Chesapeake Bay Restoration Strategies: Agricultural Certainty, Cover Crops, and Nutrient Trading

Department of Legislative Services
Office of Policy Analysis
Annapolis, Maryland

November 2013

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DEPARTMENT OF LEGISLATIVE SERVICES
OFFICE OF POLICY ANALYSIS
MARYLAND GENERAL ASSEMBLY

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November 21, 2013

The Honorable Thomas V. Mike Miller, Jr., President of the Senate
The Honorable Michael E. Busch, Speaker of the House of Delegates
Members, Maryland General Assembly

Ladies and Gentlemen:

To achieve mandatory federal Chesapeake Bay restoration goals, the State is implementing a diverse array of policy initiatives and best management practices to reduce pollution. While the State has met its short-term bay restoration goals, long-term success hinges on implementation of the most effective pollution reduction tactics. Three specific strategies that are receiving a significant amount of attention are (1) maximizing the use of cover crops; (2) establishing an agricultural certainty program; and (3) expanding the use of nutrient trading markets.

To better understand the efficacy of these strategies and how Maryland compares to other states, the Natural Resources, Environment, and Transportation Workgroup within the Office of Policy Analysis prepared this report. Specifically, the report (1) provides background information on each strategy and how it is being used in Maryland; (2) discusses implementation of the strategy in other states; and (3) identifies policy issues that merit further consideration.

We trust this report will prove useful to the General Assembly in better understanding several high profile bay restoration strategies. If you would like additional information regarding this report, please contact Jonathan D. Martin at (410) 946-5530.

Sincerely,

Warren G. Deschenaux
Director

WGD/AMM/kwb

cc: Mr. Karl S. Aro

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Introduction

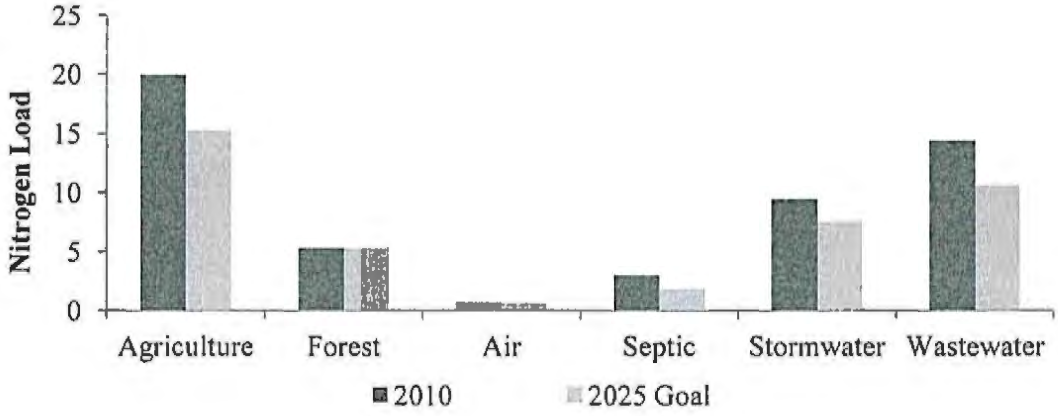
To achieve mandatory federal Chesapeake Bay restoration goals, a diverse and complex web of strategies is being implemented at the national, state, and local level. In Maryland, a variety of approaches are being used to reduce the impacts of pollution from, among other things, wastewater treatment plants, onsite sewage disposal systems, agricultural land, and stormwater runoff. Three specific strategies that are receiving a significant amount of attention are (1) maximizing the use of cover crops; (2) establishing an agricultural certainty program; and (3) expanding the use of nutrient trading markets. This report examines these three bay restoration strategies and identifies several policy issues that merit further consideration.

Background

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 Virginia and the District of Columbia. The TMDL sets the maximum amount of pollution the bay can receive and still attain water quality standards. It also identifies specific state pollution reduction requirements and requires pollution reduction measures to be in place by 2025, with at least 60.0% of the actions completed by 2017. Maryland must establish pollution control measures by 2025 that, based on 2010 levels, reduce nitrogen loads to the bay by 22.0%, phosphorus loads by 14.9%, and sediment loads by 1.9%. **Exhibit 1** presents Maryland's nitrogen pollution loads and illustrates that agriculture, wastewater, and stormwater are the major pollution sources being targeted for load reductions.

As part of the TMDL, bay jurisdictions must develop Watershed Implementation Plans (WIP) that identify measures to reduce pollution and restore the bay. The WIPs (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 pollution reductions will be achieved, which is a basic requirement of all TMDLs. In addition, bay jurisdictions have committed to achieving specific, short-term bay restoration milestones in order to assess progress toward achieving pollution reduction goals. As part of this effort, jurisdictions submit pollution reduction progress and program information to EPA for review every two years. Maryland achieved its first set of bay restoration milestone goals, and it is anticipated that the State will achieve its 2012 through 2013 milestone goals.

Exhibit 1
Maryland's Nitrogen Pollution Loads by Source
(Million Pounds Per Year)



Source: Maryland's Phase II Watershed Implementation Plan

The State is implementing numerous programmatic initiatives and best management practices (BMP) – practical methods designed to prevent or reduce the movement of pollutants from land to surface and/or ground waters – to achieve its bay restoration goals. However, three efforts that are receiving significant sustained or new attention are agricultural certainty, cover crops, and nutrient trading. The State's recently authorized agricultural certainty program seeks to provide agricultural operations with certainty that the State will not impose additional environmental protection requirements for a given period of time. The cover crop program, one of the State's primary agricultural sector strategies for achieving bay restoration, allocates grants to farmers who plant cover crops in the fall to conserve nutrients, reduce soil erosion, and protect water quality. Maryland's nutrient trading program, which is expected to play a key role in efforts to address future pollution growth, seeks to reduce pollution by establishing a system of credits that can be traded. The following pages provide background information on these three strategies and identify associated policy issues for further consideration.

Agricultural Certainty

Agricultural certainty programs seek to provide farmers with certainty that a state will not impose additional environmental protection requirements for a given period of time if the operation maintains specific conservation practices. Although agricultural certainty is not a federally approved agricultural BMP, it seeks to encourage farmers to voluntarily adopt BMPs that help achieve compliance with pollution reduction goals more quickly, and, in some

instances, go beyond what would otherwise be required. Proponents of agricultural certainty in Maryland believe it has the potential to expedite the State's progress toward meeting the bay TMDL and WIP goals for the agricultural sector. Opponents, however, argue that agricultural certainty may actually limit progress by restricting the State's flexibility to respond to revised TMDL goals and BMP efficiency estimates.

Federal Role

The U.S. Department of Agriculture (USDA) and EPA have been working for a number of years with states and members of the agricultural and environmental communities to develop a framework for agricultural certainty programs. Former EPA administrator Lisa Jackson has stated that agricultural certainty programs are "...among the most effective means for improving water quality in our nation." Furthermore, USDA has described agricultural certainty programs as a valuable tool for accelerating voluntary private land conservation and has prioritized implementation of such programs in the bay watershed. USDA's Natural Resources Conservation Service (NRCS) helps states develop agricultural certainty programs, and USDA may give farmers participating in agricultural certainty programs priority consideration for technical and financial assistance through programs such as Agricultural Management Assistance and the Conservation Stewardship Program.

The agricultural certainty concept is modeled after national "safe harbor agreements" implemented under the federal Endangered Species Act. In accordance with safe harbor agreements, property owners take certain actions on their private property that contribute toward the recovery of a listed species, and the U.S. Fish and Wildlife Service or the National Oceanic and Atmospheric Administration agree not to require additional or different conservation measures without the property owner's consent. Thus, safe harbor agreements seek to recover threatened species on private lands while giving property owners the assurance that additional land use measures will not be established, even if those measures effectively attract or increase species.

Maryland

Maryland's efforts to establish an agricultural certainty program began in 2010 when the Maryland Department of Agriculture (MDA) prepared a proposal for a USDA grant. The grant proposal was for, among other things, a pilot program in two counties featuring a five-year certification period, annual inspections, and a 10 to 20% margin of safety for calculating the agricultural operation's baseline pollution load. Also, in fall 2011, MDA convened a stakeholder group to develop a framework for creating a State agricultural certainty program and recommended authorizing legislation. After 18 months of consideration, the group identified key structural issues necessary for an effective certainty program and recommended authorizing legislation. In 2012, MDA received a three-year, $600,000 USDA grant to develop an agricultural certainty program in the State.

Efforts to establish an agricultural certainty program received additional attention in spring 2013 when the Maryland General Assembly passed Senate Bill 1029 of 2013 (Chapter 339). Chapter 339 established a voluntary agricultural certainty program to accelerate the implementation of agricultural BMPs to meet the State's agricultural pollution reduction goals. Key components of Chapter 339 are summarized below.

- MDA must develop the program in conjunction with the Maryland Department of the Environment (MDE).

- MDA may certify an agricultural operation for 10 years if the operation meets specific criteria, including a fully implemented soil conservation and water quality plan (which is not currently required for all agricultural operations), a fully implemented nutrient management plan (which is not currently required for all agricultural operations), and farm-specific TMDL pollution reductions required by the certainty program.

- Certified agricultural operations are exempt from State or local laws or regulations enacted or adopted after the date of certification that relate to the reduction of agricultural sources of nitrogen, phosphorus, or sediment to meet all applicable TMDLs, or other water quality requirements.

- All other laws, regulations, or permits, are still applicable to the certified agricultural operation.

- Certified program verifiers must conduct onsite inspections of operations at least once every three years during the certification period, and MDA, in coordination with MDE, must establish a program to certify individuals to be program verifiers.

- MDA, MDE, and certified program verifiers must maintain information about operations in a manner that protects the identity of individuals, and MDA must make information about operations available for public review in a manner that provides the greatest public disclosure while protecting the identity of individuals.

In accordance with Chapter 339, an Agricultural Certainty Program Oversight Committee was formed in June 2013 to (1) monitor and provide oversight on the development and implementation of policies and standards relating to the program; (2) assist in the development of implementing regulations; (3) meet at least once every year to evaluate program performance; and (4) make recommendations for improvements to, or termination of, the program. Committee members include representatives from the public, farming community, farming industry, soil conservation districts (SCD), environmental community, academic community, EPA, MDA, USDA, and MDE (see **Appendix 1** for a full list of committee members).

The committee plans to hold monthly meetings until it submits implementing regulations in December 2013. Committee meetings through October 2013 focused on (1) identifying the

best methods for determining whether an agricultural operation meets its TMDL allocation; (2) determining whether all or only a portion of property under an agricultural operator's management must be certified to participate in the program; (3) discussing whether an operation with specified animal feeding permits may participate in the program; (4) determining the timeframe within which to address compliance issues; (5) handling suspension and revocation of certification; and (6) addressing MDE's role in reviewing program applications. Currently, MDA plans to initiate the program in spring 2014.

Other States

Agricultural certainty programs have been established in several states. Delaware and Vermont are in the process of developing programs, and four states (Louisiana, Michigan, New York, and Texas) have less comprehensive programs that exempt farmers from certain fines or presume compliance with certain requirements for the certification period. Minnesota and Virginia have established agricultural certainty programs that are voluntary, provide certification for a 9- or 10-year period, require verification, and ensure landowner confidentiality. The programs in Minnesota and Virginia are described in greater detail below and are summarized with the Maryland program in **Exhibit 2**.

In January 2012, USDA, EPA, and the state of Minnesota signed an agreement establishing the first federal-state agricultural certainty program. Minnesota received $6.5 million in USDA funding and dedicated $3.0 million from its Clean Water, Land, and Legacy Amendment to start the Minnesota Agricultural Water Quality Certification Program in four watersheds. The program is being implemented as a pilot program for up to three years, with the goal of testing and refining the program. Participants will be exempt from any new water quality protection regulations for a period of 10 years if the operation undertakes conservation activities to reduce nutrient run-off and erosion. While the requirements for certification are still being determined, at a minimum, the program will ensure that an agricultural operation meets the targeted pollution reduction for its individual contribution in addition to all current pollution reduction requirements. Additionally, participants will receive priority for cost-share funding from federal and state agencies, thus reducing the uncertainty of their operating environment. Minnesota's General Assembly recently considered, but did not pass, legislation (House File 1175/Senate File 1373 of 2013) that would have codified the program.

In 2011, the Virginia General Assembly passed legislation (House Bill 1830/Chapter 781) that established an agricultural certainty program to help meet the bay TMDL goals. In accordance with Chapter 781 and implementing regulations, which take effect in December 2013, farmers who fully implement and maintain components of a resource management plan are deemed to be in full compliance with any TMDL and applicable state water quality requirements for nutrients and sediment for a nine-year period. The resource management plans, which agricultural operations are not required to have, must be developed by a qualified professional and must include agricultural BMPs sufficient to meet Virginia's bay TMDL goals. Landowners and agricultural operators participating in the program will also be eligible for grant funding for agricultural BMPs and may be eligible for state tax credits.

Exhibit 2
State Agricultural Certainty Programs

State	Participation Requirements	Benefits to the Farmer	Certification Period	Frequency of Inspection	Program Funding	Program Established	Current Status
Maryland	Fully implemented soil conservation and water quality plan and nutrient management plan; meet specific nutrient and sediment load reductions; and meet specific State and federal laws, regulations, and permit conditions	Exemption for duration of certification period from State or local laws or regulations enacted or adopted after the date of certification that relate to the reduction of agricultural sources of nitrogen, phosphorus, or sediment to meet the bay TMDL, local TMDLs, or other water quality requirements	10 years	At least once every three years	$600,000 U.S. Department of Agriculture grant, over three years	Authorized in 2013	Regulations being developed; program implementation anticipated in spring 2014
Minnesota	Still being determined, but at a minimum, adoption of specific best management practices	Exemption for duration of certification period from any new water quality protection regulations and prioritized status for cost-share funding from federal and state agencies	10 years	Recommended optional inspection once every three years	$6.5 million U.S. Department of Agriculture grant and $3.0 million in state Legacy Amendment funds	2012	Pilot program areas selected and local officials are recruiting participants
Virginia	Full maintenance and implementation of applicable components of a resource management plan	Exemption for duration of certification period from TMDL and state water quality requirements adopted during the certification period	9 years	At least once every three years, but not more than annually unless special circumstances apply	No specific funding allocated	2011	Final regulations take effect in December 2013

TMDL: total maximum daily load
Source: Minnesota Department of Agriculture; Virginia Chapter 781 of 2011; Virginia regulations (4VAC50-70-10 et seq.); Maryland Department of Legislative Services

Policy Considerations

The following issues may merit consideration when determining how the State should implement agricultural certainty programs in the future.

- **Limited Participation Possible:** MDA advises that of approximately 5,000 agricultural operations eligible to enroll in the program, only a handful of high-performing operations will likely become early participants. The Maryland Association of Soil Conservation Districts has stated that many agricultural operations see no benefit in waiting 10 years to comply with new regulations. Additionally, the Maryland Grain Producers Association found that while many grain farmers are interested in the program, they are unlikely to participate because 65% of their land is rented, and annual variations in the lands rented may make participation difficult.

- **Uneven Distribution of Pollution Reduction Responsibility in the Agricultural Sector:** In 2017, EPA will reevaluate bay restoration and determine if more pollution reductions are required to meet the bay TMDL. If EPA determines that more action is necessary, the agricultural sector may be required to implement additional BMPs. The State should (1) address how to treat an agricultural operation certified under the agricultural certainty program prior to 2017 if, due to EPA's reevaluation, the agricultural sector must make further nutrient reductions; and (2) determine whether shifting new pollution reduction requirements to agricultural operations that do not participate in the certainty program is a reasonable strategy.

- **Cautious Estimates of Pollution Reduction Efficiencies and Baseline Pollution:** The effectiveness of an agricultural certainty program hinges on the accuracy of initial farm-specific baseline assessments that ensure an agricultural operation is achieving its share of applicable water quality requirements through appropriate BMPs. It may be prudent to establish a cautious baseline assessment for agricultural operations that reflects at least a 10 to 20% margin of safety to offset the possibility of BMPs not achieving necessary pollution reductions.

- **Certified Verifiers Critical to Program Success:** Inspections of agricultural operations are vital to ensuring program success, and the credibility of the program will be impacted by the requirements and restrictions put on certified verifiers. The State should (1) ensure a sufficient number of verifiers to inspect participating operations; (2) establish qualifications for verifiers that include appropriate education and experience; and (3) create an explicit conflict of interest policy to avoid a family member or other potentially biased individual from inspecting an agricultural operation.

- **Broadening MDE's Program Authority May Help Ensure the Bay TMDL Compliance:** Because MDE is the main State agency responsible for ensuring

compliance with the bay TMDL, the General Assembly may wish to broaden MDE's role in the program. For example, consideration could be given to granting MDE authority to revoke or suspend certification for violating a provision of the program and to authorizing MDE to assist MDA with all inspections.

Cover Crops

The State is implementing a variety of agricultural BMPs to reduce pollution loads, including constructing animal waste structures, expanding stream protection, and updating farm soil conservation and water quality plans. However, the agricultural BMP that has arguably received the most policy attention and financial support is the winter cover crop program. Cover crops are cereal grains and winter annual brassicas (plants in the cabbage family) that are planted in the fall to take up nutrients that remain in the soil following the harvest of corn, soybeans, sorghum, tobacco, or vegetables. Cover crops grow through the winter and recycle unused plant nutrients, protect fields against wind and water erosion, and help improve the soil for the spring crop. Cover crops have been described as the State's single most cost-effective BMP available to prevent nitrogen from entering groundwater and polluting the bay. However, others note that investing in efforts to prevent the initial application of excess nutrients is a better strategy for addressing agricultural pollution.

Federal Role

The federal government is actively engaged in efforts to promote cover crops. USDA provides financial assistance to farmers to plant certain cover crop mixes through programs such as the Environmental Quality Incentives Program and Conservation Stewardship Program. Also, USDA recently developed guidance to ensure that farmers who plant cover crops remain eligible for crop insurance and commodity program payments. EPA has approved numerous different cover crop BMPs for use in the bay region. In addition, an expert review panel is currently evaluating various cover crop practices in order to, among other things, develop new and/or improved pollution reduction efficiency values and update protocols for applying the practices. This review panel may address a current federal limitation, namely that USDA's NRCS only supports cover crop seed mixes that are not eligible to receive pollution reduction credits for purposes of the bay TMDL.

Maryland

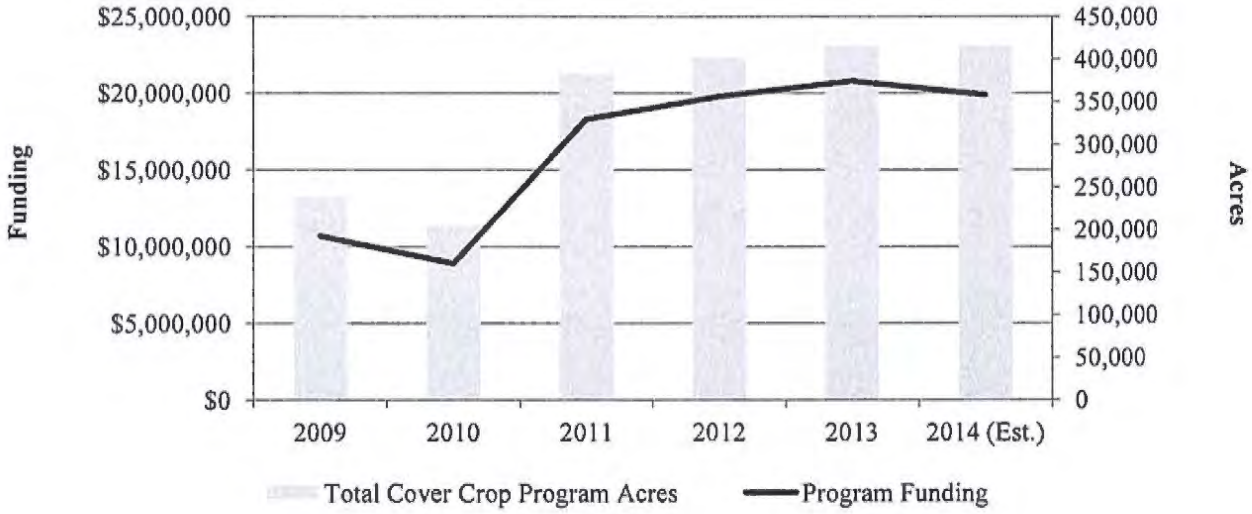
Maryland's cover crop program is administered by MDA and the State's 24 SCDs through the Maryland Agricultural Water Quality Cost-share Program. MDA provides grants to farmers to offset the cost of planting at least five acres of cover crops in the fall. The 2013 through 2014 cover crop program is offering an unlimited number of participants (1) between $30/ and $55/acre for traditional cover crops and up to an additional $45/acre for the use of highly valued planting practices such as early planting; and (2) $25/acre for commodity

(harvested) cover crops and a bonus payment of $10/acre if rye is planted. Program applicants must be in good standing with other MDA programs and must be in compliance with the State's nutrient management program. To ultimately qualify for payment, farmers must certify acres planted with their SCD, and SCDs conduct field checks on 20% of certified cover crop acres in the fall and 10% of certified acres in the spring to verify program compliance. While the program has been voluntary in the past, recent nutrient management regulations require cover crops to be planted when organic nutrient sources are applied to fields in the fall.

Maryland's cover crop program is modified annually in response to, among other things, recommendations from a technical advisory committee, feedback from SCDs, and funding availability. Several program characteristics have changed significantly in recent years, including the payment structure, program acreage limits, eligible crops, and planting and tillage methods. Specifically, annual program acreage caps were in place during the fiscal 2008 to 2010 period due to limited funding, and traditional base per acre payments have increased from $30 in fiscal 2007 to $45 in fiscal 2014. Generally, modifications were made to respond to overhead cost increases, enhance participation, and encourage the planting of particularly effective cover crop varieties.

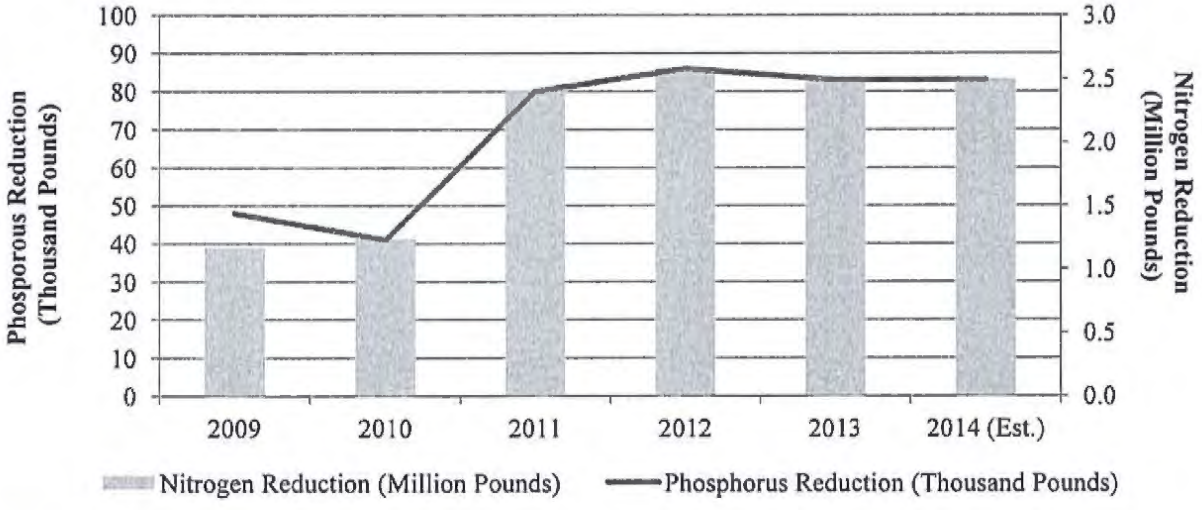
Over the past five years, the State has invested significant resources in the cover crop program and has effectively surpassed its program acreage goals for the Phase II WIP. As illustrated in **Exhibit 3**, between fiscal 2009 and 2014, State funding for the cover crop program increased from $10.7 million to $19.9 million, a $9.2 million, or 86%, increase. The program's fiscal 2014 budget is largely provided by the Chesapeake and Atlantic Coastal Bays 2010 Trust Fund ($10.0 million in fiscal 2014) and the Chesapeake Bay Restoration Fund ($9.9 million in fiscal 2014). For contextual purposes, the program's fiscal 2014 budget represents approximately 25% of MDA's entire operating budget. Exhibit 3 also shows the number of certified cover crop acres over the past five years. **Exhibit 4** illustrates the estimated nitrogen and phosphorous pollution reduction associated with the State's cover crop program over the past five years.

Exhibit 3
Cover Crop Program – Funding and Acreage
Fiscal 2009-2014



Source: Maryland Department of Agriculture

Exhibit 4
Cover Crop Program – Nitrogen and Phosphorous Pollution Reduction
Fiscal 2009-2014



Source: Maryland Department of Agriculture

Efficiency

Cover crops are among the more cost-effective BMPs available to prevent nitrogen movement to groundwater and subsequently the bay. **Exhibit 5** reflects data developed by MDE and MDA concerning the average costs and pollution reduction impact associated with the implementation of several agricultural BMPs in Maryland. The exhibit illustrates how certain BMPs, such as erecting fences near streams, may have high annual costs per acre, but a low average cost per pound of nitrogen reduced due to the practice's significant impact. Alternatively, practices such as the development of nutrient management plans have a low annual cost per acre, but a high cost per pound of nitrogen reduced due to the modest pollution load reduction associated with this practice. Standard cover crops cost an average of $40 per acre annually and remove an average of four pounds of nitrogen per acre annually; however, the capacity of cover crops to remove nutrients from the soil is highly variable. A cover crop's efficiency depends on (1) when and how the crop is planted; (2) the condition of the soil; and (3) the type of cover crop planted. Generally, research suggests that maximum benefits are achieved when early fall planting occurs, crops are planted with maximum soil to seed contact, and plants such as rye are used.

Exhibit 5

Agricultural Best Management Practices – Impact and Costs

Practice	Average Nitrogen Load Reduction (Lbs/Acre/Year)	Life Span (Years)	Annual Totalized Cost (Per Acre/Year)	Average Cost Per Pound Reduced
Conservation Tillage*	0.47	1	$23.00	$49.00
Cover Crop (Standard Drilled Wheat)	3.65	1	40.27	11.00
Nutrient Management Plans	0.16	1	13.05	82.00
Stream Access Control with Fencing	48.37	15	1,247.82	26.00

*Conservation tillage involves leaving a previous years crop residue (*e.g.*, corn stalks) on fields before and after planting the next crop to reduce soil erosion and runoff.

Note: The costs reflect the initial costs of the practice and any annual costs (*e.g.*, inspections), but do not account for inflation.

Source: Maryland's Assessment and Scenario Tool; Maryland Department of Agriculture

Making a clear determination of the pollution removal and cost efficiency of a BMP is difficult. Generally, EPA modeling has shown that nonpoint source BMPs, such as cover crops, offer lower-cost options than point source BMPs, such as wastewater treatment plant upgrades. However, relatively large and verifiable nutrient load reductions can often be achieved through point source BMPs, and nonpoint source BMPs are generally more diffuse and difficult to monitor. In addition, the useable life of a BMP can obscure determinations of BMP efficiency. For example, the efficiency associated with annual BMPs, such as cover crops, and permanent BMPs, such as establishing forested buffers, could vary significantly based on the period of time evaluated.

The economic advantages and disadvantages of cover crops vary from practice to practice and from farm to farm. In general, they are affected by the acreage involved, the cash crop system being implemented, and the type of cover crop seeded. Some of the potential economic benefits of cover crops include increased cash crop yields, reduced fertilizer needs, reduced need to apply herbicide to suppress weeds, decreased drought damages, and reduced soil erosion. Some of the potential economic disadvantages include cover crop establishment costs (*e.g.*, seed and labor) and costs associated with deferring or forgoing cash crops. Overall, it can be challenging for an individual farmer to determine and weigh the potential risks and benefits of this practice.

Other States

Virginia

Virginia promotes the planting of cover crops through the Agricultural BMP Tax Credit Program and the Virginia Agricultural Cost-share (VACS) Program. The BMP Tax Credit Program provides a 25% state income tax credit, up to $17,500 annually, to encourage farmers to install eligible BMPs. The VACS Program provides financial incentives for the implementation of cover crops and other approved BMPs and is carried out by the state's soil and water conservation districts. In 2013, the VACS Program participants were given a $25/acre base cost-share payment for planting cover crops. Similar to incentives in Maryland, farmers can qualify for additional funds by planting early and using certain rye cultivars.

While Virginia is using cover crops to meet its bay TMDL goals, it is not relying on this strategy as heavily as Maryland. Virginia's Phase I WIP establishes several cover crop-related goals, including identifying additional funding for financial incentive programs and encouraging cover crops with standard planting dates on 10% of the available cropland. Virginia planted 79,000 acres of cover crops in 2009 and has set a goal to plant 309,000 acres annually by 2025. Virginia's program promotion efforts emphasize the paired use of no-till farming practices, which can enhance cover crop benefits by allowing biomass to accumulate and enrich the soil.

Pennsylvania

Pennsylvania encourages the planting of cover crops on agricultural lands through several federal and state programs. The state receives USDA funding that is distributed via incentive payments, cost-share funds, and grants for implementation of a variety of BMPs, including cover crop planting. Also, the state's Resource Enhancement and Protection Program gives farmers and businesses tax credits in exchange for implementing agricultural BMPs. Furthermore, the state's Growing Greener effort allocates state funding to the Park the Plow Program which provides financial and technical assistance to farmers for continuous no-till and cover crop planting on fields.

Pennsylvania is relying on cover crop programs to help meet its bay TMDL goal as well. According to Pennsylvania's Phase I WIP, the state plans to expand cover crop acreage from 190,714 acres in 2009 to 643,913 acres in 2025, a nearly 240% increase. The plan identifies existing state and federal sources as providing reasonable assurance that it will achieve this acreage goal. However, Pennsylvania's Phase II WIP does not list numeric goals for BMPs and does not address cover crop goals in the narrative.

Policy Considerations

While planting cover crops can be an effective pollution reduction method, it is clearly not the panacea for agricultural sector pollution. Some policy issues that may merit consideration when considering future investment in this BMP are described below.

- **Promoting Efficient Fertilization First:** Prioritizing efforts to establish crop fertilization policies and technology that better control the application of nutrients, rather than subsequently absorbing excess nutrients with cover crops, may be a more efficient use of limited State resources.

- **Allocation of State Agriculture Resources:** Due in large part to significant increases in State funding, the cover crop program has essentially achieved the 2017 program acreage goal enumerated in the State's Phase II WIP. The State should consider whether the benefits associated with early achievement of this goal outweigh a more equitable distribution of funding among the agricultural BMPs being implemented in accordance with the State's Phase II WIP.

- **Cost Effectiveness of Annual Versus Permanent Practices:** Unlike permanent practices, such as establishing forested stream buffers and waste storage structures, cover crops are an annual practice that have an immediate impact, recurring costs, and are highly weather dependent. When risks and costs are annualized over the expected life of the BMP, annual practices such as cover crops may involve more risks and cost.

- **Determination of Program Cost Share Amount:** MDA must take into consideration commodity prices, input costs, farmer risks, and other variables when determining the cover crop program's base cost-share amounts and incentive payments. The subsidies must be significant enough to prompt farmers' consideration, in spite of often limited information about the practice's exact production benefits. Because cost-share amounts may vary significantly from farm to farm, some farmers may net a significant financial benefit from participating in the program, because, for example, they are located in a high priority location, while others may only recover the input costs.

- **Geographic Targeting:** Maryland's cover crop program provides a $10 per acre incentive to plant in areas EPA has prioritized for addressing agricultural loading. To further encourage geographic targeting, the State should consider establishing specific program goals related to pollution reduction in high priority geographic areas.

- **Cover Crop Program Participation Maximized:** Recent nutrient management regulatory changes may prompt some increase in cover crop program demand and prompt program changes, such as establishing acreage caps and/or geographic area limits. However, MDA does not anticipate significant increases in cover crop program participation in the future. Thus, the State should focus on investing in, and creating incentives and opportunities to, implement other agricultural BMPs to achieve the State's agriculture sector pollution reduction goals.

Nutrient Trading

Nutrient trading is a market-based approach that involves the exchange of pollution allocations between sources in order to protect and improve water quality. 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 watershed-wide 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. This framework allows sources facing high pollution reduction costs to purchase less costly reductions from other sources.

While nutrient trading originated in 1968, it has received more attention in recent years, perhaps due to the success of trading efforts associated with EPA's Acid Rain Program and the Regional Greenhouse Gas Initiative. In Maryland, programs featuring trading between point sources (*i.e.*, wastewater treatment plants) are in place; although, to date, only the reallocation of loads between point sources has occured. However, development of a more robust trading program that encompasses both point and nonpoint (*i.e.*, agriculture) pollution sources has become the centerpiece of efforts to account for future growth in bay pollution loads. Generally, proponents of nutrient trading argue that it is more efficient than government regulation and thus

reduces the overall cost of compliance. Alternatively, opponents of nutrient trading argue that the complexity and lack of public scrutiny associated with trades yields too much uncertainty about the long-term reliability of pollution load reductions.

Federal Role

The federal government is involved in the development and support of state nutrient trading programs. While EPA has played the primary federal role in guiding nutrient trading efforts due to its authority over the federal TMDL process, USDA has provided advice on nutrient trading programs involving agriculture and forestry operations. In general, EPA encourages voluntary trading programs that facilitate implementation of TMDLs, reduce the costs of Clean Water Act compliance, establish incentives for voluntary reductions, and promote watershed-based initiatives. EPA has developed targeted guidance on nutrient trading, including a 2003 Water Quality Trading Policy and a 2007 Water Quality Trading Toolkit for National Pollutant Discharge Elimination System Permit Writers.

Federal agencies have taken specific steps to guide and promote nutrient trading in the bay watershed. For example, USDA provided a $512,000 Conservation Innovation Grant to MDA to implement a nutrient trading program during the fiscal 2010 through 2012 period. In addition, EPA has issued a series of guidance documents, including a draft June 2013 technical memorandum titled *Accounting for Uncertainty in Offset and Trading Programs*. This guidance document addresses the importance of identifying ways to reduce uncertainty (*i.e.* BMP effectiveness, weather variability, and failure to ultimately generate credits) in the calculation of credits used for offsets or trading, and it suggests a 2:1 trading ratio, which means at least two nonpoint source credits must be generated to offset every point source credit. The guidance distinguishes between three related ratios for addressing uncertainty: (1) reserve ratios, which set aside a percent of each nutrient credit allocated into a credit insurance pool to account for failed credit generation; (2) retirement ratios, which discount each nutrient credit to ensure that a trade results in an improvement in water quality through the donation of a portion of the credit to an entity that will not apply the credits to offset pollution; and (3) trading ratios, which are applied to nonpoint sources to address concerns about BMP effectiveness and monitoring.

Federal legislation promoting nutrient trading in the bay region has been introduced, but has not passed. In 2009, bills were introduced in both the U.S. House of Representatives (House Resolution 3852 of 2009) and the U.S. Senate (Senate 1816 of 2009) requiring, among other things, establishment of interstate nitrogen, phosphorus, and sediment trading programs. Furthermore, the bills would have required EPA to establish a five-year Chesapeake Bay nutrient trading guarantee pilot program to provide guarantees to purchasers of nutrient credits and to help ensure public transparency of nutrient trading activities.

Maryland

In early 2008, Maryland issued a policy for nutrient cap management and trading that outlined fundamental principles and guidelines for nutrient trading between point sources. When this policy was released, it was recognized that trading between point and nonpoint sources presented unique challenges. As a result, MDA organized an agricultural nonpoint nutrient trading advisory committee to develop agriculture-specific policy in this area. The committee issued two comprehensive documents in April 2008, recommending requirements and procedures for agricultural source nutrient trading. The State's agricultural nutrient trading policy was further defined by the enactment of legislation authorizing MDA to establish requirements for the voluntary certification and registration of nutrient credits (Chapter 447 of 2010) and sediment credits (Chapter 25 of 2012) on agricultural land.

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 nutrient trading program framework, which was developed to facilitate cost-effective compliance with permits, extends to both point and nonpoint sources of pollution. Based on information through February 7, 2013, the State's:

- **point-to-point source trading** among wastewater treatment plants has involved the reallocation of pollution loads between wastewater treatment plants;

- **point-to-nonpoint source trading** between wastewater treatment plants and farms has involved certification of credits but no actual trades; and

- **nonpoint-to-nonpoint source trading** between farms and urban stormwater or between urban stormwater projects has not occurred but is the focus of anticipated regulations that address future pollution growth.

To date, nutrient trading has been used in Maryland to reduce existing pollution loads. However, there is strong interest in using nutrient trading to offset new or increased loads from future development. Growth is estimated to add 478,000 households in Maryland by 2035, or more than 2 million pounds of nitrogen pollution to the bay per year that must be offset. To comply with the bay TMDL, the State is currently planning to use nutrient trading to help maintain reduced pollution loads as growth and development occurs.

In October 2012, consistent with its Phase II WIP, the State released a draft policy for addressing future pollution growth that relied heavily on nutrient trading strategies. As a part of the draft policy development process, MDE held a series of workshops around the State, but no consensus was reached among stakeholders. To better inform this policy effort, an Accounting for Growth Workgroup was subsequently convened in January 2013. The workgroup –

comprised of environmental, developer, local government, and public interest stakeholders – met throughout the first half of 2013 and submitted a final report in August 2013 that includes numerous nutrient trading program recommendations. Among other things, the workgroup recommended (1) credit certification, verification, and transparency requirements similar to MDA protocols that establish independent reviewers and make trades publicly accessible via an online database; (2) regulation of brokers and aggregators and their practices that reflects the need for research on other BMP regulations; and (3) margins of safety that require pollution loads to be offset at a 1:1 ratio, with a 10% retirement ratio to ensure permanent water quality benefits. The workgroup did not reach consensus on other nutrient trading issues, such as establishing new geographic boundaries for trading and the baseline to which new post-development loads will be compared.

During fall 2013, the Administration considered the workgroup's recommendations and drafted regulations establishing a policy for addressing future pollution growth. These implementing regulations are anticipated prior to 2014 and will likely feature nutrient trading markets as a primary means for offsetting new or increased pollution loads.

Other States

Several states in the bay watershed are implementing or considering nutrient trading programs. A February 2012 EPA review of state nutrient trading programs concluded that Delaware did not have a plan for a point-to-nonpoint nutrient trading program due to the limited number of point sources in the state, the District of Columbia was developing an offset program that would create a market for stormwater retrofits, New York has the capability of using point-to-point source trading under existing general authority, and West Virginia was evaluating the need for a formal trading program. Virginia and Pennsylvania have nutrient trading programs, and **Exhibit 6** compares Maryland's nutrient trading program to the programs in both states. As shown in Exhibit 6, all three state programs include point-to-point and point-to-nonpoint source trading for nitrogen and phosphorus, have multiple trading geographies, and establish permanency and trading ratio requirements of some kind.

Exhibit 6
State Nutrient Trading Programs as of May 2011

	Maryland	Pennsylvania	Virginia
Authority	Statute, Policy, Guidance	Regulation	Statute, Regulation, Guidance
Agency Responsible	MDA for nonpoint sources, MDE for point sources and septic hookups	Department of Environmental Protection	Department of Environmental Quality
Pollutants Traded	Nitrogen, Phosphorous, Sediment	Nitrogen, Phosphorous, Sediment	Nitrogen, Phosphorous
Trading Boundaries	Patuxent, Potomac, "Everywhere Else" (Eastern Shore, Western Shore, and Susquehanna Watershed)	Potomac, Susquehanna	Eastern Shore, James, Rappahannock, Potomac-Shenandoah, York River
Permanency	Point sources must secure offsets for at least 10 years and submit a plan for an additional 10 years	Point sources must secure credits for at least 5 years	Point sources must secure credits for at least 10 years
Trading Ratio	*Retirement ratio*: 5% for point source credits and 10% for nonpoint sources. *Uncertainty ratio*: ≥10% for credits generated by nonpoint sources using BMPs not approved by the Chesapeake Bay Program	*Reserve ratio*: 10% for all certified credits	*Uncertainty ratio*: 100% for offsets generated by nonpoint sources (*i.e.*, 2:1 ratio)

BMP: best management practice
MDA: Maryland Department of Agriculture
MDE: Maryland Department of the Environment

Source: *Comparison Tables of State Nutrient Trading Programs in the Chesapeake Bay Watershed*, World Resources Institute, May 2011

Policy Considerations

The following issues may merit consideration when determining how the State should implement nutrient trading programs in the future.

- **Trading Geographies:** There are several geographic boundaries within which trading may occur, including requiring the credit buyer and seller to be within the same state basin when dealing with a local TMDL within the same state, or within the multi-state bay watershed. The choice of trading level can have meaningful ramifications. For example, establishing geographic boundaries that are too small may limit the local availability of credits and thus drive up prices. Concern has also been raised about concentrating credit purchasing in certain areas and effectively creating environmental justice concerns and/or encouraging sprawl development. Some environmental advocates have suggested adopting an "upstream reduction policy" that requires pollution load offsets to be upstream from the pollution source, to effectively improve a larger segment of a waterway.

- **Ensuring Permanency:** EPA requires that pollution offsets exist as long as the new pollution load exists. The BMPs that generate tradable credits may be annual, permanent, or semi-permanent practices. Thus, there is concern about using nonpermanent practices to meet the State's permanent pollution reduction requirements and ensuring pollution load reductions are maintained over the long-term. Consideration should be given to developing nutrient credit banks within an overall market-based trading system to (1) broker the creation of credits or generate them internally and (2) take long-term responsibility for guaranteeing pollution load reductions.

- **Developing a Trading Ratio that Accounts for Uncertainty:** Because load reductions from nonpoint sources are generally more uncertain than those from point source control technologies, trading programs often impose a "trading ratio" for credit exchanges between point and nonpoint sources. The EPA expects a 2:1 trading ratio for nonpoint source credits purchased by a new or expanding point source to ensure pollution load reductions. In this instance, for every credit needed, the point source must purchase two credits from the nonpoint seller. However, the Accounting for Growth Workgroup recommended a 1:1 trading ratio, with a 10% retirement ratio. Therefore, Maryland will need to discuss further what trading ratio is necessary to meet federal guidelines.

- **Baseline for Determining Post-development Pollution Load:** The Accounting for Growth Workgroup did not reach consensus on a methodology for determining new post-development pollution loads. The workgroup considered several different approaches, including a stringent forest load baseline for all new development and a more flexible pasture load baseline for development on all farmland. The baseline(s) ultimately chosen should ensure responsibility for pollution from new development is not

borne by existing development and maintenance of the bay TMDL pollution limits in perpetuity.

The State's potential reliance on nutrient trading as a means for offsetting future pollution loads presents a significant challenge. The State has not completed any trades involving nonpoint sources and is still trying, among other things, to determine how to (1) establish a baseline for developers; (2) create a more robust trading marketplace that is characterized by adequate verification of and certification of credits, enforceability, accountability, and tracking; and (3) best distribute trading marketplace roles and responsibilities among State, local, and private entities.

Conclusion

The State's efforts to promote cover crops, establish an agricultural certainty program, and advance nutrient trading, illustrate that a combination of proven and experimental approaches are being pursued to achieve pollution reduction goals. However, it is still not clear whether these policies and programs will effectuate the pollution reduction necessary to restore the bay. This report identifies a number of policy issues that merit consideration when determining future State investment in these agricultural nutrient management strategies.

Agricultural Certainty Program Oversight Committee Members

- Ridgway Hall, attorney, Washington, DC
- Trey Hill, farmer, Rock Hall (Kent County)
- Lynne Hoot, Edgewater (Anne Arundel County)
- David Kann, AET Ag Consulting, Dover, Pennsylvania
- Drew Koslow, Choptank Riverkeeper, Easton (Talbot County)
- Wes Messick, Dorchester County Soil Conservation District Chairman
- Doug Meyers, Chesapeake Bay Foundation, Annapolis (Anne Arundel County)
- Judith Marie O'Neil, University of Maryland Center for Environmental Science, Cambridge (Dorchester County)
- Steuart Pittman, Dodon Farm Training Center, Davidsonville (Anne Arundel County)
- Denny Remsburg, Catoctin Soil Conservation District Manager (Frederick County)
- Paul Spies, Chester River Association, Cordova (Talbot County)
- Robert Stabler, farmer, Brookville (Montgomery County)
- Wayne Stafford, Cecil County Farm Bureau (Cecil County)
- Ann Swanson, Chesapeake Bay Commission, Annapolis (Anne Arundel County)
- Representatives from EPA, USDA, MDA, and MDE as selected

Information Resources

Agricultural Certainty

Louisiana Master Farmer Program; *see* http://www.lsuagcenter.com/en/environment/conservation/master_farmer/.

Maryland Farm Stewardship Certification and Assessment Program; *see* http://www.mascd.net/FSCA/.

Michigan Agriculture Environmental Assurance Program; *see* http://www.maeap.org/.

New York Agricultural Management; *see* http://www.nys-soilandwater.org/aem/.

Texas Water Quality Management Plans; *see* http://www.tsswcb.texas.gov/wqmp.

Cover Crops

United States Department of Agriculture Natural Resources Conservation Service; *Assessment of the Effects of Conservation Practices on Cultivated Cropland in the Chesapeake Bay Region*; February 2011.

Maryland Department of Agriculture; Cover Crop Program; *see* http://mda.maryland.gov/resource_conservation/Pages/cover_crop.aspx

Nutrient Trading

Accounting for Growth Workgroup; Final Report and Supporting Material; *see* http://www.mde.state.md.us/programs/Water/TMDL/TMDLImplementation/Pages/Accounting_For_Growth.aspx

Chesapeake Bay Commission; *Nutrient Credit Trading for the Chesapeake Bay – An Economic Study*; *see* http://www.chesbay.us/Publications/nutrient-trading-2012.pdf

Maryland Nutrient Trading; *see* http://www.mdnutrienttrading.com/

Senior Scientists and Policymakers for the Bay Nutrient Trading Subcommittee; *see* http://www.bayactionplan.com/wordpress/wp-content/uploads/2012/01/Nutrient-Trading-Report.pdf

World Resources Institute; "How Nutrient Trading Can Help Restore the Chesapeake Bay"; *see* http://pdf.wri.org/factsheets/factsheet_nutrient_trading_chesapeake_bay.pdf
World Resources Institute – "Water Quality Trading Programs: An International Overview"; *see* http://pdf.wri.org/water_trading_quality_programs_international_overview.pdf

U.S. Environmental Protection Agency Chesapeake Bay Program; Science and Technical Advisory Committee Nutrient Trading Workshop; *see* http://www.chesapeake.org/stac/workshop.php?activity_id=223

U.S. Environmental Protection Agency; "Chesapeake Bay TMDL – How does it Work? Ensuring Results"; *see* http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/EnsuringResults.html