EPA EVALUATION OF MARYLAND'S 2020-2021 and 2022-2023 MILESTONES

Executive Summary

The Chesapeake Bay Program (CBP) partnership established the goal to have all practices and controls in place by 2025 that were necessary to meet applicable water quality standards in the Chesapeake Bay (Bay) and its tidal tributaries ("2025 Goal"). The seven jurisdictions (Delaware, the District of Columbia, Maryland, New York, Pennsylvania, Virginia, and West Virginia) in the CBP partnership agreed to develop and implement a framework for holding each partner accountable for reducing nitrogen, phosphorus, and sediment loads to meet water quality standards in the Bay and its tidal tributaries. The U.S. Environmental Protection Agency (EPA) is providing this evaluation of Maryland's 2020-2021 and 2022-2023 milestones to the CBP partnership and the public in accordance with its oversight role and responsibility under the CBP partnership's accountability framework.

In that role, EPA has evaluated Maryland's progress toward attaining its portion of the 2025 Goal. This evaluation includes an assessment of progress toward attaining nutrient and sediment goals at the state and state-basin level and progress toward meeting sector-specific programmatic commitments for the 2020-2021 milestone period. This evaluation also provides an assessment of sector-specific programmatic and numeric commitments (e.g., Best Management Practices (BMP) or BMP implementation targets) for the 2022-2023 milestone period and the status of the relevant water quality monitoring trends.

In reviewing Maryland's final programmatic progress for the 2020-2021 milestones, the 2021 numeric progress, and the final 2022-2023 milestone commitments, EPA identified sector-by-sector strengths as well as areas for enhancement. According to the data provided by Maryland for the 2021 progress run, Maryland did not achieve its statewide 2021 targets for nitrogen and phosphorus but did achieve its statewide 2021 targets for sediment. EPA stands ready to assist Maryland with implementing its 2022-2023 two-year milestone commitments.

Some notable strengths identified in this evaluation of Maryland's 2020-2021 milestones and the final 2022-2023 milestones include:

- Provided quantitative implementation goals for priority conservation practices and identified specific programmatic actions to support implementation of these practices.
- Reissued the Concentrated Animal Feeding Operation (CAFO) general permit effective July 2020.
- Created 53 State positions within Maryland to provide direct technical assistance to farmers that has led to 23 planners and 14 technicians being hired.
- Reissued Phase I Municipal Separate Storm Sewer System (MS4) permits for Baltimore City, and Baltimore, Montgomery, and Anne Arundel Counties.
- Targeted several programmatic and numeric milestones towards underserved communities in Maryland.

Some key areas that EPA expects Maryland to address in the 2022-2023 milestone period include:

- Reissue all remaining expired Phase I MS4 permits so that impervious surface restoration requirements will continue to be implemented.
- Accelerate BMP implementation in the agricultural sector, especially since several BMP implementation targets were not met in the 2020-2021 milestone period.

Detailed Evaluation of Overall Load Reductions and Source Sectors

Load Reduction Review

When evaluating Maryland's 2020-2021 milestone implementation, EPA simulated nutrient and sediment loads using the Chesapeake Assessment Scenario Tool 2019 (CAST-19)[1] and wastewater discharge data reported by Maryland, and compared those simulated loads to Maryland's statewide and state-basin Phase III Watershed Implementation Plan (WIP) planning targets.

According to the data provided by Maryland for the 2021 progress run[2], Maryland did not achieve its statewide 2021 targets for nitrogen or phosphorus. Maryland achieved its statewide 2021 targets for sediment. Maryland achieved its 2021 nitrogen targets for the Patuxent basin but did not achieve its 2021 targets for nitrogen in the other major basins (Eastern Shore, Western Shore, Potomac, and Susquehanna). Maryland achieved its 2021 phosphorus targets for the Potomac and Patuxent basins but did not achieve its 2021 phosphorus targets for the other major basins. Maryland achieved its 2021 sediment targets for the Eastern Shore, Western Shore, Potomac, and Patuxent basins but did not achieve its target for the Susquehanna basin.

Table 1. Loads and Targets for Maryland based on CAST-19 and reported wastewater data.

Pollutant	2009 Progress Loads (M lbs/year)	2021 Progress Loads (M lbs/year)	2025 Target (M lbs/year)
Nitrogen	57.61	50.74	45.83
Phosphorus	4.153	3.803	3.680
Sediment	7,663	7,603	8,343

Maryland developed specific BMP implementation targets for the 2020-2021 and 2022-2023 milestones for those practices identified in Maryland's Phase III WIP that account for the majority of the nitrogen reductions. Table 2 provides a summary of Maryland's 2021 progress

[1] CAST-19 is part of the Phase 6.0 suite of modeling tools for the Chesapeake Bay.
[2] Each year, jurisdictions in the CBP partnership report on the BMPs installed, tracked and verified and the pollutant load reductions from wastewater treatment plants. Using the Chesapeake Assessment Scenario Tool 2019, this information (or "annual progress runs") provides an estimate of how much nitrogen, phosphorus and sediment has been reduced.

compared to the 2009 baseline and the 2025 targets, as well as the 2022-2023 commitments, for these priority BMPs.

Table 2. Progress toward Targets for Maryland's priority BMPs (those that account for the majority of the nitrogen reductions).

BMP[3]	**2009 Progress**	**2021 Progress**	**2022-2023 Milestone Target**	**2025 WIP Target**
Cover Crops (acres)	146,839	419,397	470,000	464,191
Tillage Management – Continuous High Residue (acres)	548,015	634,570	643,000 annually	618,411
Animal Waste Management Systems – Poultry (percentage)	90%	94.3%	100%	100%
Animal Waste Management System-Livestock (percentage)	31.8%	30.1%	50%	54.4%
Soil Conservation and Water Quality Plans (acres)	780,852	824,578	1,000,000	1,022,031
Grass Buffers (acres)	37,323	31,583	4,295 annually	42,516
Nutrient Management Core Nitrogen (% compliance rate)	None reported[4]	72.2%	70.0%	63%

The summary progress from the CBP partnership's modeling tools for 2009 and 2021 incorporate BMP credit duration. The CBP partnership decided to remove reported BMPs from the model simulation at the end of their established lifespans unless verified by the state as inspected and continuing to function as designed. Maryland is expected to provide detailed programmatic milestones to support these BMP implementation targets. In the sector-specific

[3] BMP levels are units reported or planned by the jurisdiction. The levels are calculated using CAST-19 of the Phase 6.0 suite of modeling tools and include everything established or installed, reported, and functioning through the particular year, e.g., through 2009, or through 2021, etc., not just new reported implementation, unless otherwise noted.

[4] CBP partnership modeling tools evolve based on CBP partnership decisions. As a result, some BMPs have "none reported" listed since those particular BMP names were not available for reporting. These practices were often included in another BMP category before the refinement to be more specific in the naming convention.

sections below, EPA provides its evaluation of these programmatic milestones and the connection to increased implementation.

Looking Forward for Future Reviews of Progress

The CBP partnership is just a few years away from the 2025 date that has been agreed upon for several of the goals and outcomes under the *2014 Chesapeake Bay Watershed Agreement*, including the 2025 Goal. Given the number of changing conditions (e.g., human and animal population growth, 2025 and 2035 climate impacts, model updates) that have and will continue to impact progress and the level of effort towards meeting these goals, it is critical to begin planning for the future.

Source Sector Review

Agriculture

Maryland is predominantly relying on agriculture BMP implementation to meet its 2025 targets based on its Phase III WIP. Maryland continues to make incremental progress toward its goals however, the current pace of implementation is not on track to meet its overall nutrient targets. EPA expects Maryland to accelerate BMP implementation in the agricultural sector.

2020-2021 Milestone Achievements

- Reissued the CAFO general permit effective July 2020.
- Exceeded implementation targets for additional acres under prescribed grazing, horse pasture management, and grass and riparian buffers.
- Created 53 State positions within Maryland to provide direct technical assistance to farmers that have led to 23 Planners and 14 Technicians being hired.

2020-2021 Milestones Not Achieved

- Did not achieve implementation targets for animal waste management systems. Maryland achieved 90 percent implementation for poultry animal units with a goal of 100 percent for poultry and 61 percent combined for livestock and dairy animal units compared to goals of 50 percent for livestock and 90 percent for dairy, respectively.

2022-2023 Milestone Strengths

- Provides quantitative implementation goals for priority conservation practices (e.g., cover crops, tillage, animal waste management systems, conservation plans, grass buffers, and nutrient management) and identifies specific programmatic actions to support implementation of these practices.
- Continues the renewal of coverage for facilities under the CAFO general permit, including prioritizing the 19 CAFOs that were not covered by the previous permit.
- Establishes BMP implementation targets in Pocomoke and Wicomico River Basins, which are some of the most impaired segments in Maryland.
- Clarifies that the additional 4,295 acres per year of grass and riparian buffers represent newly implemented or verified buffers.
- Continues to fund and support the Manure Transport Program as part of the Phosphorus Management Tool for the transportation of manure to a producer or alternative use facility where it can be utilized in accordance with a Nutrient Management Plan.

- Includes the recently published CBP partnership's BMP expert panel report on agricultural drainage management as a reference source for modifications to the Maryland Agricultural Water Quality Cost-Share Program and future implementation to ensure consistency.

Key Areas to Address in the 2022-2023 Milestone Period

- Set milestones to accelerate BMP implementation in the agricultural sector and identify what programs will be implemented to achieve the implementation targets, especially since several BMP implementation targets were not met in the 2020-2021 milestone period.

Urban/Suburban Stormwater

Maryland is expecting additional nutrient reductions from the stormwater sector by 2025 according to its Phase III WIP. EPA expects Maryland to accelerate BMP implementation in the urban/suburban stormwater sector.

2020-2021 Milestone Achievements

- Reissued MS4 permits for Baltimore City, and Baltimore, Montgomery, and Anne Arundel Counties.
- Issued the Tentative Determination (i.e., draft permit) for the Prince George's County Phase I MS4 permit.
- Updated the MS4 Accounting Guidance in 2021.

2020-2021 Milestones Not Achieved

- Did not reissue Phase I MS4 permits for five medium MS4 jurisdictions. However, draft permits were submitted and accepted by EPA during the milestone period.
- Did not reissue the Maryland State Highway Administration Phase I MS4 permit.
- Did not provide a progress update on whether the BMP implementation targets for urban nutrient management were achieved.

2022-2023 Milestone Strengths

- Commits to reissuing the general permit for Stormwater Associated with Industrial Activities.
- Commits to reissuing the general permit for Stormwater Associated with Construction Activities.
- Commits to finalizing the report on the Advancing Stormwater Resiliency in Maryland initiative to make stormwater BMPs more resilient in the face of climate change.
- Commits to updating the Stormwater Design Manual to include standardized definitions of flooding, incorporation of updated National Oceanic and Atmospheric Administration Atlas 14 precipitation estimates, and updating the design standards for Environmental Site Design practices for new and redevelopment.
- Commits to identifying frequently flooded areas post-2000 and creating a map to show those areas.
- Commits to drafting regulations to require comprehensive watershed studies, where funding exists, for identified flood areas.
- Commits to creating a stakeholder advisory group to review existing stormwater regulations and address future needs.

Key Areas to Address in the 2022-2023 Milestone Period

- Reissue all remaining expired Phase I MS4 permits so that impervious surface restoration requirements will continue to be implemented.

Wastewater Treatment Plants and Onsite Systems

2020-2021 Milestone Achievements

- Reported that four non-significant Wastewater Treatment Plant (WWTP) facilities have been upgraded to Enhanced Nutrient Removal (ENR); surpassing the goal of two plant upgrades.
- Reported that calendar year 2020 results for nitrogen concentrations at significant WWTP facilities (i.e., those with a design flow greater than 0.5 million gallons per day) were annualized flow weighted average of 2.9 milligrams per Liter (mg/L). This exceeds Maryland's Phase III WIP goal of 3.25 mg/L.
- Reported that all significant WWTP facilities have been upgraded to ENR.
- Achieved and surpassed the goal of funding 1,800 septic systems to be upgraded to Best Available Technology within Critical Area by achieving 2,553 upgrades.

2020-2021 Milestones Not Achieved

- Did not finalize Maryland's Regulation Amendment to include loading rate decreases when Best Available Technology or Membrane Bioreactor technology is utilized for systems that discharge more than 5,000 gallons per day.
- Did not achieve Bermed Infiltration Pond removal on 8 priority facilities; however, Maryland developed an Action Plan for Bermed Infiltration Pond facilities that will be implemented in the 2022-2023 Milestone period.

2022-2023 Milestone Strengths

- Continues to incentivize significant WWTPs to reduce effluent concentrations to a statewide flow weighted average of 2.85 mg/L total nitrogen, which is lower than Maryland's Phase III WIP commitment of 3.25 mg/L total nitrogen.
- Commits to modify the Bay Restoration Fund ranking tool to allow for smaller facilities to qualify for State grants.
- Prioritizes upgrades for two of the largest non-significant WWTPs to ENR.
- Commits to resolve violations at Back River and Patapsco WWTPs and to return significant WWTPs to effluent levels achieved in 2019.
- Commits to further incentivize significant WWTPs towards achieving 2.85 mg/l to offset impacts from 2025 climate change conditions.

Key Areas to Address in the 2022-2023 Milestone Period

- None.

Growth, Offsets, and Trading

2020-2021 Milestone Achievements

- Provided new guidance documents that will help participants better understand the process for generating and transferring nutrient credits.

- Implemented an oyster harvest verification process to allow participation in its Water Quality Trading Program and registered the first trade of nutrient credits derived from oyster aquaculture.
- Updated the CBP partnership's Phase 6 suite of modeling tools with Maryland's own projections of growth in the urban sector.

2020-2021 Milestones Not Achieved

- None.

2022-2023 Milestone Strengths

- Continues to provide EPA with Maryland's own projections of growth in the urban sector.
- Explores the use of the Maryland Department of Planning's Growth Simulation Model to account for 2025 projected growth.
- Continues to update and maintain Maryland's land preservation datasets to inform the CBP partnership's Phase 6 suite of modeling tools.
- Supports ongoing Water Quality Trading Program Enhancements by (1) working to include credits from agriculture in the Water Quality Trading Program; 2) finalizing the Water Quality Trading Registry and online marketplace; and 3) working to increase the quantity of credit buyers in the program through encouragement of participation by non-traditional partners.

Key Areas to Address in 2022-2023 Milestone Period

- Continue to work with EPA in offsetting any new or increased nutrient and sediment loads in Maryland's portion of the Chesapeake Bay watershed.

Climate

In 2020, the Principals' Staff Committee (PSC) issued a directive that by 2022 all jurisdictions would account for the additional nutrient loads due to 2025 climate change conditions in a Phase III WIP addendum, or in the two-year milestones, if it had not already done so in its Phase III WIP. Maryland addressed the 2025 climate change loads in its two-year milestones and a Phase III WIP addendum. Therefore, this evaluation reflects the work and effort that Maryland put toward addressing the 2025 climate loads with the understanding that expectations related to 2025 climate change conditions could change as a result of future PSC decisions and future model updates.

At its August 29, 2022 meeting, the PSC decided to address "unaccounted additional loads" after 2025. The CBP partnership will define "unaccounted additional loads" and will determine how to address them. This decision came after Maryland completed the work and effort noted in this section to address the 2025 climate loads.

2022-2023 Milestone Strengths

- Created a Phase III WIP climate change addendum to address the additional nutrient loads due to 2025 climate change conditions, per the 2020 PSC directive. The CAST scenario, submitted as part of the WIP addendum, demonstrates an ability to account for the additional nutrient pollutant loads.

- Included narrative in its Phase III WIP climate change addendum to describe the current understanding of the 2035 climate change conditions.
- Committed to develop and publish a suite of indicators to communicate and measure progress on climate adaptation across Maryland.
- Targeted tidal restoration for carbon sequestration to meet both Chesapeake Bay water quality and Maryland's Atlantic Ocean acidification goals.
- Quantified the protective services of marsh, submerged aquatic vegetation, and living shorelines under current and future sea level conditions.
- Committed to increase the percentage of shoreline stabilization projects that use Living Shoreline practices and develop ways to evaluate and improve techniques in the face of climate change.

Key Areas to Address in the 2022-2023 Milestone Period

- None.

Other (BMP verification, Segment-shed Goals for the Tidal Jurisdictions, Local Engagement, etc.)

2020-2021 Milestone Achievements

- Updated siting and design criteria that maximize resiliency benefits for the construction or reconstruction of certain state and local capital projects.
- Completed the Maryland Economic Adjustment Strategy in July 2021 that supports sustainable forestry.
- Supported 10 research and development projects and invested in four Maryland companies through the Innovative Technology Fund. This fund is intended to develop new nonpoint source BMPs for nitrogen, phosphorus, and sediment reduction and expand partnerships with other programs that develop emerging technologies.

2020-2021 Milestones Not Achieved

- Did not report the number of projects funded through the Bay Restoration and Clean Water State Revolving Loan Funds.
- Did not complete the Maryland Healthy Watersheds Assessment that seeks to create a relative state watershed health baseline, on the segment-catchment scale, based on metrics known to influence watershed health, as well as identify vulnerability indicators.

2022-2023 Milestone Strengths

- Prioritizes Environmental Justice communities to implement enhanced compliance and pollution prevention efforts.
- Commits to establish a 5 Million Tree Program to support tree planting with an emphasis on urban underserved areas.
- Commits to complete all initial oyster reef restoration in the St. Mary's sanctuary and complete 100 acres of initial oyster reef restoration in the Manokin sanctuary.
- Establishes a partnership with Chesapeake Bay Trust to launch the Capacity Building Organization-Capacity Building Initiative that will identify historically under-engaged community-based organizations that have not previously participated in two grant programs - the Watershed Assistance Grant Program and the Resiliency Through Restoration Initiative.

- Provides support for a circuit rider in the Choptank watershed that will assist with BMP placement, design, and grant application assistance to implement practices in underserved areas within Maryland.

Key Areas to Address in the 2022-2023 Milestone Period

- None.

Potential Federal Actions and Assistance

As noted in its Phase III WIP evaluations, EPA remains prepared to assist each of the seven watershed jurisdictions in implementing the 2022-2023 milestones. EPA will work with each jurisdiction to develop a specific oversight and assistance activities to provide prioritized support for implementation efforts, including funding, technical assistance and analysis, training, and regulatory reviews.

EPA plans to continue to commit staff, contractual and funding resources to support the seven watershed jurisdictions in implementing the 2022-2023 milestones and future two-year milestones. This support includes evaluation of the most-effective practices and locations, annual funding assistance to address priority implementation needs, evaluation of Bay jurisdictions' implementation capacity under various staffing, funding, regulatory and programmatic scenarios, local planning outreach, legislative and regulatory gap analysis, and monitoring trend analyses.

In addition, EPA will continue to work with federal partners to provide leadership and coordinate with Bay jurisdictions on WIP and two-year milestone implementation to reduce pollutants from federal lands. EPA will continue its commitment to track annual progress of the Bay jurisdictions and make those results available to the partnership and the public. [See: https://www.epa.gov/chesapeake-bay-tmdl/epa-oversight-watershed-implementation-plans-wips-and-milestones-chesapeake-bay and https://www.chesapeakeprogress.com/

Monitoring Trends Summary

The CBP partnership's Chesapeake Bay Program Nontidal Water Quality Monitoring Network, supported by EPA, the U.S. Geological Survey (USGS), the Susquehanna River Basin Commission (SRBC), and the Bay jurisdictions, generates water quality monitoring data in freshwater rivers and streams throughout the watershed that is analyzed by USGS for nutrient and sediment loads and trends. The most recent USGS results (www.usgs.gov/CB-wq-loads-trends) over the long-term period 1985-2020 and short term 2009-2020 for most stations were made available in September 2020. New nutrient and suspended-sediment load and trend results became available for the nine River Input Monitoring (RIM) stations for the long-term period 1985-2020 and short term 2011-2020.

While identifying drivers behind individual trends is often complex, the monitoring results are worthy of Maryland's consideration as it develops the programs and BMPs planned for the next two years. EPA's initial summary of how the monitoring results in Maryland's watersheds can potentially inform planning are below.

- Trends are improving in the majority of Maryland's highest loading monitored watersheds for nitrogen and phosphorus. Implementing efforts in high loading areas can potentially yield the greatest nutrient reduction benefits. Most of Maryland's highest loading monitored

watersheds for nitrogen and phosphorus are agricultural, but the top two highest loading monitored watersheds for phosphrous are developed watersheds on the Western Shore. This information can be used to inform implementation efforts by sector and/or geographically.

- Trends in Maryland's monitored agricultural watersheds show that nitrogen and phosphrous are improving in some areas but degrading in others. While more information would be needed to determine what is driving individual trends, agricultural areas should be a continued focus for both nitrogen and phosphorus.
- Trends in Maryland's monitored developed watersheds show that nitrogen and phosphrous are improving. More exploration on what is occuring in these monitored watersheds can potentially reveal successful programs, policies, or practices.
- Trends at the two monitored watersheds on the Eastern Shore (Tuckahoe Creek near Ruthsburg, MD and the Choptank River near Greensboro, MD) continue to degrade for phosphorus. For nitrogen, the Tuckahoe is improving while the Choptank is degrading. While groundwater can contribute to a delayed response in nitrogen levels, phosphorus loads are most associated with overland runoff. This suggests the Eastern Shore should be explored as an area of focus for future milestones.