AN EIP POLICY PAPER

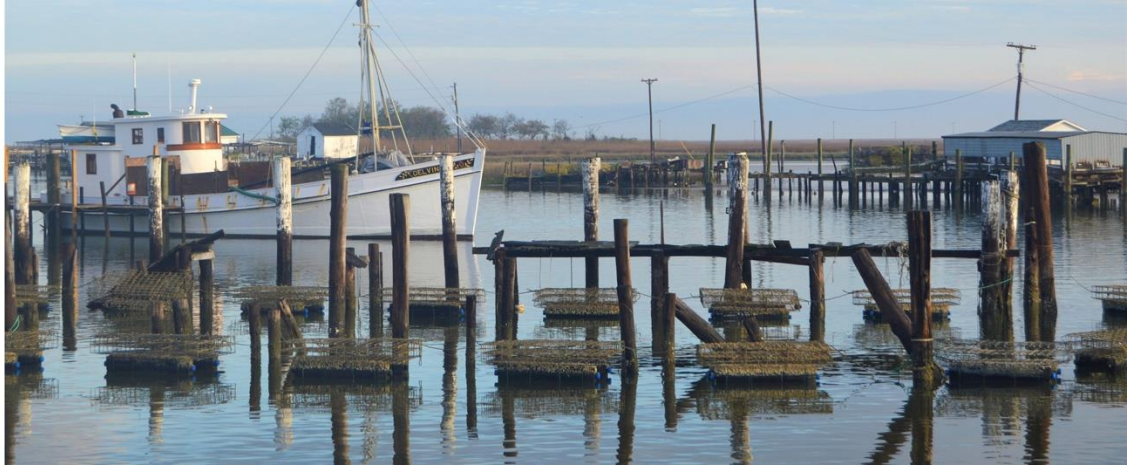
AUGUST 19, 2019

Pollution Trading in the Chesapeake Bay:

Threat to Bay Cleanup Progress

ENVIRONMENTAL INTEGRITY PROJECT

BY ABEL RUSS, EIP SENIOR ATTORNEY



Pollution Trading in the Chesapeake Bay:

Threat to Bay Cleanup Progress

Executive Summary

The Chesapeake Bay cleanup effort – guided by the EPA's Bay Total Maximum Daily Load, or TMDL – is slowly making progress. Pollution loads are starting to decline, and indicators of Bay health are starting to improve. However, the low-hanging fruit has been picked, and the next wave of pollution reductions will be harder to achieve. The Bay states are trying to make this process easier by encouraging polluters to trade with each other. In the abstract, this might be a plausible strategy. Polluters who cannot easily reduce their pollution loads can buy "credits," or pollution reduction equivalents, from other polluters who have ways of making relatively cheap pollution reductions. In the real world, though, pollution trading is complicated, and there are many pitfalls. A poorly executed trading program can be counterproductive, slowing progress toward overall cleanup targets and even causing net increases in pollution. This white paper explores pollution trading in Maryland, Pennsylvania and Virginia and makes the following observations:

1. So far, the volume of pollution trading has been limited to less than 1% of total nitrogen and phosphorus loads reaching the Bay each year.

2. The Bay states are hoping to encourage more trading by, among other things, allowing urban stormwater permittees to purchase credits instead of reducing stormwater loads.

3. The Bay states sometimes suggest that pollution trading will reduce pollution loads. It will not. Even in a best-case scenario, pollution trading will have no net effect on pollution loads.

4. A good trading program should be transparent. If you cannot trace each pollution credit from a specific generator to a specific buyer, then you cannot protect local water quality, enforce pollution permits, or even keep an accurate pollution balance sheet. Unfortunately, none of the Bay states has a perfectly transparent trading platform. Each one is missing some key information. For example, many trading programs have

intermediary brokers who buy and sell credits. Listing a broker as the credit seller for a particular trade obscures the original generator associated with that credit.

5. The trading programs are encouraging the sale of credits based on pollution controls implemented several years ago. As a policy matter, this means that polluters can literally "take credit" for past reductions, rather than generating new, additional pollution reductions. This will hamper progress.

6. If credits based on past reductions are sold as offsets for new loads, then the net result will be an increase in overall pollution. Pollution trading might therefore cause states to backslide on the progress achieved to date.

7. The trading programs are not adequately accounting for the fact that credit-generating practices on farms and other "nonpoint" sources tend to underperform – a problem exacerbated by climate change. The buyers of these credits are generally not getting what they pay for, and these trades will further hamper progress toward TMDL goals.

Contents

Pollution Trading in the Chesapeake Bay: Threat to TMDL Progress

1. Background

The Chesapeake Bay is slowly getting better. The Bay states have made some progress since the current cleanup plan was launched in 2009, though not as much as they had hoped. Now the Bay states are trying to figure out how to complete the process by 2025, working to complete their third "Watershed Implementation Plans" based on a new set of targets for nitrogen and phosphorus load. Meeting the 2025 targets will require the states to redouble their effort and accelerate pollution reductions. The states will also try to make the process more efficient – reducing pollution loads at a lower per-pound cost – by allowing various sources of pollution to trade. For example, it might be cheaper for a farmer to reduce 100 pounds of phosphorus runoff by planting cover crops than it is for a county to reduce 100 pounds of phosphorus runoff by ripping up pavement and replacing it with something more permeable. Instead of restoring the pavement, the county might elect to purchase pollution reductions from the farmer. The trade would not change the overall balance – the net phosphorus load would still be 100 pounds less with or without the trade – but the trade would make the pollution reduction more affordable. That is the idealized version of "nutrient trading." The reality is much more complicated. In the real world, many things can go wrong, and a poorly designed and implemented nutrient trading program can undermine incentives for pollution reduction, or even cause a net increase in pollution loads. This white paper evaluates a few key elements of the Bay states' nutrient trading

programs to answer three basic questions. First, how much will each state lean on nutrient trading as a strategy? Second, how transparent are the trading programs? Is it possible for the public to follow pollution reductions from a seller of a pollution credit to a buyer? Finally, will the trading programs help, or hinder, TMDL progress?

This white paper will focus on just three states – Maryland, Pennsylvania and Virginia – because these three states account for roughly 90 percent of annual nitrogen and phosphorus loads to the Chesapeake Bay.[1]

We found that trading is a relatively minor feature of the overall TMDL implementation landscape so far, generally amounting to less than one percent of each state's annual nitrogen and phosphorus loads. However, the states are hoping to increase the volume of nutrient trading, particularly as a replacement for urban stormwater controls. Although each of the states maintains a public website with a substantial amount of information about nutrient trades, there are gaps in each state that make it difficult to track pollution credits from a permitted credit purchaser back to a credit-generating practice at a particular source. Finally, for reasons unrelated to transparency, including the use of questionable credit generation baselines and failure to correctly apply trading ratios for uncertainty, the three states' trading programs are more of an obstacle than an asset: They are not incentivizing additional pollution controls and they are not reducing pollution. In fact, the opposite is true. Nutrient trading programs are undermining incentives for pollution reduction, and in some case causing net increases in pollution load.

2. How much is each state leaning on nutrient trading?

So far, the volume of trading in each state (in terms of nitrogen or phosphorus pounds traded) has amounted to less than one percent of statewide nutrient loads. Maryland is hoping to see a significant volume of trading in the future, but its trading program is new, and only a handful of trades have occurred so far. Pennsylvania and Virginia have older trading programs, but trading in these two states has been somewhat limited.

The Bay states and the U.S. EPA are currently in the process of refining their strategies for meeting 2025 pollution targets. The strategic plans are known as "Watershed Implementation Plans" or "WIPs." We looked at each WIP to see what the states had to say about nutrient trading. Among other things, we wanted to know whether the states were trying to assign pollution reductions to nutrient trading. This would be improper, and it would be bad accounting. After all, a trade is not a reduction. An idealized trading situation works like this: Suppose I, as a polluter, am supposed to reduce my annual nitrogen load by 10 pounds. Either I can make that reduction myself, or I can pay someone else to make that reduction. Either way, there will be a 10-pound reduction. Similarly, if a state is supposed to reduce the loads of phosphorus from urban runoff by 100,000 pounds, it can restore its impervious surfaces (pavement) to prevent the equivalent volume of runoff, or perhaps it can purchase 100,000 pounds of phosphorus credits

[1] Based the "2017 progress" outputs of the Chesapeake Bay program's Phase 6 watershed model, Maryland, Pennsylvania and Virginia are responsible for 88 percent of the nitrogen reaching the Bay each year, and 92 percent of the phosphorus.

from farmers. Either way, there will be a 100,000-pound reduction in phosphorus load. Nutrient trading may change where the reductions come from, and how much they cost, but nutrient trading does not reduce pollution.

a. Maryland

Maryland has a very new trading program. The state's point source trading registry, maintained by the Maryland Department of the Environment, lists a single transaction: 30 nitrogen credits, 8 phosphorus credits, and 3,400 sediment credits, all sold by the Elkton Wastewater Treatment Plant to the Terumo Medical Corporation on March 19, 2019. Maryland's point source registry lists a larger number of *certified* (but not necessarily purchased) credits, most of which have not been purchased: 10,741 nitrogen credits, 1,742 phosphorus credits, and 217,391 sediment credits. These certified point source credit totals represent less than 0.1 percent of Maryland's total annual load of each pollutant.

Agriculture is a "nonpoint" source, meaning that agricultural loads are not discharged through discreet point source outfalls. Instead, agricultural loads enter rivers and streams as runoff or baseflow (groundwater that discharges into surface waterways). Agricultural credits in Maryland are certified by the Maryland Department of Agriculture (MDA). MDA is developing its own online trading platform, but it appears that MDA has not yet certified any agricultural credits.

Looking to the future, Maryland's WIP discusses nutrient trading with respect to municipal storm water ("MS4s"), which are likely to be nutrient credit purchasers, and septic systems and sewage treatment plants, which are likely to be credit generators. Maryland's WIP is inconsistent about whether these trades should be thought of sources of additional pollution reductions (which would be inappropriate). Maryland's trading program is new, and the WIP does not put a quantitative estimate on future trading capacity (e.g., in pounds traded per year). Maryland probably does not know how popular its trading program will be, and the WIP generally does not try to guess how important nutrient trading will be to total TMDL progress.

> **Stormwater.** Developed, paved land generates large quantities of runoff when it rains. Until now, Maryland had been planning to reduce these stormwater loads by requiring cities and counties with Municipal Separate Storm Sewer Systems ("MS4s") to make a 20 percent reduction in impervious acres through "restoration," or replacing impervious surfaces with materials that allow rainwater infiltration. Now, through Maryland's Water Quality Trading Program, MS4s can purchase reductions from other sources, including neighboring, non-MS4 counties that install stormwater Best Management Practices (BMPs).[2] Pages 7 and 21 of the draft WIP state that "miscellaneous implementation on non-MS4 counties (i.e., trading, trust fund)" will reduce nitrogen and phosphorus loads by 5,000 and 500 pounds, respectively, at a cost of $5 million. This is problematic. It is not clear how much of these reductions are being attributed to trading, but it appears that some of them are.

[2] Maryland draft WIP at B-34.

Again, nutrient trading does not reduce pollution. If an MS4 meets part of its restoration requirement by purchasing credits from a neighboring non-MS4 county, then the 'reduction' in the non-MS4 county is really an offset. The non-MS4 county will reduce its stormwater load, and this will offset the fact that the MS4 failed to reduce stormwater by as much as it was supposed to.

This can be further illustrated with another example from Maryland's WIP. One source of nitrogen credits in Maryland's nutrient trading scheme is "non-required septic upgrades."[3] Maryland believes that "this will act as an additional driver of septic implementation."[4] Maybe so. But every trade involving septic implementation represents two things – nitrogen reductions at the septic system, and a failure to reduce nitrogen somewhere else. In other words, the septic upgrade will be used to offset nitrogen reductions that another source was supposed to make. The other source – the nitrogen credit purchaser – will continue to discharge more nitrogen than it should. On balance, Maryland will not be any closer to its overall nitrogen goals. At one point in its WIP Maryland seems to acknowledge this fact:

> Maryland will promote using septic upgrades as a mechanism for generating credit to meet NPDES permit requirements. We acknowledge that there will be a reduction; however, that reduction will be used to meet NPDES permit requirements so no estimate figure is provided here. MD WIP at B-21.

In other words, the septic upgrades generate reductions, but since those are used as an offset (to meet someone else's NPDES permit requirements), they are not counted on the balance sheet as new reductions. This is the proper way to account for and discuss nutrient trading. Unfortunately, Maryland's WIP is inconsistent. Where trading incentivizes septic upgrades, Maryland acknowledges that there is no net improvement. Yet where trading incentivizes stormwater BMPs in non-MS4 counties, Maryland falsely claims that there is an additional pollution reduction.

There is an additional problem with MS4s in Maryland's trading scheme, and that has to do with how trades account for uncertainty around the pollution reductions generated by non-point sources like farms. This is discussed in greater detail in Section 3 of this white paper, but in short, MS4s are exempted from the general requirement (and EPA expectation) that all trades involving nonpoint credits should use a 2:1 "uncertainty ratio." To illustrate, consider a farmer planting cover crops, a form of agricultural Best Management Practice or BMP. The cover crops are assigned a certain pollution reduction using a Chesapeake Bay Program-approved effectiveness estimate. However, BMPs tend to under-perform, and this will become increasingly true as a result of climate change. So the EPA expects credit purchasers, when buying credits from a farm or other nonpoint source, to purchase 2 pounds of credits for every pound that it wants to offset. This creates a margin of safety to account for any underperformance on the part of the credit

[3] Id. at B-20.
[4] Id. at B-21.

generator. Under Maryland's trading scheme, MS4s are exempt from the required 2:1 uncertainty ratio. As a result, when an MS4 purchases credits from a nonpoint source, and the nonpoint source fails to reduce nutrient loads by the predicted amount, then the reduction that appears on paper will be greater than the reduction that actually occurs.

Wastewater. Pages 7 and 21 of the WIP state that trading will incentivize additional treatment of sewage, beyond the level of treatment necessary to meet wastewater nitrogen concentrations of 3 mg/L. The WIP does not quantify the associated load reduction ("no estimate"). It is not clear whether Maryland sees this incentive as a source of additional reductions. Regardless, there are other problems with this strategy. Among other things, it seems clear that Maryland's trading program will not incentivize additional sewage treatment, because sewage treatment plants will be flooding the market with credits based on past reductions, for which no additional pollution control investments are required (see Section 3 below).

b. Pennsylvania

Pennsylvania has had an active nutrient trading program since 2013. Over that time, the number of credits traded each year has declined, as shown in the following table:

Table 1: Summary of nutrient trades in Pennsylvania, 2013-2018

	Nitrogen credits traded (% of annual nitrogen load)	Phosphorus credits traded (% of annual phosphorus load)
2013	1,155,705 (1.0%)	106,336 (2.6%)
2014	817,822 (0.7%)	72,686 (1.8%)
2015	611,696 (0.6%)	55,196 (1.4%)
2016	602,487 (0.6%)	45,487 (1.2%)
2017	272,399 (0.3%)	35,143 (0.9%)
2018	628,891 (0.6%)	31,529 (0.8%)

Over the 2013-2018 time period, most credits appear to have come from wastewater treatment plants. Pennsylvania's trading regulations allow point sources to sell credits for the difference between what they actually discharge and what their permits allow. In addition, starting with the 2016 compliance year, wastewater treatment plants can only sell credits to the extent that their annual discharge concentrations are less than 6 mg/L (nitrogen) and 0.8 mg/L (phosphorus).

Since 2016, wastewater treatment plants have been the source of roughly 60 percent of the nitrogen and phosphorus credits traded in Pennsylvania.[5]

The role of agriculture in nutrient trading has declined, perhaps in part because Pennsylvania adopted a 3:1 trading ratio for agricultural sources in 2016, meaning that credit purchasers must obtain three agricultural credits for every pound of their own discharge that they want to offset. In 2013, agriculture was the source of 23 percent of the nitrogen credits and 26 percent of the phosphorus credits traded in Pennsylvania. Over the 2016-2018 time period, farms were the source of 17 percent of the nitrogen credits and 15 percent of the phosphorus credits.

Going forward, Pennsylvania's Phase III WIP describes the nutrient trading program under the heading "Accounting for State Actions Not Currently Credited to Pennsylvania: Agriculture."[6] The WIP does not appear to attribute any specific reductions to trading, which suggests that Pennsylvania correctly views trading as a potential way to increase the efficiency and affordability of meeting TMDL goals, rather than as a unique source of reductions.

c. Virginia

So far, Virginia's nutrient trading program has been limited to a small number of permanent offsets and a larger number of annual point source trades. 55,597 permanent nitrogen credits have been generated by nonpoint sources. Of these, 94 percent were generated by land conversion (e.g., allowing farmland to re-forest). For phosphorus, 8,306 credits have been generated, again coming mainly from land conversion (87 percent). Just over of half of these credits have been used/purchased – 32,110 nitrogen credits and 4,903 phosphorus credits. Virginia's nonpoint source nutrient credit registry does not say where the credits were used, instead providing the name of the bank and broker that obtained each set of credits. Our understanding from conversations with Virginia DEQ staff is that these credits have been used to offset relatively permanent new loads (e.g., new development). The total number of nonpoint credits is very low. The 32,110 nonpoint nitrogen credits that have been used amount to 0.06% of Virginia's annual nitrogen load (as of 2017). The 4,903 nonpoint phosphorus credits represent 0.08% of Virginia's annual phosphorus load.

Virginia's point source credit trades are summarized in annual "nutrient trades reports." The state's website currently includes annual reports for 2015-2018. Each report lists the buyer of a set of credits, the watershed in which the buyer is located, the buyer's waste load allocation, the buyer's actual discharge the year in question, and the number of credits purchased (generally equal to the extent to which actual load exceeded the waste load allocation). The reports also show the source of the credits, though the source is almost always the Virginia Nutrient Credit Exchange Association (VNCEA). The VNCEA, in turn, publishes its own annual reports, which are also available on the Virginia DEQ website, with prospective details of nutrient trades

[5] The total is probably higher. We sorted credit generators into three categories based on their names. Many generators have "wwtp" or "stp" in their name, and we put these in the "wastewater treatment plant" category. Other generators have "farm generator IDs" and we put these in the "agricultural" category. The remaining sources we described as "unknown," but many of these (e.g., "Wellsboro Mun Auth") are likely to be wastewater treatment plants.

[6] Draft Pennsylvania WIP at 67.

arranged by watershed. The number of credits for a given year (e.g., roughly 2,000,000 nitrogen credits were available and tentatively claimed for the 2017 year) is much greater than the number of credits actually traded (306,174 nitrogen credits were actually traded in 2017).

The credits traded in 2015-2018 are shown below. The number of credits traded is equal to less than 1 percent of Virginia's total load each year, for both nitrogen and phosphorus. However, if all of the credits lined up by VNCEA were to be purchased, then traded credits would amount to roughly 3% of Virginia's nitrogen and phosphorus load.

Table 2: Summary of point source nutrient trades in Virginia, 2015-2018

	2015	2016	2017	2018
Nitrogen				
Credits traded	508,516	508,190	306,174	324,333
Statewide nitrogen load	60,673,504	59,757,370	58,155,064	58,161,130
Trading/total load	0.8%	0.9%	0.5%	0.6%
Phosphorus				
Credits traded	30,124	43,757	28,962	47,084
Statewide phosphorus load	6,203,643	6,278,241	6,122,161	6,156,269
Trading/total load	0.5%	0.7%	0.5%	0.8%

Virginia, like Maryland, is predicting an increase in the number of MS4s seeking to purchase nutrient credits:

> Financing of urban reductions has been partially achieved through the Virginia Stormwater Local Assistance Fund (SLAF). Under § 62.1-44.19:21.A of the Code of Virginia, MS4s are also able to take advantage of point source and nonpoint source trading programs to achieve their nutrient and sediment reduction goals. Trading activity to date has been very limited as MS4s have achieved required reductions through the implementation of onsite BMPs. Trading activity is expected to increase in the future as incremental reductions in urban sector nutrient and sediment loads become more challenging to achieve and urban retrofits are phased in over time.[7]

3. How transparent are the trading programs?

From the perspective of environmental protection and accountability, a transparent trading program would allow the public to trace each credit back from a buyer to a generator. There are several reasons for this. First, credit buyers, who are using credits to meet legally enforceable

[7] Draft Virginia Phase III WIP at 9.

permit limits, are liable for any credit failure. For example, if a wastewater point source buys credits from a farmer who claims to have planted a forest buffer, but it later turns out that the buffer was never planted, then the point source will have violated its permit limit. A second reason for 'cradle-to-grave' accountability has to do with local water quality. Trading can have adverse impacts on local water quality if, for example, a polluter defers pollution upgrades and instead buys credits from a different watershed. If the polluter (credit purchaser) had made the pollution control upgrades, then the environmental benefit would have occurred in the polluter's watershed. With the trade, however, the environmental benefit is transferred to the credit generator's watershed, and the polluter's watershed is arguably worse off (or no better). Finally, accountability is important for evaluating overall TMDL implementation. As we discuss in more detail below, trading may create the appearance of pollution reductions where in fact there are none. And to the extent that trades are actually offsets – where credits are purchased to offset a new load – they are very likely to create net increases in pollution load. All of this can only be proven or disproven with complete data.

So, how transparent are the states' programs? The short answer, based on what the states make available online[8], is that they are all 'translucent.' Each state provides some information, and some states more than others, but no state provides everything we might want to see.

Maryland's trading program is the newest, and also the most transparent, at least for point source credits. The state maintains an online credit registry[9] that provides the following information for each point source credit:

- A credit ID number for each credit/pound. For example, when the Easton Wastewater Treatment Facility registered 6,648 nitrogen credits for sale, they were given credit IDs of 2018_CHOOH_N_00001 through 2018_CHOOH_N_06648. These IDs show the year in which the credits were generated (2018), the subwatershed where they were generated ("CHOOH" is the oligohaline portion of the Choptank River), the nutrient (N, for nitrogen), and a unique number for each pound.
- Information about the generator, including the name and address of the facility and the name of someone to contact.
- Details about the credits. These include the watershed, the year generated, and the credit type (nitrogen or phosphorus), all of which can also be gleaned from the credit ID numbers. Other details include the date certified and the "credit status," either available for purchase ("active") or sold ("traded").
- Details about the purchaser of each credit, including name, date of trade, whether the credit has been applied to the purchaser's permit, and the associated permit number.

This is a good start. It allows the public to trace the fate of each credit, from generator to purchaser.

What's missing from Maryland's trading registry is a link to the certification for each credit. We do not know *how* each generator generated its credits, and that is important information. There is

[8] Although more information may be available through public records requests, we consider that to be an additional obstacle to true transparency, and

[9] https://mde.maryland.gov/programs/Water/WQT/Pages/MDE_WQT_Register.aspx

a big difference between claiming credit for pollution reductions that a facility made in 2008 using taxpayer money, and claiming credit for reductions generated by a facility's investments in new pollution controls.

Pennsylvania's nutrient trading website also provides a great deal of information, including a list of trades for every year between 2013 and 2018. These annual trading reports include the name of both the credit generator and the credit purchaser, though the shorthand is not always clear. Pennsylvania's websites also includes more extensive details on credit generators, including the mechanism by which each credit was generated "pollutant reduction activity," but only for the most recent credit year (2018). The permit numbers associated with each buyer and seller are not available in the annual trading reports. Credit buyers' permit numbers are available for credit years 2014-2018 in separate documents. Credit generators' permit numbers are available for credit years 2017-2018.

Virginia's nutrient trading website provides links to several different types of document:

- Annual "nutrient trades reports" for 2015-2017. These show the name, permit number, and basin (watershed) of each credit purchaser, each purchaser's delivered load, the number of credits purchased, and the source of the credits. However, the source of the credits is almost always listed as "VNCEA," the Virginia Nutrient Credit Exchange Association." The VNCEA serves as a kind of broker between credit generators and credit buyers. The annual nutrient trades reports do not allow the public to see where the credits for each buyer were generated, or how they were generated.
- Annual "nutrient loads" reports for 2015-2018. These reports, organized by basin, show each permittee's wasteload allocation and actual load.
- Annual "exchange compliance plans" from the Virginia Nutrient Credit Exchange Association for 2017-2019. These plans are largely prospective, showing the trading potential for the upcoming year and future years, including details about credit purchase agreements. Of the large number of credits lined up for potential trades year (e.g., roughly 2,000,000 nitrogen credits for 2017), only a small subset are actually traded (roughly 300,000 nitrogen credits in 2017).
- A nonpoint source credit registry. As discussed above, the nonpoint registry provides a list of "permanent" credits, including information about the credit generators (certification number, nutrient bank, bank sponsor, broker, and broker contact) and about the Best Management Practices used to generate credits (almost always "ag land conversion"). The nonpoint source credit registry does not provide information about credit buyers.
- Nonpoint source credit applications. This spreadsheet provides the same information as the nonpoint source credit registry, but for nonpoint sources that have pending applications.

The following table summarizes what each state does and does not provide on its public website. It can be seen that each state provides some, but not all, of the information that can support complete accountability.

Table 3: Transparency of online nutrient trading registries

	Maryland	Pennsylvania	Virginia
Point source credit purchasers			
Name	Yes	Yes	Yes
Permit number	Yes	Yes	Yes
Credit ID	Yes	No	No
Associated credit generator	Yes	Yes	Generally not[10]
Point source credit generators			
Name	Yes	Yes	Prospective estimates only[11]
Permit number	No	Yes	
Credit ID	Yes	No	
Pollutant reduction activity	No	Yes	Each point source generates credits by discharging less than its wasteload allocation
Associated credit purchaser	Yes	Yes	No
Nonpoint source credit purchasers			
Name	No nonpoint sources have purchased credits in Maryland	It appears that only point sources purchase credits in PA[12]	No
Credit ID			No
Associated credit generator			No
Nonpoint source credit generators			
Name	The Maryland Department of Agriculture has not yet launched its credit registry, perhaps because it has not yet certified any nonpoint credits	Yes	Yes
ID number		Yes (certification ID)	Yes (certification number)
Credit ID		No	No
Pollutant reduction activity		Yes	Yes
Associated credit purchaser		Yes	No

[10] The source is almost always listed as "VNCEA" (Virginia Nutrient Credit Exchange Association).
[11] Annual VCNEA plans provide prospective estimates of credit generation for each point source
[12] There are also a small number of credits purchased by credit brokers from time to time. For example, 12% of the nitrogen credits purchased in 2018 went to the broker Red Barn, while the rest (and all phosphorus credits) went to point sources. All of the nitrogen and phosphorus credits in 2017 were purchased by point sources. In 2016, 97% of the nitrogen credits and all of the phosphorus credits went to point sources.

4. Is trading going to help, or hinder, TMDL progress?

Transparency and accountability are critical elements of any adequate trading program, but they are not the only critical elements. Each state's nutrient trading program has additional weaknesses, some of which are inherent in the form of nutrient trading sanctioned by the U.S. EPA, that will inevitably lead to an unfortunate conclusion: Nutrient trading will almost certainly slow each state's progress toward meeting its TMDL targets.

a. Baselines and additionality

One of the key elements of a nutrient trading program is the baseline for credit generation. Credits are supposed to represent pollution reductions. When someone buys nutrient credits, it is because they have a legal obligation to reduce their pollution load. They decide that it's cheaper to pay someone else to do it. In the case of offsets, someone is generating a new pollution load, and under the terms of the TMDL, that new load has to be offset by a pollution reduction somewhere else.

But how do we quantify that credit generator's pollution reduction? Theoretically, the pollution reduction behind each credit should be the difference between the credit generator's load *now*, and what that load used to be. What that load used to be can be described as the 'baseline,' the point of comparison from which we calculate credits. This is simple enough in theory, but much more complicated in practice. The following list of questions illustrate that complexity:

- When was the baseline? Was it last year? Was it five years ago? Is it a multi-year average?
- If the credit generator is a nonpoint source like a farm, for which we have no monitoring data, the baseline has to be estimated. How do we do that?
- What if a permitted point source has permit limits that reflect that source's wasteload allocation under the TMDL. Could that be a baseline? In other words, if a source discharges less pollution than it is legally allowed to discharge, can it claim (and sell) credit for the difference?

The U.S. EPA has answered these questions in the TMDL document itself and in a series of "technical memoranda" that lay out the Agency's expectations for trading programs in the Bay region. In its simplest form, EPA's expectation is that baselines are whatever the TMDL required in the form of waste load allocations (for significant point sources) and load allocations (for other sources).[13] As described in more detail below, the Bay states are generally meeting this expectation.

However, the EPA also requires "additionality," explained as follows:

[13] See, e.g., TMDL at 10-1 ("[O]ffsets are to be in addition to reductions already needed to meet the allocations in the TMDL…"); TMDL at S-2 (defining "Offsets Baseline" as "the amount of pollutant loading allowed by wasteload allocation (WLA) or load allocation (LA) that applies to individual credit generators in the absence of offsets"); U.S. EPA, Establishing Offset and Trading Baselines in the Chesapeake Bay Watershed: EPA Technical Memorandum at 4 (Feb. 2, 2016) ("The baseline used for credit generation is the same regardless of whether those credits will be used as offsets for new or increased loads or trades for compliance purposes.").

> During the initial stage of a trading or offset regime, a credit generating practice is: (1) to have been implemented no earlier than January 1, 2006, which was the cutoff date for calibrating the CBP Partnership Watershed Model that was used in setting the Bat TMDL; and (2) in addition to pollutant reductions committed to in the generating sector's level of implementation contained in a Bay jurisdiction's final Phase II Watershed Implementation Plan.[14]

Finally, the TMDL also states that "EPA does not support any trading activity that would delay or weaken implementation of the Bay TMDL."[15]

At the state level, baselines are defined as follows:

In Maryland, the general baseline for a point source is that source's wasteload allocation.[16] Sewage treatment plants are subject to the additional requirement that they can only obtain credit to the extent that their average annual discharge concentrations are less than 3 mg/L (nitrogen) or 0.3 mg/L (phosphorus).[17] This is roughly what sewage treatment plants upgraded to "enhanced nutrient removal" are expected to achieve. For agricultural nonpoint sources, the baseline is a farm's share of the applicable load allocation, as calculated using a modeling tool provided by the Maryland Department of Agriculture.[18]

In Pennsylvania, the baseline is generally the applicable TMDL wasteload allocation or load allocation.[19] Sewage treatment plants can only obtain credit to the extent that their average annual discharge concentrations are less than 6 mg/L (nitrogen) or 0.8 mg/L (phosphorus).[20] Agricultural sources can only generate credits after they comply with a set of performance requirements, including, for example, erosion and sediment control planning and manure application setbacks.[21]

In Virginia, the general baseline for point sources is each point source's wasteload allocation.[22] The baseline for agricultural credits is "those actions necessary to achieve a level of reduction assigned in the Virginia Chesapeake Bay TMDL Watershed Implementation Plan or approved TMDLs as implemented on the tract, field, or other land area under consideration."[23]

In short, and aside from more restrictive baselines applied to sewage treatment plants in Maryland and Pennsylvania, the baseline for generating credits is the applicable TMDL allocation. This is problematic. Consider a hypothetical point source polluter subject to, but currently exceeding, a certain wasteload allocation and associated permit limit on its nitrogen

---

[14] U.S. EPA, Components of Credit Calculation: EPA Technical Memorandum at 9 (May 14, 2014).
[15] TMDL at 10-3.
[16] Where a source is subject to a local TMDL in addition to the Bay TMDL, then the stricter TMDL controls for purposes of calculating the baseline. COMAR 26.08.11.05.C.
[17] COMAR 26.08.11.06, 26.08.11.03(35).
[18] COMAR 15.20.12.04.
[19] Where a local TMDL applies in addition to the Bay TMDL, the baseline would be based on the stricter of the two. 25 Pa. Code § 96.8(a), 98.6(d)(2)(ii).
[20] Pennsylvania DEP, Phase 2 Watershed Implementation Plan Nutrient Trading Supplement, Revised (Oct. 14, 2016).
[21] 25 Pa Code § 96.8(d).
[22] 9VAC25-820-10 (definitions of "point source nitrogen credit" and "point source phosphorus credit").
[23] Va. Code Ann. § 62.1-44.19:20.

load. In the absence of nutrient trading, the polluter would have to reduce its pollution load. With trading, however, the polluter could instead purchase credits. And those credits would probably not represent new reductions. Instead, the credits might represent pollution reductions that occurred 5 or 6 years ago, and may have been paid for by taxpayers. In the absence of trading, nitrogen loads would have declined. With trading, nitrogen loads stay the same.

Another specific, actual example can be found in Maryland's first nutrient trade: On March 19, 2019, the Terumo Medical Corporation bought 30 nitrogen credits, 8 phosphorus credits, and 3,400 sediment credits from the Elkton Wastewater Treatment Plant. This was the first, and as of June 2019, the only trade on Maryland's trading registry. It was a small trade, but it illustrates the problem with wastewater treatment plants selling credits.

The Elkton Wastewater Treatment Plant upgraded to "enhanced nutrient removal" in 2008. The project was partly paid for by taxpayers, through the Bay Restoration Fund. Enhanced nutrient removal is a technique that is designed to achieve nitrogen concentrations of 3 mg/L and phosphorus concentrations of 0.3 mg/L. The Elkton plant upgrades worked, and the plant's nitrogen discharges are almost always less than 3 mg/L. Since the upgrades were completed in 2008, the Elkton plant has discharged an average of roughly 12,000 pounds of nitrogen each year, compared to annual discharges of over 100,000 pounds before the upgrade. Figure 1 shows the trend since 2008.

Figure 1: Total nitrogen discharges from the Elkton Wastewater Treatment Plant (lb/year)

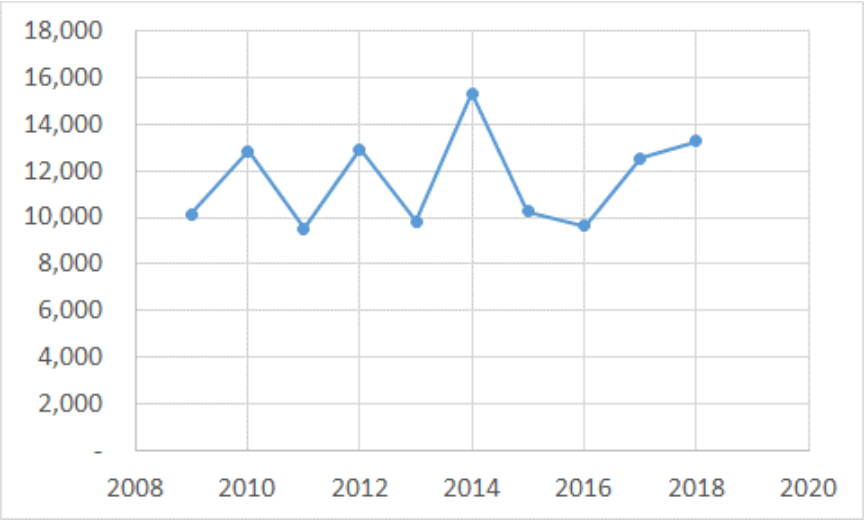


Figure 1 shows that the Elkton plant's discharges have fluctuated since 2008, but with no clear upward or downward trend. In other words, after making a significant improvement in wastewater quality in 2008, things have stayed about the same. In 2018, the Elkton plant had an annual nitrogen load of just over 13,000 pounds. This was above average for the plant, and in fact the second-highest nitrogen load since the 2008 upgrade.

In short, there was no reduction in nitrogen load in 2018. If anything, there was an increase. Yet the Maryland Department of the Environment (MDE) certified over 4,000 pounds of nitrogen credits that the Elkton plant can now sell. That's because Maryland's trading regulations allow any wastewater treatment plant discharging less than 3 mg/L of nitrogen to sell credits for the

difference between what they actually discharge and what they would be discharging if the nitrogen concentration were 3 mg/L. The Elkton plant had an average nitrogen concentration of 2.2 mg/L in 2018. If that concentration had been 3 mg/L, Elkton's nitrogen load would have been roughly 18,000 pounds. The difference is now being sold as nitrogen credits.

The Elkton plant example shows that these credits are not backed up by real reductions in nitrogen load. Nitrogen loads from the Elkton plant increased in 2018, yet the plant was able to sell over 4,000 pounds of credits. These are "paper credits." The purchaser of these credits will not make pollution reductions that they would otherwise have made. In terms of real nitrogen load, nothing will change.

MDE also certified a number of phosphorus and sediment credits for the Elkton plant, and again, these are not backed up by real reductions. The plant's phosphorus load has been increasing since 2008 (see **Attachment** A, Figure A1), and although its sediment load dropped between 2010 and 2011, it has been steady since then (Figure A2). This is unfortunately not a unique case, and is in fact typical. Point sources can generally sell credits whenever they discharge less than they are allowed to discharge, regardless of whether they have made actual reductions in the past few years.

Without nutrient trading, each polluter has an incentive – in the form of legally enforceable permit limits – to make pollution reductions. With nutrient trading, that incentive is undermined. The polluter can instead take credit (literally) for another polluter's less-than-allowable discharge. And while proponents of nutrient trading often claim that trading creates a financial incentive for polluters to generate credits by reducing pollution, we can see that this is simply not happening, because the market is already flooded with credits from polluters who did not have to invest in any new pollution controls. In this scenario, relative to last year, or even relative to 2009, neither the credit purchaser nor the credit generator is making any additional pollution reductions. Nutrient trading has undermined TMDL progress by allowing pollution loads to be re-allocated rather than reduced.

In the case of offsets, the problem is even worse. Consider a new source of pollution purchasing offset credits from a sewage treatment plant that made upgrades in 2008 and currently discharges less than 3 mg/L of nitrogen. The combined result will be (a) an increase in pollution from the new source, plus (b) no change on the part of the credit generator, resulting in a net increase in pollution load overall.

It is worth repeating that "EPA does not support any trading activity that would delay or weaken implementation of the Bay TMDL."[24] The trading programs in all three states will delay and weaken implementation of the Bay TMDL by undermining incentives for pollution reduction. A proper trading program would require <u>new</u> reductions, generated by <u>new</u> pollution control upgrades, for the sale of credits. What we have instead is a shell game that simply moves pollution around.

The problem with sewage treatment plants selling nutrient credits is explored in much greater detail in **Attachment B**, a report written by EIP and the Center for Progressive Reform in 2017,

[24] TMDL at 10-3.

and **Attachment C**, comments on Maryland's nutrient trading program produced by EIP and others.

b. Uncertainty Ratios

Attachments B and C also explore the issue of uncertainty ratios. The EPA expects trading programs to apply 2:1 trading ratios whenever credits come from nonpoint sources, meaning that a credit purchaser would have to buy two credits for every pound it wishes to offset. The 2:1 uncertainty ratio is there to account for the fact that reductions in nonpoint source pollution are uncertain. Each nonpoint reduction is generated by a Best Management Practice, or BMP. BMPs include things like cover crops, forest buffers, stream restoration, the restoration of impervious surfaces, and so on. The Chesapeake Bay Program generates estimates of how well each BMP works, but acknowledges that these estimates are optimistic. The estimates are optimistic because, among other things, they are based on carefully controlled experimental studies. In the real world, things are less predictable. Everyone familiar with this area of study, including the Chesapeake Bay Program and the National Research Council, acknowledges that BMPs generally don't work as well as they are expected to work (see Attachment B at page 17). This problem is amplified by climate change, which is creating more erratic and intense precipitation patterns.[25]

Unfortunately, Maryland and Virginia appear to be heading down a path where they will allow sources of urban stormwater (municipal separate storm sewer systems, or MS4s) to purchase credits from nonpoint sources without a 2:1 uncertainty ratio.[26] The logic behind this policy choice is deeply flawed, but goes something like this: 'Since agricultural nonpoint pollution and urban stormwater pollution are both 'runoff,' trading between them is apples-to-apples. There may be uncertainty in agricultural BMP effectiveness, but there is also uncertainty in urban runoff estimates. The uncertainty cancels out.' This is wrong. The uncertainty does not cancel out, as we explained in comments on Maryland's nutrient trading program.[27] When a state fails to require a 2:1 uncertainty ratio, it allows a credit buyer to forego pollution controls in exchange for an overestimate of pollution reductions somewhere else. Instead of reducing its nitrogen load by 10,000 pounds, for example, a point source might buy 10,000 nonpoint credits, which represent an actual load reduction of something much less than 10,000 pounds. In the absence of trading, the point source would have reduced its load by 10,000 pounds. With trading, the net result is a pollution reduction of maybe 7,500 pounds. In this scenario, trading has impeded TMDL progress.

Pennsylvania, on the other hand, has been requiring a trading ratio of 3:1 for all trades involving agricultural credits, in response to intervention from EPA.[28]

---

[25] See, e.g., Maryland's draft Phase III WIP at 53 ("The BMPs used to control water pollution will likely become less effective at controlling extreme storm events and be subject to damaging stresses of climate change").
[26] See, e.g., COMAR 26.08.11.08.C(1)(a).
[27] Attachment B at 19 and Appendix A.
[28] Pennsylvania DEP, Phase 2 Watershed Implementation Plan Nutrient Trading Supplement, Revised, at 7 (Oct. 14, 2016). EPA had expressed concern that "DEP had not made a quantitative demonstration that [baseline] requirements achieve the load allocations for agricultural sources in the [TMDL]"). *Id* at 1.

4. Conclusions and recommendations

So far, nutrient trading is not a major component of the Bay states' efforts to meet TMDL targets, but that may be changing. The current trading programs have a number of critical flaws. They are not adequately transparent, they do not require "additionality" of pollution reductions, and they do not adequately account for the underperformance of pollution reduction practices. If these trading programs grow, they will undermine TMDL progress. The wisdom of nutrient trading is debatable, but if the Bay states hope to encourage more nutrient trading, they should make several changes in their programs.

First, the Bay states should require each trading platform to include "cradle to grave" credit tracking, where each pollution credit gets an ID number that can be matched to both a generator and a purchaser. Maryland's point source trading platform provides a good example of how this should look. Intermediary credit brokers are not a problem so long as assign each credit to a specific buyer and publicly share the necessary credit tracking information.

Second, the Bay states should require additionality. All pollution credits should be derived from new, additional pollution reductions. Although this could be implemented in a variety of ways, one option would be to establish a credit calculation baseline year of 2017, which was the midpoint of the TMDL process and the benchmark from which the Bay states are planning to reach their 2025 targets.

Finally, the Bay states must apply a 2:1 uncertainty ratio to all trades involving nonpoint credit generators, regardless of whether the credit purchaser is a point source or a nonpoint source. This is the only way to ensure that nutrient credits do not overestimate pollution reductions.

Attachment A

Figure A1: Phosphorus discharges from the Elkton Wastewater Treatment Plant (pounds per year)

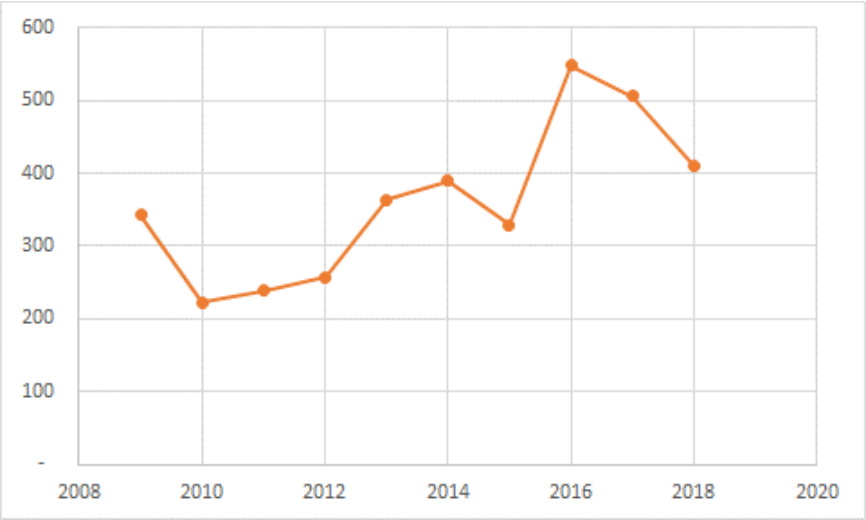
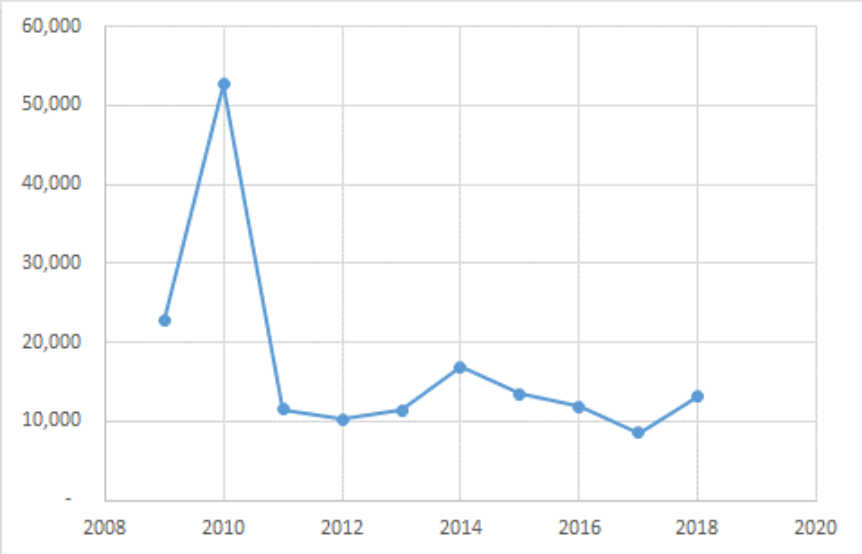
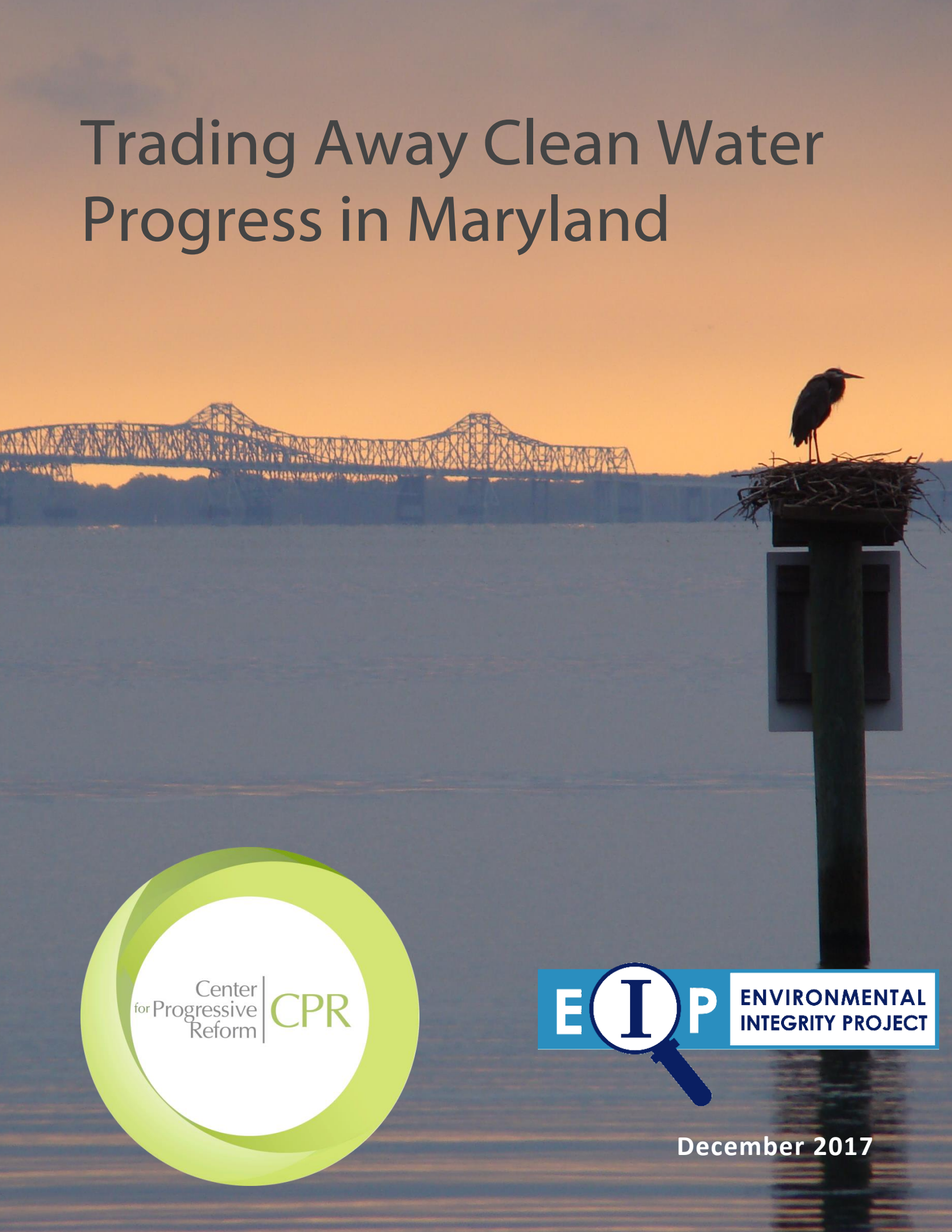


Figure A2: Sediment discharges from the Elkton Wastewater Treatment Plant (pounds per year)



Attachment B

Trading Away Clean Water Progress in Maryland



Center for Progressive Reform | CPR

EIP ENVIRONMENTAL INTEGRITY PROJECT

December 2017

Acknowledgments

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

Authors

Evan Isaacson, CPR Policy Analyst for the Chesapeake Bay.

Abel Russ, attorney at the Environmental Integrity Project.

CPR Member Scholars **Rena Steinzor** and **Victor Flatt** contributed to this report.

Connect With CPR

Website: www.progressivereform.org

CPRBlog: www.progressivereform.org/CPRBlog.cfm

Twitter: @CPRBlog

Facebook: https://www.facebook.com/CenterforProgressiveReform/

Direct media inquiries by email to Brian Gumm or Matthew Freeman, or by phone at 202.747.0698.

Connect With EIP

Website: www.environmentalintegrity.org

Twitter: @EIPOnline

Facebook: https://www.facebook.com/EnvIntegrity/

Direct media inquiries by email to Tom Pelton, or by phone at 443.510.2574.

Table of Contents

Trading Away Clean Water Progress in Maryland

Executive Summary

The Chesapeake Bay watershed covers parts of eight states and the District of Columbia. It is home to an aquatic ecosystem so diverse and historically productive that it is studied by scientists from around the world. But years of pollution have left the Bay in poor health, prompting the Environmental Protection Agency (EPA) to establish a landmark watershed cleanup plan in coordination with the six watershed states and the District of Columbia. Begun in 2010, the ambitious goal of this plan was to have practices in place by 2025 that would eventually reduce the quantity of nitrogen, phosphorus, and sediment pollution entering the Bay by 25 percent, 24 percent, and 20 percent, respectively. To be sure the effort stayed on track, the plan called for more than half of the progress to be in place by the plan's midpoint in 2017.

We are now at that midpoint of the restoration plan, and it is clear that the states collectively have not met their interim 2017 goal, and indeed look to be nowhere close to reaching the final 2025 goal. Progress has lagged in large part because restoring the Chesapeake Bay requires substantial energy, commitment, and, of course, resources. But with most of the "low-hanging" pollution reductions already banked, regulators and government officials across the watershed are desperately scrambling for additional reductions. Sometimes, these efforts result in truly innovative approaches, but sometimes they rely on corner-cutting.

The current push for a trading market for nutrient pollution is seen by some as an innovative market-based solution to jump-start the flagging restoration effort at a low cost. A trading market would allow people, companies, and governments required by law to reduce the amount of pollution they discharge to purchase "credits" for pollution reduction efforts undertaken by someone else. In theory, water pollution trading ensures overall discharges are capped over time and encourages reductions to happen where they can be achieved at the lowest cost. If done right, a trading program may provide an incentive for some to reduce pollution beyond what is required of them by law.

But water pollution trading is untested on a large scale in the real world, and success or failure in the context of the Bay depends entirely on how the market is structured. The main problem with trading generally is the risk that program designers will prioritize rules that promote trading activity over

ones that would demonstrably help to meet pollution-reduction goals. In their efforts to develop a functioning market, they can lose sight of the true purpose: cleaning up the Bay.

The first principle of trading should be to do no harm. Trading programs are only a means to an end. The end is clean water, not establishing a high-volume trading market. The Chesapeake Bay will not be restored by shuffling pollution credits around or by concocting questionable accounting rules. If the rules governing a trading market are drawn poorly, then the market could actually facilitate an increase in pollution with each pollution credit traded.

The following report is based on a close evaluation and analysis of more than two years' effort by the Maryland Department of the Environment to create a water pollution trading program. Over the past two years, the department has worked with a stakeholder advisory group to develop a new, comprehensive nutrient trading program. The department released a draft trading manual and a number of early discussion drafts before submitting its finished product to the General Assembly in October 2017. After immediate criticism, the department pulled the regulations back to make some changes and on December 8, 2017, published a final proposal of the regulations for public comment. Unless the department again pulls the regulations back, the new trading program will be up and running in early 2018.

From day one, environmentalists and others have raised concerns about program design choices that threaten to undermine the broad goal of reducing pollution in an equitable, measureable, and transparent way. True to those expectations, the final proposed trading regulations suffer from three major problems:

- **Uncertain Reductions**: The regulations fail to account for uncertainty about the degree to which certain pollution-reduction activities are actually reducing pollution;

- **Pollution Hot Spots**. The regulations will allow trading in a way that leads to pollution hot spots and other concerns for local communities and water quality; and

- **Paper Credits**. The regulations will allow trading of credits that exist only on paper and are not backed by real pollution reductions — "paper credits."

If Maryland's trading program is to succeed in creating a market that reduces pollution with every trade, we should expect to see dozens or hundreds of

new water pollution control projects created throughout the state over the next few years. Instead, what the newly proposed regulations are likely to generate is what the nonpartisan federal analysts at the Government Accountability Office (GAO) recently found in their review of about two dozen smaller water pollution trading programs around the United States: that "trading is not responsible for reducing nutrient pollution, according to EPA, state, and other stakeholders" but instead "was useful because it allowed point sources to manage risk" and "reduce the cost of compliance." If Maryland expects a different result here, one that actually reduces nutrient pollution, it will need to significantly revise the proposed trading regulations.

Maryland has traditionally been seen as a leader in Bay restoration efforts, but the new nutrient trading policy proposed by the state's Department of the Environment has several major flaws. If adopted, the policy would threaten not only Maryland's leadership role, but also the potential for meeting the state's pollution reduction goals under the Bay cleanup.

An Introduction to Pollution Trading

Pollution trading is a market-based regulatory tool that has primarily been used in the United States over the last several decades to facilitate the reduction of air pollution or mitigate human impact on our climate. Familiar examples include the national acid-rain reduction effort based on trading credits for reducing nitrogen oxide and sulfur dioxide emissions from stationary sources of air pollution. The common theme is that trading can be used to allocate pollution reduction responsibilities across a large geographic area, where pollutants are widely dispersed and the total pollution load from all sources may be capped and reduced.

The premise behind pollution trading is that some entities can reduce their pollution loads more easily than others. If the required reductions are converted to 'credits,' which can be bought and sold, then those who cannot easily reduce their pollution can instead offset their excess by purchasing credits from others who are able to go beyond their individual limits at a lower cost. In the abstract, trading can incentivize pollution reductions from the easiest, most affordable sources, leading to a lower total cost of meeting a pollution cap.

A nutrient trading program, if implemented correctly, will include carefully considered rules and safeguards. A trading program implemented without such safeguards, can easily lead to an overall increase in pollution.

In theory, then, pollution trading might be a reasonable regulatory mechanism for the Chesapeake Bay Total Maximum Daily Load (Bay TMDL) because Bay pollutants originate at a variety of geographically dispersed sources and because decades of careful scientific study have established a strong understanding of the pollution levels that the receiving waters can accommodate.

Real-world nutrient trading programs are complex. A nutrient trading program, if implemented correctly, will include carefully considered rules and safeguards. These safeguards include things like rigorous reporting requirements, transparency, mechanisms for enforcement and evaluation of program effectiveness, and quantitative adjustments to account for uncertainty.

If a trading program is implemented without such safeguards, it can easily lead to an overall increase in pollution. In other words, efforts to promote a nutrient trading program by making it easier or cheaper for participants can be counterproductive. If policymakers lose sight of the ultimate goal — clean water — and instead become fixated on maximizing trading market activity, they may omit important safeguards. This will inevitably lead to a policy failure – marketplace activity will go up, but so will pollution.

Another risk inherent in trading relates to geography – if a nutrient trading program is designed around a cap covering a large area (*e.g.*, the Bay watershed, or a state in its entirety), it can create local "hot spots" where

pollution can remain at previous levels or even increase. Such a failure to eliminate hot spots might not prevent the region from meeting the overall cap but could create unhealthy conditions for specific waterways and communities. A successful nutrient trading program will, therefore, include safeguards to protect local water quality.

The U.S. Environmental Protection Agency (EPA) expects all state-level nutrient trading programs to contain multiple, specific safeguards. The agency's expectations are laid out in a series of "Technical Memoranda" on topics such as "establishing offset and trading baselines" and "accounting for uncertainty."[1] The Technical Memoranda reflect EPA expectations about what is necessary to ensure the attainment of water quality standards in the Chesapeake Bay watershed. EPA is supposed to object to Clean Water Act permits, and reject pollution load reduction credits claimed by states that are part of the Bay TMDL, if they are based on an inadequate trading program.

To briefly summarize, a few of the essential elements of a successful trading program include:

- Nutrient credits that account for uncertainty and the risk of a net increase in pollution loads;

- Nutrient credits that meet the principle of "additionality," meaning that each credit must be backed by a real and additional reduction beyond what the credit generator is already obligated to produce; and

- Protections for local water quality.

These issues are not the only fundamental components of a legitimate and well-designed trading policy, but they stand out because they have the greatest potential to derail progress in restoring the Chesapeake Bay. If the final trading program regulations address these three issues properly, the program may ultimately be successful at providing minor additional nutrient and sediment pollution reduction benefits while mitigating the side effects of pollution trading. But if the current trading regulations become law, Maryland's program will almost surely deliver a clear and unambiguous setback for the Bay and may significantly worsen local water quality and environmental conditions for many communities.

Pollution Hot Spots Are Inevitable and Must Be Mitigated

Pollution trading programs can create local "hot spots," where a large number of pollution credits are bought in a small geographic area. By definition, each credit represents pollution reduced somewhere other than where credits are purchased. A well-designed pollution trading program, however, can mitigate local impacts. Unfortunately, Maryland's recently proposed trading regulations do not resolve these concerns, raising the possibility that they cross the line in the Clean Water Act that prohibits anything that "causes or contributes" to local water quality impairments.

Hot spots present two primary concerns: first, that discharges of the target pollutant remain unacceptably high in local areas; and second, that discharges of co-pollutants are ignored.

Hot spots present two primary concerns: first, that discharges of the target pollutant remain unacceptably high in local areas; and second, that discharges of co-pollutants are ignored.

In a properly designed trading program, pollution is reduced in the locations where credits are generated and never surpasses pre-trading levels where the credits are purchased. In essence, credit purchasers in a trading program with a pollution cap are importing the right to continue to discharge pollution in their area. This will necessarily cause disparate outcomes for communities and ecosystems surrounding the credit purchasers, compared with the area surrounding the credit sellers.

All trading programs focus on only one or a few specific pollutants. The pollutant of concern for climate trading programs is generally carbon dioxide; with air programs, it might be nitrogen oxides or sulfur dioxide; and with water pollution trading programs, the pollutants of concern are often nutrients. Invariably, any type of trading program ignores many other pollutants that are discharged alongside the pollutant of concern. This is a challenge for nearly every trading program. Thus, program designers and policymakers should ask important questions before proceeding, such as:

- How many other pollutants are present in the discharges that we are seeking to address?
- Are these other co-pollutants more or less harmful to public health or the environment?
- Would existing pollution reduction efforts better protect communities than a trading program?
- Would a trading program lead to significant disinvestment in environmentally and economically beneficial pollution reduction programs?

Maryland's proposed trading regulations have fundamental flaws that fail to protect local waters from both stubbornly high levels of nutrients and unacceptable discharges of co-pollutants.

Maryland's Proposed Trading Regions Are Not Based on the Real World

One of the first questions confronting pollution trading program designers – and one of the first opportunities to establish policies that protect against hot spots – is how to draw trading region boundaries. Put simply, large boundaries maximize the number of potential trades, while smaller boundaries limit the possibility for adverse consequences on local communities. Since the main purpose of a nutrient trading program is clean water, not maximizing trading volumes, Maryland's nutrient trading program needs geographic restrictions based on reasonably small and actual watershed boundaries, reflecting local water quality conditions and guarding against downstream trades that fail to benefit local areas.

Figure 1. Comparison of the Proposed Trading Regions and Four-Digit Watersheds

Note: The map on the left shows the five different four-digit watersheds in Maryland's portion of the Chesapeake Bay watershed, including the merger of three different four-digit watersheds (Western Shore, Eastern Shore, and Susquehanna) into one new trading region, as proposed in the trading regulations. The map on the right shows the 153 eight-digit watersheds in Maryland, including the 142 watersheds in the Chesapeake Bay watershed.

The commonly used classification system for watersheds is the U.S. Geological Survey's Hydrologic Unit Code.[2] This code spans from very large "two-digit" regions (like the entire Mid-Atlantic, coded HUC 02) all the way down to a small "twelve-digit" subwatershed (like Lower Rock Creek or Upper Bull Run, both of which have HUC identifiers that are 12 numbers long). From the outset, Maryland's trading rules have centered on only three excessively large trading regions: the Potomac River Basin, the Patuxent River Basin, and everything else in Maryland's portion of the Chesapeake Bay watershed (which creates a single trading region out of three different four-digit watersheds).

Despite consistent opposition and feedback from concerned stakeholders, Maryland's recently proposed regulations maintain these three trading

regions, which are both overly expansive and not based on real watershed boundaries. Figure 1 above illustrates the difference between large four digit watersheds in Maryland and smaller eight-digit watersheds.

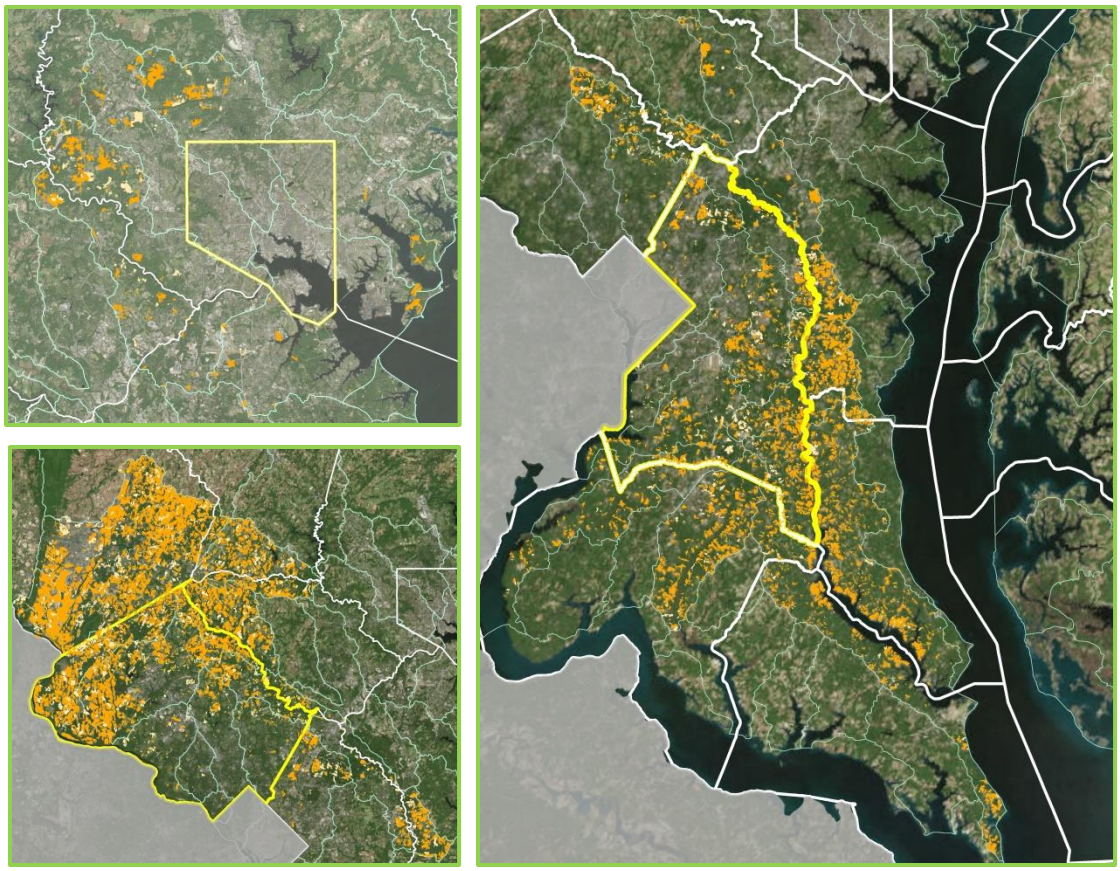
Drawing only three excessively large "four-digit" trading regions means that urban Prince George's County, east of Washington, D.C., could buy pollution reduction credits from someone in Garrett County in the far western part of the state, or that Baltimore City could buy credits from somewhere in Worcester County near the Atlantic Ocean. The justification for such expansive trading geographies is that it is all the same as far as pollution to the main stem of the Chesapeake Bay is concerned. But what about local water quality?

Recognizing that the largest demand for nutrient credits will likely be cities and counties needing to comply with their relatively expensive stormwater permits, Maryland's early draft trading manual laid out specific rules governing where those credits could come from. For example, one of the drafts of the trading manual proposed a sensible trading scale in which a county stormwater permit holder could purchase credits from any eight-digit watershed that overlapped with the county boundary, giving most counties somewhere between five and ten watersheds from which to purchase credits and creating a trading region twice the size of the county.

Using moderately sized eight-digit watersheds as the trading boundaries would have been a reasonable compromise among stakeholders. Unfortunately, the recently proposed final version of the regulations submitted in December 2017 uses the excessively large four-digit regions. Without suitably small trading boundaries, the regulations will fail to protect local water quality and will distort the market by limiting the demand for local credits. Figure 2 below shows that a trading system based on eight-digit watersheds would provide plenty of capacity to purchase credits generated on crop or pasture land in and around each urban county. With so much agricultural and other land available for the generation of credits in local watershed boundaries, there is no justification for maintaining just three oversized trading regions.

The early draft trading manual declared as a "guiding principle" that the program must "protect local water quality." But without more stringent rules, this guiding principle will be a hollow promise, inconsistent with EPA's recent guidance[3] providing explicit directions to Chesapeake Bay states regarding how to create a proper trading program that protects local water quality. Protecting local water quality is neither optional nor subordinate to efforts to protect the Chesapeake Bay. The Clean Water Act prohibits anything that causes or contributes to local water quality impairments. If the trading regulations are designed in a way that leads to an increase in pollution of local waters, it will be hard to defend the regulations as lawful.

Figure 2: Crop and Pasture Lands in Urban Watersheds



Note: The maps above show crop and pasture lands in watersheds that are within or intersect the boundaries of Montgomery and Prince George's counties and Baltimore City. This demonstrates the potential for the purchase of credits generated from the agriculture sector even in the most urban counties and where trading regions are restricted to only eight-digit watersheds.

Sending Money Downstream

Another basic principle that Maryland has recognized in early drafts of the trading rules but failed to fully achieve in its recently proposed regulations is the need to ensure that pollution credit buyers are downstream of the sellers or generators of those credits. To understand why this principle is essential to creating a trading program that protects local water quality, consider the following example.

If the Town of Springfield wanted to purchase pollution reduction credits from a farmer who can reduce water pollution at a much lower cost than the town can, should it turn to Farmer Joe two miles upstream or Farmer Bob two miles downstream? The town would be foolish if it sent taxpayer dollars down to Farmer Bob, whose pollution reductions would only benefit downstream communities and never reach the town. In addition, the entire

stretch of land and water between the upstream town and farmer Bob would suffer. The town would obviously want to contract with Farmer Joe, upstream, to benefit water quality for the town (and the stretch between Farmer Joe and the town).

But what if Farmer Joe is charging twice as much, or cannot and will not reduce pollution at all? Then Springfield might have an incentive to work with Farmer Bob downstream anyway, even though the trade threatens local water quality.

Maryland's new regulations include some restrictions on these sorts of trades involving downstream purchases that are improved somewhat from earlier drafts of the regulations, but not enough to prevent local water quality from being sacrificed with inappropriate downstream purchases of credits.

Last-Minute Changes Are Still Not Enough to Protect Local Waters

Precise and carefully crafted geographic trading rules are essential for creating a trading market that is protective of the local environment. But smart geographic rules are also economically beneficial.

Maryland first announced the release of its trading regulations in October 2017, but after stakeholders expressed serious concerns about the lack of rules protecting impaired local waters, among other things, the department pulled the regulations back to make changes. Unfortunately, those changes still do not address a few important issues.

For example, the department changed the regulations by requiring that a credit from a local impaired waterway be generated within the same watershed "*or* upstream" [emphasis added]. It is unclear whether this is a drafting error or intentional, but instead of requiring the credit to be bought in the same local watershed *and* upstream, the regulations still allow for downstream purchases. Moreover, the regulations do not provide a definition of "upstream." This is no small or inconsequential oversight. Because the trading regulations contain only three excessively large trading regions, it is possible that a credit buyer in a locally impaired watershed could still be allowed to buy a credit from dozens, or even hundreds, of miles "upstream" in that same trading region.

Precise and carefully crafted geographic trading rules are essential for creating a trading market that is protective of the local environment. But smart geographic rules are also economically beneficial. MDE declared that a nutrient trading system supports "an emerging environmental restoration economy." But if a town sends its taxpayer dollars downstream, or to far-flung areas of the state, not only will less money go to improve local water quality, it could stymie the actual restoration economies that have already been emerging around the state thanks to major investments in clean water projects funded by county stormwater remediation fees and other sources.

Each year, state and local governments invest hundreds of millions of dollars in stormwater remediation, stream restoration, and other projects to reduce the impact of polluted runoff and improve local streams. These restoration projects improve water quality and the health of local communities and ecosystems. A growing body of economic research shows that they also provide a substantial return on the investment of local taxpayer dollars.[4] These projects are both labor- and capital-intensive, providing local jobs that cannot be exported and boosting demand for local contractors and engineering firms. Such investments benefit the local economy, the local environment, and local quality of life – a triple bottom line.

But if trading regions are drawn broadly and municipalities are allowed to purchase cheap credits from faraway places, the state's trading program will create a strong disincentive to make these investments, trading away all of the benefits and undercutting the local restoration economy.

Making Sure Hot Spots Do Not Become Dangerously Polluted Clusters

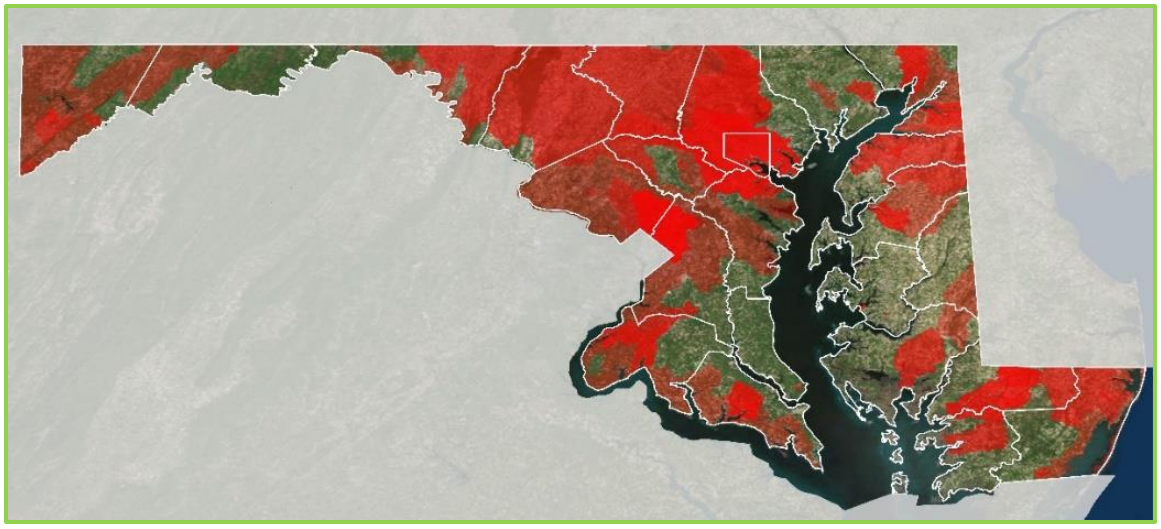
Creating reasonably small trading regions and prohibiting the purchase of downstream credits are two relatively straightforward recommendations for mitigating hot spots and addressing local water quality concerns. But a much thornier issue is how to make sure a *nutrient* trading program does not delay or destroy efforts to reduce *other* forms of pollution, including some that are far more toxic and hazardous to local communities.

The main focus of Maryland's nutrient trading program is reducing nitrogen pollution in the Chesapeake Bay. The program's developers are certainly cognizant of the problems that arise when local water quality conditions are ignored. In fact, the very first paragraph of the trading regulations refer to the need to "enhance Maryland's effort to protect and restore not only the water resources of the Chesapeake Bay and its tributaries, *but also local waters*" [emphasis added], and allow trades "as long as the trade does not cause or contribute to a violation of State water quality standards." However, the new regulations are designed in such a way that they will almost certainly result in disinvestment from pollution control projects, particularly in urban areas that are most afflicted by pollution.

Most local waterways in Maryland are recognized as impaired by at least one pollutant, and as a result, many watersheds are subject to one or more TMDLs (see Figure 3 below). If the state's trading program were to fully respect local water quality concerns, virtually all trades would be subject to restrictive geographic trading rules that force trades to be upstream *and* within the local (eight-digit or smaller) watershed. Unfortunately, even if such protective rules that respect the territorial boundaries of TMDLs or impaired watersheds were developed, they would not, by themselves, be sufficient to protect local water quality. To illustrate why, consider the most

common type of trade initially envisioned by trading program advocates and developers.

Figure 3. Watersheds Subject to a Local TMDL



Note: Areas in red reflect watersheds subject to a local TMDL. Darker shades of red reflect areas subject to multiple TMDLs. The map does not show areas subject to the Chesapeake Bay TMDL, which covers nearly all of the state, or areas that are known to be impaired but do not yet have a TMDL.

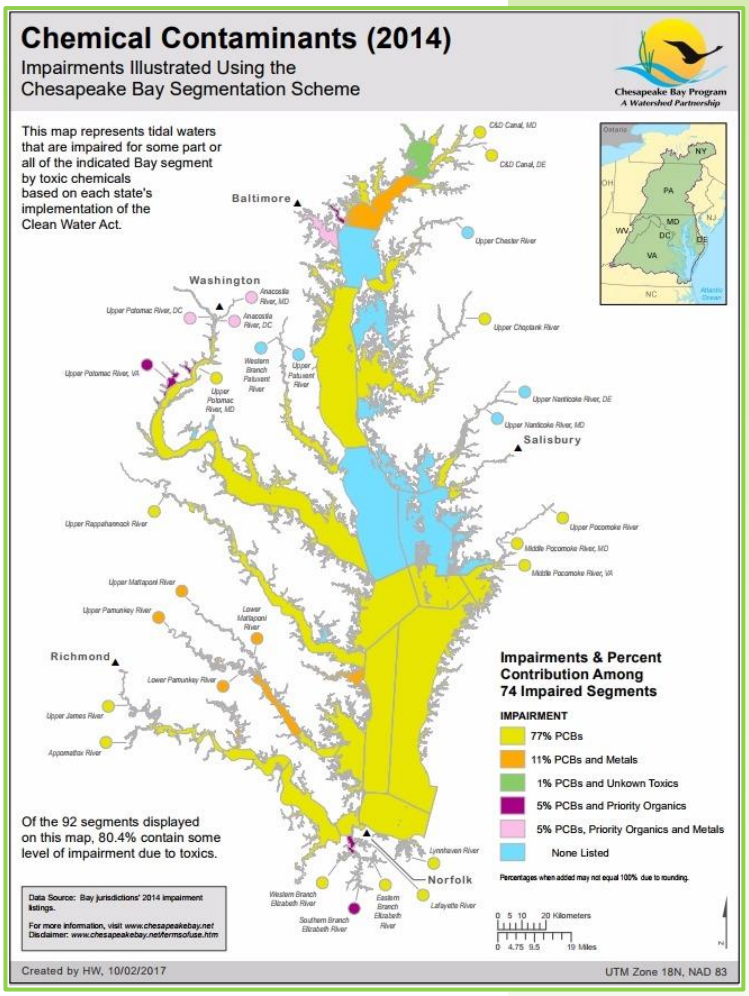
Most trading volume in a future trading market in Maryland will likely occur between a municipality holding a stormwater permit and a farmer, because this is where the greatest opportunity for arbitrage, or difference in the ability to reduce pollution, exists. Reducing a pound of nitrogen pollution by removing pavement or installing polluted runoff control projects is expensive on a dollar-per-pound basis. It is much cheaper to reduce a pound of nitrogen on a farm field by planting or installing agricultural best management practices and projects. Given this price differential, most nitrogen credits should theoretically be purchased by a stormwater permit holder and sold by a farmer.

In this theoretical world, the trading program would involve millions of *nitrogen* credits flowing from agricultural sellers to eager urban buyers, and total *nitrogen* pollution would theoretically decline (further assuming the trading program rules were designed appropriately). But if a municipality decides to forgo the installation of stormwater management projects, it is not only missing the opportunity to reduce *nitrogen* pollution, but also to address the problem of hundreds of chemicals and other pollutants coating the pavement and washing untreated through the local communities and directly into the nearest waterways.

In this way, where the pollution profiles of buyers and sellers are vastly different, a one-for-one trade of nitrogen will not necessarily improve the

environment or protect community health. In fact, such a trade could make matters much worse for communities if the buyer is purchasing only a reduction of nitrogen in exchange for the permission not to control dozens, if not hundreds, of other toxic pollutants that would otherwise be captured. (And, as noted, the community gets no benefit at all if the credit is not purchased from upstream in the same watershed.)

This sort of disinvestment in local environmental restoration projects limits local investments in green jobs and fails to deliver needed improvements to public health in local communities. It may reduce short-term costs for the local government, but it shifts costs onto members of the local community and prevents the economic, health, and environmental benefits that come from such investments.



The Chesapeake Bay suffers from nitrogen, phosphorus, and sediment pollution, but it also receives all sorts of other toxic contaminants, such as lead, mercury, and thousands of chemical compounds. This is why the 2014 Chesapeake Bay Watershed Agreement speaks of the need for achieving the Bay TMDL reductions of nutrient and sediment pollution, as well as "reducing the impact of toxic contaminants" including "mercury, PCBs, and other contaminants of emerging and widespread concern." [5] The Chesapeake Bay Program has established an entire work group focused on how to address these many dangerous pollutants.[6]

A trading program that does not recognize the hazardous potential from the many toxic substances polluting urban waterways can end up ignoring our most vulnerable communities by allowing local jurisdictions to merely pursue the cheapest possible manner to reduce nutrients or comply with their environmental permit obligations. As shown in a map produced by the Toxic Contaminant Workgroup,[7] at right, most tidal segments of the Chesapeake Bay watershed are impaired by at least one class of toxic chemicals, and urban waters near Baltimore City and Washington, D.C., are impaired by several classes of toxic contaminants.

To address this problem, trading regulations should include provisions that require credit purchasers to disclose publicly all pollutants they discharge and require the department to prohibit any purchase without a demonstration that the credit buyer is adequately controlling each pollutant. Where a proposed purchaser of nutrient or sediment credits discharges a different type of pollution into a waterway that has been deemed impaired for that same pollutant, the trade should be prohibited without a clear demonstration that the purchase will not interfere with efforts to control that pollutant.

Real Pollution Reductions Can Only Be Achieved if Maryland Accounts for Uncertainty

If a farmer plants a forested buffer between her crop fields and a river, she will reduce the amount of nitrogen and phosphorus migrating from the crop fields to the river. The farmer will reduce her pollution load. If the farmer lives in a state with a nutrient trading program, she may be able to sell credits for that reduction. The number of credits that the farmer can sell will be calculated using a model based on studies that estimate the extent to which buffers are generally able to reduce nutrient loads.

But will this particular farmer's forest buffer perform as well as the model assumes? Probably not. The scientific literature on this topic suggests that forest buffers and other agricultural Best Management Practices (BMPs) do not perform as well in the real world as they do in experimental studies. There is a lot of uncertainty in BMP performance. If we do not account for that uncertainty, we run the risk of giving credit for load reductions that have not actually occurred.

Substantial Trading Ratios Are a Fundamental Component of Good Trading Programs

Simple pound-for-pound water pollution trading schemes are rare. Most trading programs apply one or more *trading ratios* or *retirement provisions* to alter the balance of credits on either side of a sale. A 2:1 trading ratio, for example, requires a credit buyer to purchase two pounds worth of credits for every pound of pollution the buyer plans to discharge. Whatever the precise numbers, trading ratios or retirement provisions are critical to good trading programs because they enable the programs to achieve a range of policy goals including water quality improvement, creation of an insurance or reserve pool of credits that are used to mitigate failed credit generation, and adjustment for pollution attenuation between an upstream location and a downstream location.[8]

One of the most important policy goals served by trading ratios is accounting for the uncertainty inherent in a trade. A credit theoretically represents a pound of pollution reduction, but the actual amount of pollution reduced by a BMP is rarely, if ever, known. The net load after a trade should be zero – with the credit generator offsetting the load of the credit purchaser – but in practice it will almost always be something other than zero. This uncertainty is typically addressed with an explicit "uncertainty ratio." Uncertainty ratios provide a margin of safety against overestimates of load reduction, and they help to account for variability in the performance of credited practices. An uncertainty ratio is especially important for trades or offsets involving so-called "nonpoint" sources, such as farm fields, because the pollution loads from nonpoint sources cannot be

measured in the same way that discrete point source discharges (e.g., at the end of a pipe) can be measured.

In the context of the Bay TMDL, uncertainty ratios help environmental agencies provide the required "reasonable assurance" that water quality standards will be attained:

> When the [EPA] establishes or approves a [TMDL] that allocates pollutant loads to both point and nonpoint sources, it determines whether there is reasonable assurance that load allocations will be achieved and water quality standards will be attained. EPA does that to ensure that the wasteload allocations and load allocations established in the TMDL are not based on overly generous assumptions regarding the amount of nonpoint source pollutant reductions that will occur. This is necessary because the wasteload allocations for point sources are determined, in part, on the basis of the expected contributions to be made by nonpoint sources to the total pollutant reductions necessary to achieve water quality standards. If the reductions embodied in load allocations are not fully achieved because of a failure to fully implement needed point source pollution controls, or the reduction potential of the proposed BMPs was overestimated, the collective reductions from all sources will not result in attainment of water quality standards. As a result, EPA evaluates whether a TMDL provides reasonable assurance that nonpoint source controls will achieve expected load reductions.[9]

Research indicates that regulators routinely overestimate best management practices efficiencies; because of the present degree of uncertainty, an uncertainty ratio of at least 2:1 should be established.

Uncertainty ratios also help agencies provide a margin of safety, another requirement of the Clean Water Act.[10]

As explained below, research indicates that regulators routinely overestimate BMP efficiencies; because of the present degree of uncertainty, an uncertainty ratio of at least 2:1 should be established. This is in line with the uncertainty ratios applied in other nonpoint-point nutrient trading programs, which are almost universally 2:1 or higher.

Regulators Routinely Overestimate BMP Effectiveness

Unlike discharges through monitored point source outfalls, the nutrient load reductions from agricultural BMPs are difficult to measure. Instead, pollution reduction assumptions, sometimes called "BMP efficiencies," are generated from carefully controlled research studies.

For a number of reasons, BMP efficiencies derived from research experiments tend to overestimate real-world pollution reductions. A study of BMP implementation at a small farm in Michigan presents one example.[11] Researchers first estimated and then measured the phosphorus removal efficiencies of various BMPs, including the exclusion of livestock from a stream area, the planting of grass filter strips, and manure management. The projected BMP efficiency (87 percent phosphorus removal) overestimated the actual efficiency (23.4 percent) by a factor greater than 3.

That was not an isolated case. The National Research Council (NRC) observed that

> BMP efficiencies are often derived from limited research or small-scale, intensive, field-monitoring studies in which they may perform better than they would in aggregate in larger applications . . . Thus, estimates of load reduction efficiencies are subject to a high degree of uncertainty.[12]

The NRC suggests that the uncertainty is largely in one direction – BMP efficiencies are likely to overestimate actual nutrient removals. Indeed, the report goes on to say that "[p]ast experience . . . has shown that credited BMP efficiencies have more commonly been decreased rather than increased in the light of new field information."[13]

The EPA echoes the NRC conclusion, stating that "few, if any, data suggest actual watershed-wide implementation efficiencies as high as those in the research literature."[14] This is in part because real-world validation of nonpoint pollution load estimates is so difficult that it is rarely attempted. However, to the extent that we can compare BMP pollution reduction assumptions to actual pollution reductions, the BMP efficiencies appear to be overly optimistic.[15]

Such findings are persuasive, and they make clear that the gaps between projected and actual pollution savings from BMP are not simply a matter of uncertainty or unpredictability, but rather of systematic bias in the projections. In some cases, the Chesapeake Bay Model BMP efficiencies reflect adjustments made to account for this bias. Research estimates for cover crop effectiveness, for example, were reduced by 25 percent in an attempt to approximate realistic estimates for average conditions.[16] It is important to note that these adjustments, when they were made, only accounted for a perceived bias. Even after such adjustments are made, the effectiveness of a BMP continues to be uncertain due to factors such as how well a BMP is maintained or how long a living BMP (e.g., a forest buffer) takes to reach maturity.

Research to date suggests that an uncertainty ratio of at least 2:1 is needed to account for the high degree of uncertainty associated with agricultural and other nonpoint BMPs.

BMP Efficiencies Are Not 'Conservative'

Some people familiar with the development and implementation of nutrient trading programs have mischaracterized BMP efficiencies as "conservative," meaning that they are intentionally lower than actual effectiveness.[17] This is a critical error. As discussed above, it is more likely that the opposite is true, and that BMP efficiencies are overly optimistic. In the case of the Bay Model's treatment of agricultural BMPs, for example, even after adjustments were made to adjust for known biases, the results were not conservative. According to EPA, "The process used to develop the CBP partnership BMP effectiveness values is designed to arrive at unbiased and realistic values…. [Adjustments to remove bias] generate BMP effectiveness values that are *unbiased and realistic but not necessarily conservative* [emphasis added]."[18] In the best case, BMP efficiencies are realistic. In other cases, they suffer from such a bias, and they are too high. They are, in fact, the opposite of conservative.

Trading Ratios Less Than 2:1 Are Outside the Norm

Research to date suggests that an uncertainty ratio of at least 2:1 is needed to account for the high degree of uncertainty associated with agricultural and other nonpoint BMPs. In general, reviews of pollutant trading programs have confirmed that uncertainty ratios are usually 2:1. A 2005 EPA review, for example, stated that:

> Trading ratios often are used as a mechanism to manage uncertainty associated with the effectiveness of non-point source controls. All programs use trading ratios, but these ratios vary considerably from program to program. . . [T]he most common trading ratio for programs that are trading nutrients between point and non-point sources is 2 to 1.[19]

Trading programs have been reviewed many times, and this conclusion about uncertainty ratios is consistent.[20]

Several reviews of trading ratios have blurred the distinction between ratios used to address uncertainty and ratios used for other purposes (*e.g.*, net reduction in load), and have also considered various ratios used in point-to-point, nonpoint-to-point, or cross-pollutant trading. We have read several reviews and looked into individual trading programs in order to make a rough inventory of uncertainty ratios used specifically in nonpoint-to-point trading of nutrients. As shown in Table 1, uncertainty ratios are almost uniformly 2:1.

Uncertainty Ratios Account for Uncertainty in Credit Generation

The EPA has identified several overlapping sources of uncertainty in nutrient trading, including the BMP efficiency estimate, variability in weather conditions, the time it takes for a BMP to become fully functional, and others. All of these sources of uncertainty relate to characteristics of the credit generator.[21] The uncertainty ratio is a tool to mitigate against underperformance of credit-generating BMPs. Some have suggested that trades between nonpoint credit generators and nonpoint credit purchasers – nonpoint-nonpoint trades – should not require uncertainty ratios, with a vague justification that the uncertainties on either side of the trade will mysteriously "cancel each other out." This argument is both glib and unsupported by experience.

The uncertainty ratio exists to account for uncertainty in *credit generation*; the characteristics of the credit purchaser are irrelevant. Mathematically, there is no reason to expect that the uncertainties on either side of the trade will cancel each other out. In fact, in some scenarios they will amplify each other, leading to an even greater net increase in loads. Appendix A breaks this down graphically and shows that the net result of a trade is the same regardless of whether the credit purchaser is a point source or a nonpoint source. With both types of trade, there is a significant risk that there will be a net increase in pollution unless an uncertainty ratio is used.

EPA Expects All Trades Involving Nonpoint Credit Generators to Use 2:1 Uncertainty Ratios

The EPA set out its expectations for addressing uncertainty in nutrient trading programs in a 2014 technical memorandum.[22] Again, this memorandum's expectations are not merely aspirational or in any way optional. The memo provides instructions to the states regarding the policies that the EPA will require before approving permits and accepting nutrient reduction data for use in the Bay Model.

The technical memorandum on uncertainty states that, with a couple of narrow exceptions, "EPA expects the Bay jurisdictions to apply an uncertainty ratio of at least 2:1 to transactions involving credits generated by nonpoint sources."[23] This statement is clearly focused on credit generators, says nothing about credit purchasers, and does not create an exception for nonpoint credit purchasers (nonpoint-nonpoint trades). States must apply the 2:1 ratio to all trades involving nonpoint credit generators, even if the purchaser is also a nonpoint source. Failure to do so would violate the TMDL and increase the risk of an overall increase in pollution loads.

Maryland's Proposed Nutrient Trading Regulation Fails to Adequately Implement the 2:1 Uncertainty Ratio

The Maryland Department of the Environment's (MDE) recently proposed nutrient trading regulation includes a 2:1 uncertainty ratio but does not apply it broadly enough. Specifically, it requires a 2:1 ratio for trades "involving credits generated by nonpoint sources and acquired by wastewater point sources."[24] However, the next sentence of the proposed rule creates a giant loophole, allowing MDE to use a lower ratio (or no ratio) if "the generator, seller or buyer of the credit is able to demonstrate to the Department that a lower ratio is justified and protective of water quality standards." MDE therefore has virtually unlimited discretion to ignore EPA's 2:1 ratio requirement.

Just as troubling, the regulation explicitly exempts certain nonpoint-to-point trades from the 2:1 requirement. For trades "involving credits generated by nonpoint sources and acquired by stormwater point sources," the uncertainty ratio is 1:1, which is to say no uncertainty ratio at all.[25] This plainly fails to meet EPA expectations.

In addition, the regulation creates yet another carve-out for trades between nonpoint credit generators and "other non-regulated sources," which are generally going to be other nonpoint sources. As described above, there is no rational policy reason to exempt trades between two nonpoint sources, and again MDE has failed to meet EPA expectations.

The result of all of these loopholes is that many trades, perhaps even most trades, will be exempted from the 2:1 uncertainty ratio requirement. If the BMPs used to generate these credits fail to perform as expected, overall pollution loads will increase. As discussed earlier, there is a high likelihood of this happening. MDE's nutrient trading regulation is therefore likely to seriously undermine Maryland's ability to meet its TMDL targets.

Table 1: Uncertainty ratios used in point-nonpoint nutrient trading programs.

Trading Program	Pollutant	Trading Ratio	Basis for Ratio	Reference
Colorado; Bear Creek Total Phosphorus Trade Program	Phosphorus	2:1	Unknown	Bear Creek Watershed Association[26]
Colorado; Chatfield Reservoir	Phosphorus	2:1[27]	Uncertainty (implied by basis for possible exemption[27])	Chatfield Water Authority[28]
Colorado; Cherry Creek Basin Trading Program	Phosphorus	2:1 to 3:1	Uncertainty	U.S. EPA [29]
Colorado; Lake Dillon	Phosphorus	2:1	Unknown	U.S. EPA[30]
Delaware; Pinnacle (Vlassic Foods)	Nutrients	2:1	Margin of safety and location	UVA[31]
Delaware; Inland Bays	Nutrients	2:1	Unknown	UVA[32]
Florida; Lower St. Johns River	Nutrients	2:1 and 3:1, depending on source of credits	Uncertainty	Florida DEP[33]
Massachusetts; Wayland Business Center Treatment Plant Permit	Phosphorus	3:1	Unknown	Environomics[34]
Michigan; Kalamazoo River Water Quality Trading Demonstration Project	Phosphorus	2:1 or 4:1, depending on the nature of baseline practices	Uncertainty	Environomics[35]; U.S. EPA [36]
Michigan; Water Quality Trading	Nutrients and other pollutants	2:1[37]	Uncertainty and environmental benefit	Michigan Administrative Code[37 above]
Minnesota; Southern Minnesota Beet Sugar Cooperative Trading Program	Phosphorus	1.6:1[38]	Uncertainty	Environomics and EcoAgriculture Partners[38]
Minnesota; Draft Statewide Water Quality Trading Rules	Phosphorus	2.5:1	Uncertainty, risk, and location	UVA[39]

Trading Program	Pollutant	Trading Ratio	Basis for Ratio	Reference
New York; New York City Watershed Phosphorus Offset Pilot Program	Phosphorus	3:1	Unknown	Environomics; U.S. EPA [40]
New York; Croton Watershed	Phosphorus	2:1 to 3:1	Unknown	UVA[41]
North Carolina; Neuse River Nutrient Sensitive Water Management Strategy	Nutrients	2:1 (implied by payment price)[42]	Unknown	Environomics[42]; U.S. EPA [43]
North Carolina; Tar-Pamlico Nutrient Reduction Trading Program	Nutrients	2:1 or 3:1, depending on source of credits	Uncertainty	UVA[44]
Ohio; sugar Creek Watershed—Alpine Cheese Co.	Phosphorus	3:1	Uncertainty and Margin of Safety	UVA[45]
Ontario South Nation River Total Phosphorus Management Program	Phosphorus	4:1	Uncertainty	OECD[46]
Virginia trading policy	Nutrients	2:1	Uncertainty	U.S. EPA[47]
Wisconsin Red Cedar River Pilot Trading Program	Phosphorus	2:1	Unknown	Environomics[48]

Paper Credits and the Principle of Additionality

In 2004, Maryland's General Assembly made a bold decision that would significantly reduce water pollution flowing into the Chesapeake but would also alter the nature of any future nutrient trading program in Maryland. The Bay Restoration Fund law created a small user fee to pay for upgrades at the state's 67 major sewage treatment plants, among other pollution control projects. Once fully completed, these 67 large projects will reduce annual nitrogen pollution discharged into the Bay by more than 9 million pounds.

Years later, when Maryland officials began discussing the creation of a comprehensive nutrient trading program, the simplest path forward would have been to simply ignore sewage treatment plants as a potential source of pollution reduction credits, or at least ignore any facilities that had received Bay Restoration Fund money. After all, the state long ago made the decision to subsidize the installation of pollution reduction equipment representing the limits of technology, taking off the table 9 million potential pollution credits – a significant majority of credit generating potential from the municipal wastewater pollution source sector.

Instead, Maryland's trading program will allow already upgraded sewage treatment plants to generate pollution reduction credits. The problem with that approach, of course, is that if pollution reductions have already occurred, then there cannot be any *additional* pollution reductions behind each pollution reduction credit traded. Moreover, if facilities upgraded with public funds are allowed to generate credits without affirmatively acting or investing in a way that further reduces pollution, then the public has effectively subsidized the pollution of waters near both the credit buyer and seller.

It is in fact technologically possible for any of Maryland's upgraded sewage plants to further reduce pollution. But the danger in allowing these plants to become a source of new credits is that, if the trading program does not include just the right mix of carefully crafted rules, the entire program could be jeopardized and the market overwhelmed by "paper credits" backed by no new and actual pollution reductions. This situation would represent a major setback for water quality in Maryland, a dubious use of taxpayer dollars, an unfair advantage for these facilities in the nutrient trading market, and a substantial distortion in the market that the state is working to foster.

This section describes the fundamentally important trading principle of "additionality," analyzes Maryland's development of trading rules for upgraded sewage treatment plants, and offers a few straightforward

recommendations to prevent the market from becoming overwhelmed with paper credits that can seriously impair water quality.

Additionality Means Not Getting Something for Nothing

The principle of "additionality" is as simple as it is essential in a pollution trading program. Basically, it means that behind each pollution reduction credit is an *additional* reduction in pollution. By contrast, we use the term "paper credit" here to refer to a credit that exists only on paper and is not backed by any new reduction in pollution. For example, a discharger might try to sell credits for reductions that were made in the past, or for reductions that are to occur in the future. If there are a large number of paper credits in a trading marketplace, the ultimate amount of pollution will fail to meet reduction targets, and may even increase, as buyers attempt to offset real pollution with fictional reductions.

In some pollution trading markets, selling a paper credit might be considered fraud or grounds for serious sanction. And in any trading market, a significant number of paper credits not only harms the environment but can cripple the market by establishing artificially low prices that prevent the participation of legitimate credit producers. After all, it does cost money, time, and resources to reduce pollution. If there is no market signal setting a price, no incentive will exist to invest in the work needed to create pollution-reducing projects to generate new credits. Without significant changes, Maryland's regulations will fail to establish a legitimate market to promote new pollution control projects.

Over the last several years, each of the drafts of the Maryland's nutrient trading manual or regulations has contained provisions that would allow the market to be flooded with innumerable paper credits from sewage treatment plants.

Over the last several years, each of the drafts of the Maryland's nutrient trading manual or regulations has contained provisions that would allow the market to be flooded with innumerable paper credits from sewage treatment plants. This happens when an upgraded facility that had previously used state Bay Restoration Fund subsidies to upgrade to "enhanced nutrient removal" (ENR) technology is allowed to count these past reductions from already upgraded plants as creditable projects.

Specifically, a few provisions in these drafts allowed for the creation of paper credits. First, the rules attempted to redefine ENR pollution levels as 4 milligrams per liter (mg/L) of nitrogen pollution, rather than the lower and more protective 3 mg/L standard already set out in state statute. The Bay Restoration Fund law and all written materials generated by both the General Assembly and MDE during and after the enactment of the statute set 3 mg/L for nitrogen as a key threshold level for the program. To establish a baseline of 4 mg/L would set an inappropriately weak standard for becoming eligible to trade and would, as noted above, subsidize additional pollution.

Second, the draft rules failed to specify that credits must be based on a level of pollution lower than the one at which sewage plants were already operating. In other words, even if a sewage plant was operating at clean levels below the appropriate baseline of 3 mg/L, they could still sell credits for doing nothing more than operating at the levels they were supposed to after receiving state funds to upgrade their technology. Third, these early draft rules did not specify that credits must be generated by *new* projects or activities, such as ones established after a certain date or specified in a credit application. Here again, it appears that the drafters of the rule lost sight of the purpose of the credit-trading market: to reduce pollution.

Despite Improvements, the Regulations Fail To Ensure Real Reductions

After receiving significant feedback about the need to ensure conformance with the principle of additionality, MDE made some changes before releasing the first version of its proposed regulations in October 2017. These new rules appeared to address some of the additionality problems but still contained a number of inconsistent provisions that would create uncertainty and potential loopholes.

These pre-release revisions included three improvements on earlier proposals related to the principle of additionality. One allowed upgraded sewage plants to only "generate credits for performance below 3 mg/L of nitrogen." The second properly defined a "pollution reduction" behind each credit as "a practice, or combination of practices that is determined by the Chesapeake Bay Program to be an effective and practicable method of preventing or reducing pollutants." The third is a prohibition on the generation of credits prior to the effective date of the regulations.

After strong and immediate opposition from stakeholders, MDE pulled the October 2017 regulations back for revisions and released an improved set of regulations in December 2017.

Each of these changes made before the regulations were first proposed in October 2017 took steps toward resolving the additionality problem, but each was seemingly negated by conflicting or ambiguous language elsewhere in the regulations. For instance, while the October 2017 regulations appropriately stated that credits generated by sewage plants must be below 3 mg/L of nitrogen, they nevertheless redefined ENR to be 4 mg/L of nitrogen, which is inconsistent with statute. The regulations also repeated this higher 4 mg/L threshold in the rule governing how to calculate credits. It is unclear what the purpose of these provisions would have been if plants are truly not allowed to generate credits without at least meeting the 3 mg/L limit currently defined by state law.

After strong and immediate opposition from stakeholders, MDE pulled the October 2017 regulations back for revisions and released an improved set of regulations in December 2017. The December regulations take additional steps toward resolving the problem by requiring wastewater treatment plants to discharge at rates consistent with statute (the definition of ENR was not corrected and still includes a reference to nitrogen levels of 4 mg/L, but

the operative rules were fixed). But, once again, the December regulations simply do not go far enough to close the loopholes and ensure suitably protective trades.

Although the final regulations submitted in December contain a more restrictive standard (at 3 mg/L) and also a rule requiring that credit generating practices be new as of the effective date of the regulations, this language rings hollow if sewage plants that have already been upgraded over the last decade are still allowed to generate credits without doing anything additional.

Paper credits from sewage treatment facilities are still virtually certain to be sold on the market. Under the final December regulations, a municipal wastewater treatment plant that was upgraded years ago and is operating under ENR levels of 3 mg/L can generate credits. The regulations do not require a facility to apply for credits prospectively and describe what new actions they will take or investments they will make to reduce pollution. Instead, the credit calculation provisions merely state that "at the end of each calendar year," credits will be awarded based simply on a subtraction between ENR levels and actual levels. Not only does it not matter if the facility did nothing new at all to earn those credits, nothing in the rules even prevent the facility from earning credits if pollution increased over the prior year. Such credits exist entirely on paper and do nothing to curb pollution. To the contrary, they support increased pollution.

Another failing of the December draft is that while the regulations sensibly claim to prohibit the use of public funds for the generation of credits, the rule is rendered meaningless because sewage plants previously upgraded using state funds are expressly permitted to generate credits for doing nothing. The vast majority of the taxpayer-funded cost associated with restoring the Chesapeake Bay over the last decade occurred at the time that each of the ENR upgrade projects was installed. These pollution reductions were already purchased by taxpayers and should not be allowed for purchase now.

MDE officials understand the need for these simple and common-sense rules. In fact, better provisions have already been drafted by the department and are included in another regulatory proposal to implement the new Clean Water Commerce Act, a state law designed to spur innovative new pollution reduction projects using the state Bay Restoration Fund. If sensible protections against paper credits are appropriate for those regulations, surely they are similarly appropriate for the state's larger and more comprehensive pollution trading regulations.

If the final nutrient trading regulations are revised to include a few corrective provisions, water quality advocates can be assured that each credit

generated by an ENR facility is new and represents actual reductions, and other credit generators can participate in the market knowing they compete on a level playing field as part of a fair market for buying and selling credits.

Conclusions and Recommendations

Maryland's new nutrient trading regulations suffer from three main shortcomings. If they are not addressed, Maryland's efforts to restore the Chesapeake Bay and protect local water quality will suffer, and the state's attempt to establish a nutrient trading program that can serve as a model for other states will likely fail.

The following is a set of recommendations designed to remedy the problems with the trading rules.

- **Maryland's trading regions must be suitably small and firmly drawn.** An eight-digit boundary could represent a reasonable compromise for all trades, and the rules should incentivize the creation of local pollution reduction practices by clearly prohibiting trades outside of the bounds of these trading regions.

- **Maryland's trading rules should clearly prohibit the purchase of credits from downstream sellers.** Even if trading regions are maintained within the boundaries of eight-digit watersheds or smaller, local water quality problems will arise if buyers purchase credits from sellers located downstream.

- **Maryland's trading program must recognize pollutants beyond nutrients or other pollutants of concern.** The program must require the prospective buyer of credits to demonstrate that trades will not jeopardize other existing efforts to invest in local projects that control polluted and toxic runoff and mitigate public and community health hazards.

- **All trades involving nonpoint credits must use a 2:1 uncertainty ratio.** Nonpoint pollution credits are inherently uncertain. In many cases, the default assumption about how well a nonpoint pollution control works will be overly optimistic. Since the uncertainty derives from the credit generator, the characteristics of the credit purchaser are irrelevant, and there is no rational basis for exempting "nonpoint-nonpoint" trades from this requirement.

- **The regulations should take a firm and unambiguous stance that no credits may be generated without an additional and verifiable pollution reduction.** These provisions should require a facility to submit an application to the department describing what new and additional capital investments or operational improvements it will make to reduce pollution. Any resulting pollution reduction credits awarded should be based only on the difference in actual pollution

loads between the subsequent year and the prior year. And in no circumstance should credits be allowed for a plant that is not meeting the statutorily defined ENR threshold of 3 mg/L.

Appendix A: Net Change in Pollution Load with Point or Nonpoint Source Credit Purchasers

The following tables demonstrate that the characteristics of the credit purchaser are irrelevant to the need for an uncertainty ratio. These tables assume that pollution loads from credit generators or purchasers are greater than or less than expectations by a fixed amount – in other words, that errors in opposite directions will "cancel each other out." The tables also assume that there are no trading ratios used. Table A1 presents scenarios in which the credit generator is a nonpoint source, with uncertain loads, and the credit purchaser is a point source, with certain loads. Table A2 presents scenarios in which both sources are nonpoint sources with uncertain loads.

These tables show that whether the credit purchaser is a point source or a nonpoint source, the likelihood of a net increase in pollution loads is the same. If the credit purchaser is a nonpoint source, there is the additional risk of a large net increase in pollution.

Table A1: Nonpoint source credit generator and point source credit purchaser.

Credit generator: Is load reduction greater than, less than, or equal to expectation?	Credit purchaser: Is load to be offset greater than, less than, or equal to expectation?	Net result
Reductions > expectation	Load = expectation	Net decrease in pollution
Reductions = expectation	Load = expectation	No net change
Reductions < expectation	Load = expectation	Net increase in pollution
Net increase in pollution:		**1 out of 3 scenarios**

Table A2: Nonpoint source credit generator and nonpoint source credit purchaser.

Credit generator: Is load reduction greater than, less than, or equal to expectation?	Credit purchaser: Is load to be offset greater than, less than, or equal to expectation?	Net result
Reductions > expectation	Load > expectation	No net change
Reductions > expectation	Load = expectation	Net decrease in pollution
Reductions > expectation	Load < expectation	Large net decrease in pollution
Reductions = expectation	Load > expectation	Net increase in pollution
Reductions = expectation	Load = expectation	No net change
Reductions = expectation	Load < expectation	Net decrease in pollution
Reductions < expectation	Load > expectation	Large net increase in pollution
Reductions < expectation	Load = expectation	Net increase in pollution
Reductions < expectation	Load < expectation	No net change
Net increase in pollution:		**1 out of 3 scenarios**

About the Center for Progressive Reform

Founded in 2002, the nonprofit Center for Progressive Reform is a 501(c)(3) nonprofit research and educational organization comprising a network of scholars across the nation dedicated to protecting health, safety, and the environment through analysis and commentary. CPR believes sensible safeguards in these areas serve important shared values, including doing the best we can to prevent harm to people and the environment, distributing environmental harms and benefits fairly, and protecting the earth for future generations. CPR rejects the view that the economic efficiency of private markets should be the only value used to guide government action. Rather, CPR supports thoughtful government action and reform to advance the well-being of human life and the environment. Additionally, CPR believes people play a crucial role in ensuring both private and public sector decisions that result in improved protection of consumers, public health and safety, and the environment. Accordingly, CPR supports ready public access to the courts, enhanced public participation, and improved public access to information.

About the Environmental Integrity Project

The Environmental Integrity Project is a nonpartisan, nonprofit watchdog organization that advocates for effective enforcement of environmental laws. Comprised of former EPA enforcement attorneys, public interest lawyers, analysts, investigators, and community organizers, EIP has three goals:

1. To illustrate through objective facts and figures how the failure to enforce or implement environmental laws increases pollution and harms public health;
2. To hold federal and state agencies, as well as individual corporations, accountable for failing to enforce or comply with environmental laws; and
3. To help local communities obtain the protections of environmental laws.

We act as a watchdog because we have to. State and federal agencies charged with protecting the environment often are squeezed by limited resources and political interference from well-funded lobbyists hired by the industries they are required to regulate. We help level the playing field by giving communities the legal and technical resources they need to claim their rights under environmental laws.

Political influence should play no role when the government decides whether to enforce laws which keep cancer-causing benzene out of the lungs of children, for example, or deadly coal soot particles out of the bloodstreams of the elderly.

We do this by advocating for fair enforcement of environmental laws and regulations; writing and distributing reports and data; taking legal actions against big polluters and government agencies, when necessary; and by teaching communities how to participate in the public process regarding important state and federal environmental decisions.

Endnotes

[1] U.S. EPA, Trading and Offset Technical Memoranda for the Chesapeake Bay Watershed, available at: https://www.epa.gov/chesapeake-bay-tmdl/trading-and-offset-technical-memoranda-chesapeake-bay-watershed.
[2] For more information, see U.S. Geological Survey, Hydrologic Unit Maps, available at: https://water.usgs.gov/GIS/huc.html.
[3] U.S. EPA, Local Water Quality Protection When Using Credits for NPDES Permit Issuance and Compliance, available at: https://www.epa.gov/sites/production/files/2015-07/documents/localwaterqualitytm20140306pg.pdf.
[4] *See e.g.*, Water Environment Federation and WateReuse, The Economic, Job Creation, and Federal Tax Revenue Benefits of Increased Funding for the State Revolving Fund Programs (April 2016), available at https://watereuse.org/wp-content/uploads/2015/01/WEF-WRA-SRF-Economic-Impact-Study-Report-April-29-2016.pdf.
[5] Chesapeake Bay Program, 2014 Chesapeake Bay Watershed Agreement, available at: https://www.chesapeakebay.net/documents/ChesapeakeBayWatershedAgreemenetFINAL.pdf.
[6] See the Chesapeake Bay Program Toxic Contaminant Workgroup, available at:
[7] The map is available at: https://www.chesapeakebay.net/channel_files/25557/toxics_indicator_2014.pdf.
[8] *See, e.g.*, Cynthia Morgan and Ann Wolverton, Water Quality Trading in the United States, Working Paper # 05-07 for the National Center for Environmental Economics, U.S. EPA, at 15 – 16 (June, 2005); World Resources Institute (WRI), Water Quality Trading Programs: An International Overview, at 9 – 11 (March 2009).
[9] U.S. EPA, Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus and Sediment, page 7-1 (Dec. 29, 2010) (emphasis added, and certain acronyms converted to full text for clarity).
[10] 33 U.S.C. § 1313(d)(1)(C).
[11] Kieser & Associates, Post-BMP Implementation Monitoring Results for the Cooper Township Agricultural Site #2 Area A, Project 97-IRM-5C (Dec. 31, 2001).
[12] National Research Council (NRC), Achieving Nutrient and Sediment Reduction Goals in the Chesapeake Bay 73 (2011).
[13] *Id.* at 76.
[14] U.S. EPA, Chesapeake Bay Phase 5.3 Community Watershed Model, page 6-9 (Dec. 2010), available at: http://www.chesapeakebay.net/about/programs/modeling/53.
[15] For more on comparisons between BMP efficiencies and real-world data, see Environmental Integrity Project, Murky Waters: More Accountability Needed for Farm Pollution in the Chesapeake Bay, pp. 29-39 (July 14, 2014), available at: http://www.environmentalintegrity.org/reports/murky-waters/.
[16] T. Simpson and S. Weammert, Developing Best Management Practice Definitions and Effectiveness Estimates for Nitrogen, Phosphorus and

Sediment in the Chesapeake Bay Watershed, 114 (University of Maryland Mid-Atlantic Water Program, Dec. 2009).
[17] See, e.g., World Resources Institute, Addressing Risk and Uncertainty in Water Quality Trading Markets, 3, 13 (Feb. 2014).
[18] U.S. EPA, Accounting for Uncertainty in Offset and Trading Programs – EPA Technical Memorandum, 8 (Feb. 12, 2014); see also U.S. EPA Chesapeake Bay Model, supra note 5, at 6-3 ("[t]he objective was to develop BMP definitions and effectiveness estimates that represent the average operational condition of the entire watershed").
[19] Morgan and Wolverton, *supra* note 1, at 15; *see also* Organization for Economic Co-operation and Development, Water Quality Trading in Agriculture 36 (2012) (citing Morgan and Wolverton as evidence that "ratios of 2:1 or higher are common in U.S. programs.").
[20] *See, e.g.*, WRI, *supra* note 1, at 10 ("Uncertainty ratios are often set at 2:1"); M.O. Ribaudo and J. Gottlieb, Point-Nonpoint Trading—Can it Work?, 47 J Am. Water Resources Assn. 5, 9 (Feb. 2011) ("Uncertainty ratios in water quality trading programs generally range from 2:1 to 5:1.").
[21] See EPA, 2014 Technical Memorandum, supra note 11, at 6 ("A number of factors may cause a BMP to produce lower than expected pollutant load reductions").
[22] Id.
[23] *Id.* at 10. The exceptions are for instances where routine monitoring is used to increase the certainty of load reduction estimates, or where BMPs are made permanent through a conservation easement or other deed restriction.
[24] Section .08(C)(1)(c).
[25] Section .08(C)(1)(a).
[26] Bear Creek Watershed Association, Total Phosphorus Trade Program and Nonpoint Source Trading Guidelines (Feb. 8, 2006).
[27] "[T]he Trade Ratio will be 2:1 for all Trade Projects unless the applicant requests an exemption of the 2:1 trade ratio based on adequate water quality data collected on a project-specific basis." Chatfield Water Authority, Water Quality Trading Guidelines, 10 (Apr. 25, 2007).
[28] *Id.*
[29] Morgan and Wolverton, *supra* note 1, at 17.
[30] *Id.*
[31] Jennifer Vogel, A Survey of Trading Ratios Used for Generation of Credits in Water Quality Trading Programs, 6 (UVA Environmental Law Clinic, July 20, 2012).
[32] *Id.* at 6.
[33] Florida DEP, The Pilot Water Quality Credit Trading Program for the Lower St. Johns River: A Report to the Governor and Legislature, at 12–13 (Oct. 2010), available at http://www.dep.state.fl.us/water/wqssp/docs/WaterQualityCreditReport-101410.pdf.
[34] Environomics, A Summary of U.S. Effluent Trading and Offsets Projects, prepared for Dr. Mahesh Podar, U.S. EPA, at 17 (Nov. 1999).
[35] *Id.* at 19.
[36] Morgan and Wolverton, *supra* note 1, at 17.

[37] Michigan regulations require retirement of 50% of nonpoint source credits "to address uncertainty and to provide a net water quality benefit." This would be, in ratio terms, a 2:1 ratio. Mich. Admin. Code r. 323.3016.
[38] The trading ratio is divided into three components: 1.0 to provide an offset, 1.0 to provide an environmental benefit, and 0.6 to account for uncertainty. Environomics, *supra* note 21, at 23; *see also* EcoAgriculture Partners, The Watson Partners and the Southern Minnesota Sugar Beet Cooperative, 18 (May, 2011) (confirming that "the required number of phosphorus reduction trading credits remains 2.6 times the annual phosphorus mass discharge limit for the WWTF.").
[39] Vogel, *supra* note 18, at 10.
[40] Environomics, *supra* note 21 at 29; Morgan and Wolverton, *supra* note 1, at 17.
[41] Vogel, *supra* note 18, at 18.
[42] *See* Environomics, *supra* note 21, at 25.
[43] Morgan and Wolverton, *supra* note 1, at 17.
[44] Vogel, *supra* note 18, at 12.
[45] *Id.* at 14.
[46] Organization for Economic Co-operation and Development, Water Quality Trading in Agriculture 23 (2012)
[47] U.S. EPA, Virginia's Trading and Offset Programs Review Observations, Final Report (Feb. 17, 2012).
[48] Environomics, *supra* note 21, at 36.

Attachment C

July 7, 2017

Via Email:
gary.setzer@maryland.gov

Mr. Gary Setzer
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

Re: Comments on Maryland Department of Environment's Subtitle 08 Chapter 11 Maryland Water Quality Nutrient and Sediment Trading and Offset Program Draft Regulations

Dear Mr. Setzer:

On behalf of the undersigned organizations, please accept these comments on the draft Nutrient and Sediment Trading and Offset Program regulations that were distributed on June 7. These comments were formulated in a collaborative effort between the Maryland Clean Agriculture Coalition (MCAC) and the Choose Clean Water Coalition (CCWC).

Our comments are based upon the MCAC guiding principles on nutrient pollution trading, which are attached. In general, we believe that any nutrient pollution trading program must be designed to reduce pollution to the Chesapeake Bay and its tributaries with a level of transparency and accountability to ensure its effectiveness.

Comments on Draft Regulations

We commend Maryland Department of the Environment (MDE) for listening to many of the concerns of our members and other stakeholders in creating actual regulations rather than trying to establish a trading program simply relying on guidance. We urge MDE to include more details in the regulations and make some changes to improve the regulations in order to make a robust trading program that will not endanger water quality in the Bay or the local level.

1. The regulations must adhere to the EPA technical memoranda on nutrient trading.

The Environmental Protection agency (EPA) has developed a series of technical memoranda that provide details on EPA's expectations for nutrient trading programs designed to meet the Bay TMDL target allocations.[1] Specifically, the technical memoranda elaborate on Appendix S and Section 10 of the TMDL.[2] These are not merely guidance, but reflect the fundamentally important "expectations" of EPA, the Chesapeake Bay Program partner responsible for ensuring accountability in the TMDL

[1] U.S. EPA, Trading and Offset Technical Memoranda for the Chesapeake Bay Watershed, https://www.epa.gov/chesapeake-bay-tmdl/trading-and-offset-technical-memoranda-chesapeake-bay-watershed.
[2] U.S. EPA, Accounting for Uncertainty in Offset and Trading Programs – EPA Technical Memorandum, 4 (Feb. 12, 2014).

implementation. If Maryland chooses to ignore the memoranda, it runs the risk not only of forcing EPA to object to permits and reject credits or offsets for use in meeting TMDL allocations, but also of losing credibility in the eyes of other partners and the public.

2. The draft regulations must require the use of a 2:1 uncertainty ratio for all trades involving nonpoint credit generators.

The pollution loads from nonpoint sources of pollution, which by definition lack discreet "point" source outfalls, are very difficult to measure. When these nonpoint sources implement Best Management Practices (BMPs) to reduce pollution loads, the reductions are equally difficult to measure. In practice, these loads and pollution reductions are never measured, but are instead estimated. Nutrient credits generated by nonpoint sources are therefore inherently uncertain.

Adding to that basic uncertainty is the fact that most estimates of BMP effectiveness are generated from carefully controlled research experiments – not real-world demonstrations. The National Research Council (NRC) observed that

> *BMP efficiencies are often derived from limited research or small-scale, intensive, field-monitoring studies in which they may perform better than they would in aggregate in larger applications . . . Thus, estimates of load reduction efficiencies are subject to a high degree of uncertainty*.[3]

Note that the NRC authors are suggesting that the uncertainty is largely in one direction—BMP efficiencies are likely to overestimate actual nutrient removals. Indeed, the authors go on to say that "[p]ast experience . . . has shown that credited BMP efficiencies have more commonly been decreased rather than increased in the light of new field information."[4]

In other words, BMP effectiveness estimates tend to overestimate pollution reductions. The Chesapeake Bay Program has modified certain BMP effectiveness estimates to address some, but not all, of this bias (to "remove unwarranted optimism").[5] There has been some confusion on this point. For example, in 2011 Maryland Department of Agriculture (MDA) stated that "[a]ny uncertainty associated with [BMPs] has already been taken into account by the Chesapeake Bay Program in the adoption of the stipulated efficiency."[6] But this is incorrect. Not all BMPs have been adjusted as described above, and not all sources of uncertainty have been addressed. According to EPA:

> *The CBP partnership BMP effectiveness values vary across the Chesapeake Bay watershed for conditions such as implementation date, growth rate of crops, and physiographic region. These adjustments generate BMP effectiveness values that are <u>unbiased and realistic</u> but not necessarily conservative because they were established using realistic estimates for load reductions that do not reflect additional sources of uncertainty, especially hydrological variability and operation and maintenance over the*

---

[3] National Research Council (NRC), Achieving Nutrient and Sediment Reduction Goals in the Chesapeake Bay 73 (2011).
[4] *Id*. at 76.
[5] U.S. EPA, Accounting for Uncertainty in Offset and Trading Programs – EPA Technical Memorandum, 8 (Feb. 12, 2014).
[6] MDA, Producing and Selling Credits in Maryland's Nutrient Trading Market, 9 (Mar. 14, 2011).

lifetime of BMPs. The uncertainty ratio recommended in this technical memorandum is designed partially to account for those additional sources of uncertainty.[7]

Therefore, there is a reasonable probability that a BMP may not generate the pollution reductions that it is given credit for. In order to avoid a net increase in pollution loads, EPA expects the states to use an uncertainty ratio "of at least 2:1" for trades between nonpoint credit generators and point source credit buyers.[8] In other words, a credit buyer hoping to offset one pound of new nitrogen load would have to purchase credits worth two pounds of nonpoint nitrogen. EPA allows for two possible exceptions to this policy. The first is where "direct and representative monitoring of a nonpoint source is performed at a level similar to that performed at traditional NPDES point source."[9] The second is where land conservation is made "permanent" through a conservation easement or other deed attachment.[10]

In general, however, Maryland is required to apply a 2:1 ratio to all nonpoint-point trades. The draft regulation defines uncertainty ratios, but does not include any substantive language about them. Perhaps this is an error in drafting – since MDE included a definition, we presume that the Department intended to include substantive language. Maryland's most recent guidance manual[11] includes some language about uncertainty ratios, but misses the mark. Specifically, the manual requires a 2:1 uncertainty ratio for trades between nonpoint credit generators and "wastewater point sources," but does not require a 2:1 ratio for trades between nonpoint credit generators and "stormwater point sources."[12] This is an arbitrary distinction, and it is impermissible. The characteristics of the credit purchaser are irrelevant to the policy goal that a 2:1 uncertainty ratio is intended to serve. The uncertainty ratio is there to ensure that credits do not overestimate the pollution reductions achieved by the credit generator.

Virginia has adopted an uncertainty ratio requirement that comports with the TMDL and EPA's expectations:

> Credits used to offset new or increased nutrient loads under this subdivision shall be:
>
> (1) Subject to a trading ratio of two pounds reduced for every pound to be discharged if certified as a nonpoint source credit by the board pursuant to § 62.1-44.19:20 of the Code of Virginia. On a case-by-case basis the board may approve nonpoint source to source trading ratios of less than 2:1 (but not less than 1:1) when the applicant demonstrates factors that ameliorate the presumed 2:1 uncertainty ratio for credits generation by nonpoint sources such as:
>
> (a) When direct and representative monitoring of the pollutant loadings from a nonpoint source is performed in a manner and at a frequency similar to that performed at VPDES point sources and there is consistency in the effectiveness of the operation of the nonpoint source best management practice (BMP) approaching that of a conventional point source.

---

[7] U.S. EPA, Accounting for Uncertainty in Offset and Trading Programs – EPA Technical Memorandum, 8 (Feb. 12, 2014) (emphasis added).
[8] U.S. EPA, Accounting for Uncertainty in Offset and Trading Programs – EPA Technical Memorandum, 4 (Feb. 12, 2014).
[9] Id. at 5.
[10] Id.
[11] MDE and MDA, Maryland Trading and Offset Policy and Guidance Manual, Chesapeake Bay Watershed (Apr. 17, 2017).
[12] Id. at 13.

(b) When nonpoint source credits are generated from land conservation that ensures permanent protection through a conservation easement or other instrument attached to the deed and when load reductions can be reliably determined;.[13]

MDE should adopt similar language and apply it to all trades and offsets.

Furthermore, the same logic should apply to all trades involving nonpoint credit generators, including the sale of credits to nonpoint credit purchasers. Again, the uncertainty ratio is there to ensure that credits do not overestimate the pollution reductions achieved by the credit generator. The characteristics of the credit purchaser are irrelevant.

In short, MDE must require the use of a 2:1 uncertainty ratio for all trades involving nonpoint nutrient credits, including but not limited to trades between nonpoint credit generators and "stormwater point sources."

3. Use a retirement ratio to ensure net improvement to water quality.

Trading programs must result in actual net improvements to water quality. The current draft regulations do not include a retirement ratio. They include a "reserve ratio", which is inadequate, because it does not ensure that there is a net reduction of pollution from any trade. We urge MDE to reinstate the retirement ratios that have long been part of Maryland's draft trading manual.[14] MDE should require that 5% of credits generated by point sources, and 10% of credits generated by nonpoint sources, be "retired." An earlier iteration of the Maryland Department of Agriculture's nutrient trading policy included the following "fundamental principle":

> *Trades must result in a net decrease in loads. To ensure this net decrease is achieved, 10 percent of the agricultural credits sold in a trade will be "retired" and applied toward Tributary Strategies or TMDL goals. The buyer will retire the credits following the transaction, and this determination should be reflected in the buyer/seller contract*.[15]

At the January 8th, 2016 trading symposium, MDE stated that a percentage of credits will be retired for the sake of net water quality benefit. We agree with this policy and urge MDE to ensure that these levels are included. As noted above, the current draft omits the retirement ratio and instead includes a 'reserve ratio.' The reserve ratio alone is insufficient for two reasons. First, it is not a retirement ratio, and does not ensure a net reduction in pollution loads. Second, at the end of the year there is nothing that prevents MDE from distributing the reserved credits to noncompliant dischargers. This creates a perverse incentive to polluters to fall short of their pollution reduction targets. We have no objection to applying a reserve ratio if MDE also incorporates the appropriate retirement ratio.

---

[13] 9 Va. Admin. Code 25-820-70, Part II.B.1.b.(1).

[14] See, e.g., MDE and MDA, Draft Maryland Trading and Offset Policy and Guidance Manual, 19 and 45 (Jan. 2016).

[15] MDA, Producing and Selling Credits in Maryland's Nutrient Trading Market, 5 (Mar. 14, 2011).

We recommend the following in words or substance:

> *"A retirement ratio will be applied to each trade, and represents the percentage of the total purchased credits to be retired towards net water quality benefit. The retirement ratio is 1.05 for point source credits and 1.1 percent for nonpoint credits. This means that credit purchasers will have to purchase 1.05 pounds of point source credits, or 1.1 pounds of nonpoint credits, before accounting for any other trading ratios, to offset one pound of pollution."*

4. Ensure that trading does not cause degradation of local waters or pollution hotspots.

We strongly support the intent of the language in section .05.B**.** The TMDL and EPA's technical memorandum on local water quality both prohibit trades that would cause or contribute to local water quality impairments, including any exceedances of water quality standards.[16] We commend MDE for limiting trading to credits generated upstream of where the water discharge reaches impaired waters as a good practice to help ensure compliance with local water quality standards. However, section .05.B.1, as written, is too narrow and is inconsistent with section .05.B, the TMDL, and EPA's technical memorandum. Section .05.B. prohibits trades that would cause or contribute to an impairment or to an exceedance of water quality standards. We would strongly urge MDE to consider language that would avoid creating pollution "hot spots" for local communities by requiring that <u>all</u> trades be executed within a small watershed, with credit generators upstream of credit purchasers. At a minimum, however, we request the following:

Strike:

> "Where necessary to ensure compliance with local water quality standards, the exchange of credits in an area within the Chesapeake Bay Watershed subject to an approved local TMDL for total nitrogen, total phosphorus, or total suspended solids with allocations more stringent than the Chesapeake Bay Watershed TMDL shall be limited to those credits generated upstream of where the discharge reaches impaired waters."

And replace with:

> "Where necessary to ensure compliance with local water quality standards and to prevent local water quality impairments, the exchange of credits in areas where a credit purchaser may cause or contribute to a violation of water quality standards, an impairment, or a violation of a local TMDL, shall be limited to credits generated upstream of where the credit purchaser's discharge reaches impaired waters."

We also urge MDE to ensure that permittees, particularly MS4 jurisdictions, do not use trading to meet the entirety of their pollution reduction requirements. Trading should not be allowed to offset more

---

[16] U.S. EPA, Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus and Sediment, S-4 (Dec. 29, 2010); U.S. EPA, Local Water Quality Protection when Using Credits for NPDES Permit Issuance and Compliance, EPA Technical Memorandum, (March 17, 2014).

than 50% of a permittee's requirements. This will ensure that local waters are not significantly degraded and also ensure that MS4s do not abandon all stormwater and polluted runoff reduction efforts within the boundaries of their jurisdictions.

In addition, the three broad "Trading Regions" authorized in Section 05.F(1) are far too broad, and will not ensure the protection of local water quality, unless they are subject to the revised language that we have proposed for Section 05.B(1). Our proposed language would remedy this problem.

5. Include additional details on enforcement: The regulations should ensure greater enforcement against fraud in the program and repeat offenders.

Since nutrient trading creates a host of new enforcement issues, the draft regulation must add significantly more detail on enforcement. Section 11 should outline specific enforcement measures that MDE would pursue in response to credit failure, willfully fraudulent trading or verification misrepresentations, and repeat offenders.

As a starting point, the regulation should clearly and comprehensively state that credit purchasers are responsible for credit failure, and that a credit failure is a permit violation subject to Clean Water Act and state law enforcement. Section .08.A.1(d) states that "in the event of a default in a trade contract or the invalidation of credits, the MS4 permittee using those credits remains responsible for complying with MS4 permit requirements that would apply if the trade had not occurred." This is a step in the right direction, but it does not go far enough and only applies to MS4 credit purchasers. The draft regulation should expand this language to state that permittees are subject to enforcement for permit violations in the cases of credit default, and apply that language to all credit purchasers.

Enforcement provisions should recognize that there will likely be minor infractions, or a failure of a BMP performance, that can be corrected expeditiously. They should authorize administrative compliance orders to address these and other violations, coupled with penalties for failure to comply.

In addition, we recommend that the regulations expand the enforcement sanctions for willfully fraudulent trading or verification, and for repeat offenders. A noncompliant verifier working with a willful counterfeiter of credits could jeopardize the integrity of the entire trading system and the health of the Chesapeake Bay. Greater enforcement mechanisms are necessary to reduce the temptation to falsify credit verification reports, particularly when the verifiers are third party entities.

Both the MDA and MDE should have the authority to impose on any noncompliant party a ban from the nutrient trading system of up to 10 years, as well as a lifetime ban for the most serious and/or repeat offenders. MDA should also refer cases of fraud to the State Attorney General to take appropriate action under the state's general civil and criminal fraud laws.

Finally, we recommend the Department include a definition of "significant noncompliance" since this term is used in .04E.(1) to describe one basis for becoming ineligible to participate in the trading program.

6. The draft regulation must include more detail on certification and verification of credits

The draft regulation currently includes very little detail on verification, despite the fact that Maryland has adopted a comprehensive Best Management Practice verification plan.[17] Much of the verification under this plan will be done by MDA, but the plan also assigns numerous responsibilities to MDE (e.g., stormwater BMP and wastewater treatment plant verification, review and submittal to the Chesapeake Bay Program of MDA verification data, etc.). To the extent that the BMP verification plan may overlap with the nutrient trading regulation, MDE should incorporate the overlapping policies and language.

In addition, section .05.E(5) suffers from both substantive and drafting problems. First, section .05.E(5) states that "permanent credits are available in perpetuity and . . . may be verified annually." This suggests that permanent credits may not be verified at all. Nothing is truly "permanent," and MDE must prescribe some form of follow-up verification for any practice used to generate credits. Maryland's BMP verification plan lays out a schedule for initial and follow-up inspections for virtually every kind of credit-generating practice.[18] EPA's technical memorandum on verification simply says that the Agency expects "all credit generating projects and practices to be verified on an annual basis."[19] MDE must ensure that the draft regulation is consistent with that plan.

Section .05.E(5) goes on to exempt two types of practices from the preceding language, but because the preceding language includes three clauses, it is unclear what the practices in .05.E(5)(a) and (b) are exempted from. If the language exempts (a) and (b) from the "may be verified annually" clause, then MDE is effectively stating that these two practices – converting septic systems to wastewater treatment plant hookups and land conversions with deed restrictions – cannot be verified after initial project completion. It makes no sense for MDE to tie its hands in this way. Since .05.E(5) does not require anything beyond initial verification on project completion, there is no reason to exempt any practices, and the word "except" and parts .05.E(5)(a) and (b) should be deleted.

7. Credit timing

The draft regulation presents a conflicted set of requirements for the use of credits over time. On one hand, credits are generally valid for one year and cannot be banked for future years – a good policy (section .05.E(4)). On the other hand, the draft regulation contemplates "permanent credits" (.05.E(5)), and "[p]ermittees are required to secure credits in perpetuity or the term of their permit," (section .05.E(6)), or for up to 20 years (section .07.A.(3)(b)(ii)). The draft regulations fail to explain how a permittee could "secure" credits for 20 years (or in perpetuity) when most credits are annual and expire a year after they are created.

This issue requires careful thought on MDE's part. The Department may wish to require that long-term credit purchases be limited to long-term credit generating practices such as land conversion with deed

---

[17] Maryland's DRAFT Best Management Practice BMP Verification Protocol (Nov. 2015), http://www.chesapeakebay.net/documents/MD_BMP_Verification_Protocols_Final.pdf.
[18] Id.
[19] U.S. EPA, Certification and Verification of Offsets and Trading Credits in the Chesapeake Bay Watershed, Technical Memorandum, 7 (July 21, 2015).

restrictions. Alternatively, the Department will have to provide a mechanism by which permittees can "secure" credits in a way that the Department can validate and track. A simple contract between a permittee and a broker, where the broker promises to find annual credits every year for the next 20 years, is plainly insufficient. A binding contract with one or more credit generators to provide future credits by implementing and maintaining BMPs that are already in place or easy to implement and verify might be sufficient to satisfy the requirements in Section 07.A(3) that NPDES permit holders using credits demonstrate their availability during future years.

Unfortunately, EPA has provided very little guidance on this issue, but the Agency does expect that "[t]he procurement of credits should be documented in the permit, the fact sheet, and the administrative record. This includes documented assurances in place to show that credits have been secured from a project and/or practice certified by a person properly authorized to do so for the duration of the authorization to discharge."[20]

MDE must adhere to EPA's expectations in the following ways: (1) It must revise the draft regulation to specify that "securing" credits means lining up credits from specific projects and/or practices (not from brokers), and (2) it must include details about how the credits were secured in the relevant permit, fact sheet, and administrative record.

8. The draft regulations should explicitly prohibit bubble permits and interstate trading

As written, the draft regulation would allow for "multiple facilities in a watershed" to form an association and obtain a single permit (a "bubble permit") as co-permittees (Section 07.A(4)).This provision is not authorized under the Clean Water Act and has no basis for inclusion in nutrient trading regulations.

Moreover, even if a way could be found to design a bubble permit that is consistent with the Clean Water Act, we have serious concerns about the impact of bubble permits, which create a laundry list of potential problems for local water quality, transparency, accountability, and enforcement, and must be avoided. For example, as drafted, the term "watershed" is not defined and could allow permittees anywhere within the Chesapeake Bay watershed to combine their discharge limits. Worse, the draft regulation establishes no restrictions at all on the number of owners forming an association. Theoretically, a single bubble permit could be written for all nutrient dischargers in Maryland's part of the Chesapeake Bay watershed.

Even a bubble permit involving a limited number of facilities poses significant permit-writing and enforcement questions. For example, how will MDE ensure that there are no local water quality impacts at all locations? How will MDE even conduct a "reasonable potential" analysis, which it must do pursuant to the Clean Water Act, to determine whether Water Quality-Based Effluent Limitations are required? Will co-permittees report their discharges individually, as a group, or both? These are just a few of the questions that are not addressed in the draft regulations.

[20] U.S. EPA, Permanence of Credits Used for NPDES Permit Issuance and Compliance, Technical Memorandum, 5 (Aug. 19, 2014).

MDE should initiate an entirely new rulemaking process and create a new set of regulations to address all of the complex issues and potentially dangerous consequences of bubble permitting. It is inappropriate to address this issue with only five lines of text in an unrelated regulatory proposal that contains no reference to bubble permits in the Statement of Purpose.

9. Interstate trading

The draft regulation is silent about interstate nutrient trading, but we are aware that Maryland is considering this possibility. We are strongly opposed to interstate trading for several important reasons:

- Accountability and transparency, which are both difficult enough to achieve at the state level, will be much harder to achieve on an interstate basis, as each state will have its own system for credit tracking.

- Interstate trading increases the likelihood of local water quality issues by increasing the distance between credit generators and credit purchasers (making it more likely that they are in different sub-watersheds).

- Interstate trades will be complicated by the fact that a credit is calculated differently in each state. How would Maryland ensure that interstate trades are "apples-to-apples?"

- We are concerned that interstate trading will lead to a "race to the bottom" in terms of trading program standards. For example, consider a credit buyer in state A, and two credit sellers, one in state A and one in state B. Assume that state A has a stringent trading program, and that state B has a weak program. It would presumably be more expensive for a credit generator in state A to install and maintain the practices necessary to qualify for credit generation, and to generate the pollution reductions. The credit seller in state A would set its price accordingly. The credit seller in state B could offer much cheaper credits. The credit buyer would probably buy the credits from state B. If this became a pattern, pollution reductions would tend to accrue to state B. State A, trying to meet TMDL goals for pollution reduction, would have a strong incentive to weaken its program to facilitate more in-state trades.

- Interstate trading would create major obstacles to enforcement. If a Maryland permittee purchased credits from a Pennsylvania credit seller, and those credits failed, how would MDE enforce the permit across state lines? In the meantime, how would MDE verify that the credits secured for 20 years continued to materialize (in Pennsylvania)? Appendix S of the TMDL specifically lists as one its "common elements" the following language under the "certification and enforceability" element: "Ensuring that transactions can be enforced by the jurisdiction. Articulating how transactions can otherwise be protected by the jurisdiction."[21] MDE has no authority to inspect BMPs in another state, or to bring enforcement actions in the event of violations.

[21] TDML, Appendix S, S-5.

For all of these reasons, we strongly believe that interstate trading is impermissible, vulnerable to abuse, and would likely lead to net increases in pollution loads. We strongly encourage MDE to avoid interstate trading.

10. Baselines must be better defined

Section .07.B(2)(d) is unclear. Subsection (d)(i) begins with "If greater than 6,100 pounds per year total nitrogen load cap and 457 pounds per year total phosphorus load cap." It is unclear what is (or is not) greater than these load caps. It may be baselines, but it may also be "previously assigned 2004 Point Source Tributary Strategy" goals (section .07.B(2)(d)(i)). MDE should clarify.

That section goes on to describe how the baseline can be "no more than 50 percent of the amount that is above [the load caps]." This is unclear mathematically. Why would the baseline be half of the excess above the load caps? We strongly encourage MDE to clarify this language as well.

Furthermore,, section .07.B(4) suggests that the baseline for significant industrial dischargers will be "based on a combination of historical performance levels, the amount of loading reductions already achieved since the initial baselines established in 1985, and establishment on a case-by-case basis of additional potential loading reductions." This language is ambiguous and appears to be a statement of purpose, but is not appropriate in the context of a regulation. MDE should settle on a baseline definition and provide a precise statement for the benefit of the regulated community and public.

The baseline provisions must be rewritten to ensure full compliance with EPA's Technical Memorandum on Establishing Offset and Trading Baselines (February 2, 2016). In particular, for any point source discharger, the baseline must include compliance with any technology-based requirements and with any Water Quality Based Effluent Limitations (WQBELs) established by the permit. For nonpoint source dischargers, baseline requirements must ensure compliance with any applicable load allocation "for the appropriate sector [of which the nonpoint source is a member]…and…needed to facilitate improved environmental compliance with WQS."[22] The load allocated to an individual nonpoint source within a sector should be calculated to ensure that that source is doing its fair share to contribute towards achieving compliance with any applicable Water Quality Standards so as to avoid inequitable burdens being placed on members of the sector whose baselines are established at a later date. While many, if not most, baselines for nonpoint sources will be established by MDA under its regulations, MDE will likely be called on to establish some of these, and its regulations therefore must include appropriate provisions to enable it to do so.

11. MDE cannot allow capacity credit generation or capacity trading

The Water Quality Trading Advisory Committee rightly reached a decision that wastewater treatment plants should not be allowed to sell credits representing their extra capacity. Not only does it fail to comport with Clean Water Act principles and the fundamentally important principle of *additionality*

[22] See EPA , Technical Memorandum, Establishing Offset and Trading Baselines p. 4 (February 2, 2016).

embedded in the TMDL,[23] capacity trading can also flood the market with 'free' credits that interfere with the creation of the viable marketplace that MDE is trying to create.

Several MS4s have already declared their intent to use this allowance as a loophole to get out of financing new stormwater projects if it becomes available. In subparagraph .08A.(1)(b)(iv), the regulations allow an MS4 to purchase capacity credits if other sources of credit generation do not "reasonably" meet the demand. This provision is both ambiguous and inappropriate. The entire purpose of these regulations is to create the rules for the marketplace. This open-ended provision does not precisely define what is "reasonable." It furthermore represents a very clear and bold loophole that could sabotage the marketplace and, more importantly, all of the past and present efforts to meet our commitment to the Bay TMDL and attain local water quality standards. By making capacity credits the trade of last resort, the Department is in essence declaring that (a) capacity credits are not an appropriate or effective means of reducing pollution; (b) the purchase of these undesirable credits is preferable to stimulating demand for new and effective pollution reduction projects and practices through market signals (higher prices); and (c) that giving pollution allowances away is preferable to the enforcement of existing pollution limits set out in Clean Water Act permits.

Wastewater treatment plants should only be able to generate credits if they invest in new projects or undertake other new initiatives that create additional pollution load reductions which would not otherwise occur. Credits fail this additionality test if, for example, they are not set at a baseline consistent with the nutrient load concentrations envisioned in state law (3 mg/L for nitrogen; and 0.3 mg/L for phosphorus) and created by wastewater treatment plant upgrade projects that have already been completed and financed with taxpayer dollars. We strongly urge MDE to create clear eligibility requirements for credit generation by wastewater treatment plants. These criteria could include, for example, the submission by the facility of an application created by the department that allows the proposed credit generator to describe what additional capital projects or operational changes the facility will undertake, an estimate of the load reduction to be achieved, and the formula that the applicant will use in this estimate and that the department will use to ultimately certify the number of credits created. The formula must ensure that credits are only certified for reductions that are based on (1) new or additional projects, investments, or actions taken; (2) reductions below the "enhanced nutrient removal" load concentration levels set by the General Assembly and codified in Title 9, Subtitle 16 of the Environment Article; and (3) load concentration levels which are, in fact, lower than historic levels for the facility.

Again, the trading of excess capacity fails the principle of additionality and violates the TMDL and the Clean Water Act. MDE is not authorized to permit capacity trading.

12. Increase Transparency: Provide an opportunity for the public to comment on an application for credit approval when MDA or MDE receives a completed Certification and Registration Form.

[23] See, e.g., U.S. EPA, Components of Credit Calculation, Technical Memorandum, 5 (May 14, 2014).

The regulation needs to include more opportunities for transparency in the nutrient trading program. The MDA regulations give some guidance as to what MDE should include in the regulations. These regulations state in Sections 07.B and C the essential requirements that must be met before a credit can be certified. Section 07.F of the MDA regulations specifies that credits may be "certified" once these requirements are met, and Section 07.G says that following approval each credit shall be given a "unique registration number" and registered. This or similar language should also be included for other nonagricultural credit generation.

There are also additional components MDE should add to this regulation. After credits are certified, MDE must include a system for tracking each credit, as required by the EPA Technical Memorandum on Certification and Verification of Offset and Trading Credits in the Chesapeake Bay Watershed.[24]

Furthermore public notice and comment should be required when MDA or MDE receives a completed Certification and Registration Form, along with the other documents and information required by Sections 07.A and .B. of the MDA trading generation regulations. Without the publication by the department of an announcement of the credit request and a reasonable period for comments, there is no meaningful transparency in the program. Requiring public notice and comment is the only opportunity for interested parties to review the proposed credit(s) and supporting documentation and evaluate and comment on whether: (1) the applicant has properly complied with baseline requirements, (2) the requirements that the Nutrient Management Plan and Soil Conservation and Water Quality Plan be fully implemented are demonstrated, (3) the effectiveness and likely duration of the credits have been properly calculated, (4) whether calculations requiring application of the Maryland Nutrient Trading tool have been properly performed and documented, and (5) the other information required by Section 07.A and B has been provided by the applicant.

In addition, MDA and MDE should both receive a copy of the application no later than the date of the public announcement. MDE has an important interest in any measure that could affect achievement of TMDL goals and water quality standards. In most, if not all cases, any credit purchased and used by a point source discharger will be incorporated into an NPDES permit, which is issued by MDE. In cases where a credit application is submitted to MDA, MDE should have an opportunity at this time to review the credit application and provide comments to MDA. In the event MDE believes there is anything unsatisfactory in the credit, the correction should be addressed before the credit has been approved, registered, purchased, and included with a permit application to MDE.

The MDA regulations in Section 08.D appear to recognize the important role played by MDE because they require that MDE be provided with a copy of the verifier's report generated after an annual verification inspection. However, MDE regulations should also require the original application be shared with MDE as well to assist in verification.

These important elements of the process can be effectively accomplished by adding a new subsection C under Section .07. The existing Subsection 07.C should then be designated as 07.D. The new Section 07.C should provide, in words or substance, as follows:

> *C. Promptly after a determination by MDE or MDA that an application for approval and registration of one or more credits includes all of the documents specified in this Section*

[24] U.S. EPA, "Certification and Verification of Offset and Trading Credits in the Chesapeake Bay Watershed", p. 9 (July 21, 2015).

07, and Sections 08, 09 and 10, as applicable,, the Department shall post on its website an announcement of the application and identifying a location where the application and related documents can be inspected and copied, and allowing a time for public comments on the application of not less than 30 days following the date of publication of the announcement. In addition, not later than the date of publication, MDE or MDA, as appropriate, shall provide the other with a copy of the application and supporting information.

Finally, the Department should get copies of disputed information reports. Section 09.E of the MDA regulations allows the owner or operator of a facility to "dispute information in" the verifier's report by filing a statement of written concerns with the Maryland Department of Agriculture within 30 days of his or her receipt of the report. MDE should require that a copy of the written concerns be provided to MDE at the same time as MDA. MDE will have received the verifier's report, and should be advised if there is a challenge to it by the owner/operator.

We appreciate the opportunity to submit these comments. We would be pleased to discuss any aspect of them and answer any questions. Please contact Abel Russ, with Environmental Integrity Project, with any questions, comments, or concerns at aruss@environmentalintegrity.org.

Respectfully submitted,

Audubon Naturalist Society
Common Cause Maryland
Environmental Integrity Project
Maryland League of Conservation Voters
Maryland Sierra Club
Midshore Riverkeeper Conservancy
Rachel Carson Council
Waterkeepers Chesapeake
West/Rhode Riverkeeper

cc by email:

***Ben Grumbles**, Secretary, Maryland Department of the Environment, ben.grumbles@maryland.gov*
***Lynn Y. Buhl**, Assistant Secretary*, Maryland Department of the Environment, lynn.buhl@maryland.gov
***Nick DiPasquale**, Director, Chesapeake Bay Program, Dipasquale.nicholas@Epa.gov*
***Rich Batiuk**, Associate Director for Science, Accountability and Implementation, Chesapeake Bay Program, batiuk.richard@epa.gov*