Chesapeake Bay
Fiscal 2016 Budget Overview

Department of Legislative Services
Office of Policy Analysis
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Analysis in Brief

Major Trends

Maryland on Track for Calendar 2017 Progress Check: The U.S. Environmental Protection Agency's (EPA) most recent evaluation of Maryland's progress and commitments indicates that the State will have enough measures in place by calendar 2017 to achieve 60% of the necessary nutrient pollution reductions. However, those commitments include actions that have not yet been fully mapped out or implemented, including regulations for the Phosphorus Management Tool, renewing the general discharge permit for animal feeding operations, developing a tracking system for accounting for new growth, and funding upgrades for minor wastewater treatment plants.

Issues

Overall Chesapeake Bay Restoration Funding: Major changes in Chesapeake Bay restoration funding between fiscal 2015 and 2016 include transit funding increases in the Maryland Department of Transportation and decreases in general obligation bond authorization for Chesapeake and Atlantic Coastal Bays 2010 Trust Fund stormwater projects. Contingent reductions are included in fiscal 2016 for land and conservation easement programs and Chesapeake and Atlantic Coastal Bays 2010 Trust Fund projects funded with special funds. **The Department of Legislative Services (DLS) recommends the addition of budget bill language to request that the Administration continue to publish the overall Chesapeake Bay restoration data and two-year milestones funding in the Governor's budget books.**

Significant Policy Gaps: While the State is meeting its two-year milestones for many pollution reduction measures, EPA notes that Maryland's long-term success for Total Maximum Daily Load (TMDL) achievement is dependent on continuing implementation in all sectors. A report that was submitted on historical and projected Chesapeake Bay restoration provides some understanding of future needs, but did not provide the requested overall framework to meet the calendar 2025 requirement of having all best management practices in place to meet water quality standards for restoring the Chesapeake Bay. Nevertheless, it is clear that certain challenges remain. **DLS recommends that the BayStat agencies comment on the plans for the growth strategy, Phosphorus Management Tool, financing restoration activities such as through nutrient trading, and cost-effectiveness of the pollution reduction strategy. In addition, DLS recommends again that the BayStat agencies submit information on updated historical spending and projected Chesapeake Bay restoration spending and associated impacts and the overall framework to meet the calendar 2025 requirement of having all best management practices in place to meet water quality standards for restoring the Chesapeake Bay.**

Funding Need for Study of Ocean Acidification Impact on Chesapeake Bay?: Chapter 383 of 2014 established the Task Force to Study the Impact of Ocean Acidification on State Waters, staffed by the Department of Natural Resources (DNR). Task force findings include the particular concern on what nutrient-created acidification holds for the Chesapeake Bay and the need for more

research, monitoring, coordination, and outreach on acidification. It appears that no funding has been explicitly requested to address the findings and recommendations. **DLS recommends that the BayStat agencies comment on whether any funding is budgeted to address the scale, pattern, and trend of acidification and its impact on the Chesapeake Bay and Atlantic coastal bays and whether efforts are planned to secure federal and or other sources of funding for evaluating this risk.**

Conowingo Dam Status: The Conowingo Dam has been described as the biggest best management practice on the Susquehanna River. However, the Conowingo Dam, and two other dams in the Lower Susquehanna River owned by Exelon Corporation – Safe Harbor and Holtwood – have reached an end state in terms of sediment storage capacity and are now up for relicensing by the Federal Energy Regulatory Commission. The primary concern for the Chesapeake Bay is that nutrients are no longer being trapped behind the dam, although sediment storage may also be a concern because 3 of the 92 bay segments under the TMDL for dissolved oxygen would not achieve the goals as a result of increased frequency and amount of nutrient and sediment loading from behind the at-capacity dams from storm events. Exelon Corporation has agreed to provide up to $3.5 million to study the effects of sediment related to the dam on water quality in the Susquehanna River and the Chesapeake Bay. **DLS recommends that the BayStat agencies comment on the likely decision points that will result from the additional study of the impact of Conowingo Dam sediment on the Chesapeake Bay.**

Recommended Actions

1. Add budget bill language on a Chesapeake Bay restoration framework.

2. Add budget bill language on two Chesapeake Bay restoration reports.

Overview

Past efforts to restore the Chesapeake Bay watershed, which includes parts of Delaware, the District of Columbia, Maryland, New York, Pennsylvania, Virginia, and West Virginia, have resulted in insufficient progress and continued poor water quality. However, a regional restoration initiative, required by the federal government and characterized by accountability measures and shorter term program evaluation, is underway. The current bay restoration policy framework is described below.

The Overarching Goal: Chesapeake Bay Total Maximum Daily Load

In December 2010, the U.S. Environmental Protection Agency (EPA) established a Chesapeake Bay Total Maximum Daily Load (TMDL), as required under the federal Clean Water Act and in response to consent decrees in the District of Columbia and Virginia. This TMDL sets the maximum amount of nutrient and sediment pollution the bay can receive and still attain water quality standards. It also identifies specific pollution reduction requirements; all reduction measures must be in place by 2025, with measures in place to achieve at least 60.0% of pollution reductions by calendar 2017. As shown in **Exhibit 1**, the State must establish pollution control measures by 2025 that, based on 2010 levels, will reduce nitrogen loads to the bay by 22.0%, phosphorus loads by 14.9%, and sediment loads by 1.9%.

Exhibit 1
Maryland's Pollution Reduction Goals in the Watershed Implementation Plan Phase II
(Million Pounds Per Year)

Pollutant	2010 Loads	Bay TMDL Target Load	Percent Reduction
Nitrogen	52.76	41.17	22.0%
Phosphorus	3.30	2.81	14.9%
Sediment	1,376	1,350	1.9%

TMDL: Total Maximum Daily Load

Source: Maryland Department of the Environment; U.S. Environmental Protection Agency

Achieving the Goal: An Accountability Framework for Jurisdictions in the Bay Watershed

Watershed Implementation Plans

As part of the Chesapeake Bay TMDL, bay jurisdictions must develop watershed implementation plans (WIP) that identify the measures being put in place to reduce pollution and restore the bay. WIPs are submitted to EPA for review and evaluation and (1) identify pollution load reductions to be achieved by various source sectors and in different geographic areas; and (2) help to provide "reasonable assurance" that sources of pollution will be cleaned up, which is a basic requirement of all TMDLs. In 2010, each bay jurisdiction submitted a Phase I WIP that details how the jurisdiction plans to achieve its pollution reduction goals under the TMDL. In 2012, the bay jurisdictions submitted Phase II WIPs that establish more detailed strategies to achieve the bay TMDL on a geographically smaller scale. A Phase III WIP, which must be submitted to EPA in 2018, will ensure that all practices are in place by 2025 so that restoration goals can be met.

Two-year Milestones

President Barack H. Obama issued an executive order in May 2009 that directed the federal government to lead a renewed effort to restore and protect the bay and its watershed. At the same time, the bay jurisdictions committed to achieving specific, short-term bay restoration "milestones" in order to assess progress toward achieving nitrogen, phosphorus, and sediment reduction goals. Generally, milestones are goals to be reached in two-year increments; they include implementation actions – best management practices (BMP) – and program enhancement actions. As a part of this effort, bay jurisdictions must submit pollution reduction progress and program action information to EPA. Although the bay jurisdictions developed the milestones prior to the establishment of the TMDL, the milestones have been incorporated into the TMDL process as a series of checkpoints for assessing progress toward achieving the pollution reduction goals in the TMDL.

Federal Review and Contingency Actions

EPA reviews each jurisdiction's progress toward its two-year milestones. If a jurisdiction's plans are inadequate or if its progress is insufficient, EPA may take action to ensure pollution reductions, including increasing oversight of state-issued pollution permits, requiring additional pollution reductions, prohibiting new or expanded pollution discharges, redirecting federal grants, and revising water quality standards to better protect local and downstream waters.

Chesapeake Bay Watershed Agreement

In June 2014, a new Chesapeake Bay Watershed Agreement was signed by representatives from the bay jurisdictions, as well as the Chesapeake Bay Commission and EPA. This agreement sets forth a collaborative plan for restoring and protecting the bay watershed and its living resources. Among other things, the agreement sets a goal to reduce pollutants to the bay by meeting the calendar 2017 and 2025 restoration goals and improving the capacity for monitoring and assessing progress. The agreement indicates that strategies for implementing the agreement's goals should be developed by June 2015.

Reaching the Goal: Progress to Date

2009-2011 Milestone Assessment

Maryland achieved its 2009-2011 milestone pollution reduction goals, which set out to reduce nitrogen loads by 3.75 million pounds and phosphorus loads by 193,000 pounds (relative to calendar 2008 load levels). While the State did not meet all of its individual milestone goals, Maryland was able to achieve its pollution reductions, in part, through the planting of a record number of cover crops, wastewater treatment plant upgrades, and the planting of forest buffers. Overall, EPA noted that Maryland "has made significant progress in reducing pollution and moving forward with Phase I WIP commitments."

2012-2013 Milestone Assessment

For the 2012-2013 milestone periods, Maryland was ahead of schedule by more than 3.5 million pounds for nitrogen reductions; by nearly 147,000 pounds for phosphorus reductions; and by nearly 90.0 million pounds for sediment reductions. EPA attributes Maryland's achievements largely on the planting of a record number of cover crops, timely upgrades to wastewater treatment plants, and the implementation of the Fertilizer Use Act of 2011.

While the State met and even exceeded several goals for the 2012-2013 milestones period, it did not meet all of its goals. For example, Maryland committed to installing 2,453 agricultural water control structures, but only met 37% of that goal. Additionally, the State committed to stormwater management retrofits to address 35,000 pounds of nutrients, but met only 77% of that goal. **Exhibit 2** shows various pollution reduction achievements for the 2012-2013 milestone period. Overall, EPA noted that Maryland's 2012-2013 milestone progress ensures that "[WIP] implementation is occurring even though all of the milestone goals were not achieved."

Exhibit 2
Maryland's 2012-2013 Pollution Reduction Strategies and Milestones

	2012-2013 Commitment	Percent Achieved
Agriculture		
Animal Waste Management Systems, Livestock/Poultry (Animal Units)	4,256	445%
Animal Waste Management Systems, Runoff Control (Acres)	153	84%
Conservation Plans/SCWQP (Acres/Year)	826,000	120%
Cover Crops (Acres/Year)	355,000	115%
Dairy and Poultry Manure Incorporation Technology (Acres/Year)	27,854	328%
Forest Buffers/Tree Planting (Acres)	251	364%
Grass Buffers (Acres)	538	615%
Land Retirement (Acres)	5,894	64%
Manure Transport (Tons/Year)	37,000	131%
Nutrient Management Plan Compliance (Acres)	1,219,566	75%
Pasture Grazing/Stream Protection (Acres)	5,256	146%
Water Control Structures (Structures)	2,453	37%
Wetland Restoration (Acres)	610	106%
Urban/Suburban		
Septic Retrofits (Systems)	1,200	113%
Stormwater Management Retrofits (Pounds)	35,000	77%
Wastewater		
Wastewater Nitrogen (Pounds Reduced)	750,000	134%

SCWQP: Soil Conservation and Water Quality Plan

Source: Maryland Department of the Environment; BayStat

Future Milestones and Targets

EPA primarily evaluates progress toward meeting the TMDL by reviewing a jurisdiction's combined pollution reductions among the various pollution sources. **Exhibit 3** shows pollution loads for 2010 and 2013 and illustrates that Maryland is making progress toward achieving the calendar 2017 and 2025 target nitrogen and phosphorus loads and has more than achieved sediment target loads. EPA also evaluates a jurisdiction's progress within each source sector, although jurisdictions are still held accountable for the overall reduction in nutrients and sediments, not

specifically by source sector. **Exhibit 4** illustrates Maryland's nitrogen pollution reduction progress by source sector. EPA's most recent evaluation of Maryland's progress and commitments

Exhibit 3
Maryland's 2010, 2013, 2017, and Target Pollution Loads
(Million Pounds Per Year)

Pollutant	2010 Loads	2013 Loads	2017 Target	2025 Target
Nitrogen	52.76	47.57	45.48	41.17
Phosphorus	3.30	3.00	3.01	2.81
Sediment	1,376	1,253	1,368	1,350

Source: BayStat; The Chesapeake Bay Total Maximum Daily Load Tracking and Accounting System

Exhibit 4
Maryland's Nitrogen Pollution Loads by Pollution Source
(Million Pounds Per Year)

Source	2010 Loads	2013 Loads	2017 Target	2025 Target
Agriculture	19.95	17.15	17.03	15.22
WWTPs	14.37	11.95	11.85	10.58
Stormwater	9.48	9.53	8.34	7.55
Septic	3.00	2.95	2.30	1.85

WWTP: wastewater treatment plant

Note: The nitrogen loads do not include loads from forests and atmospheric deposition to non-tidal waters. It is anticipated that forests and atmospheric deposition to non-tidal waters will contribute approximately 6.0 million pounds of nitrogen annually through 2025.

Source: BayStat

indicates that the State will have enough measures in place by calendar 2017 to achieve 60% of the necessary nutrient pollution reductions. However, those commitments include actions that have not yet been fully mapped out or implemented, including regulations for the Phosphorus Management Tool (PMT), renewing the general discharge permit for animal feeding operations, developing a tracking system for accounting for new growth, and funding upgrades for minor wastewater treatment plants. Additionally, EPA encourages each jurisdiction to enhance the

tracking, verification, and reporting of BMPs to ensure the most accurate estimates of load reductions are reported. To this end, the Maryland Department of the Environment (MDE) is currently hosting several webinars related to BMP reporting and the correction of historical reporting and will continue to improve the process through June 2015.

Watershed Implementation Plan Costs

Maryland's Watershed Implementation Plan Cost Estimate

Implementation of the State's Phase II WIP continues to demand significant resources and commitment at the federal, State, and local level and within both the public and private sectors. As shown in **Exhibit 5**, the estimated cost of implementing Maryland's Phase II WIP, covering calendar 2010 through 2025, is approximately $14.4 billion. While this cost estimate provides helpful information, it is incomplete and may change significantly. For example, the estimate excludes costs associated with financing, inflation, combined sewer and sanitary overflows, and Healthy Air Act implementation. Additionally, Maryland's Phase II WIP allocates pollution reduction responsibility to various sectors (agriculture, municipal wastewater, stormwater, and septic systems) based on equity and feasibility rather than cost efficiency. As such, the Phase II WIP does not account for the implementation of alternative, lower cost strategies such as cross-sector trading (*i.e.*, nonpoint-to-nonpoint source trading).

Exhibit 6 shows the share of the nutrient reductions assigned to each sector in relationship to the share of the total Phase II WIP implementation costs. For example, funding for the agriculture sector costs represents 6% of total estimated WIP implementation costs while this sector is expected to achieve 41% of the nitrogen reductions and 39% of the phosphorus reductions.

Exhibit 5
Maryland's Estimated Phase II WIP Implementation Costs
($ in Millions)

Source Sector	Total 2010-2025 Cost
Agriculture	**$928**
Municipal Wastewater	**$2,368**
Major Municipal Plants	2,306
Minor Municipal Plants	62
Stormwater	**$7,388**
Maryland Department of Transportation	1,500
Local Government	5,888
Septic Systems	**$3,719**
Upgrades	2,358
Connections	1,273
Pumping	88
Total	**$14,403**

WIP: Watershed Implementation Plan

Note: The exhibit does not reflect costs associated with controlling combined sewer and sanitary overflows or the implementation of the Healthy Air Act. The exhibit reflects the final Phase II WIP cost estimate released on October 26, 2012.

Source: *Phase II Watershed Implementation Plan*, Maryland Department of the Environment

Exhibit 6
Maryland's Nitrogen and Phosphorus Reductions and Estimated Phase II WIP Implementation Costs by Source Sector

Source Sector	Percent of Reduction for Nitrogen	Percent of Reduction for Phosphorus	Percent of Total Estimated Costs
Agriculture	41%	39%	6%
Municipal Wastewater	33%	17%	16%
Stormwater	17%	44%	51%
Septic	10%	0%	26%

WIP: Watershed Implementation Plan

Note: Percentages may not sum to 100% due to rounding.

Source: BayStat

The State's Phase II WIP implementation costs are also allocated into those four main sectors. Some of the major categories of implementation costs and recent policy actions aimed at addressing the State's Chesapeake Bay restoration goals are described in further detail below.

Agricultural BMPs

Funding for agriculture sector improvements represents $928.0 million, or 6%, of the total estimated WIP implementation cost. Currently, implementation of agricultural BMP has been funded with private, federal, and State funding. In October 2012, the Maryland Department of Agriculture (MDA) revised its nutrient management regulations to modify how a farm's nutrient management plan is developed and change the way that organic nutrient sources and other materials are managed. Also, in January 2013, MDA published additional regulations implementing the PMT that is used to identify where there is a high potential for phosphorous pollution and to help farmers evaluate management options. However, the regulations were withdrawn due to concerns raised by farmers and environmental groups about the implementation and unknown impacts of the regulations. In an effort to obtain additional information regarding the potential cost of the PMT to farmers, the fiscal 2015 budget bill included language prohibiting MDA from expending funds, except for funds related to the cost of an economic impact analysis, for the final development and submission of PMT regulations until MDA submits an economic analysis of the impact of the proposed regulations. The economic impact analysis was completed in fall 2014, and regulations have been adopted but not yet published and, therefore, implementation is pending.

Municipal Wastewater Treatment Plant Upgrades

Funding for municipal wastewater sector improvements represents $2.4 billion, or 16%, of the total estimated WIP implementation cost. State Bay Restoration Fund revenue is providing a significant portion of the funding necessary to upgrade the State's 67 major publicly owned wastewater treatment plants (WWTP). At the urging of the Bay Restoration Fund Advisory Committee, Chapter 150 of 2012 generally doubled the bay restoration fee beginning July 1, 2012, in order to address a significant funding shortfall that would have made it very difficult to complete the upgrades to the major publicly owned WWTPs by calendar 2017, as required by the WIP. Chapter 150 also made several other changes, such as establishing additional uses for the fund beginning in fiscal 2018. As a result of Chapter 150, the State will be better positioned to complete its WWTP upgrades by calendar 2017.

Local Government Stormwater Management

Funding for local stormwater management sector improvements represents $5.9 billion, or 41%, of the total estimated WIP implementation cost. During the 2007 special session and the 2008 regular session, the General Assembly passed legislation that established the Chesapeake and Atlantic Coastal Bays 2010 Trust Fund in an effort to provide additional State funding for nonpoint source pollution control projects. The Chesapeake and Atlantic Coastal Bays 2010 Trust Fund, which is administered by the Department of Natural Resources (DNR), provides State funding for

various nonpoint source pollution control projects and local stormwater projects. Despite the establishment of the fund, it was clear that additional funding was needed for stormwater management.

As a result, the General Assembly passed Chapter 151 of 2012, which required each county and municipal corporation subject to a National Pollutant Discharge Elimination System (NPDES) Phase I municipal separate storm sewer system (MS4) permit (currently, Baltimore City and the nine most populous counties) to adopt local laws or ordinances necessary to establish an annual stormwater remediation fee and a local watershed protection and restoration fund by July 1, 2013. These funds are to be used to provide financial assistance for the implementation of local stormwater management plans. Money derived from the fee is to be used only to support additional (not existing or ongoing efforts) improvements for stormwater management, including stream and wetland restoration projects; operation and maintenance of systems and facilities; and monitoring, inspection, and enforcement activities. Preliminary estimates indicate that fiscal 2014 stormwater remediation fee revenues will total approximately $110.9 million for the 10 jurisdictions. In addition, the Budget Reconciliation and Financing Act of 2014 (Chapter 464), authorized Carroll and Frederick counties to enter into a memorandum of understanding with MDE to develop an alternative source of financing, instead of a stormwater remediation fee, for the purpose of meeting the requirements of each jurisdiction's federal stormwater permit.

Transportation Stormwater Management

Funding for stormwater management sector improvements associated with State transportation infrastructure represents $1.5 billion, or 10%, of the total estimated WIP implementation cost. The State Highway Administration (SHA) owns more than 2,500 stormwater management facilities and nearly 17,000 lane miles of roadway located throughout the State. After many years of discussion regarding the lack of transportation funding for new infrastructure, Chapter 429 of 2013 (the Transportation Infrastructure Investment Act) was enacted. Chapter 429 increased transportation funding by increasing motor fuel taxes and transit fares. Chapter 429 also required that the Governor include specified annual appropriations in the budget bill (between fiscal 2015 and 2019) totaling $395.0 million for SHA to use to comply with the WIP. SHA reports that, as a result of Chapter 429, there will be sufficient funding available to meet its WIP obligations through 2020. However, a proposed provision in the Budget Reconciliation and Financing Act of 2015 makes the remaining $350.0 million in WIP funding a requirement of the Maryland Department of Transportation. **Exhibit 7** reflects the most recent SHA WIP funding estimate, which in the 2015 to 2020 *Consolidated Transportation Program* is $671.0 million, including $72.1 million expended prior to fiscal 2015, and $110.9 million added in fiscal 2020. Special funds, including the proposed replacement of $350 million in general funds, comprise the largest share of the projected fund sources accounting for 85% of the planned funding followed by federal funds (8%), and general obligation (GO) bonds (7%). **Exhibit 8** reflects the deletion of the required annual appropriations, which were to have been provided through use of general funds and/or GO bonds as of the 2014 legislative session.

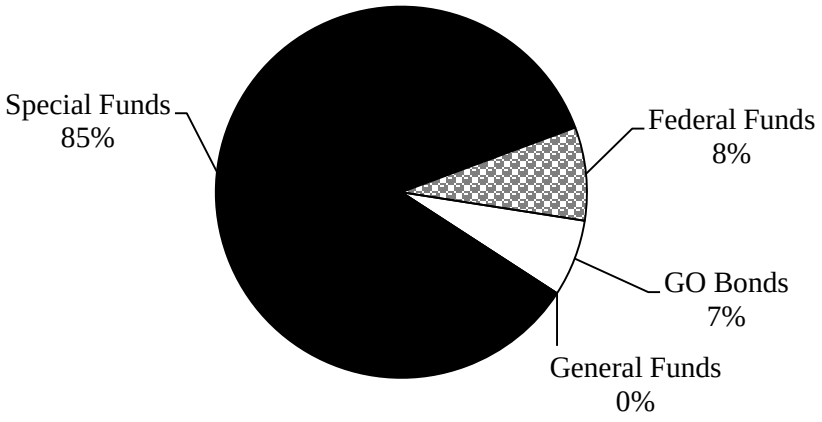
Exhibit 7
SHA Watershed Implementation Plan
Fiscal 2015-2020
($ in Thousands)

	Prior Auth.	2015	2016	2017	2018	2019	2020	Total
Planning	$0	$1,000	$2,000	$2,000	$2,000	$2,000	$2,000	$11,000
Engineering	15,200	32,500	25,000	20,000	20,000	20,000	20,000	152,700
Construction	56,900	18,000	59,500	80,300	97,700	84,000	83,900	480,300
Right-of-way	0	1,000	6,000	5,000	5,000	5,000	5,000	27,000
Total	**$72,100**	**$52,500**	**$92,500**	**$107,300**	**$124,700**	**$111,000**	**$110,900**	**$671,000**

GO: general obligation
SHA: State Highway Administration

Source: Maryland Department of Transportation; Department of Legislative Services

Exhibit 8
SHA Watershed Implementation Plan
Total Program Funding Sources



GO: general obligation
SHA: State Highway Administration

Source: Maryland Department of Transportation; Department of Legislative Services

Septic Systems

Funding for septic system sector improvements represents $3.7 billion, or 26%, of the total estimated WIP implementation cost. Septic system projects are among the most costly BMPs. While Chapter 280 of 2009 already required best available technology (BAT) for new and replacement septic systems in the Chesapeake Bay Critical Area and the Atlantic Coastal Bays Critical Area, new regulations, finalized in September 2012, expanded the requirements of Chapter 280 to require BAT for all septic systems serving new construction in the Chesapeake and Atlantic Coastal Bays watersheds and in the watershed of any nitrogen impaired water body in the State.

Additionally, in order to steer future residential growth toward more urban forms of development served by public sewer and away from the sprawling development on previously undeveloped lands that would be required to use septic systems, Chapter 149 of 2012 (the Sustainable Growth and Agricultural Preservation Act) established a system of land use tiers, which may be adopted by local jurisdictions. Chapter 149 prohibits a jurisdiction from approving a major residential subdivision served by on-site sewage disposal systems, community sewage systems, or shared systems unless it also adopts the growth tiers established by the Act. The recent statutory and regulatory changes should help the State reduce nitrogen loading attributable to new development.

Nutrient Trading

How It Works: Nutrient trading is a market-based approach that involves the exchange (buying and selling) of nutrient reduction credits (*i.e.*, pollution allocations) between sources in order to protect and improve water quality. These credits have a monetary value that may be paid to the seller for installing BMPs to reduce nitrogen or phosphorous. Nutrient trading involves (1) establishing a total amount of allowable pollution in a specified area and allocating this amount among the participating sources; and (2) allowing sources to trade in ways that meet local and watershedwide water quality goals. Once pollution allowances are allocated, sources with low-cost pollution reduction options have an incentive to reduce nutrient loadings beyond what is required of them and to sell the excess credits to sources with higher control costs. To achieve a desired load reduction, trades can take place between point sources (*e.g.*, WWTPs), between point and nonpoint sources (*e.g.*, a WWTP and a farming operation), or between nonpoint sources (*e.g.*, a farming operation and urban stormwater sites or systems).

Nutrient trading is an innovative approach to help offset pollutant discharges and offers an interesting alternative for achieving greater environmental protection than through existing regulatory programs. Generally, proponents of nutrient trading argue that it is more efficient than government regulation. As a market-based approach, nutrient trading reduces the overall cost of compliance through increased efficiency and cost effectiveness that are achieved by letting the market determine costs.

Maryland's Nutrient Trading Policy: In Maryland, both MDE and MDA are involved in implementing nutrient trading policies and programs. While MDE is generally responsible for

verification, enforcement, and transparency of point sources involved in the permitting process, MDA has assumed responsibility for certification, verification, and registration of agriculture sector credits. Maryland's existing nutrient trading program addresses (1) point-to-point source trading; (2) the generation of credits by the agriculture sector; and (3) trading between septic systems and WWTP. While the State's current nutrient trading policy framework addresses the reallocation of loads between sectors, it does not provide an avenue for sectors to achieve TMDL nutrient-load reduction targets. The State's cross-sector trading policy will authorize select nonpoint source sectors to achieve reductions toward WIP targets by purchasing credits for reductions that are achieved at a lower cost.

Maryland is currently in the process of developing a draft cross-sector trading policy that outlines the process by which certain sectors may purchase credits from other sectors. According to MDE, the State's cross-sector policy will not only serve as a statement of principle that specified sectors may achieve TMDL goals via trading, but will also provide initial guidance on which sectors may purchase credits generated by the agriculture sector. The sources identified in this policy include NPDES regulated stormwater, septic systems, and Phase II MS4 permittees.

Next Steps: It is unclear to what extent the State is relying on the implementation of cross-sector trading to help mitigate WIP implementation costs. Section 1.10.2 of Maryland's Phase II WIP states that "it is expected that, over time, alternative lesser cost agreements will be identified and sorted out." The WIP further states that "costs are expected to decrease when market forces, and other strategy refinements, come into play in the future." Currently, MDE does not have a specific timeframe for when the new policy will be implemented. MDE reports that as part of its December 2014 report to the budget committees on historical and projected Chesapeake Bay restoration spending, it will include a revised Phase II WIP cost estimate that incorporates the potential cost savings associated with the State's cross-sector trading policy. However, as noted below, revised Phase II WIP cost estimates were not provided in the historical and projected Chesapeake Bay restoration spending report. According to MDE, its goal is to gain sufficient experience with cross-sector trading to help inform the development of Maryland's Phase III WIP, which is due to EPA in 2018.

Local Stormwater Management

How It Works: Stormwater, or polluted runoff, is rain after it picks up pollutants (such as animal waste, oils, and chemicals) and runs into local streams and rivers. Polluted stormwater runoff is commonly transported through MS4s from which it is often discharged untreated into local water bodies. An MS4 is defined as a conveyance or system of conveyances that is (1) owned by a state, city, town, village, or other public entity that discharges to waters of the United States; (2) designed or used to collect or convey stormwater (including storm drains, pipes, ditches, *etc.*); (3) not a combined sewer; and (4) not part of a WWTP. To prevent pollutants from being washed or dumped into an MS4, operators must obtain an NPDES permit and develop a stormwater management program.

Under the NPDES permit program, medium and large cities or certain counties with populations of 100,000 or more are required to obtain NPDES permit coverage for stormwater

discharges. MDE began issuing the NPDES municipal stormwater permits in 1993. Generally, the NPDES permits, which are updated every five years, require the MS4 jurisdictions to restore a percentage of the jurisdiction's untreated impervious surfaces. "Untreated impervious surface" usually refers to the extent of land within an MS4 jurisdiction that is covered by impenetrable land cover that has not already been restored to the "maximum extent practicable" as defined by the State's stormwater laws and regulations. Currently, 10 local jurisdictions in Maryland are subject to the NPDES Phase I MS4 permit due to their population: Anne Arundel, Baltimore, Carroll, Charles, Frederick, Harford, Howard, Montgomery, and Prince George's counties and Baltimore City. SHA is also subject to a Phase I MS4 permit.

Local Stormwater Remediation Fees: Local jurisdictions play an important role in managing stormwater discharges and are required to make significant investments to remediate the amount of untreated impervious surfaces within each jurisdiction. As previously discussed, to assist local governments in meeting their stormwater management obligations, the General Assembly passed Chapter 151 of 2012, requiring local jurisdictions subject to a Phase I MS4 permit to establish a fee to help cover stormwater remediation costs. Under the Act, each jurisdiction has the flexibility to decide the level and structure of the fee, how it is collected, and other details of the fee and fund, subject to specified requirements.

While no jurisdiction established a fee under Chapter 151 that was capable of fully supporting local stormwater program costs through fiscal 2018 without other revenue sources, establishing a fee capable of fully supporting local stormwater management programs was not necessary given that each jurisdiction had already supported its stormwater programs through general funds or other types of charges prior to the effective date of the law. Multiple jurisdictions reported that they are planning to fully cover such costs through authorized bond issuances, existing fund balances, and other revenue sources, as needed.

Despite new stormwater fee revenue and existing funding sources, it appears that several of the jurisdictions still face long-term shortfalls for local stormwater management programs. However, these shortfalls may be reduced by (1) lower cost projections made possible by better planning and learning from interjurisdictional communication; (2) approved sector allocation amendments to local WIPs or changes to the State WIP; (3) future revenues that may be available and reprogrammed for supporting stormwater costs; (4) additional bonding capacity within the local capital improvement program; (5) efficiencies realized through public-private partnerships such as Prince George's County is pursuing; or (6) nutrient trading.

Next Steps: To date, it remains unclear to what extent the stormwater remediation fees established under Chapter 151 will help to alleviate some of the local jurisdictions' costs for complying with the WIP. In accordance with Chapter 151, beginning July 1, 2014, local jurisdictions are required to report on the amount of money deposited into the watershed protection and restoration fund for the previous two fiscal years and the percentage of funds spent on each of the purposes authorized by the bill. As of January 2015, 8 of the 10 jurisdictions have released final fiscal 2014 stormwater remediation fee revenues. Based on the preliminary information that is currently available, it appears that fiscal 2014 stormwater remediation fee revenues will total approximately $110.9 million, which is slightly higher than the fiscal 2014 estimate generated in

fall 2013 of $103.0 million. Further, it remains to be seen whether other local jurisdictions will follow Carroll and Frederick counties to successfully pursue the ability to develop an alternative source of financing for stormwater management.

As local jurisdictions make the reports required under Chapter 151 publicly available in the coming years, we will continue to learn more about local stormwater management expenditures. However, to the extent that the State is able to rely more heavily on other, lower cost sectors for nutrient reductions to meet the bay TMDL (*e.g.*, cross-sector trading), some of the stormwater costs for complying with the WIP could be mitigated.

Issues

1. Overall Chesapeake Bay Restoration Funding

The current state of Chesapeake Bay restoration funding may be reviewed at three levels:

- **Overall Chesapeake Bay Restoration** – actions that include environmental education, land preservation, transit projects, and nutrient and sediment reduction among others;

- **Two-year Milestones** – actions for nutrient and sediment reduction only; and

- **Chesapeake and Atlantic Coastal Bays 2010 Trust Fund** – actions for nutrient and sediment reduction from nonpoint sources only using certain revenues. A review of the Chesapeake and Atlantic Coastal Bays 2010 Trust Fund will be included in the DNR operating budget analysis.

Overall Chesapeake Bay Restoration

Section 37 of the fiscal 2015 budget bill expressed the General Assembly's intent that DNR, the Department of Budget and Management (DBM), and MDE submit two reports on Chesapeake Bay restoration expenditures as follows:

- **Overall Chesapeake Restoration Spending** – operating and capital expenditures by agency, fund type, and particular fund source based on programs that have over 50% of their activities directly related to Chesapeake Bay restoration for the fiscal 2014 actual, fiscal 2015 working appropriation, and fiscal 2016 allowance; and

- **Two-year Milestones** – two-year milestones funding by agency, BMP, fund type, and particular fund source along with associated nutrient and sediment reductions for fiscal 2013 to 2016.

The overall Chesapeake Bay restoration expenditures exhibit was first included in the Governor's Budget Books in fiscal 2009. The purpose of the exhibit is to understand the overall scope of Chesapeake Bay restoration funding. The current version of overall Chesapeake Bay restoration funding is Appendix S of the *Maryland Budget Highlights* book and is shown in **Exhibit 9**.

Exhibit 9
Overview of Maryland's Funding for Chesapeake Bay Restoration
Fiscal 2012-2016
Total Funds

Agency/Program	2012 Actual	2013 Actual	2014 Actual	2015 Approp.	2016 Allowance		2015-2016 $ Change	2015-2016 % Change
Department of Natural Resources	$55,027,356	$94,014,801	$101,327,759	$113,781,430	$87,758,710	[1]	-$26,022,720	-22.9%
Program Open Space	6,026,700	14,657,379	27,065,000	15,072,000	19,000,000	[2]	3,928,000	26.1%
Rural Legacy	4,515,000	5,622,000	13,512,000	16,034,000	18,205,649	[3]	2,171,649	13.5%
Department of Planning	5,225,369	4,988,878	5,069,335	5,441,294	5,818,752		377,458	6.9%
Department of Agriculture	42,337,956	38,993,231	41,995,484	49,692,876	45,858,189		-3,834,687	-7.7%
Maryland Agricultural Land Preservation Foundation	16,735,951	12,889,412	35,712,218	26,497,512	33,487,050	[4]	6,989,538	26.4%
Maryland Department of the Environment	258,648,207	360,945,068	301,151,064	285,954,448	289,533,472		3,579,024	1.3%
Maryland State Department of Education	919,455	280,943	416,945	416,945	416,945		0	0.0%
Maryland Higher Education Commission	21,992,772	19,345,005	20,387,021	29,616,355	29,978,014		361,660	1.2%
Maryland Department of Transportation	177,486,653	180,107,000	172,258,000	330,383,000	482,797,000		152,414,000	46.1%
Total	**$588,915,419**	**$731,843,717**	**$718,894,826**	**$872,889,860**	**$1,012,853,781**		**$139,963,922**	**16.0%**

Fund Type Summary

	2012 Actual	2013 Actual	2014 Actual	2015 Appropriation	2016 Allowance		2015-2016 $ Change	2015-2016 % Change
General Fund	$36,297,532	$34,662,619	$31,983,477	$35,492,837	$35,999,188	[5]	$506,351	1.4%
Special Fund	159,794,055	338,289,432	309,761,628	289,132,986	287,283,443		-1,849,543	-0.6%
Federal Fund	79,852,905	51,932,418	57,695,355	53,525,847	52,761,370		-764,477	-1.4%
Reimbursable Funds	10,017,377	8,258,635	7,985,344	25,298,835	26,432,766		1,133,931	4.5%
Current Unrestricted	10,227,751	8,742,157	11,573,308	19,039,522	24,168,139		5,128,616	26.9%
Current Restricted	11,765,020	10,602,848	8,813,713	10,576,833	5,809,876		-4,766,957	-45.1%
General Obligation Bonds	103,474,125	99,248,607	118,824,000	109,440,000	97,602,000		-11,838,000	-10.8%
Maryland Department of Transportation Funds	177,486,653	180,107,000	172,258,000	330,383,000	482,797,000		152,414,000	46.1%
Total	**$588,915,418**	**$731,843,716**	**$718,894,826**	**$872,889,860**	**$1,012,853,781**		**$139,963,922**	**16.0%**

[1] Adjusted to reflect a $8,639,632 contingent reduction of Chesapeake and Atlantic Coastal Bays 2010 Trust Fund special funds in the fiscal 2016 allowance.
[2] Adjusted to reflect a $8,792,264 contingent reduction of the fiscal 2016 allowance.
[3] Adjusted to reflect $6,238,773 contingent reduction of the fiscal 2016 allowance.
[4] Adjusted to reflect $9,830,434 contingent reduction of the fiscal 2016 allowance.
[5] Adjusted to reflect $33,501,103 in contingent special fund reductions noted above for the fiscal 2016 allowance.

Note: This presentation only includes State agency programs that have over 50% of their activities directly related to Chesapeake Bay restoration.

Source: Department of Budget and Management; Department of Legislative Services

The major changes between the fiscal 2015 working appropriation and the fiscal 2016 allowance reflected in the overall Chesapeake Bay restoration spending are as follows:

- **DNR –** decreases by $26.0 million, primarily due to the deletion of the $25.0 million in general obligation bond authorization funding enhancement for Chesapeake and Atlantic Coastal Bays 2010 Trust Fund stormwater restoration projects. A contingent reduction of $8.6 million in Chesapeake and Atlantic Coastal Bays 2010 Trust Fund special funds for non-point source nutrient and sediment reduction projects is included in the fiscal 2016 allowance.

- **Program Open Space, Rural Legacy, Maryland Agricultural Land Preservation Foundation** – increase by $13.1 million due to an increase of $7.0 million in Maryland Agricultural Land Preservation Program funding comprised of $7.5 million in general obligation (GO) bonds, which are offset partially by a reduction of $0.5 million in special funds; $3.9 million in Program Open Space funding comprised of $1.9 million in GO bonds, $1.5 million in transfer tax special funds and $0.5 million in federal funds; and, $2.2 million in GO bond funding for the Rural Legacy Program. Contingent reductions totaling $24.9 million in transfer tax special funds that are transferred to the General Fund are included in the fiscal 2016 allowance. The GO bond funding noted above provides for partial replacement of fiscal 2016 transfer tax special fund transfers to the General Fund.

- **MDA** – decreases by $3.8 million, primarily due to a reduction of $4.2 million in the allocation of GO bonds to the Maryland Agricultural Water Quality Cost-Share Program.

- **MDE** – increases by $3.6 million, primarily due to $5.3 million in additional GO bond authorization for the Biological Nutrient Removal program, which is offset partially by reductions of $1.0 million in Bay Restoration Fund special funds for upgrades to WWTP based on the planned activity level, and $1.0 million in Bay Restoration Fund special funds for septic system upgrades due to the authorization of funding for local programs to track compliance with long-term operation and maintenance of installed septic systems.

- **Maryland Department of Transportation** – increases by $152.4 million, primarily due to Maryland Transit Administration transit projects including increases for the Purple Line ($145.9 million), Red Line ($15.3 million), and Corridor Cities Transitway ($3.9 million), which are offset partially by decreases for the Waldorf Park and Ride ($5.2 million), and Langley Park Transit Center ($4.7 million).

- **Maryland Higher Education** – increases by $0.4 million primarily due to an increase of $4.1 million in current unrestricted funds for the continuation of the one-time replacement of the University of Maryland, College Park's (UMCP) The Diner's roof with an environmentally friendly roof and $1.4 million in current unrestricted funds for modified Shuttle-UM transit routes at the University of Maryland, College Park, which improve air quality. These increases are offset partially by decreases of $1.6 million in current restricted funds for studying the integration of climate change and Chesapeake Bay restoration at the University of Maryland,

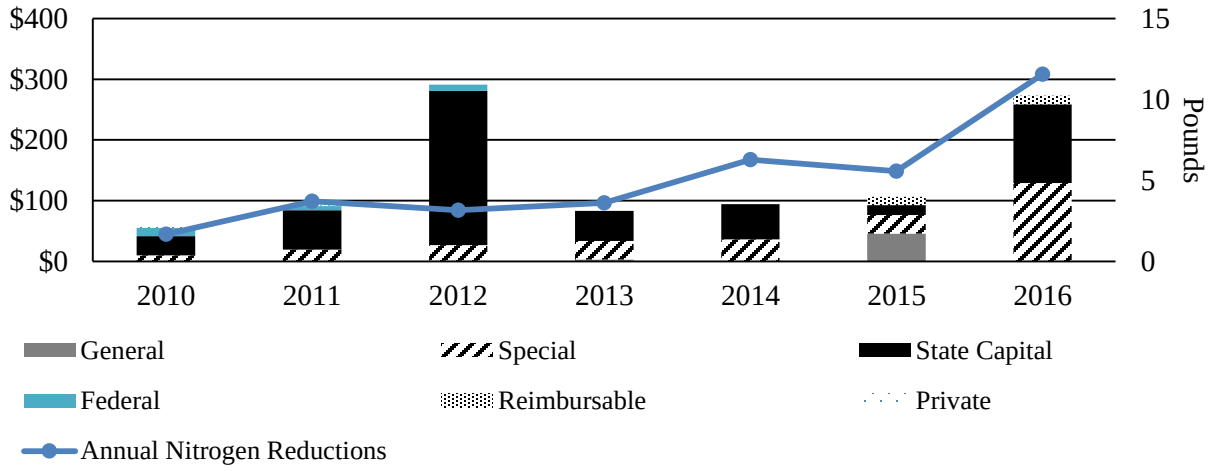
Baltimore County, $1.1 million in current unrestricted funds for biodiesel funding for transit vehicles at the UMCP, $0.7 million in current unrestricted funds for studying the impact of bioaugmentation on polychlorinated biphenyl impacted sediments at the University of Maryland, Baltimore County (UMBC), $0.5 million in current restricted funds for studying the restoration of hydrologic function to urban landscapes at the UMBC, $0.4 million in current restricted funds for studying the ecology of spatially structured communities at the UMBC, and $0.4 million in current restricted funds for studying a new aquaculture species at the UMBC.

Two-year Milestones Funding

As noted above, Section 37 of the fiscal 2013 budget also expressed the intent that DNR, DBM, and MDE submit information about two-year milestones funding and nutrient reduction. **Exhibit 10** reflects the planned funding for fiscal 2010 to 2016. Fiscal 2016 numbers reflect decisions before the final allocation of the Chesapeake and Atlantic Coastal Bays 2010 Trust Fund have been determined and do not reflect funding changes programmed for the SHA. The major trend between fiscal 2015 and 2016 is the shift from general funds for the SHA stormwater projects to GO, which was the fund source at the time the data was delivered, and an increase in special funds for wastewater treatment plant upgrades. Reimbursable funds are reflected in fiscal 2015 and 2016 for the Chesapeake and Atlantic Coastal Bays 2010 Trust Fund special funds budgeted for cover crops in MDA. The increase in nutrient reduction increase is due primarily to wastewater treatment plant upgrades.

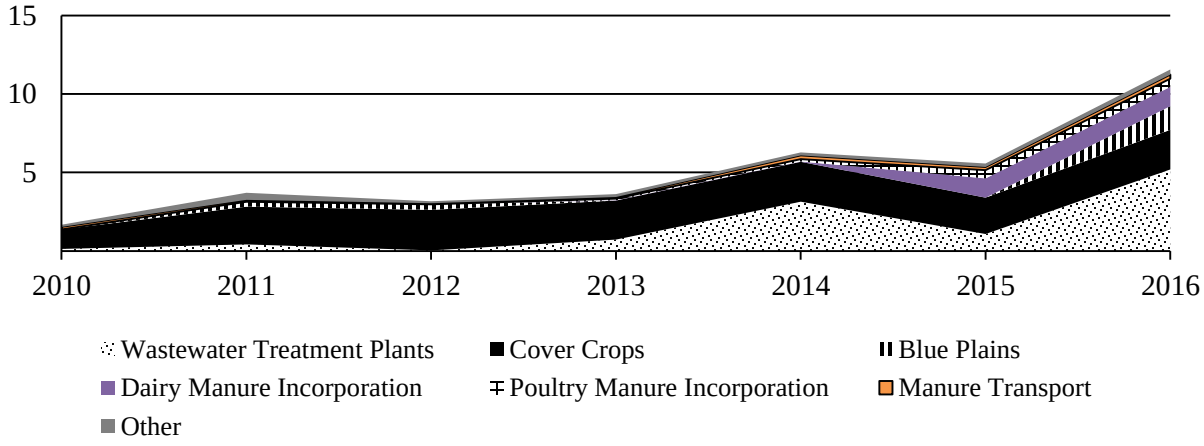
Exhibit 11 shows annual nitrogen reduction by best management practice. As can be seen, the cover crop best management practice has provided the majority of nitrogen reductions in the years shown. However, beginning in fiscal 2014, there are substantial increases in the nitrogen loading reduced by the following BMPs: dairy manure incorporation and poultry manure incorporation. Beginning in fiscal 2015 there are substantial increases in nitrogen loading reductions by WWTPs in general, and the Blue Plains WWTP in particular, reflecting the coming online of a number of the 67 major publicly owned WWTPs, as they are upgraded to enhanced nutrient technology.

Exhibit 10
Two-year Milestones Funding and Nutrient Reduction
Fiscal 2010-2016
($ and Pounds in Millions)



Source: Department of Budget and Management

Exhibit 11
Annual Nitrogen Reduction by Best Management Practice
Fiscal 2010-2016
(Pounds in Millions)



Source: Department of Budget and Management

The Department of Legislative Services (DLS) recommends the addition of budget bill language to request that the Administration continue to publish the overall Chesapeake Bay restoration data and two-year milestones funding in the Governor's budget books.

2. Significant Policy Gaps

While the State is meeting its two-year milestones for many pollution reduction measures, EPA notes that Maryland's long-term success for TMDL achievement is dependent on continuing implementation in all sectors. Section 42 of the fiscal 2015 budget bill expressed the General Assembly's intent that the Maryland Department of Planning, DNR, MDA, MDE, and DBM submit a report on historical and projected Chesapeake Bay restoration spending and associated impacts, and the overall framework to meet the calendar 2025 requirement of having all best management practices in place to meet water quality standards for restoring the Chesapeake Bay. The report noted the following: "Discussion regarding future funding or policy initiatives will be reviewed with the incoming administration prior to submitting [a report] in response to this request."

The submitted report reflects that between fiscal 2000 and 2013 the State is credited with taking actions that will reduce estimated nitrogen loads by 14.1 million pounds, phosphorus by 0.6 million pounds, and sediment by 337.0 million pounds. Monitoring indicates that corresponding reductions in nitrogen concentration have been documented at 57% of the long-term water quality monitoring stations, phosphorus at 39% of monitoring stations, and total suspended solids at 11% of monitoring stations. Over roughly the same time period, fiscal 2000 to 2014, Chesapeake Bay restoration funding in the bay cabinet agencies has totaled $5.7 billion. The report also notes sector loading changes as follows, which may also be interpreted as opportunities and threats for future loading reductions.

- **Agriculture** – Nitrogen reductions are due to BMP implementation and agricultural land conversion to development. Phosphorus changes are offset to some degree by increased poultry population estimates.

- **Urban Stormwater** – Nitrogen reductions are due to implementation of air pollution reduction strategies and stormwater implementation strategies. Phosphorus reductions partially reflect fertilizer management. The result of the combination of air pollution reduction, fertilizer management, and stormwater management practices has been roughly equaled by loads added by new development.

- **Septic Systems** – Reductions due to system upgrades and connections to wastewater treatment plants are often more than offset by loads resulting from the installation of new systems.

- **Wastewater** – Reductions are a combination of municipal wastewater treatment plant upgrades, and closures of industrial facilities, which are lessened slightly by increase in loads due to growth. In addition, there is year-to-year variability in loading due to changes in rainfall.

The following issues will likely need to be considered in order to keep Maryland on track to meet the calendar 2017 pollution reduction targets and ultimately addressed in order to achieve the TMDL.

- **Growth Strategy:** In order to comply with the TMDL, Maryland must not only reduce existing pollution loads, but also *maintain* reduced pollution loads as population growth and new development occurs. Maryland has not yet adopted a clear strategy for accounting for new pollution associated with future growth. EPA has directed the State to develop and submit to EPA a detailed schedule for adopting regulations accounting for growth during Maryland's 2014-2015 milestones period. Accounting for growth regulations have not yet been adopted.

- **Phosphorus Management Tool:** Developed by scientists at the University of Maryland, the PMT is used to identify agricultural lands where the soil is saturated with phosphorus and has a high risk of runoff. The PMT is a component in the State's WIP that will be used to reduce phosphorus loads. It was first proposed in 2013, but fiscal 2015 budget language restricted MDA funding for final development and submission of the PMT regulations until MDA submitted a full economic analysis of the impact of the proposed regulations. The analysis was released in November 2014, and reflected six-year subsidized costs to farmers ranging from $22.5 million to $61.3 million or, based on 2,026 poultry farms on the Eastern Shore, $1,851 per farm per year, up to $5,040 per farm per year, depending on assumptions about the availability of State and federal funding available to offset the cost of the regulations. Regulations were submitted in December 2014 and adopted in January 2015. While the regulations have not been published, the BayStat agencies note that they are being reviewed by the new Administration. Any delays in adopting the PMT may reduce EPA's confidence in Maryland's 2014-2015 milestones given that the PMT was included in but not completed as part of Maryland's 2013-2014 milestones.

- **Financing Restoration Activities:** The State's current $14.4 billion restoration cost estimate is incomplete and may change significantly in the future. A more complete and detailed estimate of the additional revenue required for WIP implementation, as well as the potential cost savings associated with nutrient trading strategies, is warranted to better inform future decisionmaking. This estimate, which was expected with the report on historical and projected Chesapeake Bay restoration spending, should include the potential cost savings associated with the State's cross-sector trading policy.

- **Pollution Reduction Strategy:** Maryland's Phase II WIP distributes pollution reduction responsibility among the various pollution sources and does not prioritize implementation of the most cost-effective BMPs. The State may wish to adjust this strategy and place additional emphasis on funding the most cost-effective approaches. Pursuing the most cost-effective approaches has received attention in the past. In 2004, the federal-state Chesapeake Bay Watershed Blue Ribbon Finance Panel recommended establishing a regional financing authority to fund the most cost-effective BMPs at the watershed scale.

DLS recommends that the BayStat agencies comment on the plans for the growth strategy, phosphorus management tool, financing restoration activities such as through nutrient trading, and cost-effectiveness of the pollution reduction strategy. In addition, DLS recommends again that the BayStat agencies submit information on updated historical spending and projected Chesapeake Bay restoration spending and associated impacts and the overall framework to meet the calendar 2025 requirement of having all best management practices in place to meet water quality standards for restoring the Chesapeake Bay.

3. Funding Need for Study of Ocean Acidification Impact on Chesapeake Bay?

Chapter 383 of 2014 established the Task Force to Study the Impact of Ocean Acidification on State Waters staffed by DNR. The task force was charged with analyzing the best available science regarding ocean acidification and the potential effects of acidification on the ecology of State waters and on State fisheries and making recommendations regarding potential strategies to mitigate the effects of acidification on State waters and on State fisheries. The task force reported its findings and recommendations as noted below. However, it appears that no funding has been explicitly requested to address the findings and recommendations.

Introduction

Human-caused emissions of carbon dioxide – a greenhouse gas causing climate change – have been mitigated partially by the ocean absorbing carbon dioxide. The ocean absorption of carbon dioxide, in turn, has changed ocean chemistry, making it more acidic in a process called ocean acidification. There are three versions of ocean acidification:

- **Version 1 Atmospheric Contribution (Open Ocean)** – Open ocean conditions may be such that carbon dioxide introduction makes the water more acidic and reaches a critical value whereby calcium carbonate minerals such as aragonite and calcite dissolve, and thus the shells, exoskeletons, and skeletons of animals dissolve. Atmospheric concentration of carbon dioxide is the major driver and small changes in acidity are significant and occur relatively slowly. Reduced atmospheric carbon dioxide levels would ameliorate this concern.

- **Version 2 Atmospheric Contribution and Ocean Upwelling (Continental Shelf)** – Continental shelf conditions may be such that an upwelling event, for instance in the coastal ocean off of Washington State, brings carbon-rich deep ocean water that is acidic, which can impact the success of shellfish aquaculture. The overall change of acidity is slow, but there can be abrupt changes depending on water movements. A shifting in the timing of aquaculture or other activities to avoid the upwelling periods could ameliorate this concern.

- **Version 3 Atmospheric Contribution and Respiration-induced Hypoxia (Estuaries)** – Chesapeake Bay conditions may be such that nutrient runoff may lead to an algal bloom. The algal bloom would then be decomposed by bacteria in a process called respiration that requires oxygen, thus creating hypoxia or low oxygen, and gives off carbon dioxide, thus creating more

acidic conditions. In addition, the components of the algal bloom also respire themselves at night creating a cyclical aspect to the acidity changes. Changes in acidity can be substantial, rapid, and cyclic and can be impacted by the salinity of water through either tidal movement or freshwater flow. In addition, the impacts from acidity can be exacerbated by temperature, low dissolved oxygen, temperature, and other stressors. A reduction in nutrient loading that creates the algal blooms could ameliorate this concern.

Findings

Key task force findings are as follows:

- **Enhance monitoring of State waters to quantify scale, patterns, and trends of ocean acidification –** Maryland lacks the carbonate monitoring parameters and information – measurements of partial pressure of carbon dioxide, pH, total alkalinity, and dissolved inorganic carbon – to fully assess acidification and the impacts to Maryland's aquatic resources. Existing monitoring networks conducted by DNR (general water quality conditions) and MDE (shellfish growing area conditions) could be expanded for this purpose.

- **Establish additional research priorities in estuarine and coastal waters –** Acidification research in estuaries and coastal waters is not well understood, monitored, or studied.

- **Improve coordination with other states and federal resource managers –** The states of Washington and Maine and the National Oceanic and Atmospheric Administration have recognized that acidification is an emerging issue that needs more research, monitoring and strategies to mitigate the impacts from increased carbon dioxide in the atmosphere. Other cooperative efforts should be pursued with the EPA – Chesapeake Bay Program and the Mid-Atlantic Regional Association Coastal Ocean Observing System.

- **Focus on impacts to key species and associated activities –** Maryland needs to better understand the impact of acidifying conditions for some of Maryland's high value species such as oysters, blue crabs, striped bass, and other forage fish to help mitigate loss or improve performance in key industry or conservation efforts. Potential impacts include reduced reproductive success, more susceptibility to predation, reduced growth due to increased energy expenditures, and increased mortality.

- **Provide direct support to affected industries –** The task force recommends development of a cooperative system to support industry engagement in healthy and growing shellfish production; educate growers about and incorporate relevant mitigation strategies identified by the Washington State Blue Ribbon Panel on Ocean Acidification; support a voluntary monitoring system of key carbonate chemistry parameters; maintain a database of key acidification monitoring and research findings; and encourage regular information exchanges between scientists, management, and industry.

- **Pursue legislative action –** Maryland should establish an interagency commission or workgroup with representation from industry, State agencies (DNR and MDE), academic and research institutions (for example, University of Maryland Center for Environmental Science, Smithsonian Environmental Research Center, and others), the Maryland Waterman's Association, the Chesapeake Bay Foundation, the Oyster Recovery Partnership, EPA –- Chesapeake Bay Program, and National Oceanic and Atmospheric Administration to implement recommendations, help identify additional resources, and report on the progress of interstate initiatives.

- **Improve communications and outreach –** Maryland should develop a targeted outreach plan with an associated website that provides information to watermen and coastal communities to encourage them to become engaged in planning and priority setting for responses to ocean acidification.

DLS recommends that the BayStat agencies comment on whether any funding is budgeted to address the scale, pattern, and trend of acidification and its impact on the Chesapeake Bay and Atlantic coastal bays and whether efforts are planned to secure federal and or other sources of funding for evaluating this risk.

4. Conowingo Dam Status

The Conowingo Dam – a peaking hypdroelectric facility that uses reservoir storage to generate during peak electricity demand periods – has been described as the biggest best management practice on the Susquehanna River. However, the Conowingo Dam, and two other dams in the Lower Susquehanna River owned by Exelon Corporation – Safe Harbor and Holtwood – have reached an end state in terms of sediment storage capacity. In addition, the Conowingo Dam is scheduled for relicensing by the Federal Energy Regulatory Commission (FERC). The relicensing process is informed by the FERC July 2014 Draft Multi-Project Environmental Impact Statement for Hydropower Licenses and the sediment concerns are addressed by the U.S. Army Corps of Engineers (USACE), Baltimore District, and the MDE draft October 2014 Lower Susquehanna River Watershed Assessment, Maryland and Pennsylvania Phase I.

FERC Relicensing Report

The July 2014 FERC relicensing report conclusion was to relicense the Conowingo Dam with some staff modifications and additional measures. The report also noted that the public was concerned about the effects of sedimentation on aquatic resources downstream of Conowingo Dam, including the Chesapeake Bay. As part of its relicensing package, Exelon Corporation proposed new environmental measures as follows: implement its Sediment Management Plan in order to identify benchmarks and thresholds for actions to address sediment issues that may affect project operation and conduct a bathymetric survey of Conowingo Pond every five years to monitor sediment transport and depositional patterns within the pond. The FERC staff recommendation noted that the proposed bathymetric surveys

would allow for verification of predictions from the anticipated USACE study and help identify appropriate management actions.

USACE and MDE Lower Susquehanna Report

The October 2014 USACE and MDE Lower Susquehanna Report notes that the three hydroelectric dams in the Lower Susquehanna River – Safe Harbor, Holtwood, and Conowingo – have reached an end state in terms of sediment storage capacity. The dams have now entered a dynamic equilibrium in which flooding events causing scouring – sediment removal – and then the sediment will build up again over inter-flood periods. Other report findings are as follows.

- **Nutrients, Not Sediments, Have the Greatest Impact on Bay Aquatic Life** – While sediment may reduce light for submerged aquatic vegetation during the growing season, the sediment usually settles before the growing season. Instead, the concern is that nutrients can create algal blooms, which eventually deplete oxygen from the water, and can reduce water clarity, which limit submerged aquatic vegetation growth.

- **Watershed is the Principal Source of Sediment** – During a storm 20% to 30% of sediment from the Susquehanna River is from Conowingo Reservoir bed scour and the remainder from the upstream watershed, although it is noted that the upstream watershed includes scour from behind Holtwood and Safe Harbor Dams as well. A combined strategy of addressing nutrient and sediment loads from both reservoir scour and watershed load is necessary. For instance, it is estimated that 3 of the 92 Bay segments under the TMDL for dissolved oxygen would not achieve the goals as a result of the increased frequency and amount of sediment from behind the dams.

- **Sediment Management Strategies** – Sediment management strategies were considered to reduce sediment from future storm, or scour, events including (1) reducing sediment yield from the Susquehanna River watershed above what is required for the WIP; (2) minimizing sediment deposition within the reservoirs by either routing sediment around or through the reservoir storage; and (3) increasing or recovering volume in the reservoirs. Reducing sediment yield was found to be expensive and of limited use for reducing sediment available for scour due to the majority of such low-cost BMPs already being implemented. Sediment bypassing was found to be less expensive but more environmentally costly because bypassed sediment involved discharge of nutrients, which in turn comprised Chesapeake Bay water quality. Increasing or recovering volume in the reservoirs was found to be expensive and to have short-lived environmental benefits due to the constant deposition of new sediment and associated nutrients. Sediment removal costs were estimated to be on the order of $48 million to $267 million annually for removal of 3 million cubic yards of sediment. Watershed sediment reduction costs were estimated to be on the order of a one-time cost of $1.5 billion to $3.5 billion, which is estimated to annually prevent approximately 117,000 cubic yards of sediment from reaching the Chesapeake Bay.

- **Future Needs and Opportunities** – Research is needed to: (1) quantify the full impact on Chesapeake Bay aquatic resources and water quality from the changed conditions in the Lower Susquehanna River's dams and reservoirs before calendar 2017; (2) integrate findings from the report into the development of the Phase III WIP as part of the Chesapeake Bay TMDL 2017 mid-point assessment; (3) develop and implement management options that offset impacts to the upper Chesapeake Bay ecosystem from increased sediment-associated nutrient loads; and (4) commit to enhanced long-term monitoring and analysis of sediment and nutrient processes in the lower Susquehanna River and upper Chesapeake Bay to promote adaptive management.

MDE Press Release

A December 2014 MDE press release indicates that FERC has issued a one-year extension of the current Conowingo Dam operation license. In addition, it states that MDE's intent was to deny the Proposed Relicensing of the Conowingo Hydroelectric Project Application for Water Quality Certification, and Exelon Corporation acted accordingly by withdrawing its application for the Water Quality Certification. Instead, Exelon Corporation has agreed to provide up to $3.5 million to study the effects of sediment related to the dam on water quality in the Susquehanna River and the Chesapeake Bay. A study plan has been prepared with input by MDE, Exelon Corporation, DNR, U.S. Geological Survey, the University of Maryland Center for Environmental Science, the EPA Chesapeake Bay Program, and the USACE.

DLS recommends that the BayStat agencies comment on the likely decision points that will result from the additional study of the impact of Conowingo Dam sediment on the Chesapeake Bay.

Recommended Actions

1. Add the following section:

SECTION XX. AND BE IT FURTHER ENACTED, That it is the intent of the General Assembly that the Maryland Department of Planning, the Department of Natural Resources, the Maryland Department of Agriculture, the Maryland Department of the Environment, and the Department of Budget and Management provide a report to the budget committees by December 1, 2015, on Chesapeake Bay restoration spending. The reports shall be drafted subject to the concurrence of the Department of Legislative Services (DLS) in terms of both electronic format to be used and data to be included. The report should include:

(1) fiscal 2015 annual spending by fund, fund source, program, and State government agency; associated nutrient and sediment reduction; and the impact on living resources and ambient water quality criteria for dissolved oxygen, water clarity, and "chlorophyll a" for the Chesapeake Bay and its tidal tributaries, which is to be submitted electronically in disaggregated form to DLS;

(2) projected fiscal 2016 to 2025 annual spending by fund, fund source, program, and State government agency; associated nutrient and sediment reductions; and the impact on living resources and ambient water quality criteria for dissolved oxygen, water clarity, and "chlorophyll a" for the Chesapeake Bay and its tidal tributaries, which is to be submitted electronically in disaggregated form to DLS; and

(3) an overall framework discussing the needed regulations, revenues, laws, and administrative actions and their impacts on individuals, organizations, governments, and businesses by year from fiscal 2015 to 2025 in order to reach the calendar 2025 requirement of having all best management practices in place to meet water quality standards for restoring the Chesapeake Bay, which is to be both written in narrative form and tabulated in spreadsheet form that is submitted electronically in disaggregated form to DLS.

Explanation: This language expresses the intent that the Maryland Department of Planning (MDP), the Department of Natural Resources (DNR), the Maryland Department of Agriculture (MDA), the Maryland Department of the Environment (MDE), and the Department of Budget and Management (DBM) provide a report by December 1, 2015, on recent and projected Chesapeake Bay restoration spending and associated impacts and the overall framework to meet the calendar 2025 requirement of having all best management practices in place to meet water quality standards for restoring the Chesapeake Bay.

Information Request	Authors	Due Date
Historical and projected Chesapeake Bay restoration spending	MDP DNR MDA MDE DBM	December 1, 2015

2. Add the following section:

SECTION XX. AND BE IT FURTHER ENACTED, That it is the intent of the General Assembly that the Department of Budget and Management, the Department of Natural Resources, and the Maryland Department of the Environment provide two reports on Chesapeake Bay restoration spending. The reports shall be drafted subject to the concurrence of the Department of Legislative Services (DLS) in terms of both electronic format to be used and data to be included. The scope of the reports is as follows:

(1) Chesapeake Bay restoration operating and capital expenditures by agency, fund type, and particular fund source based on programs that have over 50% of their activities directly related to Chesapeake Bay restoration for the fiscal 2015 actual, fiscal 2016 working appropriation, and fiscal 2017 allowance, which is to be included as an appendix in the fiscal 2017 budget volumes and submitted electronically in disaggregated form to DLS; and

(2) two-year milestones funding by agency, best management practice, fund type, and particular fund source along with associated nutrient and sediment reductions for fiscal 2014, 2015, 2016, and 2017, which is to be submitted electronically in disaggregated form to DLS.

Explanation: This language expresses the intent that the Department of Budget and Management (DBM), the Department of Natural Resources (DNR), and the Maryland Department of the Environment (MDE) provide at the time of the fiscal 2017 budget submission information on (1) Chesapeake Bay restoration spending for programs that have over 50% of their activities directly related to Chesapeake Bay restoration; and (2) two-year milestones funding.

Information Request	Authors	Due Date
Summary of Chesapeake Bay restoration spending for programs that have over 50% of their activities directly related to Chesapeake Bay restoration, and two-year milestones expenditures	DBM DNR MDE	Fiscal 2017 State budget submission