Historical and Projected Chesapeake Bay Restoration Spending

A Report to the Maryland General Assembly pursuant to the 2015 Joint Chairman's Report -page 225

Maryland Department of the Environment
Maryland Department of Natural Resources
Maryland Department of Agriculture
Maryland Department of Planning
Maryland Department of Budget and Management

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FINAL REPORT

Executive Summary

The Chesapeake Bay Total Maximum Daily Load (TMDL) is a comprehensive “pollution diet” to restore the health of the Bay and its local streams, creeks and rivers. The Chesapeake Bay TMDL – the largest such cleanup plan ever developed and implemented by the U.S. Environmental Protection Agency (EPA) in collaboration with Maryland and all Bay watershed states – sets limits on nitrogen, phosphorus and sediment pollution necessary to meet water quality standards in the Bay and its tidal rivers.

The Chesapeake Bay TMDL was prompted by a determination by EPA that insufficient progress had been made to restore the health of the Bay. The TMDL is designed to ensure that all pollution control measures needed to fully restore the Bay and its tidal rivers are in place by 2025, with at least 60 percent of pollution reductions completed by 2017 and those pollution loads maintained even as we grow beyond 2025.

Evaluation of Maryland’s current progress and the projections of the expected implementation practices indicate that the load reduction path to the year 2025 will not be linear. This is explained by evaluating individual source sector progress and projections for wastewater, agriculture, stormwater from developed areas, and septic systems, all of which are progressing at different rates. These differences reflect policy, engineering and funding realities.

From FY00 – FY15, the state spent over $ 6.58 billion on Chesapeake Bay restoration activities. This amount includes funding for activities that directly reduce nutrient and sediment inputs to the bay (e.g., cover crops and wastewater treatment plant upgrades), activities that indirectly support bay restoration (e.g., monitoring, education, outreach), and activities that prevent or minimize future degradation of the bay (e.g., Smart Growth and land conservation).

During the period (FY00 - FY14), the state successfully took actions that will reduce Chesapeake Bay loads of nitrogen by an estimated 11.9 m pounds (19% of goal) , of phosphorus by an estimated 0.7 m pounds (19% of goal), and of sediment by an estimated 291 m pounds (18% of goal). Corresponding reductions in bay water concentrations of nitrogen have been documented at 37 percent of long-term water

quality monitoring stations, reductions in phosphorus have been documented at 47 percent of monitoring stations, and reductions in total suspended solids at 12 percent of monitoring stations.

To meet the requirement of the Bay TMDL, the State must reduce pollution to the Bay by more than 10 million pounds of nitrogen and 0.5 million pounds of phosphorus from 2010 levels. These reductions will come, in aggregate, from four key source sectors collectively (point source wastewater, agriculture, urban stormwater, and on-site septics). Current estimates of nitrogen sources in Maryland indicate that agricultural lands represent about half the load, point source wastewater is about a quarter of the load, urban stormwater runoff contributes about 20% of the load and on-site septic systems contribute about 5% of the load.

Projections forward from FY16 through 2025 indicate that continued progress to meeting Maryland's goal is achievable but challenging. As we approach the 2017 mid-point assessment and begin to develop the Phase III Watershed Implementation Plan we have the opportunity to place Maryland on a fiscally responsible path to 2025. The third phase in the process, to be completed by the end of 2018, will be to refine the implementation strategies to ensure that the necessary policies, regulations, and financing structures are in place to achieve restoration success in the long-term (2025 and beyond) and also address critical issues such as the sediment and associated nutrient build up behind the Conowingo Dam.

Under the authority of the Chesapeake Bay TMDL Accountability Framework, all Bay watershed States are required to meet 60% of the Bay TMDL required load reductions by 2017 and 100% by 2025. Primary pollution reduction drivers in Maryland are: 1) Use of the Bay Restoration Fund (BRF) for upgrades to major wastewater treatment plants; 2) Implementation of agricultural pollution reduction practices funded through the Maryland Agricultural Cost Share Program, BRF and the Chesapeake Bay & Atlantic Coastal Bays Trust Fund (Trust Fund); 3) Atmospheric pollution reductions resulting from the Clean Air Act; and 4) NPDES Municipal Separate Storm Sewer System (MS4) Permit requirements.

A 2015 assessment by the University of Maryland Environmental Finance Center reported that "Our analysis indicates that the resources are in place to achieve interim and final restoration targets. In other words, no new state-based fees or taxes are required moving forward." This conclusion is based upon three important caveats.

First, the State applies its expected excess WWTP allocation (i.e. urban growth capacity) to offset expected shortfalls in the stormwater and septic sectors, and then builds the capacity for growth back into the system. Second, the current level of environmental regulation will be maintained within each of the four pollution sectors and that enforcement will be consistent and effective. And third, that the current State Chesapeake Bay grant programs (primarily the BRF and Trust Fund) are fully funded through 2025 and the funds allocated in the most cost effective manners possible.

The EFC's conclusion that Maryland has the resources to achieve its 2025 TMDL requirements is encouraging and the Governor's Bay Cabinet recognizes the economic, social and policy challenges associated with the caveats above. Accordingly there are six elements of Maryland's Bay Restoration Framework that will be used to address the EFC caveats and guide the State's strategies moving forward.

1. Use WWTP growth allocations wisely to preserve future options for local growth and identify solutions to build capacity back into the system.

2. Mitigate the future impact of growth in pollutant loads

3. Focus on pollution reduction targets and transition to a credit based financing and accounting system.

4. Reaffirm that restoration responsibility starts and ends with the States.

5. Complete a strategy to address the estimated $5.1 billion cost to implement remaining nutrient and sediment reductions.

6. Recognize that success doesn't end in 2025.

In summary, Maryland is expected to reach its Chesapeake Bay TMDL 2017 pollution reduction goal and the 2025 goal is within reach. Maryland's framework for achieving the Chesapeake Bay nutrient and sediment reduction targets by 2025 recognizes the need to use State revenues in the most cost-effective, fiscally responsible ways. The framework also recognizes that progress among pollution source sectors is uneven over time and that expected shortfalls in some urban sectors might need to be covered by anticipated surpluses in the wastewater sector on a temporary basis. Finally, successful Bay restoration must include, in addition to traditional tools, innovative financing, transparent public-private partnerships, and market-based approaches that drive costs down and promote break-through technologies.

Introduction

Maryland's recent policies and programs have placed the State on a path toward achieving its share of the Chesapeake Bay nutrient and sediment pollution reduction target by the year 2025. These reductions are necessary to achieve a restored Chesapeake Bay and meet obligations under the federal Clean Water Act.

Figure 1: Total Delivered Nitrogen Loads by Sector

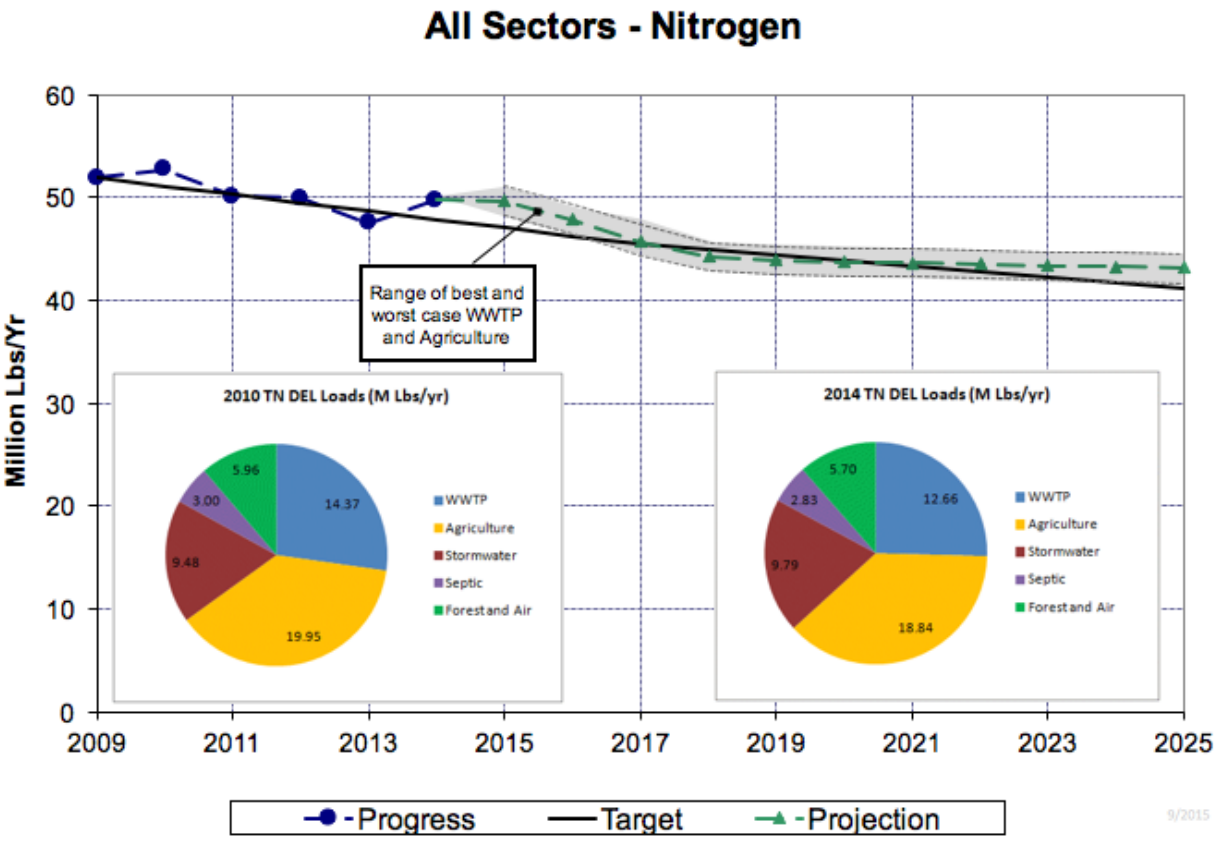


Figure 1 shows the trajectory of total nitrogen load delivered to the Bay from Maryland sources and projected future load reductions.

With the policies and programs in place, particularly the Bay Restoration Fund and the Chesapeake and Atlantic Coastal Bays Trust Fund, Maryland continues to make progress toward the TMDL pollution reduction goal (Figure 1). These initiatives have doubled the rate of nitrogen load reduction and are necessary to meet our collective goal of a restored Chesapeake Bay. Also, these actions have addressed all pollutant sources including wastewater discharges, septic systems, agriculture, stormwater runoff

and atmospheric deposition. The Bay Restoration Fund in 2012 set in motion the construction of enhanced wastewater treatment facilities to help the State meet its 2017 interim target and 2025 final target.

As a note of caution, although this graph shows Maryland on a path to reach the 2025 final target, it does not identify the significant shortfalls in meeting reduction goals for septic systems and urban and suburban stormwater. Wastewater treatment plants make up these shortfalls by going beyond their reduction targets at 2025. This cautionary note highlights the policies needed to account for growth and the need to restore future capacity at wastewater plants after 2025.

This document is presented in three distinct parts. First, a brief background is presented on the Chesapeake Bay Restoration that is now under the TMDL Clean Water Act Framework. Second we document current Maryland State spending on Bay Restoration up through FY15, the resulting estimated pollutant load reductions, and observed changes in water quality based on trends. The third section will focus on the overall framework needed to achieve the 2025 goal of having all best management practices in place to meet the required water quality standards for restoring the Bay.

Part I: The Chesapeake Bay TMDL Accountability Framework

In 2010, the United States Environmental Protection Agency (EPA) established pollution load limits to restrict three major pollutants fouling the Chesapeake Bay's waters: nitrogen, phosphorus and sediment. These loading limits, which set clear goals for reducing excess pollution, are estimates of the amount of each substance the Chesapeake Bay and its tributaries can receive and still meet standards for clean, healthy water. The goals, or pollution reduction targets, require the seven jurisdictions in the Chesapeake Bay watershed (Maryland, Virginia, Pennsylvania, Delaware, West Virginia, New York and the District of Columbia) to have pollution reduction practices in place by the year 2025 that will achieve these goals.

To ensure that all pollution control measures needed to restore water quality in the Chesapeake Bay and its tidal waters are in place by 2025 (with practices in place by 2017 to achieve 60 percent of the necessary pollutant load reductions), EPA developed an accountability framework, consisting of the Bay TMDL "pollution diet" and the following four elements:

1. Bay jurisdictions' development of Watershed Implementation Plans (WIPs);
2. Bay jurisdictions' development of 2-year milestones to demonstrate progress;
3. EPA's commitment to track and assess the jurisdictions' progress by implementing a Chesapeake Bay TMDL Tracking and Accountability System (BayTAS); and
4. EPA's commitment to take appropriate federal actions if the jurisdictions fail to:
    a) develop sufficient WIPs,
    b) effectively implement their WIPs, or
    c) fulfill their 2-year Milestones.

To provide reasonable assurance that the Bay TMDL pollutant reduction goals will be achieved, EPA directed the Bay jurisdictions to develop watershed implementation plans (WIPs) that detail specific actions each will take to meet their pollution reduction

goals by 2025, and to achieve at least 60 percent of the necessary reductions by 2017. EPA recognized that the level of detail it expects the jurisdictions to include in their WIPs would take time to develop and divided the process into three distinct phases with specific expectations:

Phase I - Divide state-major basin target loads among non-point and point sources in 92 segments of the Bay. Identify strategies and practices to be put in place by 2017 to achieve 60 percent of the necessary pollutant load reductions.

Phase II - Further divide load allocations among smaller geographic areas to help local decision-makers better understand their contribution to and responsibilities for reducing pollutant loads. Refine Phase I strategies in collaboration with key local partners to further ensure that the 2017 interim reduction targets will be met.

Phase III - Make any mid-course adjustments to reduction strategies based upon new information, such as an increased understanding about phosphorus saturated soils, the changing conditions (infill) behind the Conowingo Dam and water quality impacts from a changing climate. States will also provide additional detail with respect to management actions and practices to be implemented in the 2018-2025 timeframe to meet final 2025 targets. Propose any refinements to the Bay TMDL allocations, to be submitted to EPA in 2018.

Part II: Bay Restoration Progress to Date (FY00 - FY15)

BAY RESTORATION FUNDING: The Governor's annual Budget Highlights included a table of "Chesapeake Bay Restoration Activities Funded in the Budget". A gross summary table of FY00 – FY15 Bay Restoration spending is provided below (Table 1) and a more detailed table is attached as Appendix 1.

Several important caveats should be acknowledged when interpreting these tables.

Table 1: FY00-FY15 Bay Restoration Funding Summary

Category	Total FY00 - FY15 Funding Amount
Bay Cabinet Agencies (DNR,MDE,MDA,MDP) Bay restoration related operating funds	$3,900 M
Land Conservation (POS and Rural Legacy)	$578 M
Agricultural Land Preservation	$461 M
GO Bonds	$1,288 M
Transportation (FY15 only)	$325 M
Education (FY15 only)	$35 M
Total	**$6.58 B**

1. Data is not consistent over time: Records are less accessible and, therefore, reported funding amounts less reliable for the beginning of this time period than more recent years.

2. Not all Bay Restoration funding goes directly to reducing pollutant loads to Chesapeake Bay: "Bay Restoration" involves a diversity of important functions beyond simply reducing the amount of nitrogen, phosphorus, and sediment entering the Chesapeake Bay. For example, water quality monitoring is essential to track progress and direct future actions to the most cost effective practices; education and outreach are important to providing Maryland students and citizens with access to and appreciation for a restored Bay; and Smart Growth and land conservation programs minimize growth impacts and protect the Bay from future degradation. All of these examples (and others) are essential aspects to Bay Restoration, but do not directly result in reductions in pollutant loadings to the Bay. As a result, it is inappropriate to simply divide the total cost presented in this report by the number of pounds pollutant reduction to get a dollar amount per pound reduced.

3. Judgment calls are necessary in identifying a program as "Bay Restoration": Many state agency programs and budget categories contribute to Bay Restoration as well as other non-bay related efforts. In an effort to remain as consistent as possible, only those programs that have more than 50 percent of their activities related to Chesapeake Bay restoration are included in this analysis.

Although the annual restoration funds for the four agencies (DNR,MDA,MDE,MDP) vary from year to year, the total restoration funds for the first three years of the evaluated time period (FY00 – FY02) was $882,327,165, while the total for the past four years of the period (FY12 – FY15) was $2,383,507,560, an increase of 170 percent. This increase was driven in part by the two primary Bay restoration Special Funds: The Bay Restoration Fund (MDE) and the Chesapeake and Atlantic Coastal Bays Trust Fund (DNR).

BAY RESTORATION PROGRESS AND LOADING TRENDS: The EPA Chesapeake Bay Program Model takes our best scientific understanding of the amount of nitrogen, phosphorus, and sediment running off of different land use types in the watershed, applies it to our current use of land in Maryland, and calculates the resulting amount of those pollutants entering Chesapeake Bay from Maryland. The Model assumes that there is no delay between when a pollutant leaves a parcel of land in the watershed and when it finally enters the Bay. In reality, there is such a delay, but it is extremely difficult if not impossible to quantify at this point. The Model, therefore, is predicting what will happen at some point in the future based on our actions.

The estimated modeled reductions in nitrogen, phosphorus, and sediment loads to the Chesapeake Bay from 2000 to 2014 as a result of our actions are presented in Figure 2. As per the Model, Maryland's actions have been successful at reducing nitrogen loadings by 19 percent, phosphorus loadings by 19 percent, and sediment loadings by 18 percent. In last year's report it was noted that progress from 2000-2013 was 23 percent for nitrogen, 17 percent for phosphorus, and 21 percent for sediment. The 2014 progress shows less progress due to a variety of factors described below.

Figure 2 displays the nitrogen, phosphorus, and sediment loads to the Chesapeake Bay from the Maryland portion of the watershed. Loads are provided for the years 2000 and 2014, and are obtained from computer simulations from the Chesapeake Bay Program Phase 5.3.2 Watershed Model. Comparisons are difficult to assess because the changes in loads between years are the effect of many changing inputs. Changes in loads can result from changes in conservation practices, land use, air deposition, animal population estimates, septic systems, and precipitation. A description of the changes that occur in each sector are as follows:

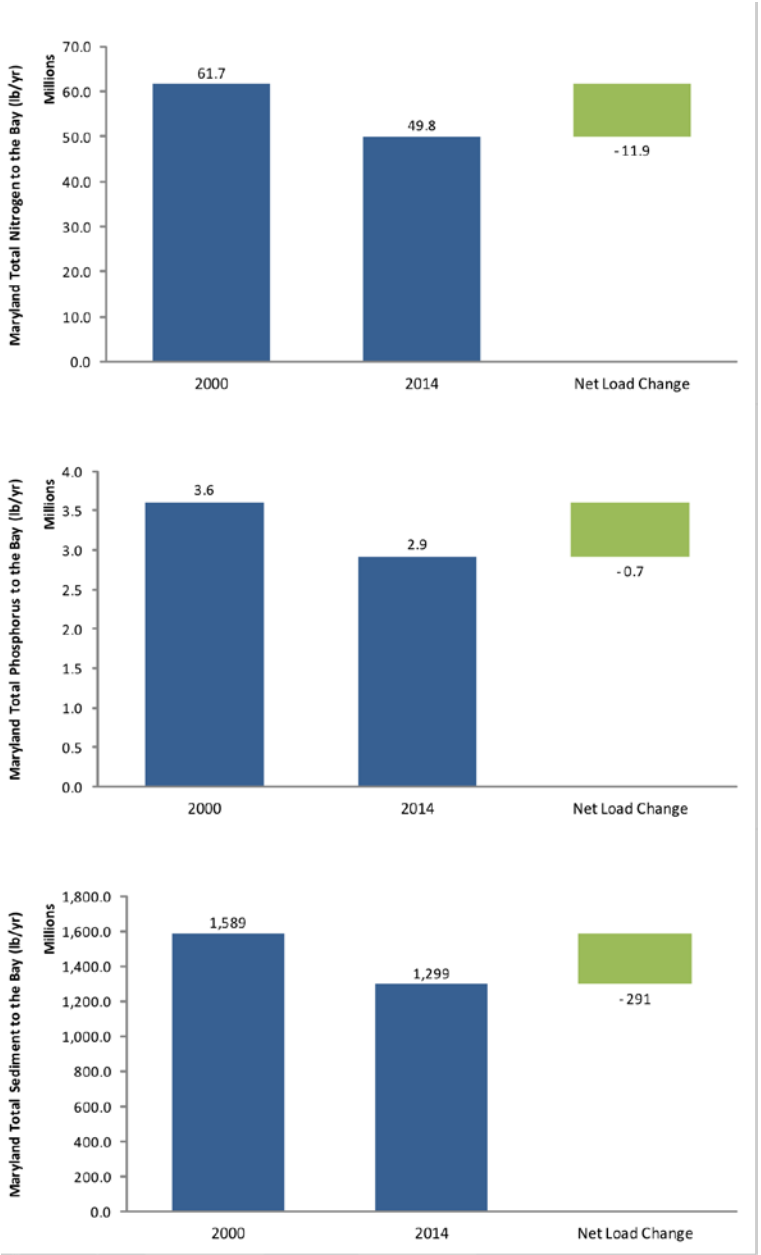
Figure 2: Maryland Modeled Loads of Nitrogen, Phosphorus and Sediment from 2000 - 2014

- *Agriculture:* The agriculture sectors sees reduction both from management practices as well as the loss of land to development.

- *Urban Stormwater:* Atmospheric deposition is a major nitrogen source in the urban environment. Implementation of air pollution reduction strategies in the region is a key driver of nitrogen reduction.

- *Septic Systems:* Reductions are from system upgrades and connections to wastewater treatment plants.

- *Wastewater:* Changes in the loads from wastewater treatment plants are a combination of the upgrades of municipal plants, closures of industrial facilities, growth, and the impact of year-to-year rainfall variability.



CHESAPEAKE BAY MONITORING DATA: In order to understand the health of the Chesapeake Bay and track progress of Chesapeake Bay restoration efforts, the State of Maryland through Maryland Department of Natural Resources regularly monitors

Maryland's tidal and non-tidal waters at 125 sites. Based on statistical analysis of monitoring data collected from 1999 through 2014, the current impact of historical Chesapeake Bay restoration spending shows reductions in nutrient and sediment concentrations in both non-tidal and tidal areas (Nitrogen 37%, Phosphorus 47% and Sediment 12%)These are represented in Figures 3,4, and 5.

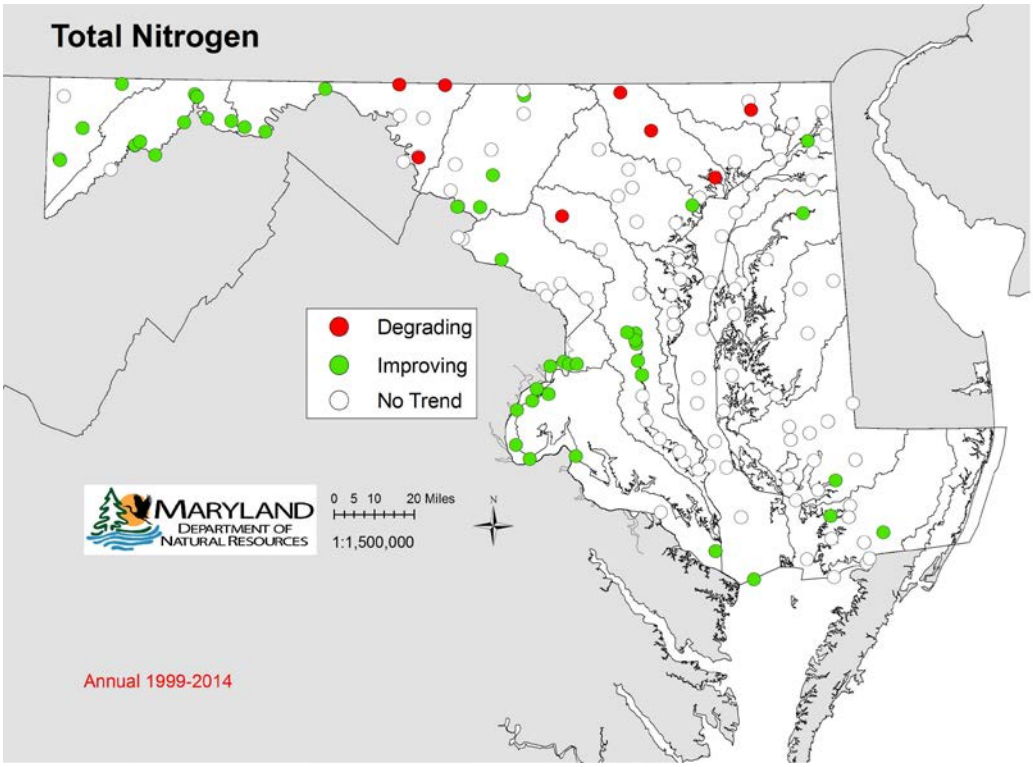


Figure 3: Total Nitrogen
37% of stations (46 of 125) are showing improving conditions since 1999.
6% of stations (8 of 125) are showing degrading conditions since 1999.
57% of stations (71 of 125) are showing no change in conditions since 1999.

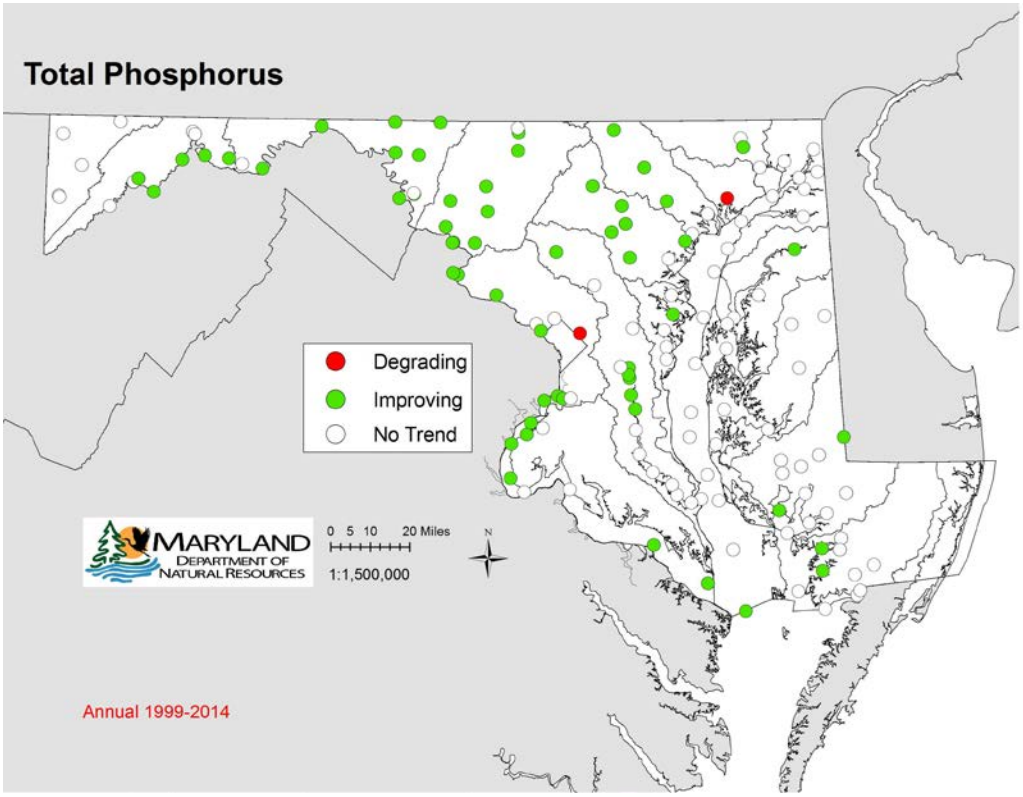


Figure 4: Total Phosphorus
47% of stations (59 of 125) are showing improving conditions since 1999.
2% of stations (2 of 125) are showing degrading conditions since 1999.
51% of stations (64 of 125) are showing no change in conditions since 1999.

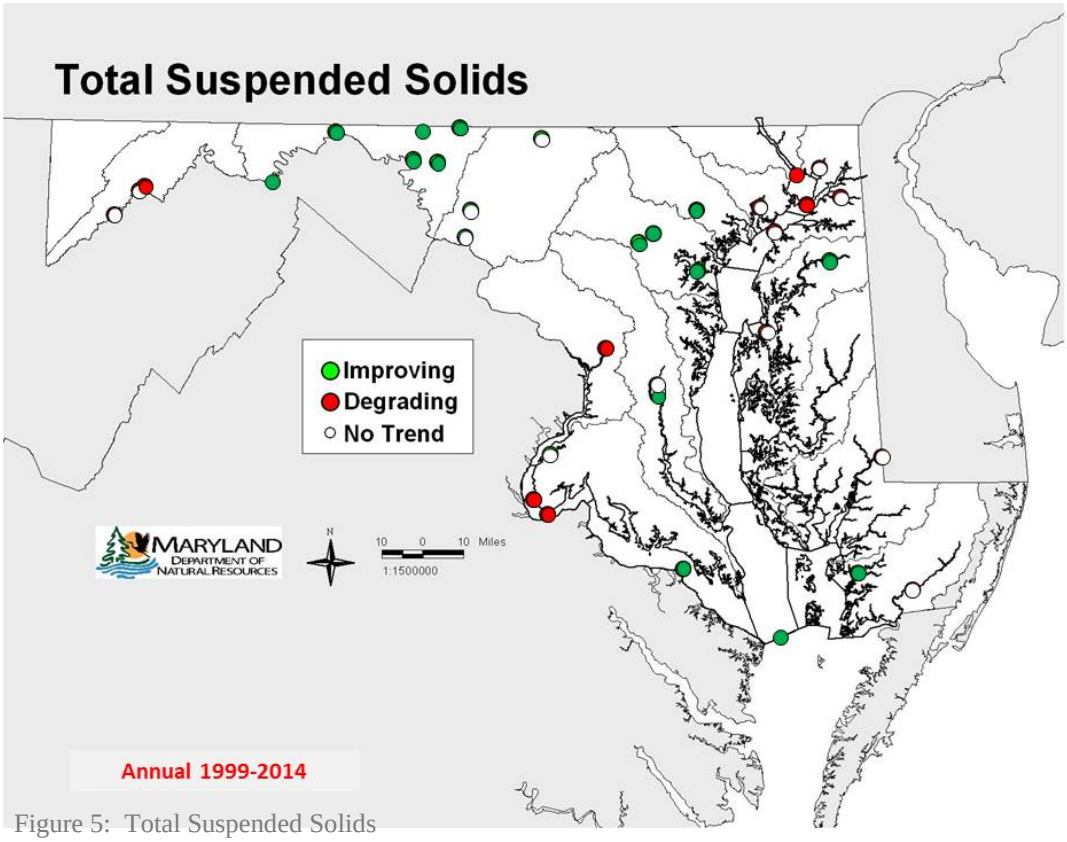


Figure 5: Total Suspended Solids
12% of stations (15 of 125) are showing improving conditions since 1999.
5% of stations (6 of 125) are showing degrading conditions since 1999.
83% of stations (104 of 125) are showing no change in conditions since 1999.

While the water quality conditions are improving due to nutrient and sediment reductions in the non-tidal areas, additional improvements are required to see corresponding improvements in tidal Chesapeake Bay dissolved oxygen, water clarity and chlorophyll a (Figures 6,7,and 8).

Chesapeake Bay Restoration: Dissolved Oxygen

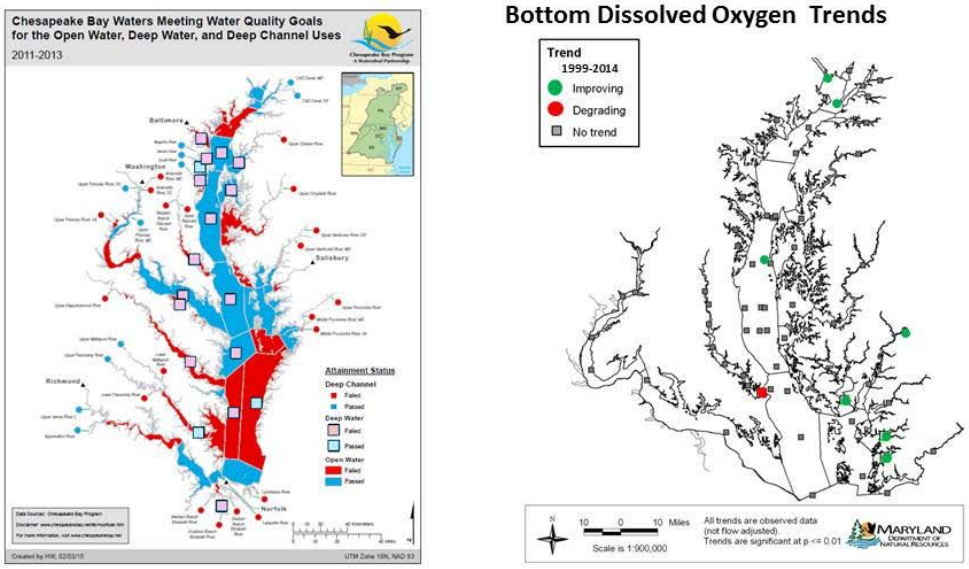


Figure 6: Dissolved Oxygen
10% of stations are showing improving conditions since 1999.
1% of stations are showing degrading conditions since 1999.
89% of stations are showing no change in conditions since 1999.
Maryland is failing the majority of the dissolved oxygen criteria for the tidal Chesapeake

Chesapeake Bay Restoration: Water Clarity

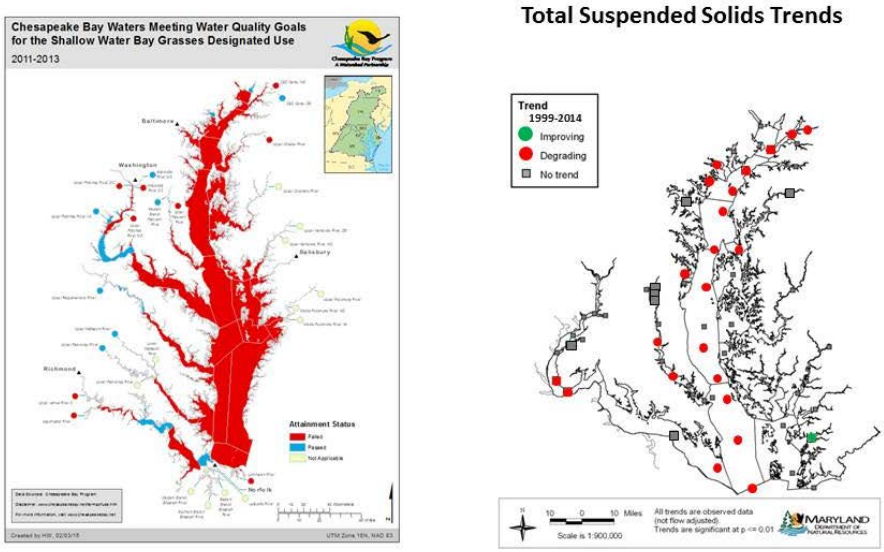


Figure 7: Water Clarity
1% of stations are showing improving conditions since 1999.
31% of stations are showing degrading conditions since 1999.
68% of stations are showing no change in conditions since 1999.
Maryland is failing the majority of the water clarity criteria for the tidal Chesapeake Bay

Chesapeake Bay Restoration: Chlorophyll a

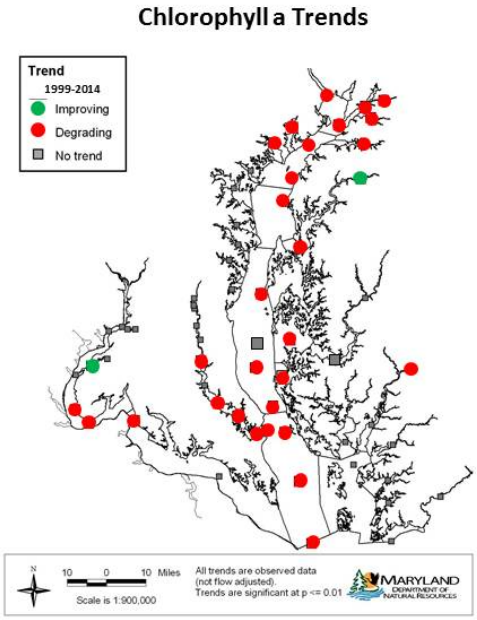


Figure 8: Chlorophyll a
3% of stations are showing improving conditions since 1999.
41% of stations are showing degrading conditions since 1999.
56% of stations are showing no change in conditions since 1999.
There are no quantitative “chlorophyll a” criteria for Maryland’s tidal Chesapeake Bay areas.

Part III: Framework for Bay Restoration 2015 - 2025

The first two phases of the Watershed Implementation Plan (WIP) process established the pollution targets, responsibilities and initial strategies for achieving the required pollution reductions. The third phase in the process, to be completed by the end of 2018, will be to refine the strategies to ensure that the necessary policies, regulations, and financing structures are in place to achieve restoration success in the long-term (2025 and beyond). This section of the report provides recommendations and next steps for establishing the foundation for that success.

The following framework focuses on the necessary role of the State and the associated policies and financing resources needed for a successful restoration effort. Achieving pollution reduction targets will require the resources and engagement of multiple stakeholders and entities —public and private—working in concert over the coming years. The following framework is intended to address the capacity of the State to lead the restoration effort subject to several key technical parameters.

BACKGROUND – POLLUTANT SOURCE SECTOR STATUS

The State must reduce its pollution to the Bay by more than 10 million pounds of nitrogen and 0.49 million pounds of phosphorus from 2010 levels. These reductions will come, in aggregate, from four key source sectors collectively (point source wastewater, agriculture, urban stormwater, and on-site septics).

Point Source Wastewater: Wastewater now represents about 25% of the nitrogen load in Maryland. The wastewater treatment in Maryland represents a true water quality financing and water quality improvement success. The combination of regulations with a dedicated and consistent revenue stream in the form of the Bay Restoration Fund (BRF) resulted in pollution reductions in the wastewater sector that also provides for future growth.

By 2017, investments from the Bay Restoration Fund will result in upgrades to most of Maryland's 67 major wastewater treatment plants (WWTPs). As of September 2015, 41 upgrades were completed, 20 were under construction and 6 were under design/planning. Minor WWTPs are also being upgraded using BRF funding. As of September 2015, three (3) are in operation, four (4) are in construction, eight are under design/planning stages. Minor plants will continue to be upgraded after 2017.

The next two years are very important for this sector because completion of the upgrades are planned at the two largest WWTPs in Maryland. Together with Blue Plains, which completed upgrade in April of 2015, three largest plants alone are expected to decrease nitrogen by about 4 million pounds.

After 2017, the major WWTPs will be upgraded to ENR levels and the largest reductions will have been realized. As a result of the ENR upgrades, wastewater sector will be below its allocations – in other words, the amount of nutrients collectively released by all Maryland major WWTPs into the Chesapeake Bay will be less than what is allowed by the TMDL (i.e. the wastewater sector will have exceeded its goal). This accomplishment was planned as a means of allowing future growth in these urbanized areas and the resulting opportunities for economic growth without negatively impacting Maryland's Bay restoration goals. However, as explained in more detail below, Maryland may have to temporarily loan this available wastewater sector allocation to make up for expected pollution reduction shortfalls in the stormwater and septic sectors in order to achieve the TMDL target in 2025. If so, new strategies and priorities are needed to address wastewater sector growth allocation and to maintain the TMDL target load after 2025.

Agricultural Lands: Nutrient loads from agricultural lands account for about half of the nutrient loads in Maryland. Implementing nutrient management plans, soil conservation plans, planting cover crops, and maintaining buffers continue to be significant nutrient reduction practices for agricultural load reduction. The practices are funded in large part through the Chesapeake & Atlantic Coastal Bays Trust Fund (Trust Fund) and Maryland Agricultural Cost Share (MACS) Program.

Additionally, the Hogan Administration implemented the Agricultural Phosphorus Initiative, which will provide solutions through implementation of the phosphorus management tool (PMT) and performing an on-farm economic analysis to inform the resource needs for a more effective PMT implementation statewide. This action enacts an immediate ban of additional phosphorus on soils highest in phosphorus; and provides comprehensive information on soil phosphorus conditions statewide to monitoring trends and provides opportunity to redistribute manure. It will also provide adequate time for farmers to fully understand and plan for new requirements, phase-in full implementation by 2022, and assures agricultural producers that critical elements are available for implementation.

Urban Stormwater: Urban stormwater represents about 20% of the nitrogen and phosphorus load in Maryland and is perhaps the most significant financing challenge associated with the Bay restoration effort. More than 80% of the Maryland urban stormwater nitrogen and phosphorus load is under the authority of permits (Phase I, II, construction). The State has issued NPDES Municipal and Separate Storm Sewer System (MS4) Permits for the regulated Phase I jurisdictions and SHA, requiring nutrient reductions associated with 20% impervious area restoration over the next five-year permit cycle in accordance with the Maryland WIPs.

Recognizing the need for a consistent and efficient restoration projects/permit review process, MDE is committing additional staff resources for the review; working with the U.S. Army Corps of Engineers on ways to condense processing times; and is developing better guidance for the assessment of stream and wetland systems to better evaluate existing conditions and predict ecological uplift.

Senate Bill 863, passed in the 2015 General Assembly and signed into law by Governor Hogan, allows jurisdictions to collect a stormwater remediation fee, and requires them to hold a public meeting on their financial assurance plan and to submit them to MDE for review and approval. The stormwater sector will require more time to meet its WIP allocations resulting in a load reduction gap for this sector in 2025. The State projects that the gap could be closed.

On-Site Septic Systems: The septic sector contributes about 6% of Maryland's nitrogen load to the Bay. The State continues to enforce regulations that new systems require the use of Best Available Technology (BAT) and failing systems in the Critical Area require upgrades to BAT. Bay Restoration Funds are directed toward about 1,200 systems per year. Through recent changes in the eligible uses of the BRF, there may be greater opportunity to use these funds to connect more areas of septic systems in the Critical Area to advanced wastewater treatment plants. These strategies will not meet the septic reductions specified in the WIP in 2025. The State projects that the gap could be closed using wastewater sector load reductions and its available growth allocation similar to stormwater. The State is reviewing regulatory reform proposals and developing strategy options for meeting septic system targets. Because septic upgrades are very expensive per pound, the state is currently evaluating market based approaches for reducing the cost and improving the environmental outcome.

Clean Air Act Role: Atmospheric deposition is a major nitrogen source in the urban environment. Implementation of air pollution reduction strategies is a key driver of nitrogen reduction. We will realize our next significant atmospheric deposition reduction during a fuel change in 2017.

Conowingo Dam: The state recognizes the ongoing risks and uncertainties surrounding sediments and nutrients building up behind the dam. Continued analysis of impacts on the Bay and equities among the parties and jurisdictions involved will be important factors as the state considers revisions to the Bay model, state WIPs, and CWA section 401 water quality certification as part of the FERC dam relicensing process.

REPORT FROM THE UNIVERSITY OF MARYLAND ENVIRONMENTAL FINANCE CENTER

A 2015 assessment by the University of Maryland Environmental Finance Center (EFC) of Maryland's Bay restoration progress to date, necessary future progress to meet the 2025 goals, and available resources stated that, "Our analysis indicates that the resources are in place to achieve interim and final restoration targets. In other words, no new state-based fees or taxes are required moving forward."[1] (Maryland's Chesapeake Bay Restoration Financing Strategy Report, University of Maryland Environmental Finance Center, February 2015).

The report also surmises that success will be primarily the result of the state's aggressive efforts to finance advanced wastewater treatment, which enabled reductions in that sector to go beyond those required in the TMDL and the WIP. In addition, the state's implementation estimates do not account for increased population growth. As a result, ultimately achieving and maintaining reduction targets will require a concerted effort on the part of the State to build the capacity for population growth back into the financing and implementation process.

The EFC's conclusion, however, is based on three important caveats, each of which is associated with significant policy implications as the state moves forward.

[1]The EFC study considered only a broad analysis of capital needs. This finding does not consider operational needs, such as the resources necessary to verify the long-term inspection and maintenance of various pollution control practices, which if not done could result in the loss of credit for practices implemented in the past.

EFC Report Caveat #1: The State applies its expected excess WWTP allocation (i.e. urban growth capacity) today to offset expected shortfalls in the stormwater and septic sectors and then builds the capacity for growth back into the system.

Given the State's current financial, regulatory and policy framework, we do not expect the urban stormwater and septic system pollution sources to meet their 2025 pollution reduction targets. As a result, the State must decide by 2025 whether to temporarily loan some or all of the unused future WWTP growth allocations to cover the stormwater and septic system shortfall, implement as-yet known alternative pollution control practices, or acknowledge failure to achieve Maryland's Bay restoration target. If allocations are loaned from wastewater to stormwater/septic, then assurances, with contingencies, must be established to ensure wastewater capacity is restored when needed. Otherwise, economic growth within our cities, towns and other communities on sewer systems would be inhibited, thereby encouraging development of farmland and forest land, which the State is trying to preserve. It would also hurt the financial condition of local governments that have paid for WWTP growth capacity. The specifics of implementing the concept of loaning, and eventually repaying, WWTP growth allocations have not yet been determined, and impacts to growth patterns and local government finances could still occur if not managed carefully. Ideas for ensuring WWTP growth allocation loans are repaid in a timely way include: continued implementation of the five-year MS4 permits after 2025; replace septic systems as they fail well beyond 2025; and, mitigate new growth in loads through growth offset regulations and policies.

EFC Report Caveat #2: Assume that the current level of regulation will be maintained within each of the four pollution sectors and that enforcement will be consistent and effective.

There are two options available to the state for addressing pollution load reductions: assigning responsibility through regulation or directly financing reductions. If permit requirements are not upheld, then it will be the state's responsibility to finance those associated pollution reductions, which would in turn require additional revenue sources. This ultimately means that permitted entities are held responsible for financing and meeting their permit requirements.

Traditionally, a private entity that receives a permit is held responsible not only for meeting the permit requirements, but for covering the financial costs necessary to do

so. The State is within reach of achieving its 2025 TMDL requirements with current funding levels, but only if it is assumed that permitted entities cover the costs of meeting their permit requirements and the State funding is used to address non-permitted cost effective restoration responsibilities.

EFC Report Caveat #3: Current State Chesapeake Bay grant programs are fully funded and applied in the most cost effective manners possible.

Maryland has taken the steps necessary through creation of the Bay Restoration Fund and the Trust Fund to ensure two dedicated and significant fund sources to assist in meeting the State's 2025 TMDL requirements. These two fund sources are expected to collectively generate approximately $1B by 2025. The EFC report estimates that the total cost to achieve the remainder of our 2025 TMDL requirements is approximately $5.1B. However, if the State temporarily loans the excess WWTP allocation to address an expected shortfall (Caveat #1 above) and holds permit holders (including MS4 jurisdictions) responsible for the costs of meeting their permit requirements (Caveat #2 above), then the $1B generated through a fully funded BRF and Trust Fund is estimated to be sufficient to cover the remainder of the gap to 2025 if the funds in these two programs are applied in the most cost effective manner possible. This means that funds in these programs must be applied in ways that realize the greatest pounds of nutrient or sediment reductions per State dollar spent. Inherent in this is the critical need for the State to maintain its Bay restoration effort grounded in sound monitoring, assessment, and science. It is essential to not only track progress in a technically robust manner, but to continually evaluate and apply the latest scientific guidance in Bay restoration.

Implementing this approach will mean changing the State's current process for allocating these funds – including eliminating set-asides for less cost effective Bay restoration practices and adhering to pre-determined pollution sector allocations. Paying for the largest number of pounds of nutrient/sediment reduction per State dollar must be the driving force in allocating these funds

MARYLAND'S BAY RESTORATION FRAMEWORK

The EFC's conclusion that Maryland has the resources to achieve its 2025 TMDL requirements is encouraging and the Governor's Bay Cabinet recognizes the economic, social and policy challenges associated with the caveats above. To address these

challenges and meet appropriate EFC conditions, the Cabinet is working through a list of key elements or approaches which can be found at the conclusion of this section.

A key message from the EFC is that projected total nitrogen and phosphorus reductions in Maryland are on track to achieve the 2017 interim goal and the 2025 final targets are within reach, even with shortfalls by septics and stormwater. Current estimates by the EFC indicate that meeting the targets will require full funding of existing Chesapeake Bay grant programs. Maryland's successful effort to achieve reduction targets will also largely be the result of aggressive implementation efforts and collaboration within the agricultural, point source wastewater management and urban stormwater sectors.

When looking toward 2025 and accounting for loads from the four key pollution sectors collectively (agriculture, point source wastewater, urban stormwater, and onsite wastewater or septic), the state will reduce more than 10 million pounds of nitrogen and 0.49 million pounds of phosphorus. Changes that increase our current nutrient loads, decrease the number of annual and new nutrient reduction practices, or diminish appropriate responsibilities of permitted entities (e.g., MS4 jurisdictions) could prevent us from meeting our 2025 reduction targets.

Accordingly the following six elements of Maryland's Bay Restoration Framework will be used to address the EFC caveats and guide the State's strategies moving forward

1. ***Use WWTP growth allocations wisely to preserve future options for local growth and identify solutions to build capacity back into the system***: Although the stormwater and septic system sectors are projected to fall short of their 2025 nutrient loading targets, the municipal wastewater sector is projected to be further ahead of its target with capacity to grow. This provides an opportunity to cover the shortfall in the stormwater and septic sectors with the surplus in the wastewater sector temporarily. If the wastewater surplus is effectively loaned to cover the shortfall, the State would need to establish mechanisms to ensure future wastewater growth capacity is available when needed after 2025. This suggests that continued reductions from stormwater and septic systems will be necessary after 2025. To ensure success, we will need a full toolbox including grants, low interest loans, trading, public-private partnerships, and permit flexibility that allows for innovation.

2. ***Mitigate the future impact of growth in pollutant loads:*** Although the State has some policies and procedures to account for and offset new pollutant loads, they are not necessarily comprehensive or effective. Consequently, future state and local

governments are at risk of paying for the mitigation of new pollution generated by the private sector in the future. To address this risk, the state should continue to invest in land protection efforts that focus on minimizing pollution and maintaining pollution reductions over time. The state must also develop policies for managing the distribution of nutrient allocations among sources over time in a transparent way. As a result, the pollution impacts of any growth in pollution loads must be mitigated to successfully maintain the pollution cap. We believe there are opportunities for market systems such as nutrient trading and mitigation banking, to reduce the costs of future mitigation efforts.

3. ***Focus on pollution reduction targets and transition to a credit based financing and accounting system:*** The State is in a position to establish a credit based financing and accounting system that would serve as the foundation for water quality investments into the future. Achieving and maintaining final pollution targets must remain the primary goal. Restoration success is possible and a more efficient, market-based approach to financing will reduce costs and accelerate implementation, ultimately resulting in a restored Chesapeake Bay in the long-term. In short, achieving restoration success efficiently and cost-effectively requires a commitment to implementation and investment, and it is an investment that we believe will pay significant dividends to the citizens of Maryland and the rest of the watershed.

4. ***Reaffirm that restoration responsibility starts and ends with the States:*** The U.S. EPA delegates responsibility to the states to implement key provisions of the federal Clean Water Act, which includes establishing the Bay TMDL allocations and WIPs. Although the WIPs assign responsibility for load reductions across the public and private sectors, it is ultimately the Bay States that are being held accountable for achieving restoration goals. Maryland is uniquely situated to use a combination of existing and new tools to advance the implementation process. In addition to technical, financial, and regulatory tools, the State has the opportunity to fully embrace nutrient pollution trading, mitigation banking, and innovative public-private partnerships to advance successful implementation. Maryland and other Bay Program states should also put increasing pressure on upstream states, such as Pennsylvania and New York, to reduce nutrient and sediment pollution.

5. ***Complete a strategy to address the estimated $5.1 billion cost to implement remaining nutrient and sediment reductions:*** Given that restoration success will require achieving stipulated pollution reductions, accomplishing the reductions goals

will come with costs. Based on an analysis of each of the four primary pollution sectors, the University of Maryland Environmental Finance Center (EFC) estimated that the remaining cost for reducing existing sources of pollution to the 2025 targets will be approximately $5.1 billion at an average cost of $66 per treated pound of nitrogen. Point source wastewater costs included debt financing only. Urban stormwater includes an estimate for MS4 permit compliance up to 2025, including Maryland SHA. Spending on septic upgrades is assumed to be level.

The majority of these costs, approximately 65% or $3.3 billion, are associated with meeting urban stormwater management permit obligations by the ten Phase I MS4 jurisdictions and the State Highway Administration (SHA). SHA, a State entity, has an estimated implementation cost to the State of approximately $690 million. The remaining $2.7 billion is the responsibility of the other ten permitted local jurisdictions. At the time the EFC report was drafted, stormwater fees in those ten jurisdictions were estimated to generate about $1.2 billion over the next ten years, leaving a gap of approximately $1.5 billion. This Stormwater (SW) funding gap can be addressed by one or more of the options below:

- BRF Grant available to local governments to offset SWM cost: Under the current statute, starting FY 2018, the local governments are eligible to apply for State BRF grant to partially offset the SW capital cost. If a SW project is selected (competitive selection based on its water quality benefits, cost efficiency etc.) up to 50% of the project cost could be provided as BRF a grant.

- Below Market Interest Rate Loans: The local governments can use the Water Quality Revolving Loan Fund (WQRLF) to access capital in lieu of issuing local debt. The WQRLF current loan interest rates (including fees) range from 1.30% /yr fixed rate for disadvantaged communities and 2.1%/yr for all others, for a term up to 30-years. This can provide substantial debt service savings when compared to issuing local debt around 4%/yr.

- Bond Leveraging: Local governments can leverage their storm water (SW) fee revenue by issuing long term debt rather than undertaking only pay-as-you-go SW capital improvements. We recognize that some local governments are reaching their debt limits but in some cases this will be an option.

- Public-Private-Partnerships. If the local government does not have the staff resources or does not want the capital debt on its balance sheet, the above option can be undertaken through a private entity that can raise the capital funds, undertake the SW capital improvements, operate and maintain the BMP to ensure nutrient reduction, while the public entity makes the annual fee payment to the private entity.

- Nutrient Trading: With the cost/lb of nutrient reduction being relatively higher for the SW sector compared to wastewater or agriculture, there may be opportunities to trade nutrients from other sectors that can generate excess credits at a lower cost per pound. For example, if a 10 MGD wastewater treatment plant could consistently be operated (using additional chemicals) at 2 mg/l nitrogen rather than at 3 mg/l (as designed using BRF funding), the excess nutrients (~30,000 lbs/yr of nitrogen in this example) could be traded for a fee or other arrangements/agreements.

The remainder of these costs – approximately 34% or $1.8 billion – are to reduce nutrients and sediment through current State funded programs that both maintain existing annual practices (e.g., cover crops) and implement new practices in the wastewater, agriculture, stormwater, and septic sectors. These are primarily funded through the Bay Restoration Fund (BRF) and the Chesapeake and Atlantic Coastal Bays 2010 Trust Fund (2010 Trust Fund). Those two funds are estimated to generate almost an additional $1 billion by 2025. Assuming that the BRF and 2010 Trust Fund appropriations are continued at adequate levels, we believe that the gap can be addressed through:

- Continued leveraging of the annual allocation to provide additional financing – this is existing practice, particularly through 2010 Trust Fund grants.

- Permitted Phase I MS4 local jurisdictions meet and fund their permitted requirements.

- The State funds the estimated $690 million for SHA to meet its permitted MS4 requirements through GO Bonds and/or the TTF.

- Issuing bonds against the BRF revenue stream.

- The State targets as much as possible existing State Chesapeake Bay grant program restoration fund sources to the most cost effective practices.

- Efficiency and cost effectiveness require flexibility and innovation. Developing new technologies, industries, and implementation processes will be critical for the restoration effort.

- The State temporarily loans some or all of the excess wastewater treatment plant capacity (aka “growth capacity”) with the commitment to “repay” afterward to accommodate continued growth.

6. ***Recognize that success doesn’t end in 2025:*** It is important to stress that the ultimate financing and restoration goal is not solely to achieve the 2025 pollution reduction requirements, but also to maintain those reductions over time. In addition to the costs of reducing existing sources of pollution, there will be costs to mitigate the impacts of pollution growth. Ideally those costs should be borne by the private sector, unless the public sector chooses to subsidize the costs as is the case with the upgrading of municipal wastewater plants via the Bay Restoration Fund. This framework will require state and local governments to effectively balance the need for immediate pollution reduction activities with long-term protection strategies, which will in turn require the state to evaluate and implement long-term cost effective strategies to accelerate restoration while reducing the cost of implementation.

SUMMARY AND NEXT STEPS:

Maryland’s framework for achieving the Chesapeake Bay nutrient and sediment reduction targets by 2025 recognizes the need to use existing State revenues in the most cost-effective way. In addition to targeting cost-effective pollution controls, this can include leveraging other funding sources, using market-based mechanisms and fostering a restoration economy.

The framework also recognizes that progress among pollution source sectors is uneven over time. Expected shortfalls in some urban sectors might need to be covered by anticipated surpluses. However, given the vital importance of ensuring long-term capacity, the State must maintain and develop tools to ensure efficient and effective reductions leading up to and continuing after 2025. In addition to traditional tools, this will likely include innovative financing, transparent public-private partnerships, and market-based approaches that drive costs down and promote innovative technologies. This framework is premised on technical analyses that use the EPA Chesapeake Bay Program’s suite of modeling tools. These tools are currently being refined as part of a

midpoint assessment process that will conclude in 2017 with a revised set of models. The refined models could change pollution estimates used to develop this framework. This represents a current uncertainty that could necessitate adjusting the framework.

In June 2017, the EPA Chesapeake Bay Program will provide states with their final expectations for developing Phase III Watershed Implementation Plans (WIPs). The Phase III WIPs will lay out the states' plans for achieving their 2025 targets. The Phase III WIPs are to be completed by the end of calendar year 2018. The framework reflected in this document can be viewed as a step towards the development of Maryland's Phase III WIP.

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Chesapeake Bay Restoration Activities Funded in the Budget

Total Funds	
	FY 2015 Actual
Department of Natural Resources	102,995,623
Program Open Space	15,072,000
Rural Legacy	16,034,000
Department of Planning	5,410,045
Department of Agriculture	45,870,551
Maryland Agricultural Land Preservation Foundation	9,144,459
Maryland Department of the Environment	252,435,580
Maryland State Dept of Education	416,945
Maryland Higher Education	35,130,714
Maryland Department of Transportation	325,234,342
Total	**807,744,259**

General Funds	
	FY 2015 Actual
Department of Natural Resources	8,003,639
Department of Planning	4,115,835
Department of Agriculture	9,854,835
Maryland Department of the Environment	10,455,497
Maryland State Dept of Education	416,945
Total	**32,846,751**

Special Funds	
	FY 2015 Actual
Department of Natural Resources	54,140,140
Program Open Space	0
Rural Legacy	803,000
Department of Agriculture	12,204,003
Maryland Agricultural Land Preservation Fund	3,459,360
Maryland Department of the Environment	200,468,899
Department of Planning	416,693
Total	**271,492,095**

Federal Funds	
	FY 2015 Actual
Department of Natural Resources	10,089,646
Program Open Space	2,500,000
Department of Planning	88,159
Department of Agriculture	598,230
Maryland Agricultural Land Preservation Fund	0
Maryland Department of the Environment	40,873,985
Total	**54,150,020**

Reimbursable Funds	
	FY 2015 Actual
Department of Natural Resources	5,762,197
Department of Agriculture	18,037,823
Maryland Department of the Environment	637,199
Department of Planning	789,358
Total	**25,226,577**

Higher Ed	
	FY 2015 Actual
Current Unrestricted	23,733,937
Current Restricted	11,396,777
Total	**35,130,714**

GO Bonds	
	FY 2015 Actual
Maryland Water Quality Revolving Loan Fund	0
WQFA CAPITAL PROJECTS	0
Biological Nutrient Removal Program	0
Program Open Space	12,572,000
Rural Legacy Program	15,231,000
Chesapeake Bay 2010 Trust Fund	25,000,000
Oyster Habitat Restoration Projects	0
Agricultural Land Preservation Program	5,685,099
Maryland Agricultural Cost Share Program	5,175,660
Total	**63,663,759**

Fund Type Summary	
	FY 2015 Actual
General Fund	32,846,751

Special Fund	271,492,095
Federal Fund	54,150,020
Reimbursable Funds	25,226,577
Current Unrestricted	23,733,937
Current Restricted	11,396,777
GO Bonds	63,663,759
MDOT	325,234,342
Total	**807,744,259**

Spending Category	
	FY 2015 Actual
Land Preservation	41,073,777
Septic Systems	20,284,577
Wastewater Treatment	222,257,427
Urban Stormwater	33,200,345
Agricultural BMPs	45,870,551
Oyster Restoration	4,288,853
Transit & Sustainable Transportation Alternatives*	325,234,342
Living Resources	66,250,947
Education and Research*	35,547,659
Other	13,735,780
Total	**807,744,259**

Note: This presentation only includes state agency programs that have more than 50% of their activities directly related to Chesapeake Bay Restoration

CHECK

BY AGENCY	807,744,259
BY FUND	807,744,259
BY CATEGORY	807,744,259

difference	0