Countdown to 2017

Five Years In, Chesapeake Bay TMDL at Risk Without EPA Enforcement

By Rena Steinzor and Evan Isaacson
February 2016

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Acknowledgments

CPR is grateful to the Town Creek Foundation and the Rauch Foundation for supporting the development of this report, as well as the Bauman Foundation, the Deer Creek Foundation, and the Public Welfare Foundation for their generous support of CPR's work in general.

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Executive Summary

When the Environmental Protection Agency (EPA) created the Chesapeake Bay Total Maximum Daily Load (Bay TMDL) out of local TMDLs for 92 individual Bay segments in 2010, reactions were polarized. Supporters of Bay restoration hoped this unprecedented, legally enforceable, multi-state approach would break the gridlock and compel compliance with a "pollution diet" that would restore the world-famous estuary from its continued state of degradation and ever-present dead zones. After all, billions of dollars in state and federal funding and decades of previous "cooperative" efforts had repeatedly failed to reach their stated goals, rendering an enforceable TMDL framework the only remaining option.

Even opponents of the significant expenditures required to meet the Bay TMDL pollution reduction goals seemed to share the view that this time would be different. As EPA, the seven Bay jurisdictions – Delaware, the District of Columbia, Maryland, New York, Pennsylvania, Virginia, and West Virginia – and the Chesapeake Bay Program began work on implementing the Bay TMDL in 2010, affected industries hurried to the courts, legislatures, and media, seeking to overturn the TMDL and obstruct EPA and state regulators from pursuing their commitments under the new framework. To its credit, EPA vigorously defended the TMDL in federal court, twice triumphing. The agency also deflected the most destructive legislative efforts to undermine implementation of the TMDL. However, EPA has no time to rest on its laurels.

Instead, EPA must recognize another, equally potent threat to Bay restoration. The seven Bay watershed jurisdictions are lagging far behind in implementing the Bay TMDL. While some sectors in some states will likely meet reduction goals for some pollutants by 2017, we now have enough data to conclude that the watershed as a whole is likely too far behind to meet each of the 2017 midpoint assessment's interim pollution reduction goals. In particular, the states are far behind in their efforts to reduce nitrogen pollution.

The 2017 interim goals represent a crucial milestone toward cleaning up the Bay and restoring the watershed because they were established with the recognition that, if the states were unable to reach these interim goals in a timely manner,

attainment of the final TMDL pollution reductions by 2025 would be impossible. In other words, six years into this landmark effort, no enforcement now means failure later.

Understanding from past experience that these challenges might well arise, EPA developed backstops that it described as an "accountability framework" for the Bay TMDL. In 2010, both EPA Region 3 (Mid-Atlantic) and its headquarters Office of Enforcement and Compliance Assurance released plans for enforcement of the TMDL if and when states started to lag. The compliance tools included in these plans include a range of options from relatively minor measures to actions designed to compel progress and state action. Examples of relatively minor actions include reducing or conditioning federal grants. More significant actions include establishing substantially more stringent terms and conditions on important Clean Water Act permits, such as lower discharge limits or net offsets. EPA may also expand regulation over previously unregulated sectors and has pledged to consider using its "endangerment authority" under the Clean Water Act or other federal environmental statutes to pursue unaddressed sources of pollution.

So far, EPA has declined to condemn state noncompliance publicly, perhaps for fear of alienating its state partners. But if the agency does not impose effective consequences on lagging states, it will set the Bay restoration effort up for another failure, a result with tragic consequences both for one of the world's most valuable natural resources and for the health of local waters in thousands of communities in the watershed. The largely business-as-usual approach that continues today for jurisdictions implementing the TMDL threatens to undermine the last and best hope for finally restoring the Bay. Unless and until EPA resolves to address ongoing annual shortfalls in pollution reduction progress with an appropriate sense of urgency, the whole Bay TMDL framework could gradually disintegrate.

By far the most significant threat to achieving the Bay TMDL goals is Pennsylvania. The Commonwealth's agriculture sector alone contributes more than one-quarter of all nitrogen pollution in the watershed. Put another way, Pennsylvania's agriculture sector contributes more nitrogen than all four pollution sectors combined from Virginia, or more than each sector in Delaware, the District of Columbia, Maryland, and West Virginia together. Despite the importance of achieving reductions within this sector, nitrogen pollution from Pennsylvania agriculture has actually increased by about 4 percent between 2009

and 2014 according to the Chesapeake Bay Program's watershed model, despite the TMDL's mandate to reduce such pollution by about 26 percent by the 2017 midpoint assessment. And while New York is even farther behind (on a percentage basis) in its efforts to reach their 2017 target, the sheer size of Pennsylvania's contribution to nutrient pollution in the watershed warrants special attention. Simply put, unless Pennsylvania makes tremendous progress on reducing its agricultural pollution in the next several years, Bay restoration efforts will fail.

The more positive news is that Virginia and the District of Columbia appeared to be ahead of schedule in 2014 toward their overall nitrogen reduction goals for 2017, while Delaware and West Virginia had roughly kept pace with three years remaining. Even Maryland, which was not on track according to the 2014 model data, is expected to reach the 2017 interim goal because of large investments in wastewater treatment plant upgrades scheduled for completion over the next two years. Yet progress in many of these states is primarily due to reliance on the least expensive pollution control approaches in the most regulated of pollution sectors. States like Maryland and Virginia and the District of Columbia have leaned heavily on the installation of state-of-the-art pollution control equipment for wastewater treatment plants, while making modest or no progress in other sectors. Unfortunately, once such "low-hanging fruit" has been fully "picked," further progress will become far more difficult to achieve as states turn to other sectors.

For example, despite some relatively advanced local programs for controlling stormwater pollution and installing green infrastructure in Maryland, Virginia, and the District of Columbia, none of these jurisdictions have done nearly enough to reduce polluted stormwater runoff, which is one-sixth of the nitrogen pollution and growing—a load of more than 40 million pounds annually.

Not only are these reductions in stormwater discharges essential to meet required Bay TMDL reductions by 2025, they could make a major contribution to the quality of life in urban areas throughout the watershed. Many local governments have resisted implementation of stormwater pollution controls on the grounds that they cannot afford the significant costs. Others also emphasize that controlling pollution from stormwater is much more costly than from other sectors, particularly agriculture, and that states ought to eliminate the price disparities by allowing cross-sector nutrient trading. But controlling urban runoff pollution through well-funded stormwater permits has proven to be both

reasonable in cost terms and popular due to the many additional benefits that advanced stormwater control practices provide for local air quality, climate change mitigation, property values, and local job growth. While nutrient trading may play an important, but limited, role for some watershed jurisdictions toward complying with the Bay TMDL, including allowing jurisdictions to offset the impact of new sources of pollution, no trading program can replace effective laws and programs tailored to address the unique issues affecting individual communities.

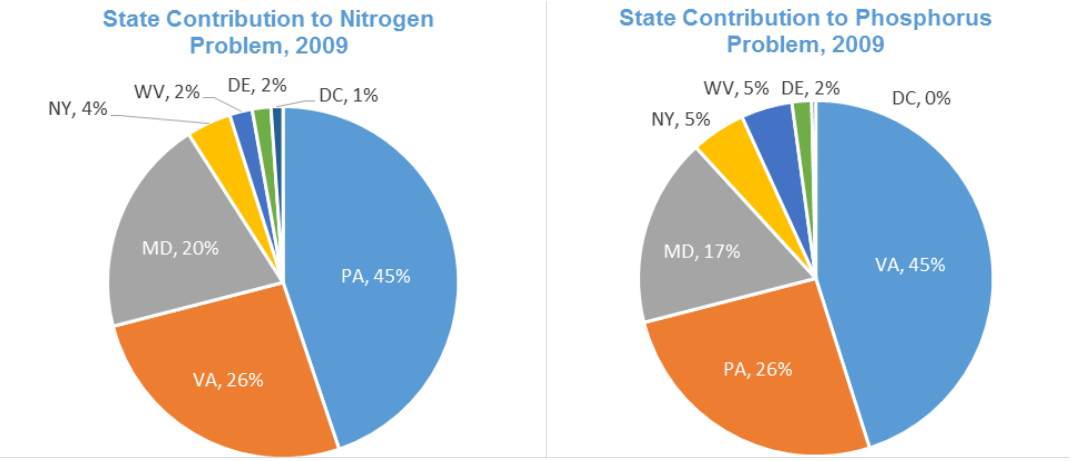
This paper analyzes how each jurisdiction in the Bay watershed has responded to the Bay TMDL during the first five years of implementation (2010 – 2014). Our conclusion is that the policies undertaken to date are inadequate to ensure that restoration remains on pace with the 2017 interim goals under the Bay TMDL. Next, the paper considers which of the primary pollution source sectors – agriculture, wastewater, stormwater, and septic systems – have achieved the greatest reductions in nitrogen pollution, finding, among other things, that significant reductions from wastewater treatment plants are being relied upon by states to mask major shortfalls from other less regulated sectors. Indeed, by relying so heavily on reductions from the wastewater sector to reach 2017 goals, Bay jurisdictions have become complacent about the significant reductions needed from the other sectors, which will be vital to achieving the 2025 TMDL goals. Finally, the paper offers several important conclusions and recommendations that help provide a greater understanding of just how close – or far – we are to finally making a healthy Chesapeake Bay watershed a reality. In summary, they are:

1. ***Pennsylvania's failure to uphold its commitments jeopardizes the entire Bay TMDL.***
2. ***Agriculture is the largest pollution source and the most promising and cost-effective sector for future reductions. Accelerating progress means solving the manure crisis.***
3. ***The Bay TMDL is vital to water quality for communities located far from the Chesapeake Bay.***
4. ***The model is not perfect, but is good enough to show where more progress is needed.***
5. ***Too much Bay pollution is unregulated or under-regulated. States must close this gap.***

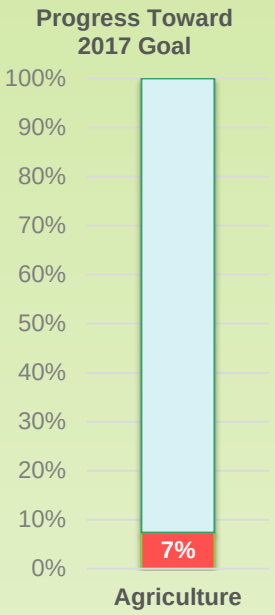
Source Sectors

Millions of different sources are responsible for the nitrogen, phosphorus, and sediment pollution in the Chesapeake Bay watershed, including everything from major wastewater treatment plants, to a vast network of streets and parking lots, to the manure generated by millions of cows, chickens, and other livestock. This paper considers four major categories that capture the majority of nutrient and sediment pollution: agriculture, wastewater treatment plants, stormwater, and septic systems. These are the four sectors for which pollution reductions are measured on a regular basis by the Chesapeake Bay Program's watershed model. The paper excludes consideration of two other sectors — forests and atmospheric deposition — not because they are minor contributors of nutrient and sediment pollution, but rather because they are treated very differently by the Chesapeake Bay Program and its model due to the nature of the pollution sources and the means of controlling them.

The largest source of nutrient pollution in the watershed, and in most jurisdictions, is the agricultural sector, followed by wastewater, stormwater, and septic systems.

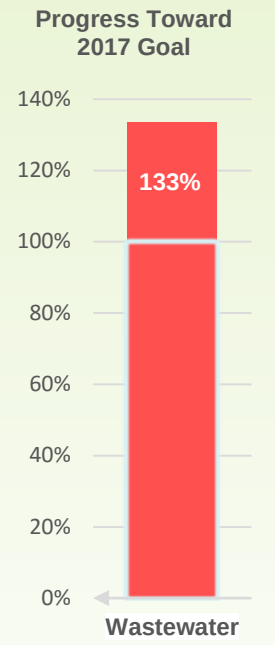


A brief discussion of each sector, and their relative performance in achieving the nutrient and sediment reduction goals of the Bay TMDL since 2009 follows:



Agriculture – Decades of state and federal implementation of programs designed to increase the use of conservation practices on agricultural lands, along with many millions of dollars of grants and loans, have helped reduce the amount of runoff from farm fields and facilities in the Chesapeake Bay watershed. Between 1985 and 2009, nitrogen pollution from the agricultural sector is estimated to have decreased by about 20 percent. However, during the five years—2010 through 2014—under the Bay TMDL, nitrogen pollution from this sector is estimated to have decreased by less than 2 percent throughout the watershed, only about 7 percent of the way toward the 2017 interim goal under the Bay TMDL, with overall progress slowed by an outright increase in nitrogen pollution from Pennsylvania's agricultural sector.

It is unclear whether this lack of progress is because the low-hanging fruit had already been picked in previous decades or because of the lack of effective new polices or enforcement by states. With so many facilities and operators choosing from a menu of different best management practices (BMPs) to implement and so few resources spent by the states on tracking and verifying the implementation of BMPs and their effectiveness, the Bay Program will continue to be challenged in measuring reductions from the agricultural sector. Nevertheless, it is clear that the watershed cannot be restored without dramatic reductions from the largest sector of pollution in the watershed and vigorous state implementation of offset policies where manure is growing, as is the case in the Delmarva Peninsula in Delaware, Maryland, and Virginia.



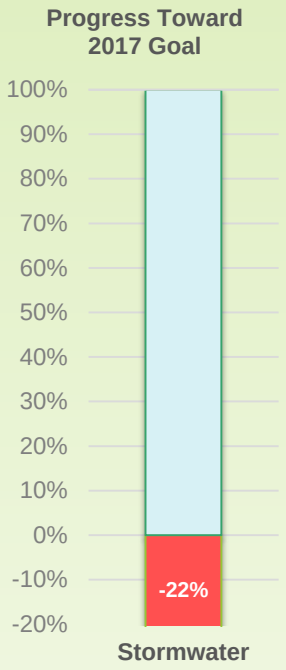
Wastewater – The second largest source of nutrient pollution in the watershed is the wastewater sector, including municipal wastewater treatment plants. This sector accounts for the vast majority of pollution reductions under the Bay TMDL. In fact, the wastewater sector is estimated to have already exceeded its 2017 interim nitrogen reduction goal, some three years early. And this commendable progress does not even include the reductions that will be achieved by additional wastewater upgrades projected to come on line in 2016 and 2017, particularly in Maryland. Figure 1 (page 9) shows major point sources of nitrogen pollution in the Bay watershed.

As traditional "point sources" (discrete conveyances of water pollution) under the Clean Water Act, wastewater facilities have benefitted from decades of technology-forcing regulation that have brought effective end-of-pipe solutions to bear on the problem. As a result, the Chesapeake Bay watershed is now home to some of the largest and most advanced wastewater treatment plants in the

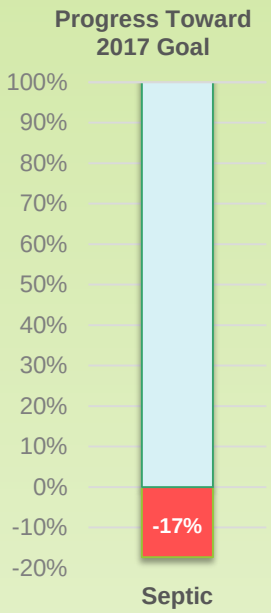
country. Wastewater treatment solutions are also relatively simple to implement from an administrative standpoint, and the subsequent reductions in pollution are relatively easy to track.

Pollution reductions from these highly successful upgrades are being relied upon by some jurisdictions to make up for the lack of progress from unregulated or less regulated sources of runoff and "nonpoint source" pollution. In fact, several states are likely to achieve their overall nutrient reduction goals by 2017 despite substantial deficiencies in other sectors simply because of significant over-attainment in this sector. Unfortunately, the failure to make progress in the other sectors jeopardizes efforts to reach the final 2025 TMDL goals. Sufficient additional wastewater pollution reductions are simply not available.

Stormwater – The stormwater sector is showing the least progress in reducing nutrient and sediment pollution in the Bay watershed as a whole. As of 2014, no jurisdiction in the watershed had been able to decrease nitrogen pollution from urban runoff under the Bay TMDL, which actually increased by about 4 percent across the watershed since 2009. While stormwater pollution, by its nature, is runoff — it is literally the water that runs off of roads and other impervious surfaces into sewers, sweeping up pollutants along the way – it is still regulated as a point source under the Clean Water Act when generated within the boundaries of a permitted municipal separate storm sewer system (MS4). Unfortunately, most states within the watershed and around the country have failed to adopt and enforce an effective MS4 permit that actually reduces the quantity and improves the quality of waters flowing through the system.



There has been some progress in recent years in ensuring that the latest MS4 permits contain some of the provisions and conditions needed to achieve pollution reductions and are sufficiently funded by states and municipalities. But it is very unlikely that any jurisdiction will meet the interim nitrogen reduction goals for stormwater under the Bay TMDL by 2017. To even begin to make progress, each jurisdiction must be able to demonstrate that it is investing sufficient resources and developing enough programmatic capacity to fully fund and enforce the MS4 permits and stormwater management programs that are the vehicles for meeting the final 2025 targets under the Bay TMDL. Without more effective and well-funded MS4 permits, in conjunction with greater enforcement of those permits, it is essentially impossible for jurisdictions to achieve the necessary pollution reductions from urban runoff under the Bay TMDL.

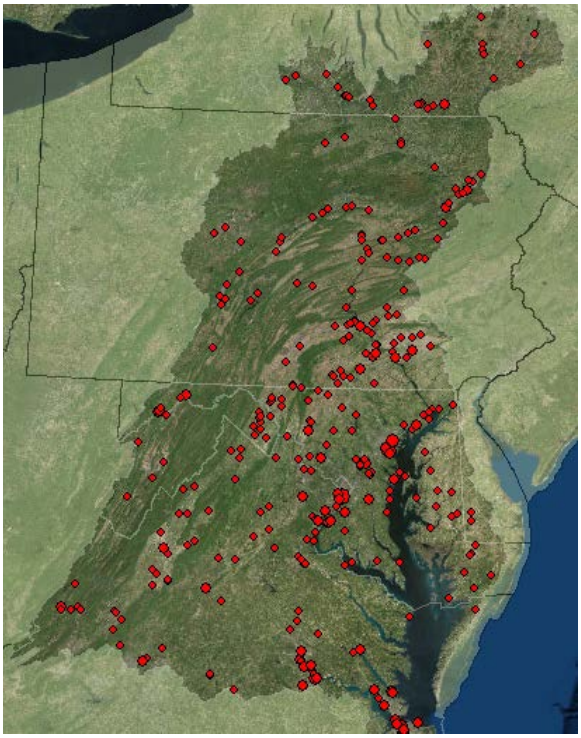


Septic Systems – Although a relatively minor source of nitrogen pollution (and an immaterial source of phosphorus pollution) in the Bay watershed, this sector doubled its share of total nitrogen pollution in the Bay watershed between 1985 and 2009. And during the five years under the Bay TMDL, nitrogen pollution from septic systems is estimated to have increased further by about 3 percent across the watershed. Unless it is dealt with now, septic system pollution will become a growing problem over the next few decades.

Today, septic systems contribute more than 8 million pounds of nitrogen pollution to the local streams flowing through exurban and rural communities across the watershed. Figure 2 (page 9) shows the geographic distribution of septic systems throughout the many subwatersheds within the Chesapeake Bay watershed and illustrates that many suburban and rural streams suffer from the effects of thousands of septic systems crammed into only a few dozen square miles.

Only two states (Maryland and West Virginia) are estimated to have reduced pollution from this sector at all. But unlike the stormwater sector, septic systems are not generally regulated under individual permits or operated by a team of professionals. The diffuse nature of pollution from this sector makes it difficult to control from an administrative, technical, and political perspective. But states can address this problem by requiring the best available technology for new septic systems, and by attempting to steer new development to areas served by sewer systems through smart growth policies.

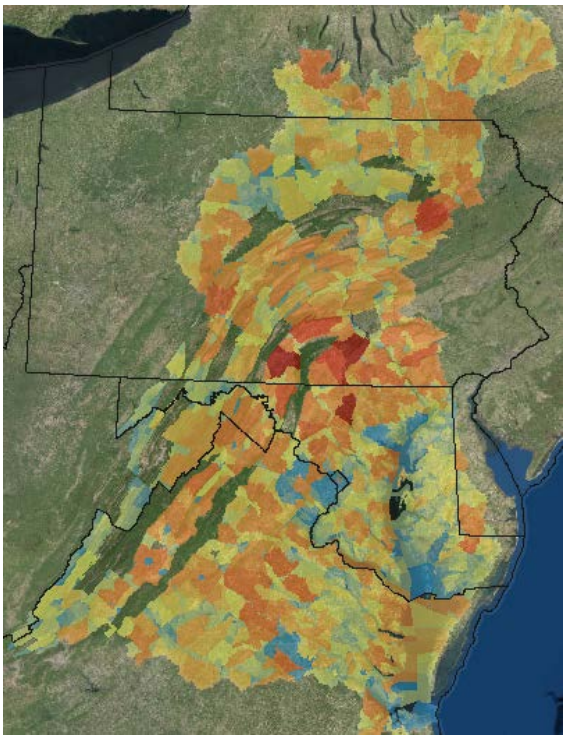
Figure 1. Major Wastewater Facilities and Other Large Point Sources of Nutrients



Note: Red dots represent major point sources of nitrogen in the Chesapeake Bay Watershed. Dot size corresponds to extent of facility nitrogen load.

Source: Chesapeake Bay Program.

Figure 2. Septic System Distribution in the Chesapeake Bay Watershed



Note: Warmer colors represent a greater number of septic systems located within a subwatershed, while cooler colors represent few or no septic systems. Subwatersheds are land-river segments defined by the Chesapeake Bay Program.
Source: Chesapeake Bay Program.

State Assessment of Progress

Each jurisdiction across the expansive Bay watershed consists of slightly different landscapes and a somewhat unique mix of pollution source sectors, necessitating a slightly different mix of policies and approaches to reducing nutrient and sediment pollution into local waters. And even though some jurisdictions contribute a much greater percentage of the overall nutrient and sediment loads to the Chesapeake Bay, each jurisdiction's efforts to restore the Bay will assist in efforts to restore local waters. What follows is a brief summary of the progress made by each of the seven jurisdictions in reducing nutrient and sediment pollution for the years 2010 through 2014.

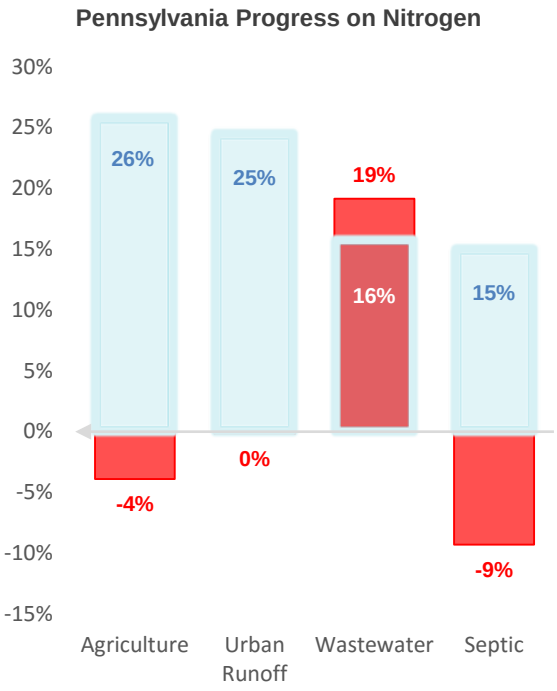
Pennsylvania

Although no part of Pennsylvania borders the Chesapeake Bay, much of the Commonwealth's land and streams are within the Bay watershed. Unfortunately, despite decades of participation in the various agreements to restore the Bay, Pennsylvania's lack of progress may be the single biggest reason to worry about the future health of the watershed.

Under the Bay TMDL, estimated nitrogen loads have only increased from agriculture, urban stormwater, and septic systems in Pennsylvania. The lone bit of positive data from the Bay Program model is that the Commonwealth is estimated to have achieved significant nutrient reductions from its wastewater sector, and has exceeded its 2017 goal for that sector through 2014.

EPA has established a system of compliance monitoring for the states, in which it releases assessments of each sector within each jurisdiction, labeling progress as "ongoing oversight," (on track) "enhanced oversight," (falling behind) and "backstop actions" (EPA action needed). Unfortunately, several Pennsylvania sectors have been downgraded to that lowest "backstop action" status, but without significant consequence. Rather, EPA has evidently created yet another status of nonattainment for Pennsylvania to reach. For example, EPA downgraded Pennsylvania's stormwater sector in 2014 from "enhanced oversight" to the "backstop actions" level. When the situation failed to improve, instead of taking clear, significant, and public actions, EPA simply decided to maintain in 2015 the Commonwealth's "backstop" status.

Because Pennsylvania continues to show little or no progress after more than five years under the TMDL and because this dismal track record is so important to the ultimate success of the TMDL, EPA must demonstrate the efficacy of its enforcement tools without further delay, or risk allowing Pennsylvania to derail the entire regional effort.



Blue bar shows 2017 reduction target
Red bar shows 2014 reduction progress
Sectors are shown in order of importance (from left to right)

Thankfully a growing consensus is emerging in support of federal action. For example, two separate letters were sent in the spring and summer of 2015, one by several Maryland state legislators and one by Senators Cardin of Maryland and Casey of Pennsylvania. While the two U.S. Senators noted that Pennsylvania's agriculture sector was a "very significant area of improvement that is critical to achieving the goals of the TMDL" and called upon the U.S. Department of Agriculture to "live up to its leadership role," the Maryland state legislators flatly demanded EPA enforcement against Pennsylvania. Additionally, the Pennsylvania Department of the Auditor General warned the General Assembly about both the environmental and economic consequences of allowing the Commonwealth's efforts to remain off track.

There are also signs that EPA may be awakening to the reality on the ground in Pennsylvania. In June 2015, EPA released its latest assessments of state progress toward their milestones commitments. In addition to the usual analysis of various sectors, programs, and practices, the written assessment for Pennsylvania indicated that EPA has begun to implement the initial stages of an enforcement strategy. For example, EPA mandated the submission of a number of additional reports from the Commonwealth on its capacity and resources to meet the Bay TMDL. Importantly, EPA specified that it had taken action to object to several permits issued by Pennsylvania under EPA jurisdiction. And recently,

Pennsylvania acknowledged in the January 2016 release of its new Chesapeake Bay Restoration Strategy document that EPA had withheld almost $3 million in federal grant funding and was exploring other options "if it is necessary to ramp up federal actions to address the Pennsylvania Bay restoration shortfalls."

While these actions fall far short of what could be expected based on the initial enforcement commitments that EPA made under Bay TMDL, they indicate that a tipping point has been reached. Unless the 2015 model data reveal a dramatic turnaround underway in Pennsylvania toward meeting its restoration goals, it will be imperative for EPA to follow through on its commitment to pursue more substantive enforcement actions. Officials in each other state recognize the situation that Pennsylvania is in and will be watching the EPA response closely for signs of whether there are any real consequences for states that are failing to live up to their commitments under the Bay TMDL.

Virginia

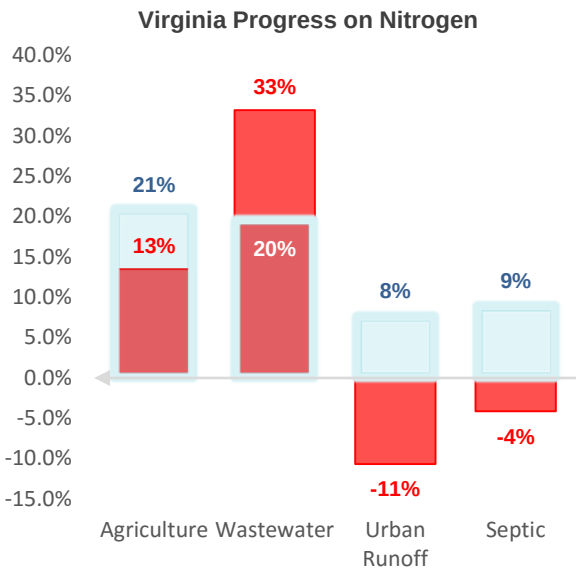
The most recent data from the watershed model indicate that, as of 2014, the Commonwealth has achieved 97.6 percent of its nitrogen reduction goal for 2017 three years ahead of schedule.

Virginia's wastewater sector is estimated by the model to be responsible for nearly half of the nitrogen reductions for the entire watershed between 2009 and 2014 (and more than half of the net reduction, including sectors where pollution is increasing). To its credit, the Commonwealth recognized the importance of funding the upgrade of its wastewater treatment plants back in 1997 and created the Water Quality Improvement Fund (WQIF). Since 1998, WQIF has distributed more than $740 million as part of 35 percent to 90 percent cost-share grants with 63 wastewater plants, for a total investment of more than $1.6 billion. Because of this early commitment to tackling pollution from these point sources, the Commonwealth has built itself a substantial cushion to work with in case of under-attainment from other sectors.

As for runoff pollution – a much more intractable problem across the watershed – Virginia has experienced more mixed results. If it is to reach its final 2025 goals, it will have to take on this more difficult challenge. The Commonwealth has had a relatively longstanding commitment to the installation of agricultural best management practices (BMPs) and is estimated to have reduced nutrient loads

from this sector by more than any other jurisdiction on both a percentage and absolute basis.

However, while the model shows that Virginia is roughly on pace to meet its 2017 goal for agriculture, the Commonwealth's own analysts have concluded that a funding problem lies ahead. By their calculation, the ongoing levels of tax credits and cost-share resources may not be enough, and much greater funding is projected to be needed on the ground for the relevant agencies and Soil and Water Conservation Districts to write nutrient management plans, market BMPs, and monitor and verify claimed reductions.



Blue bar shows 2017 reduction target
Red bar shows 2014 reduction progress
Sectors are shown in order of importance (from left to right)

Unfortunately, Virginia is going to need to rely on the significant reductions from its wastewater sector and modest reductions from agriculture to help make up for major shortfalls in the septic and stormwater sectors, where the Commonwealth is woefully behind. Nitrogen pollution from stormwater has risen faster in Virginia than in any other jurisdiction, and this nitrogen load is estimated to be more than a million pounds greater in 2014 than 2009. Several local jurisdictions made the difficult choice years ago to establish stormwater utility fees, but the Commonwealth had failed, until very recently, to simply reissue new municipal stormwater permits that incorporate the Bay TMDL's requirements for urban runoff.

EPA downgraded the Commonwealth's urban sector to the "enhanced oversight" status several years ago in an assessment of Virginia's progress under the Bay TMDL, but neglected to downgrade it further in either the 2014 or 2015 assessments despite the astounding growth of the problem. Once again, EPA has failed to pose a credible threat of enforcement or even take an appropriately firm or public stance against states that are failing to live up to commitments for each sector. One result of this failure is the continued growth of stormwater pollution in Virginia and around the watershed.

Fortunately, with permits now in place, new stormwater regulations in effect, local stormwater management programs established – many funded by sizable stormwater fees – and with the Commonwealth providing matching grants from the newly created Stormwater Local Assistance Fund, Virginia may finally be in a position to at least reverse course and start to reduce urban runoff pollution. The Commonwealth will be challenged to even bring its urban nitrogen loads back to 2009 levels by the 2017 midpoint assessment, and the same may be true for nitrogen pollution from septic systems. But because of early and substantial commitments to upgrading the Commonwealth's fleet of wastewater treatment plants and, to a lesser extent, various agricultural programs, Virginia appears well positioned overall heading into the 2017 midpoint assessment. If the Commonwealth is able to expand its efforts to all sectors in the future it may also be in good position to achieve its final 2025 goals under the Bay TMDL as well, but it has a long way to go to accomplish this.

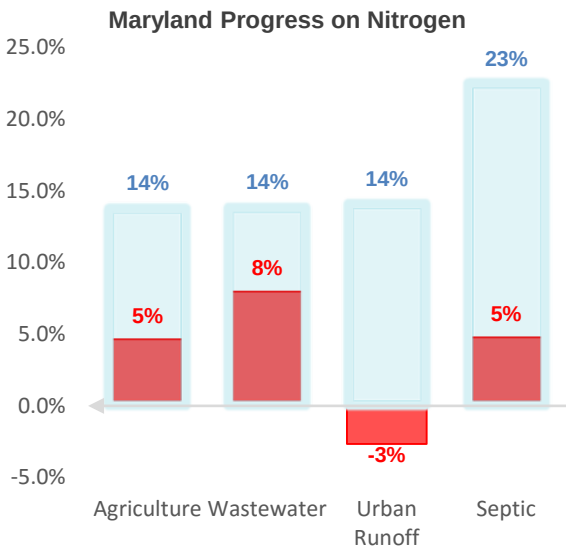
Maryland

Maryland's experience appears to be quite similar to that of Virginia, a leader in reducing nitrogen to date, in that it owes most of its success to significant early investments in wastewater treatment plant upgrades. Like Virginia, Maryland has committed over $1 billion to installing advanced technology on its major wastewater treatment plants, albeit a few years later than Virginia.

In one important respect, however, Maryland is unlike Virginia or any other Bay jurisdiction. Maryland developed its Watershed Implementation Plan (WIP) for meeting the Bay TMDL with a unique and ambitious "all of the above" strategy that seeks significant pollution reductions broadly across each main sector. Whereas one might expect state officials to emphasize relatively cheap sectors (generally, agriculture) or relatively simple sectors (generally, wastewater), Maryland called upon each of the four main sectors to contribute at least 10 percent of the state's overall nitrogen reduction target. By comparison, most jurisdictions only plan for major reductions from one or perhaps two sectors.

Ambition has also been in evidence in Maryland's WIP from the beginning. The state's first WIP called for implementing practices to achieve 70 percent of its reduction targets by 2017, not just the 60 percent required, and it also anticipated implementing all practices by 2020, instead of 2025. Alas, Maryland quickly backtracked, perhaps after understanding just how difficult a task this might be.

Unfortunately, results have come slowly in Maryland. Only one sector (wastewater) had achieved even half of the progress in 2014 required to meet the 2017 interim reduction goal. Meanwhile, the agriculture sector was only about one-third of the way toward the 2017 goal, progress on septic systems has been even slower, and stormwater runoff has only increased since 2009. Considering this model data, Maryland's performance looks relatively poor. However, while not yet evident in the 2014 data, Maryland's wastewater sector is on the verge of delivering substantial reductions of nitrogen pollution comparable to what has already been achieved in Virginia.



Blue bar shows 2017 reduction target
Red bar shows 2014 reduction progress
Sectors are shown in order of importance (from left to right)

Thanks to the creation in 2004 of the Bay Restoration Fund and the doubling of the Bay Restoration Fee in 2012, Maryland is scheduled to finish upgrading almost all of its 67 major wastewater treatment plants in time to meet the 2017 interim target. The nitrogen-removing upgrades to be completed in the next two years are so substantial that this sector alone is estimated to more than make up for the nitrogen reduction shortfalls in every other sector by 2017, which is projected to allow Maryland to meet its overall interim nitrogen reduction goal if these upgrades remain on schedule.

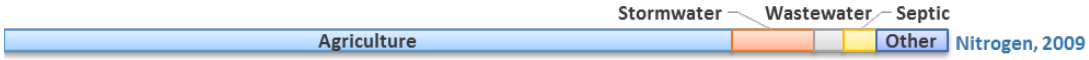
Even in the stormwater sector – the only sector where nitrogen pollution continues to increase – the state and many counties have done much of the legwork needed in terms of enacting legislation, raising funds, and building programmatic capacity. And although the stormwater permits issued by the state have some serious legal deficiencies, if fully funded and properly implemented by local governments and vigorously enforced by the state, these permits could bring about significant pollution reductions statewide. But therein lies the problem.

The saga of the so-called "rain tax" in Maryland — really a common fee typically known as a stormwater utility fee in other states, which is designed to raise money to fund stormwater infrastructure — illustrates the challenge of curtailing

stormwater pollution. Maryland enacted legislation in 2015 that allowed the state's 10 large MS4 permit holders to repeal the previously mandated fee if they identified an alternative funding source. Unfortunately, one jurisdiction (Baltimore County) repealed their fee without identifying alternative sources of funds to meet their stormwater obligations under the Clean Water Act and other jurisdictions either never established a fee (Carroll County), established a nominal fee merely to comply with state law (Frederick County), enacted a fee and then quickly repealed it (Harford County), or declared an intent to phase-out or repeal their fee in the future (Howard County). Worse, the Maryland Department of the Environment and EPA have continued to ignore the failure of municipalities in Maryland – and elsewhere – to comply with their MS4 permits. In the total absence of effective enforcement, perhaps it should be no surprise that the annual nitrogen loads from stormwater in Maryland increased by more than 250,000 pounds since 2009, while it needs to decrease by more than 1.3 million pounds by 2017. Unless EPA takes a firm and decisive stance against MS4 permittees around the watershed, MS4 permits will fail to drive the pollution reductions from stormwater needed to meet the Bay TMDL goals.

Thus, despite some promising signs, there are substantial hurdles ahead if Maryland is to expand progress beyond the wastewater sector and beyond the 2017 interim goal to meet the final goals of the Bay TMDL by 2025.

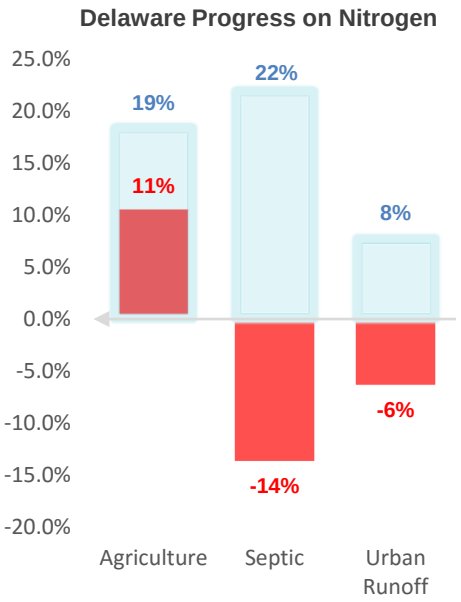
Delaware



Only about one-third of Delaware is within the Chesapeake Bay watershed. At about 1 percent of the overall watershed, this tiny area comprises only about a dozen municipalities and a handful of wastewater treatment plants. But this small slice of land on the Delmarva Peninsula is also home to millions of chickens, crammed into hundreds of houses, generating tens of thousands of tons of manure that must be disposed of somewhere. And while most of the rural Delaware landscape was long ago converted to vast fields of monocrop agriculture requiring enormous amounts of manure or other fertilizer, there is still too much animal waste compared with the crop needs of the region according to EPA. This substantial nutrient imbalance is the biggest issue that Delaware will need to address to follow through on its commitments under the Bay TMDL.

It is little surprise that the agricultural sector provides a greater share of Delaware's nutrient pollution (more than three-quarters) than it does in any other

jurisdiction in the watershed. What is perhaps more surprising is that the state is counting on the agricultural sector for nearly all of its 2017 pollution reduction goal. With such a large reliance on one sector, it is very important for Delaware to succeed in implementing the agricultural best management practices that it has committed to in its Watershed Implementation Plan (WIP).



Blue bar shows 2017 reduction target
Red bar shows 2014 reduction progress
Sectors are shown in order of importance (from left to right)

According to estimates from the 2014 watershed model run, Delaware has reduced nitrogen loading by about 10 percent, which is roughly on pace with the goal to reduce nitrogen pollution by 15 percent by 2017. However, part of the state's success has been incidental and external factors, such as declining effluent from industrial facilities.

In its 2015 assessment of Delaware's progress under the Bay TMDL, EPA acknowledged the moderate progress the state's agricultural sector has made, while also casting doubt about the sufficiency of the state's existing agricultural regulations and programs relative to the final 2025 nitrogen reduction goal. In particular, EPA questioned the state's enforcement of agricultural laws and its plans for addressing the significant anticipated growth in poultry houses in the state. EPA also showed concern in a separate assessment of Delaware's animal agriculture regulations, highlighting that the state is "relying heavily" on voluntary programs, including those with "large gaps" in needed funding. EPA concluded that there is uncertainty regarding how Delaware will achieve significant reductions from unregulated sources without a significant increase in resources.

While the state is relying almost entirely on reductions from the agricultural sector to meet its Bay TMDL goals, it should be noted that pollution from septic systems and urban runoff continues to rise at a troubling rate. Delaware's population has expanded rapidly since 2000 and it will be increasingly important for the state to address nutrient, sediment, and other water pollution issues from these urban and suburban sources.

Delaware should consider enhancing its implementation of urban and agricultural practices by enacting legislation to establish the Clean Water Fee, which has been proposed in each of the last two sessions of the Delaware General Assembly. Enactment of this legislation could provide significant new funding to control runoff pollution and put the state on much firmer ground as it strives to reach its 2017 interim goals under the Bay TMDL.

The District of Columbia

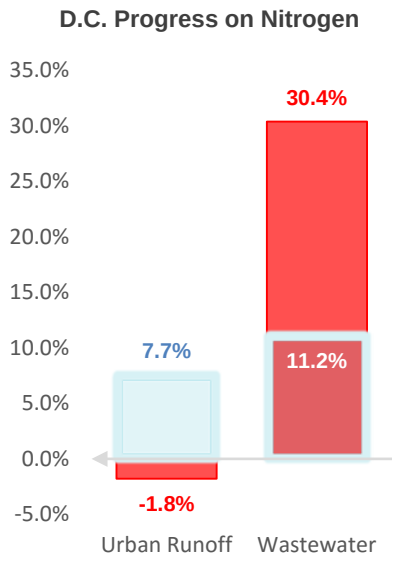
While much of the nutrient and sediment pollution in the Chesapeake Bay watershed reaches its shores and tributaries via runoff and other diffuse sources, most of the pollutants in the District of Columbia reach the Potomac, Anacostia, and Rock Creek via old fashioned pipes. This represents both a challenge and an opportunity, depending on what's on the other end of a given pipe.

Pipes leading from wastewater treatment plants represent a relatively straightforward source of pollution reductions for the District and other jurisdictions in the Bay watershed. Wastewater treatment plants are a classic example of a regulated point source under the Clean Water Act, with a familiar permitting process and well-established technologies available for reducing effluent pollution. The District has been able to take advantage of the fact that effluent from its Blue Plains plant comprises a substantial percentage of all its nutrient pollution. The District's enhanced nutrient removal upgrade at Blue Plains, which was designed in 2009 and began operation in late 2014, has reduced nitrogen pollution to such a great extent that the District is estimated to already be achieving its final 2025 goals for both nitrogen and phosphorus.

The case for sediment pollution is much different, however. The limiting sector for sediment pollutant is stormwater, not wastewater. Thus, the District will need to target other sorts of pipes – outfalls coming from municipal storm drains and those coming from the combined sewer system – to meet the Bay TMDL goal for sediment. And this effort will be much more difficult and expensive than efforts to control nutrient pollution from wastewater treatment plants, because the problem lies far from the outfalls themselves and consists of the many thousands of acres of impervious surfaces that blanket the District.

Fortunately, the District has recently taken prudent measures to address this problem by establishing both a stormwater fee to help pay for green infrastructure (such as green roofs, tree plantings, bio swales, and other projects

to retrofit impervious surfaces) and a separate impervious area charge to cover the cost of its massive combined sewer overflow (CSO) project, which primarily involves the construction of massive tunnels to ensure that sewage is treated at Blue Plains rather than washed by rain directly into the District's rivers. The CSO project was recently modified to remove one of the three proposed tunnels and replace it with many green infrastructure projects throughout the District. The good news is that hundreds, if not thousands, of such projects under this modification will be completed between now and 2025, continually ratcheting down nutrient and sediment loadings, instead of one large tunnel completed years from now that provides no other visible improvement to nearby communities.



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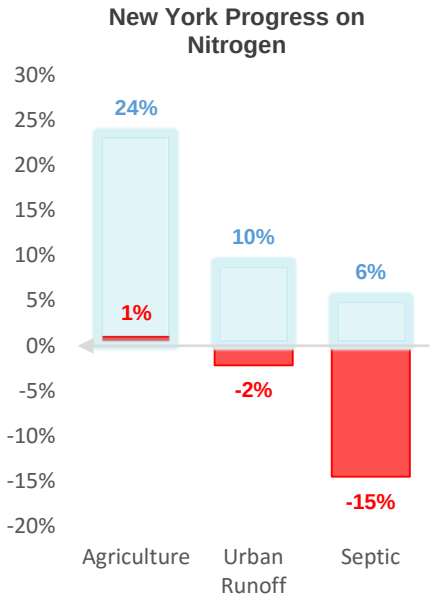
Overall, Washington D.C. has had a comparatively easy path to achieving its nutrient goals under the Bay TMDL, which rely significantly on established methods for reducing wastewater pollution from a single large plant. However, the District's path to controlling sediment pollution will be substantially harder, as it relies on achieving reductions from thousands of projects implemented by many different owners throughout the jurisdiction. To make matters more difficult, many such projects require the cooperation of federal agencies, which, despite carrying the charge of "leading by example," under the Bay TMDL have often been a source of obstruction. While most states can coordinate efforts with subordinate county and municipal governments, the various "local" jurisdictions that comprise up to one-third of the District's land area are federal agencies, which are under no obligation to follow many of the District programs and policies and have been hamstrung by recent congressional budgets.

In some respects, the District has a very unique set of issues in implementing the Bay TMDL, given that nearly the entire jurisdiction consists of densely urban areas. Even still, the District faces a similar challenge as each of the jurisdictions moving forward in that it must find a way to expand progress from end of pipe

solutions in the wastewater sector today to best management practices for addressing runoff in the future.

New York

Data from the 2014 watershed model show that New York State is among the biggest laggards in implementing the Bay TMDL. New York and Pennsylvania are the only two states that the model indicates have not yet achieved the 2017 interim phosphorus reduction goals, and New York ranks last among states in reducing its nitrogen loads on a percentage basis, which have actually increased since 2009. Fortunately for the Bay, unlike Pennsylvania, New York is a relatively minor contributor to pollution in the Bay watershed at about 5 percent of the total nutrient loads.



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The relatively small portion of New York State in the Bay watershed is a rural area in the state's Southern Tier, from Otsego County west to Steuben County. This area is heavily forested, with agriculture being the predominant "controllable" pollutant sector, representing about 25 percent of the land area. Even though agriculture contributes more than 40 percent of New York's nitrogen pollution in the watershed, the state's Watershed Implementation Plan (WIP) calls on the agricultural sector to deliver nearly all of the state's nitrogen reductions, virtually ignoring the other sectors. Whether or not it is wise to rely on one source sector to shoulder such a disproportionate amount of the pollution reductions can be debated. But certainly if New York is choosing to rely so heavily on its agricultural sector to deliver nutrient and sediment reductions, then it ought to ensure that it has a good plan to do so.

Unfortunately, the model estimates that, between 2009 and 2014, nitrogen loads from the state's agricultural sector have only decreased by about 1 percent, whereas the 2017 goal is to reduce such loads by about 24 percent. In other words,

the state is less than one-twentieth of the way to its 2017 interim goal with only three years remaining. As discouraging as this lack of progress is, what may be even more troubling is that, in the most recent assessment of the state's commitments under the Bay TMDL, EPA maintained New York's compliance status at the "ongoing oversight" level – seemingly indicating that EPA is relatively unconcerned. This message contradicts not only what the model data shows, but also the findings raised in EPA's own assessment.

Among the "achievements" that EPA found in its assessment of New York's commitments under the Bay TMDL are that it has (five years into the Bay TMDL) just recently implemented a pilot project designed to count the acres of cover crops planted. As for the actual planting of cover crops, EPA indicates that the number of acres planted must increase threefold. And given that this portion of New York is home to many large dairy farms and food producers like Chobani, one might expect the state to focus on reducing pollution from major animal feeding operations. Not so, according to the Animal Agriculture Program Assessment recently conducted by EPA. According to that 2015 assessment, New York is lagging far behind on all five "priority" best management practices for reducing pollution from concentrated animal feeding operations (CAFOs).

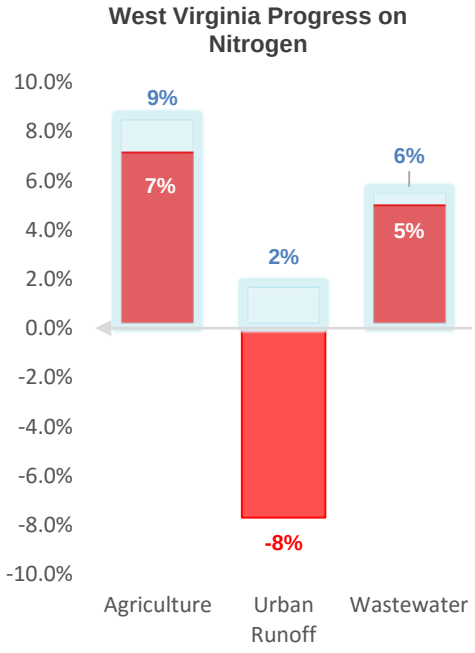
Although known as the Chesapeake Bay TMDL, this legal framework is actually an aggregation of 276 TMDLs protecting 92 different tidal segments. The people of Upstate New York and the policymakers in Albany need not value the estuarine waters of the Chesapeake Bay hundreds of miles to the south to appreciate the value of the Bay TMDL – they need to look no further than the increasingly degraded lakes and creeks in their own communities to understand why the commitments being made by the state under the Bay TMDL are a very worthwhile investment.

West Virginia

Like New York, the State of West Virginia can seem distant from the Chesapeake Bay and the process of implementing the Bay TMDL. But, even though most of the state's waterways ultimately drain into the Ohio River rather than to the Bay, the Potomac River forms the state's border with Maryland, and some of the fastest growing counties in West Virginia are those surrounding the Potomac headwaters, a short drive to the Bay itself. West Virginia has experienced at least some success to date in reducing nutrient and sediment pollution under the Bay

TMDL, but recent information from the watershed model and EPA paints a mixed picture of this progress.

West Virginia's agricultural sector exemplifies these mixed results. According to the watershed model, agricultural nitrogen loads in the state decreased by just over 7 percent between 2009 and 2014, which is close to the interim reduction goal of about 9 percent by 2017. Additionally, EPA found in its 2014 assessment of West Virginia's two-year milestones goals that the agricultural sector met each of its commitments for the 2012-2013 period. Nevertheless, EPA decided in that assessment to continue its "enhanced oversight" of the state's agricultural sector, hinting at some significant concerns.



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EPA renewed that concern in its 2015 assessment, casting doubt about the ability of the state to install enough agricultural best management practices to meet the goals of the Bay TMDL in light of the current levels of personnel and funding resources being dedicated by the state. Additionally, in its recent assessment of the state's regulation of animal agriculture, EPA noted that the state is far behind on issuing permits to concentrated animal feeding operations and that too few farmers are using nutrient management plans.

Urban runoff is the only increasing source of nitrogen or phosphorus loads in West Virginia's portion of the Bay watershed, according to 2014 model estimates, and pollution from this sector is rising faster in West Virginia than any other state except for neighboring Virginia. But, despite this very concerning data, EPA has decided in its last two assessments of West Virginia's progress not to downgrade the state from a compliance status of "ongoing oversight" to that of "enhanced oversight" – as is the case for the state's agricultural sector. To be sure, EPA has asked West Virginia to explain how its programmatic milestones related to training and education will provide the pollution reductions it is planning to achieve from the stormwater sector. Nevertheless, EPA must not only take a more firm stance regarding lagging

progress from individual sectors, but needs to provide a more transparent and coordinated strategy with states and the public.

Fortunately, like most states, West Virginia has been able to clamp down somewhat on nutrient pollution from major wastewater treatment plants. Perhaps learning from the experience of other states that acted to address wastewater pollution following earlier Bay agreements, the state legislature passed legislation shortly after the Bay TMDL went into effect to raise significant funds for upgrades at about a dozen wastewater treatment plants that discharge into the Potomac River and its tributaries. As of June 2015, four of these plants have been upgraded and the remaining upgrades are scheduled to be completed by 2017. The few upgrades that have been finished are estimated to be sufficient to already bring the state close to its overall 2017 nitrogen reduction goal. Like several other states, West Virginia is expected to achieve more reductions from the wastewater sector than is needed, likely allowing it to partially cover shortfalls from other sectors, particularly stormwater.

West Virginia officials deserve credit for acting swiftly in response to the Bay TMDL and establishing a significant new funding source to support the upgrade of its wastewater treatment plants within the Potomac headwaters of the Chesapeake Bay watershed. However, this approach will only take the state so far in meeting its commitments under the Bay TMDL. In order to achieve the final 2025 goals, the state will need to significantly accelerate its efforts to resolve the problem of polluted runoff from farm fields and urban areas. As is the case across the watershed, West Virginia will need to increase the resources available to implement and enforce municipal stormwater permits and expand the regulations or policies to protect streams from agricultural pollution.

Conclusions and Recommendations

Having examined the extent of progress toward meeting the nutrient and sediment reduction goals from the various states and sectors between 2009 and 2014, a few overarching points become clear. Following are several conclusions about the current state of restoration efforts under the Bay TMDL.

The failure of Pennsylvania to uphold its commitments jeopardizes the entire Bay TMDL.

Six of the seven jurisdictions in the Bay watershed have combined to achieve two-thirds of the 2017 nitrogen reduction target by 2014. With three years remaining, these six jurisdictions are roughly on pace collectively to meet the overall 2017 target. With substantial new pollution reduction projects projected to come online in the next several years, it is possible that some jurisdictions may even overachieve as measured against the overall 2017 nitrogen goal. However, once Pennsylvania's estimated growth in nitrogen pollution is included in these projections, overall progress toward the nitrogen reduction goal for the entire watershed in 2014 falls from about two-thirds of the 2017 goal to less than one-third of the goal. Because Pennsylvania contributes nearly half of the nitrogen pollution in the watershed (its agriculture sector alone represents about one-quarter of such pollution), barring some sort of dramatic turnaround, the simple fact is that the watershed as a whole will not meet the 2017 interim nitrogen goal under the Bay TMDL.

Agriculture is the largest pollution source and the most promising one for future reductions. Accelerating progress means solving the manure crisis.

The watershed model shows that stormwater ranks last among the four sectors in reducing nitrogen, followed closely by septic systems. In fact, nitrogen pollution from the stormwater sector has actually grown by about 4 percent by 2014 from 2009 levels and by about 3 percent from septic systems. By contrast, the agricultural sector is estimated to have reduced nitrogen pollution by nearly 2 percent over this same timeframe. The problem is that the agriculture sector contributes more than 40 percent of nitrogen pollution in the watershed, more than twice as much as the next largest source, and the sector is being relied upon to contribute more than 60 percent of the watershed's overall nitrogen reduction by 2017. In absolute terms, the agriculture sector across the watershed must reduce its annual nitrogen load by more than 23 million pounds by 2017, more than twice the required reduction from the stormwater and septic sectors

combined. So even though pollution from other sectors continue to increase, the fact that the agricultural sector had achieved less than one-tenth of its 2017 goal is far more important for understanding why the states are so far behind under the Bay TMDL.

The number of agricultural programs, subsidies, best management practices, and other conservation mechanisms that are employed by the various states subject to the Bay TMDL and tracked by the Bay Program is vast. So many programs and policies devised by states and the federal government are designed to soak up, slow down, or prevent the flow of nutrients and sediments from farm fields. Practices like stream buffers, cover crops, and low-till farming have become a prime focus of states and farm operators. But states must do a better job of addressing the root cause of so much of the problem in the agricultural sector – too much manure. In appropriate quantities, replacing chemical fertilizers with free animal waste makes as much sense as the recycling of plastic, aluminum, or other forms of waste. But due to the overconcentration of industrial agriculture in many parts of the Bay watershed, excessive volumes of manure are being dumped on farm fields instead of proper disposal through regulated methods as is required for other types of waste. The problem of manure over-application and the nutrient hot spots that it causes is well documented and has led some states to finally adopt phosphorus management indices and other such policy tools. Each jurisdiction must address the major – and, in some cases, growing – nutrient imbalance that exists within their agricultural sector if they are to quickly and cost-effectively accelerate progress under the Bay TMDL.

The Bay TMDL is vital to water quality for communities located far from the Bay.

One could argue that the biggest reason that Bay restoration progress is lagging is not deficiencies from within any state or sector, but rather the failure to properly communicate the value and role of the Bay TMDL to the restoration or preservation of water quality for individual streams, lakes, and other local waters. It may be easy for people in Annapolis to decry the lack of progress under the Bay TMDL, but it may be less obvious why residents of Charleston, West Virginia; Albany, New York; or even Harrisburg, Pennsylvania, might care about making greater sacrifices for the sake of the Chesapeake Bay. But the truth is that the Bay TMDL addresses the severe impairment of waters from every corner of the massive Chesapeake Bay watershed. Officials in all seven Bay jurisdictions face equally binding obligations – under the Clean Water Act and to their own

communities – to address the sources of pollution that are keeping local waters unhealthy and even dangerous. The same actions designed to achieve success under the Bay TMDL will help to reduce the prevalence of fish kills and beach closures from the presence of fecal bacteria, and revive the long suffering trout streams, which not long ago snaked throughout region's vibrant ecosystem. Explaining these benefits to residents throughout the watershed is the only way to reverse the perception that only coastal states with valuable beach real estate have enough "skin in the game" to care about Bay restoration.

The model is not perfect, but is good enough to show where more progress is needed.

Teams of experts convened by the Chesapeake Bay Program partnership are continuing efforts to refine the current phase of the watershed model and develop the next phase for use after 2017. Future iterations of the model will be more sophisticated and also based on the latest science to ensure that the pollution reductions estimated by the model even more closely approximate the reductions claimed by each jurisdiction going forward. The Bay Program's model is one of the most sophisticated watershed models ever created. Therefore, the model results and data should be carefully considered by state and local officials implementing the Bay TMDL and its inevitable limitations cannot be used to excuse delay or support inaction. Nevertheless, the Bay Program must also be responsive to concerns and ensure that its expert panels and work groups remain open to the valuable knowledge of the many scientists and water quality experts willing to voluntarily engage with the Bay Program work groups. Public confidence in the Bay restoration process demands transparency from the Bay Program and vigorous verification by states of the pollution reductions they claim.

Too much Bay pollution is unregulated or under-regulated. States must close this gap.

State policymakers charged with devising and implementing Watershed Implementation Plans under the Bay TMDL have a simple but critically important choice to make. They can either assign more stringent pollution reduction responsibilities to entities that are already subject to regulation, or they can create new pollution control programs to expand the universe of entities contributing to the restoration process. EPA established the National Pollutant Discharge Elimination System (NPDES) permitting regime decades ago to regulate water pollution, including nutrients and sediment. Most of the pollution reductions achieved under the Bay TMDL so far has been accomplished by

addressing facilities regulated under NPDES permits, particularly wastewater treatment plants paid for by urban and some suburban residents. But other sectors, particularly those involving runoff pollution, are subject to fewer laws and regulations. Not surprisingly, these sectors are where progress has been lagging and, in some cases, where pollution continues to increase unabated. In states where runoff is the dominant problem, the only prudent choice is to expand the scope of regulation to address previously unregulated sources of pollution. Unfortunately, this failure to act is what has prevented Bay restoration from proceeding on pace. While it is important to maximize pollution reductions from sources and sectors already subject to regulation through vigorous enforcement of existing laws, it is simply not possible to fully achieve the final 2025 goals under the Bay TMDL in most jurisdictions without expanding the scope of regulatory authority.