

Draft

Chesapeake Bay Program (CBP) Management Board Members,
c/o Michelle Price-Fay, Chair, CBP Management Board
U.S. Environmental Protection Agency Chesapeake Bay Program
1750 Forest Drive Suite 130
Annapolis, MD 21401

April 19th, 2022

**Re: The Water Quality Goal Implementation Team's concerns with CAST-21 updates.
Recommendations for the Management Board to Consider**

Dear Management Board Chair Michelle Price-Fay and Members,

We write to you, on behalf of the Water Quality Goal Implementation Team (WQGIT), to share recommendations and concerns with the 2021 update to the Chesapeake Bay Assessment Scenario Tool (CAST-21). CAST-21 updates include an additional 5 to 6 million pounds of nitrogen load that must be reduced across the watershed.

There is an expectation that jurisdictions in the watershed must reduce this additional nitrogen load through the two-year milestone process by amending the 2022-2023 milestones or addressing the nitrogen load in the 2024-2025 milestone period.

For context, since the TMDL began in 2010 through 2020, overall annual nitrogen reductions across the watershed totaled about 4 million pounds per year. Watershed-wide, therefore, the CAST-21 updates equate to more than a year's worth of progress in reducing nitrogen. This does not factor in the additional nitrogen loads from climate change (5 million pounds of nitrogen) and the Conowingo Implementation Plan (6 million pounds of nitrogen) that must be addressed between now and 2025.

Given the [decision](#) and [clarifications](#) at the Management Board during 2020, the WQGIT understands that there is no decision in front of the WQGIT to approve or not approve the release of CAST-21. This assumes that every two years CAST updates have factored in new information, Best Management Practice (BMP) efficiencies, and data previously approved by the partnership.

Below we share five recommendations for the Management Board to consider as CAST-21 is released. The recommendations are based on the concerns expressed by WQGIT members during the last several weeks to months. We attach an appendix that describes these concerns in more detail.

In addition to this letter, we want to brief you at your May 12 meeting on the content in this letter. Thank you for considering our request.

Sincerely,
WQGIT

Ed Dunne (Chair)
Suzanne Trevena (Co-Chair)

RECOMMENDATIONS

1. **The Management Board should clarify expectations for how jurisdictions must address additional nutrient loads from CAST updates.** Currently, this expectation is not clear. The 5 to 6 million pounds of additional nitrogen load associated with updating CAST-21 was unanticipated. As a result, jurisdictions do not have current plans to reduce this magnitude of additional nitrogen load and will have to adapt and develop new strategies to attain 2025 targets. Setting expectations between now and 2025 for how to address additional loads is important to align jurisdiction efforts.
2. **The Management Board should recommend that the implications of the additional 2 million pounds of nitrogen associated with missing data and errors be considered when EPA evaluates milestone progress.** For example, missing agricultural fertilizer data for 2013 and 2014 was not included in CAST-19, but is now included in CAST-21. Another example includes the missing data associated with poultry and crop yields from the National Agricultural Statistics Service surveys. Addressing errors and missing data adds about 2 million pounds of additional nitrogen to the CAST-21 updates. Addressing these unanticipated mistakes is important. Given this, EPA should consider these updates when they evaluate progress.
3. **The Management Board should recommend that a communications plan be developed to communicate CAST-21 and future CAST updates to stakeholders and the public.** It is important to communicate to stakeholders and the public what the CAST-21 results mean. A communications plan was developed with the release of CAST-19. We advocate for a similar plan with the release of CAST-21 that includes describing what is CAST, its intended use, the updated results, what the results mean and how are results used, and what are the implications of those results between now and 2025.
4. **The Management Board should recommend that the CBP partnership address problematic data sources that are used as inputs to CAST before future releases of CAST.** There are multiple concerns with fertilizer data sourced from the Association of American Plant Food Control Officials (AAPFCO), which is used for both urban and agricultural fertilizer. For example, the Urban Stormwater Workgroup did not reach consensus on a revised method that included the AAPFCO data source. Perhaps the partnership can invest in a supplemental approach to address the collective concerns with this data input source.
5. **The Management Board should encourage the partnership to establish updated policies and procedures to govern future updates of CAST.** During the release of CAST the nutrient loading estimates to the Chesapeake Bay changed, the timeline for release is unclear, and the process and ability for the partnership to effect changes to CAST updates are unclear. Updated procedures should consider timelines (and deadlines) for incorporating updates, consistent quality control provisions for all model inputs, and clear communication of updated information to foster understanding and transparency.

APPENDIX

The Magnitude of change in nutrient loads.

By the numbers. In February 2022, the total nitrogen and phosphorus load differences between CAST-19 and CAST-21 show an apparent additional 6 million pounds of total nitrogen and about 700,000 pounds less of total phosphorus.¹ More recently in March 2022, the additional 6 million pounds of total nitrogen was estimated at 5 million pounds of total nitrogen.²

Based on the presentation that was given to the WQGIT on February 14, 2022, most of the additional nitrogen load, about 4 million pounds, is from expected data updates that include land use and best management practices. About 2 million pounds of the additional nitrogen load is a result of correcting errors (i.e., missing agriculture fertilizer data from 2013 and 2014) and incorporating past missing data (i.e., data associated with crop yield and poultry). About 95 percent of the additional 6 million pounds of total nitrogen load is associated with agriculture.

What do the numbers mean from a jurisdictional perspective. Table 1 shows that the greatest nitrogen load difference between CAST-19 and CAST-21 was in Pennsylvania and least in West Virginia. On average, the increase in load across jurisdictions is about 900,000 pounds of additional nitrogen load. This is a substantial difference that impacts funding and resources to reduce additional loads. For example, the 660,000 pounds of additional nitrogen load in New York equates to about one year of implementation, while in Virginia the 1 million pounds of additional nitrogen equate to two years of implementation to reduce nitrogen loads. In Pennsylvania, the 2.8 million pounds of additional nitrogen is about 60% of Pennsylvania's 2020 progress. Not shown in table 1, but a substantial change for West Virginia was the increased total phosphorus loading from turf grass. Specifically, the total phosphorus application rate to turf increased by about 800% (from 0.4 to 3.8 pounds of phosphorus per acre per year). The result of this increase alone is about a 20% increase in the total phosphorus loading delivered to tidal waters from West Virginia.

Table 1 shows the additional total nitrogen due to updating from CAST-19 to CAST-21 by the 7 jurisdictions and at the watershed scale.³ CAST-19-21 (Reviewed) includes data updates. The effects of broiler and crop yield (past missing data) are shown separately, while (All effects) are shown in the last column.

Jurisdiction	CAST-19-21 (Reviewed)	CAST-21 Effect of Broiler Data	CAST-21 Effect of Yield Data	CAST-19-21 (All effects)
Million pounds of total nitrogen				
New York	0.70	0.00	-0.04	0.66
Pennsylvania	1.77	0.12	0.87	2.76
Maryland	1.02	-0.02	0.48	1.48
Virginia	0.57	-0.02	0.43	0.99
West Virginia	-0.15	-0.02	-0.01	-0.17
Delaware	0.37	-0.05	0.22	0.54
District of Columbia	0.00	0.00	0.00	0.00

¹ The 6 million pounds of additional nitrogen is based on a [presentation](#) given to the WQGIT on February 14.

² The 5 million pounds of additional nitrogen is based on CAST visualizations made available on March 3.

³ This table was reproduced and modified based on the presentation given to the WQGIT on February 14.

Watershed	4.27	0.03	1.96	6.25
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Putting the additional nitrogen load into context. The additional 5 to 6 million pounds of nitrogen, is similar to the additional nitrogen that must also be reduced by 2025 due to climate change—about 5 million pounds of nitrogen watershed-wide. For additional context, the Conowingo Watershed Implementation Plan cites that an additional 6 million pounds of total nitrogen, due to the Conowingo Dam infill will also be reduced by 2025, per the partnership’s decision. Taken together, to reduce these additional total nitrogen loads requires multiple years of implementation across the watershed.

Looking back, since the TMDL began in 2010 through 2020, overall annual nitrogen reductions across the watershed totaled about 4 million pounds per year. Watershed-wide, therefore, the CAST-21 updates equate to more than a year’s worth of progress in reducing nitrogen.

Looking forward, to meet the 2025 target of 215 million pounds of total nitrogen load being delivered to the Bay, about 44 million pounds of total nitrogen must be reduced (difference between 2020 progress and the 2025 target). Adding the additional total nitrogen load associated with CAST-21 to the 44 million pounds of nitrogen that must be reduced, moves us further away from the 2025 target by about 14 percent.

WQGIT Members Concerns

CAST-21 moves us further away from our 2025 planning target. The release of CAST-21 does not change the 2025 planning target, which is 215 million pounds of nitrogen allowed to enter the Bay per year. It does, however, move us further away from the target and makes it even more difficult to hit the Bay-wide target by 2025.

The magnitude of the additional nitrogen loads was not expected and there is concern about the available time between now and 2025 to adapt and develop jurisdictional strategies to achieve 2025 targets. We currently understand that the additional nitrogen loads must be reduced no later than the 2024-2025 milestone period. In other words, jurisdictions must implement new activities to reduce the additional nitrogen loads before 2025. Jurisdictions are concerned about this because the magnitude of change in the nitrogen load that included data updates, addressing past errors, and including past missing data was not anticipated. Therefore, jurisdictions do not have plans in place to address this magnitude of additional nitrogen. There is collective concern about the available time to adapt and develop strategies to achieve the 2025 targets.

The CAST-21 release process was inefficient and not transparent. The release of CAST-21 for review has been a lengthy and an inefficient process with several unexpected changes to updates incorporated late in the release. These changes significantly altered CAST-21 results. We cited one example in the “By the numbers” section of this letter where the additional total nitrogen load was estimated at 6 million pounds and that changed to 5 million pounds. Another example included the additional nitrogen load in Virginia. The estimate that was presented on February 14 was about 1 million pounds of total nitrogen and more recently that estimate changed to at about half that—460,000 pound of total nitrogen.

While we appreciate Chesapeake Bay Program Office staff communicating and taking responsibility for errors, omissions, and updates to CAST, there remains uncertainty on how CAST-21 has been updated with regards to the BMP record. This makes comparing CAST-21 to earlier versions difficult. The changes through the process and the inability to compare to understand the changes resulted in the CAST release process being difficult to track and understand.

CAST-21 results challenge our understanding of what is happening on the ground and seems at odds with monitoring and other data sources. In Virginia, for example, the short-term flow-adjusted change in total nitrogen from 2011-2020 produced in partnership between Maryland Department of Natural Resources, Virginia Department of Environmental Quality, Old Dominion University, and the Chesapeake Bay Program suggest that total nitrogen levels in the Eastern Shore of Virginia are decreasing with statistically significant trends. However, the CAST-21 nitrogen loadings for this same area show an increasing trend through time for the same period. There seems to be a discrepancy in the observed, empirical data and what CAST-21 is reporting.

Across the watershed, USGS's River Input Monitoring (RIM) network which is used to calculate nutrient loading and water quality monitoring data is showing both long-term and short-term trends in [improving total nitrogen loads](#). For example, in water year 2020, trends in nitrogen and phosphorus loading in the Susquehanna and Potomac rivers were both improving.

Agriculture is becoming more efficient and county level trends in agricultural surplus is decreasing throughout the Chesapeake Bay Watershed, based on preliminary research conducted by EPA and presented during the [January 2021 Modeling Workgroup meeting](#).

In Delaware, the Agricultural Census shows an increase in agriculture acres statewide by 19,250 acres between 2012 and 2017. The 2017 agriculture acres in CAST-19 versus CAST-21, however, shows a decrease by 11,315 acres. The discrepancy between increasing and decreasing agriculture acres is difficult to understand.

Data concerns. There are multiple concerns with the turf grass data source from the Association of American Plant Food Control Officials (AAPFCO). The correction of AAPFCO data in CAST-21 brings up a major concern in the WQGIT and partner specialists regarding the quality and integrity of the data being used, along with how it is distributed. The WQGIT supports further investigation of this data to understand its integrity and to see if it is being used appropriately in the model. For example, review the potential for double counting (e.g., sales of same nutrients to multiple entities and assumption of urban fertilizer being used in agriculture), investigate the assumption that the purchased fertilizer is fully applied in the same year of purchase, review the methods for aggregating sales data.

In Delaware, the 2018 full season soybean projections from the Agricultural Census from 2012 to 2017 shows an increase of 98,247 acres. The implication of the increase in full season soybean acres is much higher in Delaware than other states, and the impact of the change from double cropped to full season in the model has a drastic impact on loads. Unfortunately, there are no tools to manage load changes when shifting between cropping cycles occurs. It also raises the question of whether this issue is cyclical or an anomaly due to other factors.