20

- The recommendation bullets contain too much background which should be moved to the background section.
- Bullet three on funding suggests accounting for federal and state resources. This seems like an assessment activity that could be under the coordination bullet.
- Bullet one- perhaps recommend funding the DEIJ champions since we point out this goal lacks leadership.

Page 21

- Recommend carrying the same sentence used in the first paragraph on page 21 over to page 9.

Page 22

- The credit duration for forest buffers in Chesapeake Assessment Scenario Tool (CAST) CAST-19 is 10 years, it will be extended to 15 years in CAST-23.
- Should be noted that Wetland Restoration, Enhancement, and Creation acres will no longer have a credit duration assigned to them, beginning CAST-23, based on the July 2023 WQGIT consensus vote.

Page 24

- Pennsylvania State Conservation Commission’s Agriculture Conservation Assistance Program (ACAP) and Conservation Excellence Grant (CEG) program both provide flexible incentives for farmers to install buffers with limited out-of-pocket costs. Pennsylvania Department of Conservation and Natural Resources (DCNR) buffer programs also provide flexible incentives.

Page 31

- The first bullet point below "What challenges have hindered progress" doesn't seem to fit. Communicating and including fish habitat considerations in WIPs would seem like an opportunity, not a challenge.
- The Fish Habitat Outcome talks about the Bay and its tributaries – it is unclear if the focus is on tidal tributaries.

Page 35

- Recommend revising to remove "in 2025" in the statement, "We believe that the outcome will need to be revised in 2025".

Page 37

- Second bullet point under "What has helped achieve success since 2014" - giving full credit to the Clean Water Act is not accurate. Many states have their own state-wide regulatory and voluntary, nonpoint source initiatives that are outside of the scope of the Clean Water Act. Recommend adding "with support from implementing state and federal regulatory and voluntary programs."

Page 41

- Pennsylvania is the leader in dam removals across the country, according to American Rivers. This should be highlighted in the "What has helped achieve success since 2014." https://www.americanrivers.org/2023/02/dam-removals-continue-across-the-u-s-in-2022/. Dam removal map since 1912 - 2022: https://www.americanrivers.org/threats-solutions/restoring-damaged-rivers/dam-removal-map/

Page 52

- Sixth bullet – The statement, "The limited use of watershed and Bay water quality monitoring results..." is unclear as to which entity is limiting the use of monitoring results. Recommend revision for clarification.

Page 54

- Third bullet under "What challenges have hindered progress" states, "many jurisdictional WIPs do not address co-benefits for contaminant reduction..." The intent of the WIPs was to plan for nitrogen, phosphorus and sediment reduction program and practice implementation in accordance with the Chesapeake Bay TMDL. It can be misleading to the reader to state that the WIPs do not address something that was not it's intended purpose. Recommended revising to state "the TMDL does not include a requirement for WIP development to include co-benefits, including those related to toxic contaminant reductions."

Page 56

- Second bullet under "What challenges have hindered progress" - this puts the onus on the WIPs and not on the TMDL. Same comment as was made on Page 54.

Page 64

- First bullet under "What has helped achieve success since 2014" - recommend including the link to the modules.

Page 68

- The Executive Order is included here - recommend bringing it up at the top in the Executive Summary as well since it is part of the Chesapeake Bay watershed restoration strategy.
- Priority for this Protected Lands Outcome seems to be focused on wetlands and forestlands. Pennsylvania leads the nation in preserved farmland, and this should be highlighted under "What has helped achieve success since 2014." Of the 625,000 acres of protected farmland in Pennsylvania, roughly half of those acres are located in Pennsylvania's portion of the Chesapeake Bay watershed. The value of this land base from an infiltration, climate resiliency, and water quality perspective is critical.

Page 69

- Formatting edit - final statement needs an inset bullet point.

Page 70

- Fourth bullet – Linking to the Chesapeake Bay TMDL and the Executive Order should be consistently carried throughout the document.

Thank you for the opportunity to provide comments on the draft Reaching 2025 Report. As Pennsylvania's Management Board and Beyond 2025 Steering Committee representative, I look forward to continuing to work with Chesapeake Bay Program partners and stakeholders as we work together to ensure healthy waters, habitats, and communities across the Chesapeake Bay watershed.

Sincerely,

Jill K. Whitcomb
Director

Review of Reaching 2025 Report

Julie Reichert-Nguyen

Pages correspond to this version of the document:
https://d18lev1ok5leia.cloudfront.net/chesapeakebay/documents/Charting-a-Course-to-2025_CBP_2023-07-26-001306_jvtn.pdf

Pg. 19

Comment 1: Revise first bullet point that reads, "Creation of targeting criteria for marsh adaptation and green infrastructure projects," to:

"Synthesis of resilience and social vulnerability metrics to inform targeting criteria for tidal marsh adaptation projects, with plans for reviewing metrics for other natural infrastructure projects, such as living shorelines, oyster structures, and forest buffers."

Reason: The term green infrastructure typically relates to stormwater practices (green roofs, rain gardens, etc.), so as currently written, it could be misleading. Also, the Climate Resiliency Workgroup is currently focused on coastal natural infrastructure-type efforts. Specifically, the Climate Resiliency Workgroup has had the capacity to work on marsh adaptation targeting criteria through GIT-funding and partner support. We will have to find additional resources for other natural infrastructure-type projects. Green infrastructure-type projects has been a focus of the Urban Stormwater Workgroup. The Climate Resiliency Workgroup has supported some of their efforts by providing advisory support (see comment 3).

Comment 2: Revise third bullet to read, "Development of air temperature and precipitation change indicators."

Reason: The Climate Resiliency Workgroup is currently working on a water temperature change indicator. The climate change indicator on Chesapeake Progress is for air temperature. Also, these are change indicators (i.e., how much has air temperature and precipitation has changed compared to a baseline). These edits would make it clearer what these indicator are.

Comment 3: Add info on Future-Projected Intensity, Duration, and Frequency Curves effort for MD and VA. Text suggestion, "Additionally, the Climate Resiliency Workgroup provided advisory support to the Urban Stormwater Workgroup and the Modeling Workgroup for the development of future projected intensity, duration, and frequency (IDF) curves that account for changes in precipitation in Maryland and Virginia. These future-projected IDF curves are being used to inform improvements to stormwater infrastructure design and management under changing climate conditions."

Reason: The future-projected IDF curve work was a huge cross-workgroup effort producing a product that will advance the development of improved stormwater design and management under changing climate conditions. Since it is not highlighted anywhere else in the report, I suggest adding it as a paragraph under the bulleted list. I don't recommend adding it to the bulleted list since the Climate Resiliency Workgroup only advised on this project and did not lead the collaboration.

If the above suggestions are incorporated, then this section on Pg. 19 would read as follows:

"The Climate Resiliency Workgroup was successful in moving a handful of projects forward by identifying those considered to be high-priority based on the partnership's interest. This allowed the workgroup to lead collaboration across multiple GITs and stakeholders resulting in the following specific deliverables:

- Synthesis of resilience and social vulnerability metrics to inform targeting criteria for tidal marsh adaptation projects, with plans for reviewing metrics for other natural infrastructure projects, such as living shorelines, oyster structures, and forest buffers.
- Inclusion of climate change impacts (sea level rise) in the Bay Program's suite of modeling tools.
- Development of air temperature and precipitation change indicators.
- Completion of the Scientific and Technical Advisory Committee (STAC) sponsored report, Rising Watershed and Bay Water Temperatures—Ecological Implications and Management Responses.

Additionally, the Climate Resiliency Workgroup provided advisory support to the Urban Stormwater Workgroup and the Modeling Workgroup for the development of future projected intensity, duration, and frequency (IDF) curves that account for changes in precipitation in Maryland and Virginia. These future-projected IDF curves are being used to inform improvements to stormwater infrastructure design and management under changing climate conditions."

Pg. 23

Comment: This comment is in regards to the sentence, "Land subsidence, marsh migration, flooding, drought and increases in air and water temperature are just some of the ways in which a changing climate is impacting buffers and wetlands." Should marsh migration be "sea level rise?" Sea level rise seems more accurate in this sentence. I can see how forestry folks may view marsh migration as an emerging threat, but tidal wetland and habitat folks are looking to conserving marsh migration corridors as a climate change solution (which is mentioned in the black duck outcome section). Lumping marsh migration as a "threat" in this sentence could be misleading. Marsh migration falls under trade-off discussions. Suggest adding a sentence to cover this important point.

Suggested text: "Land subsidence, sea level rise, flooding, drought and increases in air and water temperature are just some of the ways in which a changing climate is impacting buffers and wetlands. Additionally, trade-offs exist where marsh migration poses a threat to forested land, while also providing a solution to address tidal wetland losses from sea level rise. Moving forward, practitioners will need to incorporate climate change considerations into species selection, site design and maintenance planning."

Stakeholders' Advisory Committee comments on the Charting a Course to 2025 Report
August 21, 2023

The Stakeholders' Advisory Committee submitted the below comments on TMDL WIPs, Forestry and Wetlands on July 5, 2023 during the drafting of the report.

A members' sentiment on reading the final report issued for public comment:
"I read through it a couple of times and believe it is much better and more detailed than the earlier draft particularly with the inclusion of the other outcomes. I especially like the sections recommending actions to sustain or accelerate progress on achieving outcomes. However, I think my earlier comments are still appropriate with respect to the water quality and forestry sections. I'm still missing the timelines or progress expectations to and beyond 2025 and the accountability for how the recommendations will be achieved."

TMDL WIP Report

1. The public must understand the purpose of the report.
    a. Is the purpose of the report to provide the public with information on what should be done in the next 2 years to improve the quality of the Bay?
    b. There should be a section in the beginning that explains that this is just information about Reaching Water quality issues relating to the 2025 deadlines.
    c. If the purpose of the report is to "provide" actions that will be taken over the next two years to help accelerate progress for each jurisdiction's Phase III WIPs goals: where are the specifics?
2. Specific actions need to be listed.
    a. Phrases like "**expand the existing conversation; begin the conversation; and begin the discussion**," are all vague and provide no accountability. Specific examples must be listed as a guideline. This report fails to set any specific goals, measurable outcomes, and timelines or progress expectations to and beyond 2025. This makes us sound like little more than a debate society or social club. I realize these documents are not supposed to be the end-all, be-all, but we (the Partners) do have responsibility to chart a new or revised course toward regulatory (TMDL) compliance.
    b. A specific example that could be listed in response to "**Expand the existing conversation around how to address pollution from nonpoint sources**" is: Moonshot investment in how to sustainably turn manure and litter into products that give the farmer an income stream (without adding additional pollution).
3. Demonstrate the progress jurisdictions are making.
    a. Where is the section on monitoring data? Without connection between model information and real-world monitoring data, the section does not provide the reader with any information on what should/could be done to improve water quality.
4. Provide more information on the Conowingo Dam.
    a. It is mentioned that funding has been committed by NY, PA, and MD for implementation purposes. How much money has been committed and by when will implementation begin?
    b. There is a misleading statement in the report suggesting that all the money necessary for implementing the Conowingo WIP is allocated when if fact only a small portion necessary has been committed: ***"While the Conowingo WIP has not yet been implemented, funding has been committed by Maryland, New York and Pennsylvania for implementation purposes."***
5. BMP Verification.

a. In response to the decision to **prioritize limited state technical capacity to verify existing BMPs or implement new BMPs**… it is not an either/or. BMPs must be verified. Why add more implementation funding if strong verification won't justify taxpayer expenditure; this must also include monitoring data.
b. Clarify which agricultural BMPs are the most cost-effective.

Forest Buffers and Wetlands

a. This report does not provide clear information on reaching 2025 that is included in the Wetlands Task Force Action plan. Unless this report can be significantly rewritten, there should be 2 reports – one relating to wetlands and one to forestry. While some of the issues and barriers are similar, the specific suggestions for change that are offered with respect to wetlands deserve time and focus.
b. What are examples of strategies and the status of the action plan implementation?

2. Barriers to accelerating progress for meeting targets.
    a. Where is the discussion of impact of development and enforcement of permits – preventing loss must be as important as planting/creating.
    b. **Funding**
        i. **"...dedicated, stable funding sources are needed for forest buffers and wetlands to ensure the sustainability of effective state and local restoration programs."** - What is an example of a program that has requests for implementation but has not been able to meet the requests?
        ii. Is this sustainable funding to hire staff or AmeriCorps type program personnel?
        iii. **"Therefore, it is essential to also support technical assistance positions that pay a fair wage, have job security and provide a good working environment."** - This is confusing, is the issue the lack of a dedicated long-term funding source that is coupled with a long-term commitment from the landowner to keep the land covered – with forest buffer or wetland?
    c. **Capacity**
        i. Where and why has there been good landowner demand? What is the funding gap?
    d. **Tracking**
        i. **"Next, each jurisdiction has different mechanisms for tracking implementation, making it difficult to provide guidance."** - This is an unacceptable explanation.
        ii. Why not move to a geo-spatial form of tracking?
        iii. Be innovative - hire college students with a drone.
        iv. **"In regard to wetlands, they are not currently counted in the model in urban areas, and wetland enhancement is not considered a BMP, making it unable to be tracked"** - Are they counted or credited? If it is not a BMP, what is the issue with tracking? Or should it be a BMP?
    e. **Outreach and Engagement**
        i. Has the CBP still not developed clear information for outreach by this point?
        ii. Reference the Supreme Court change in designation?
3. Activities helping achieve success of the outcomes.
    a. **"Both outcomes have several ongoing activities that are helping them to achieve success" -** What is the status of those plans; they should be linked here.
    b. The operative word here is "HOW" – instead of a list of "common priorities"…. Given the explanation of the barriers (possibly too focused on model tracking) -- what are the specific things that will be done in the next 2 years to overcome the barriers that have grown larger over the past years.
    c. This is a continued reliance on the age-old excuse of lack of funding and technical assistance, without addressing possible new regulatory approaches that could and should be undertaken by state and local governments.

d. The action plan from the *Restoring Wetlands of the Chesapeake Bay Watershed Workshop* contains significant conclusions: "...to lose wetlands acreage faster than the current voluntary restoration efforts can restore them"
    i. The General recommendation of the Action plan should be added: Having the Management Board representatives meet formally with all the agencies within their jurisdictions once a year to discuss progress and ensure barriers are moved and remain out of the way will greatly increase the potential of meeting the wetlands outcome and significant suggestions like: Using innovative wetland restoration, creation, and enhancement approaches; "leveraging existing and new funding sources; and re-prioritizing by the Bay Program to address the lagging wetlands outcome provides an opportunity to change the trajectory.
e. **Expand Tracking and Reporting**
    i. A change in Program priorities and approaches is needed. As pointed out in Task Force action plan - Project proponents have focused on sediment and nutrient load reduction projects aimed toward achieving the Chesapeake Bay WIP. While both tidal vegetated wetlands and nontidal wetlands creation and restoration are approved as water quality BMPs, the practitioners are choosing practices based on agency priorities and a perceived "bang for the buck", i.e., relative ease of less complicated practices.
    ii. Tracking is the LEAST important component of this goal and probably the easiest to fix if the PSC would make sure it happened
    iii. Funding for tracking? Why are there no recommendations for funding practices or staff?
    iv. "**expanded tracking and reporting**" and "**enhanced data collection**" in the recommendations for forest buffers and wetlands are all well and good but they are not going to produce the " **...significant increase in project implementation rates (that) would be needed to meet the goals set in the outcomes for both forest buffers and wetlands**."
f. **Develop and support effective and flexible programs**
    i. List examples and use them as a guideline.

The following is taken from the Wetland task force report – it is an important part of the story for the context of action.

> This protection coupled with voluntary efforts of the Bay Program partners were envisioned to restore much of the lost wetlands improving water quality and habitat across the watershed. The current paradigm used in the 2014 Bay Agreement for wetlands assumes that development and agriculture are the stressors on non-tidal wetlands and could be offset by the "no net loss" policy and permit mitigation. Tidal wetlands were assumed to be stable in the 2014 Bay Agreement. **In this paradigm the wetlands baseline is assumed to be static and the rate at which the outcome is achieved is dependent on the rate at which funding is available for voluntary restoration.**
>
> The reality is that loopholes and failed mitigation in the "no net loss" strategy coupled with the severe effects of climate change are causing the Chesapeake Bay watershed to lose wetlands acreage faster than the current voluntary restoration efforts can restore them (Figure 2). Particularly vulnerable are tidal wetlands, which are not only susceptible to development and agriculture impacts but are extremely vulnerable to sea level rise due to climate change as well as the ongoing effects of glacial subsidence, which exacerbates the effects of climate change and increases the tidal wetland loss in the Chesapeake Bay watershed (Phillips, 2007). Without intervention, as much 161,000 acres of tidal marsh will be lost in the Chesapeake watershed by 2100 (National Wildlife Federation, 2008).

Additional important information should be added

The consequence has been that resources and capacity within existing voluntary wetland restoration, creation, and enhancement programs have not had the priority necessary to successfully meet the outcomes under the current Chesapeake Bay Program Agreement, and don't even begin to make a dent in the loss of wetlands when climate change models are considered in the stressor model.

Thanks for the opportunity to comment on the draft "Charting a Course to 2025 Report". This is a fantastic overview of some of the key challenges and opportunities to accelerate progress to meeting the goals set in the Watershed Agreement.

I appreciate the level of effort that went into this report under a very tight timeline. I have several recommendations to consider as you work to develop the final report. Some of these recommendations are more editorial in nature, so please use as you see fit:

- Consider adding an acronym key at the beginning of the report

Executive Summary

- Consider developing a short set of clear, high-level recommendations to lead with at the beginning of the report (in the Executive Summary). There are currently so many recommendations, it is difficult to identify the key priorities the Program will pursue to accelerate progress towards 2025. For example:
    - Prioritize the conservation of existing forests and natural areas. These lands are our most valuable assets for meeting water quality, habitat, and climate resilience goals.
    - Support implementation of the recommendations for accelerating forest buffer and wetlands restoration, as these are key outcomes that will help meet the partnership's goals for water quality and living resources.
- Consider adding an introduction section and moving a lot of the content from the Executive Summary to the introduction. Then keep the Executive Summary at a higher level (1-2 pages) and do not repeat all the numerous recommendations made in the various sections of the report.
- In the Outcome Attainability observations on page 5, the wording on bullet #1 is a bit awkward and the second sentence is fragmented. I recommend removing the second sentence, since some outcomes will likely, by necessity, remain qualitative.
- In the Outcome Attainability observations on page 5, I recommend rewording bullet #4 to add that ambitious outcomes should be justified based on their importance for restoring local waterways and the Bay, in addition to the practical caveats already noted.
- In the Outcome Attainability observations on page 5, I recommend removing or reworking the following sentence: "Efforts should focus on high-impact actions and avoid implementation of many small, disconnected projects that can dilute staff and financial resources". These small, disconnected projects, while expensive, are often critical to engaging with historically underrepresented communities and landowners.
- Recommend adding some sort of heading or intro to the bulleted lists in each of the sub-sections (if they stay in the executive summary) to clarify that these are the recommendations identified in each section.
- On page 6, where you outline the three factors that influence whether practices would achieve the desired benefits, it is difficult to discern what those three factors are (there seem to be way more than three factors listed there). It could help to turn these into bullets or to simplify the description of the factors to improve clarity.
- The recommendations in the TMDL/WIP section don't align with the recommendations in the body of the report. The recommendations in the executive summary are much stronger in my opinion.

- The TMDL/WIP recommendation about the role of the EPA in providing oversight (on page 7) is framed differently than the rest of the list. Recommend rewording to make it more of a recommended action for consistency.
- On page 7 there is a typo in the Emerging Science section. The "be" between "would" and "improve" should be removed in the last sentence before the bulleted list.
- On page 8 in the first bullet, remove "Recommendations from" at the beginning to avoid having "recommendations" and "recommend" in the same sentence (and to be more consistent with the framing of the bullet on the CESR report)

Chesapeake Bay TMDL & Phase III WIPs

- In the third paragraph, recommend putting all these numbers into a more visual graph or chart. It is difficult to read a paragraph full of numbers.
- Page 11, Conowingo Dam bullet, third line down- "were" should be "was- "its trapping capacity for sediment and nutrients **was** being impacted".
- Page 12- is there a more precise heading that could be used for the "Miscellaneous" bullet? Maybe "External factors"?
- The paragraph after the set of bullets is confusing as currently worded. It seems to say that there is a major capacity challenge in spending the influx of new funds, but the new funds are allowing for an increase in staff (which a previous bullet contradicted- saying that funding restrictions made it difficult to use grants to increase staff). It might help to try to disentangle the challenges from the opportunities. The new funding is a clear opportunity.
- This section of the report doesn't follow the same format as the other sections with sub-headings (even though it largely seems to cover the same topics). Recommend adding in sub-headings for consistency.
- Consider replacing the recommendations in this section with the recommendations from the executive summary. The recommendations as currently written are not particularly action oriented, focusing more on conversations and messaging. While this is important, in my opinion, we need more specific recommendations on how to increase progress to meeting our water quality goals.
- Recommend rewording the last bullet so it read more like a recommendation/action rather than a statement

Emerging Science, Monitoring and Analysis

- Pg 17- recommend rewording the bullet on the Rising Water Temperatures report (consistent with the change recommended in the executive summary) to remove the "Recommendations from" at the beginning of the bullet
- Pg 17- for the bullet on capacity building and community engagement, recommend adding "Use social science to" at the beginning of the bullet to more clearly tie this work to science

Climate Change and DEIJ

- Are there opportunities to make a few statements about the nexus between climate change and DEIJ? As the section reads now, they are treated mostly separately (while acknowledging there are common challenges towards advancing these objectives). For example, something like "climate change is having disproportionate impacts on historically underserved communities

and additional focus is needed to support adaptation and resiliency in these areas". That could also potentially lead into a separate recommendation about identifying/supporting actions that can improve climate resiliency in these communities (for example, planting and maintaining trees to reduce heat exposure in urban heat islands).

- I appreciate the link to the DEIJ Implementation Plan, which a tremendous amount of work went into. Are there opportunities to bring some of the key actions from that implementation plan directly into this section? One of the key recommendations from that plan was to hire a high-level, cross-GIT DEIJ coordinator. I would consider elevating that recommendation from the Plan in the Recommendations on Progressing to 2025 sub-section in the Provide Cross-Outcome Coordination bullet. This seems like it would be a particularly actionable recommendation in the short term. A similar recommendation could be made for climate.

Forest Buffers and Wetlands

- Recommend adding some discussion of conservation to this section. The issue of land use conversion could get brought up as an emerging threat for both wetlands and forest buffers, referencing the new land use data and the recent supreme court decision reducing protections for wetlands. Then we could add a recommendation specifically focused on ensuring we are conserving existing and new forest buffers and wetlands so we protect the investments we are making in restoring these critical habitats.
- Consider revising the sub-heading "Accelerate Progress to 2025" to align with the sub-headings in the other sections, which read "Recommendations on Progressing to 2025"