SFY 2021

Maryland's 319 Nonpoint Source Program Annual Report

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Program Highlights | Maryland's Statewide NPS Management Program

Overview: Maryland's Clean Water Act Section 319 Nonpoint Source Management

Maryland's Nonpoint Source Management Program is required by the Federal Clean Water Act, Section 319, to protect the State's waterways from nonpoint source (NPS) pollution. Maryland has aligned this program with its commitments and responsibilities in the Chesapeake Bay Agreement[1], the Chesapeake Bay Total Maximum Daily Load (TMDL)[2], and Maryland's Phase III Chesapeake Bay Watershed Implementation Plan (WIP)[3]. This annual FY21 report covers 319 project implementation from July 1, 2020 through June 30, 2021.

Project Selection

To receive 319(h) Grant funding, projects must be implemented within a 319 Priority Watershed (Figure 1) that has an A-I Watershed Plan approved by the U.S. Environmental Protection Agency (EPA). A-I plans are submitted to EPA by any combination of Maryland State Agencies, local governments, and non-government organizations.

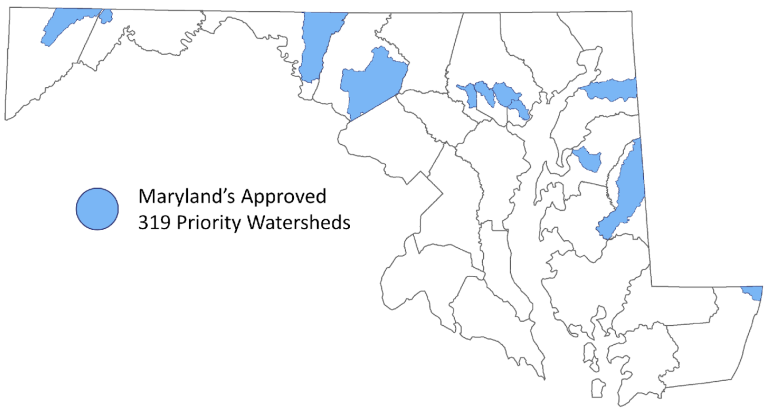


***Figure 1**: Maryland's 319 Priority Watersheds*

Program Administration

Maryland's 319 NPS Management Program, including the 319(h) Grant Program, is administered by Maryland Department of the Environment (MDE) with the assistance of the Maryland Departments of Agriculture and Natural Resources; implementation is carried out by Maryland's local governments. MDE coordinates with local partners to provide grant funding for in-ground projects and report annual progress to EPA.

[1] Chesapeake Bay Agreement: https://www.chesapeakebay.net/what/what_guides_us/watershed_agreement
[2] Chesapeake Bay TMDL: https://www.epa.gov/chesapeake-bay-tmdl/chesapeake-bay-tmdl-document
[3] MD P3 WIP: https://mde.maryland.gov/programs/Water/TMDL/TMDLImplementation/Pages/Phase3WIP.aspx

Annual Reporting for Maryland's 319 Program

EPA requires MDE to produce annual reports demonstrating progress of Maryland's 319 NPS Management Program that show how the State meets 319(h) Grant conditions while maintaining consistency with the U.S. Environmental Protection Agency (EPA) FY2022-2026 Strategic Plan Goal #5 "Ensure Clean and Safe Water for All Communities", and Objective 5.2 "Protect and Restore Waterbodies and Watersheds.

Nonpoint Source Pollution Threatens Maryland's Waterways

Water is inextricably tied to Maryland's identity and culture. The State is traversed by innumerable rivers and streams that provide residents with drinking water, places for recreation, and critically important habitat for Maryland's abundant wildlife. The Chesapeake Bay supports a vibrant fishing industry that is valued at nearly $600 million per year and provides over one third of the annual United States blue crab harvest. The primary nonpoint source pollutants that threaten this resource are Nitrogen and Phosphorus.

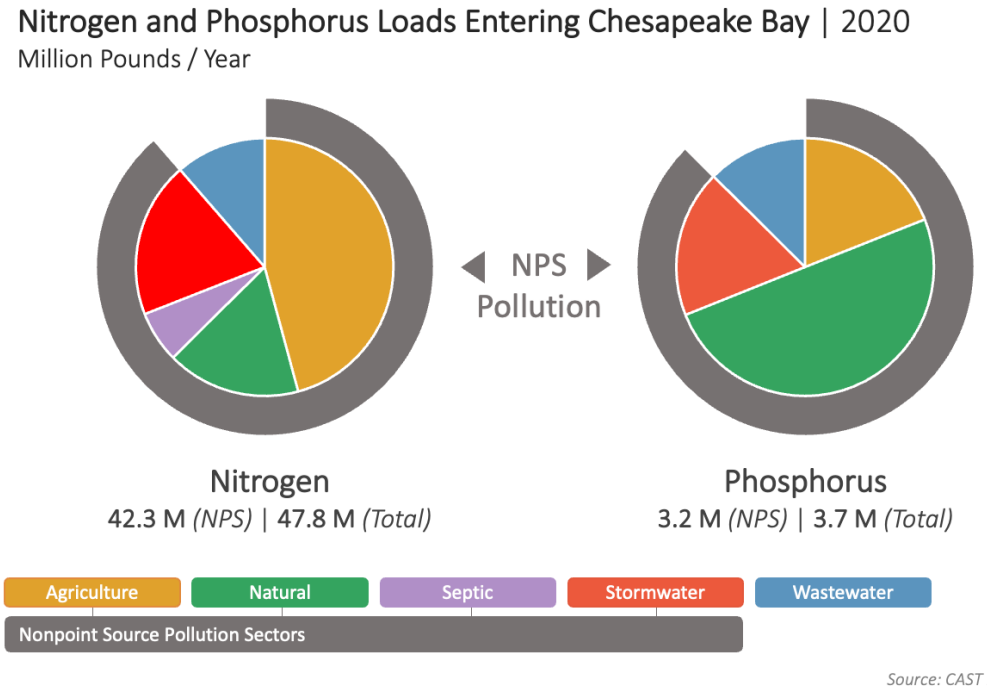


Figure 2: *Maryland's nitrogen and phosphorus loads delivered to Chesapeake Bay in 2020*[4]

NPS pollution threatens the health of Maryland's waterways and comes from both agricultural and developed areas (Figure 2). Natural loads include anthropogenic impacts within the natural system, like

[4] Chesapeake Bay Annual Progress always lags a year behind FFY reporting due to modeling outcomes not being available until after our annual reporting period.

erosion flows from stormwater runoff that can scour stream banks, as well as true natural sources of nitrogen and phosphorus, such as forests, and wetlands. While the NPS pollution focus for Maryland's Chesapeake Bay watershed includes nitrogen, phosphorus, and sediment, those same watersheds are also impaired by other NPS pollution, such as acid mine drainage and toxic contaminates.

NPS pollution is costly to manage because it originates from diffuse sources across wide areas. The high cost and difficulty of managing this pollution is challenging for local governments that must balance local needs with protecting and restoring aquatic resources.

Reducing NPS pollution is accomplished through implementing best management practices (BMPs). This generic name for pollution reduction practices covers a collection of actions, policies, and physical structures that are used to reduce pollution entering waterways[5]. Funding for BMPs comes from local, state, federal, and NGO funding sources, including the 319(h) Grant.

Overall Progress: Maryland's 319 NPS Management Program | SFY 2021

Reporting Updates for SFY 2021

319 Project Funding:
Four watersheds received 319(h) Project Grant funding in SFY 2021: Antietam Creek, Gwynn's Falls, Upper Choptank, and Upper Jennings Run.

Document Accounting:
MDE simplified BMP accounting by tracking projects by funding date rather than project completion date. Further, this report now tracks funds allocated to projects rather than project expenditures to more accurately reflect the funds given to a particular watershed for restoration.

This approach was approved in the FFY19 annual report submission. Our modeling/loading results only include actual implementation. In the future we will still do this for overall expenditures in watersheds, but actual reductions will be from completed projects.

Watershed Modeling:
Since the past report, the Chesapeake Bay Program made significant updates to the Chesapeake Assessment Scenario Tool (CAST) model. MDE uses the CAST model to estimate nutrient and sediment reductions in this report. The CAST 2019 update has made significant changes to Maryland's nutrient and sediment loads.

Funding: Federal and State Contributions

[5] Examples of BMPs – Maryland's Chesapeake Cleanup Center:
https://mde.maryland.gov/programs/Water/TMDL/TMDLImplementation/Pages/pollution-in-the-chesapeake.aspx

Maryland has spent about $48.3 million dollars in State grants over the past 16 years [6] along with about $10.9 million additional dollars from the 319(h) Grant to fund in the ground projects within 319 watersheds (Figure 3). While the 319(h) Grant is a small part of Maryland's total spending on NPS pollution, it helps local governments leverage limited funds. Helping local governments maximize their potential resources is a core component of Maryland's Chesapeake Bay Phase III WIP, which was designed to be locally driven and achievable. For detailed funding information, see Appendix A.

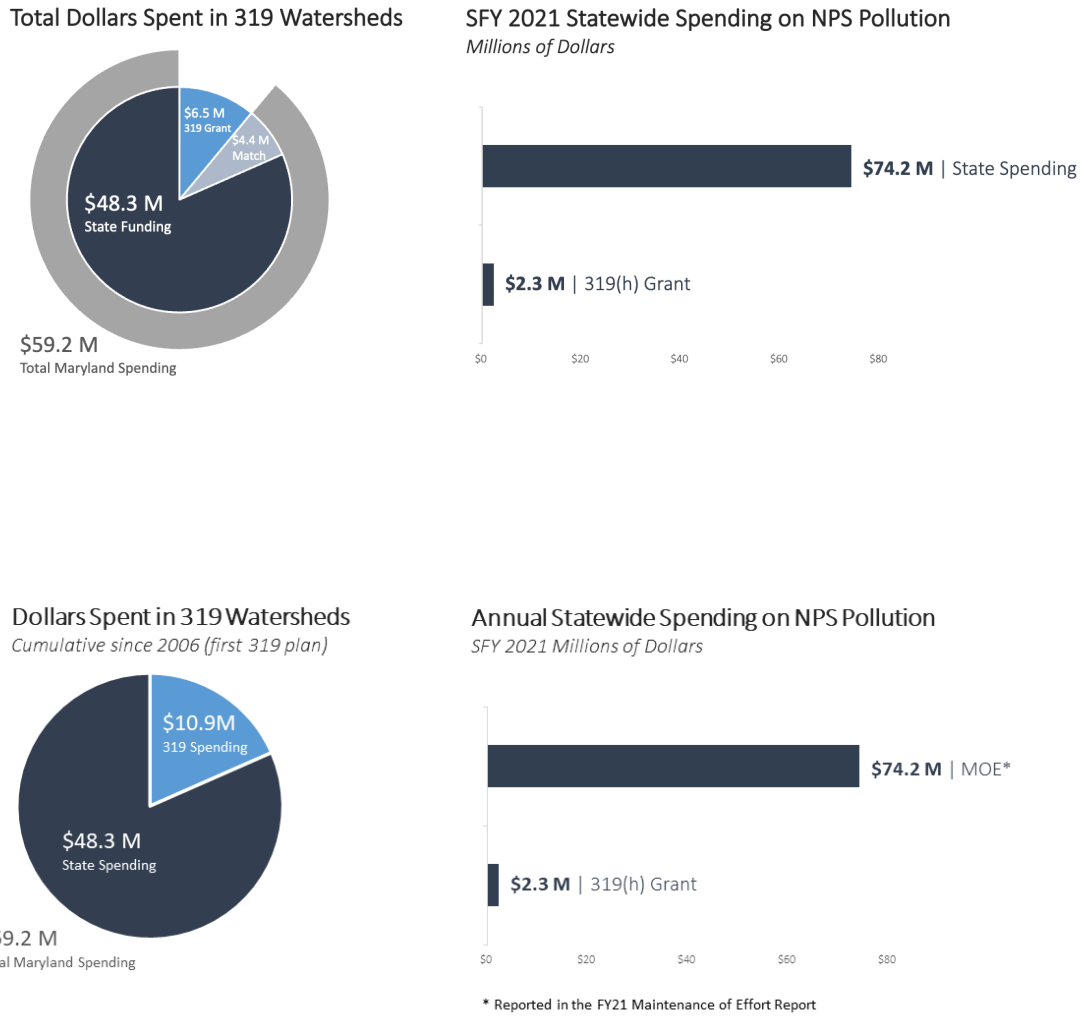


Figure 3: *319(h) Grant spending vs Maryland State spending on NPS pollution*

Overall Load Reductions for Nitrogen, Phosphorus, and Sediment

The State's 319 Priority Watersheds continue to make steady progress in reducing nitrogen and phosphorus loads (Table 1); Appendix B tracks all NPS pollution in greater detail. When evaluating

[6]Maryland's first A-I Plan (*Corsica River)* was accepted in 2004.

overall progress for 319 Priority Watersheds, some watersheds are farther along towards their goals while others have just started. For detailed information on individual watershed progress, please see the *Priority Watersheds* section of this report (*page 13*).

This is not solely an evaluation of installed 319 BMPs, but an assessment of all modeled aspects of a watershed including land use change, animal numbers, septic counts, etc. CAST was used to produce these numbers.

This includes everything nonpoint source related that is also within the CAST, or Chesapeake Bay Model and specifically for the watersheds identified in this report. The reductions are for FY19, FY20 progress is not made available until mid CY 2021, which comes way after the annual report is due.

In an effort to simplify reporting and align with regional goals, outcomes were modified to meet CB TMDL goals for the 319 watersheds. This meant using CAST, which is an amalgam of changes that affect loads on a year-to-year basis, to create a spreadsheet tool that allows for us to more consistently estimate the effects of BMPs implemented in 319 watersheds.

Table 1: *Overall 2020 NPS pollution reductions in 319 Priority Watersheds (Million Pounds/Year)*

	Target Reduction	Current Reduction	Percent Progress
Nitrogen	1.91M	0.40M	21%
Phosphorus	0.11M	0.02M	19%
Sediment	220M	5.86M	3%

Overall, Maryland and its partners made significant progress in addressing the seven programmatic NPS goals identified in the 2021-2025 Maryland Nonpoint Source Pollution Management Plan. This includes estimated pollutant load reductions of 746,398 pounds per year of nitrogen, 35,594 pounds per year of phosphorus, and 27,202 tons per year of sediment resulting from the implementation of all reported structural best management practices (BMPs) in 319 priority watersheds with EPA-accepted watershed-based plans (WBPs), regardless of funding source. While MD's 2021 load reductions represent a decrease from those achieved through implementation in 2020, the 2021 load reductions only account for those achieved through BMPs expected to be cumulative, and exclude annual practices (e.g., Cover crops) due to limitations in field BMP verification during the pandemic in 2021.

Maryland tracks nutrient and sediment reductions since 2010 to align with the start of the Chesapeake Bay Restoration Blueprint. Decreases in nitrogen, phosphorus, and sediment loads can be attributed to land use changes and the implementation of BMPs, including BMPs funded by the 319(h) Grant.

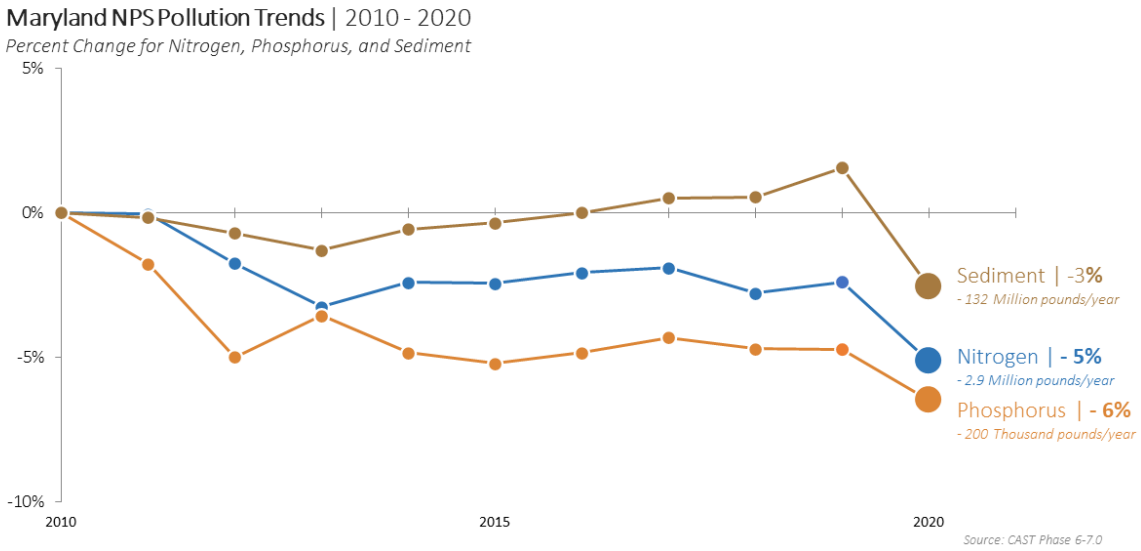


Figure 4: *Maryland's statewide nitrogen, phosphorus, and sediment NPS reductions*

Summary

Maryland's 319 NPS Management Program is a core component of the State's watershed restoration and protection strategy and is designed to align with Maryland's Chesapeake Bay Phase III WIP, the Chesapeake Bay TMDL, and Chesapeake Watershed Agreement. The 319(h) Grant is a small but important portion of Maryland's spending on NPS pollution programs and BMPs. These grant funds are critical in supporting local governments with by giving them additional financial leverage to protect local aquatic resources while also fulfilling the needs of residents.

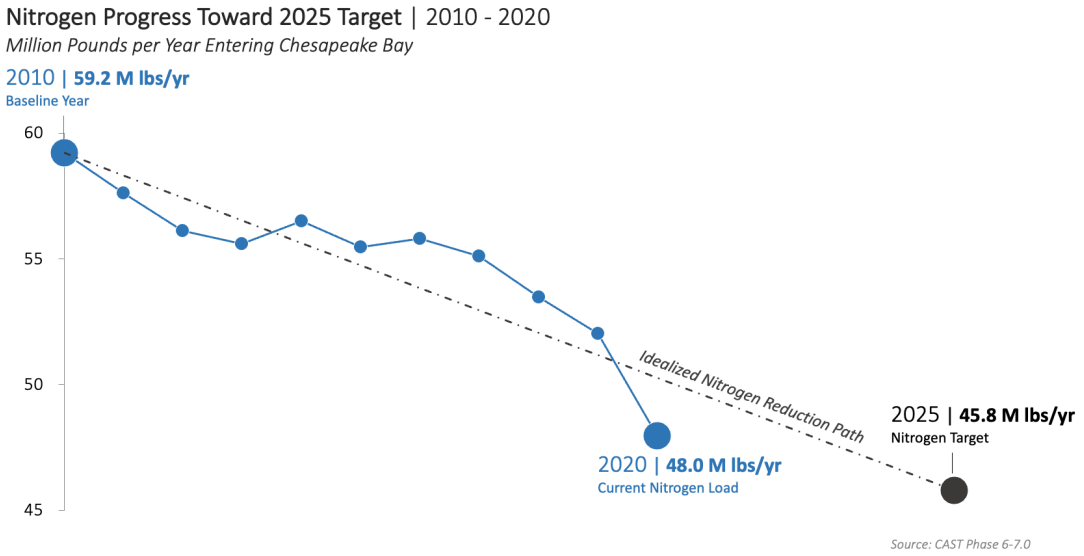
Reductions in nutrient and sediment NPS pollution are a priority for Maryland's portion of the Chesapeake Bay, as detailed in the State's NPS Management Plan and Phase III WIP. Maryland has made significant strides in reducing NPS pollution from agricultural and urban sources. Under Maryland's Phase III WIP and 319 NPS Management Plan, the State will continue reducing NPS pollution to meet its 2025 Chesapeake Bay TMDL targets, protect and restore local waters, and sustain its aquatic resources into the future.

Progress | Maryland's 319 NPS Management Program

How Maryland Tracks Progress for its NPS Management Program

Maryland tracks its NPS Management Plan progress based on the funding allocated to NPS pollution programs, BMP implementation, and NPS pollution reductions. Starting in 2019, the State moved to tracking all nutrient and sediment reductions towards its Chesapeake Bay cleanup targets (Figure 5) on

Maryland's Chesapeake Bay Annual Progress website[7]. This includes nutrient and sediment reductions from wastewater treatment plants as well as NPS reductions.



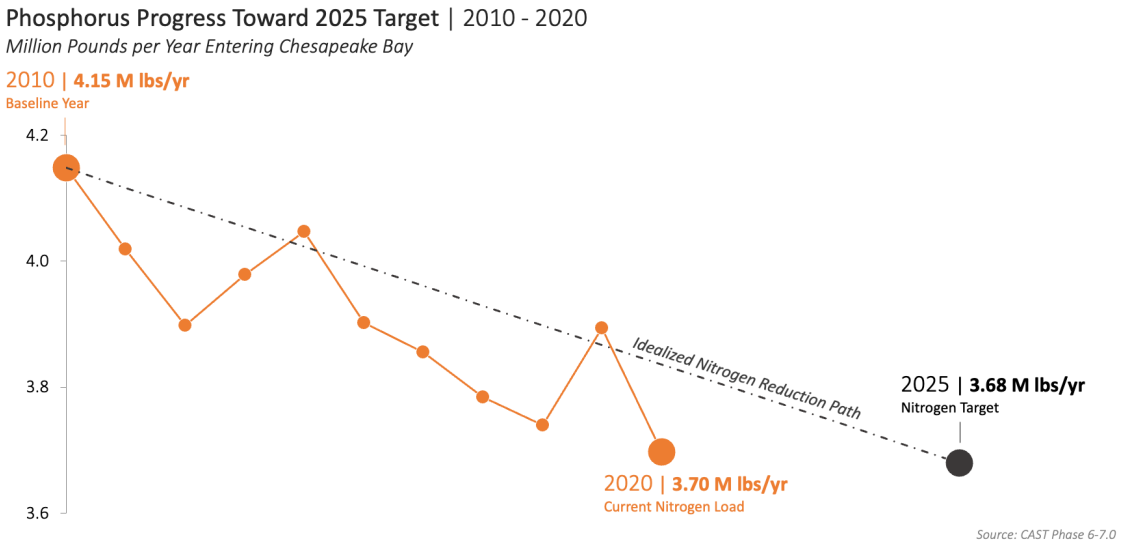


Figure 5: *Maryland's total nitrogen and phosphorus reduction progress towards its 2025 Chesapeake Bay cleanup target*

BMP Implementation

The State tracks progress towards its Phase III WIP BMP implementation goals for both point source and

[7] Maryland's Chesapeake Bay Annual Progress: https://storymaps.arcgis.com/stories/234759335b7249d88442a7bff53a8784
Figure 5 includes both point source and nonpoint source sectors combined for the State's total progress toward Chesapeake Bay WIP goals.

NPS pollution using the Chesapeake Assessment Scenario Tool (CAST), an online tool incorporating elements of the Bay model. Using CAST, MDE measures nutrient and sediment reductions. Sector specific information can be found on the State's Chesapeake Bay Annual Progress Website and includes Agriculture, Stormwater, Septic, Natural, and wastewater treatment plants. Table 2 provides a summary of NPS BMPs implemented by category, for a full listing of the BMPs implemented in 319 watersheds, please see Appendix B.

Table 2: *Summary of BMPs in 319 Priority Watersheds functioning in SFY21*

Measurement for each BMP	Unit	All 319 Watersheds
Agriculture Practices		
Ag Stormwater Management	Acres Treated	-
Alternative Crops	Acres	76.10
Ammonia Emission Reductions (Biofilters)	cumulative	-
Ammonia Emission Reductions (Lagoon Covers)	Animal Units	-
Ammonia Emission Reductions (Litter Amendments)	Animal Units	-
Barnyard Runoff Control & Loafing Lot Management	Acres	52.16
Broiler Mortality Freezers	Dry Tons (Carcasses)	-
Capture & Reuse	Acres	-
Cover Crop – Commodity	Acres	2,962.21
Cover Crop – Traditional	Acres	8,670.97
Crop Irrigation Management	Acres	-
Dairy Precision Feeding	Animal Units	-
Denitrifying Ditch Bioreactors	Acres	2,350.10
Forest Buffers	Acres in Buffers	697.23
Forest Buffers on Fenced Pasture Corridor	Acres in Buffers	45.47
Grass Buffers	Acres in Buffers	1,244.30
Grass Buffers on Fenced Pasture Corridor	Acres in Buffers	31.80
Horse Pasture Management	Acres	10.40
Land Retirement	Acres	1,685.70
Manure Incorporation	Acres	0.27
Manure Transport	Dry Tons	1,238.89
Non Urban Shoreline Management	Feet	-
Non Urban Stream Restoration	Feet	2,625.75
Nutrient Management – Core Nitrogen	Acres	26,452.40
Nutrient Management – Core Phosphorus	Acres	26,452.40
Nutrient Management – Placement Nitrogen	Acres	34.12
Nutrient Management – Placement Phosphorus	Acres	24.68
Nutrient Management – Rate Nitrogen	Acres	211.17
Nutrient Management – Rate Phosphorus	Acres	12.42
Nutrient Management – Timing Nitrogen	Acres	5.13
Nutrient Management – Timing Phosphorus	Acres	-
Pature Alternative Watering	Acres	2,192.43

Prescribed Grazing	Acres	535.49
Saturated Buffer	Acres	2,350.10
Soil and Water Conservation Plan	Acres	50,638.85
Sorbing Materials in Ag Ditches	Acres	2,350.10
Tillage – Conservation	Acres	11,001.46
Tillage – Continuous High Residue	Acres	32,722.88
Tillage – Low Residue	Acres	-
Tree Planting	Acres	208.27
Water Control Structures	Acres	2,350.10
Wetland Creation	Acres	67.71
Wetland Enhancement and Rehabilitation	Acres	-
Wetland Restoration	Acres	56.06
Urban/Suburban Practices		
BioRetention	Acres Treated	91.58
BioSwale	Acres Treated	75.91
Conservation Landscaping Practices	Acres Treated	-
Dry Ponds	Acres Treated	3,048.26
Erosion and Sediment Control	Acres	262.82
Extended Dry Ponds	Acres Treated	3,631.84
Filtering Practices	Acres Treated	141.06
Floating Treatment Wetlands	Acres Treated (Wet Pond)	-
Grey Infrastructure (IDDE)	Acres Treated	-
Impervious Disconnection	Acres Treated	0.25
Impervious Surface Reduction	Acres	3.54
Infiltration Practices	Acres Treated	156.93
Permeable Pavement	Acres Treated	0.62
Runoff Reduction Performance Standard	Acres Treated	189.70
Septic Connections	No. Systems	15.96
Septic Denitrification	No. Systems	96.10
Septic Pumping	No. Systems	-
Storm Drain Cleanout	Lbs of Sediment	-
Storm Water Treatment Performance Standard	Acres Treated	6,218.88
Street Sweeping	Acres	-
Urban Filter Strips	Acres Treated	-
Urban Forest Buffers	Acres in Buffers	76.80
Urban Forest Planting	Acres	71.25
Urban Nutrient Management	Acres	27,429.93
Urban Shoreline Management	Feet	-
Urban Stream Restoration	Feet	3,741.45
Urban Tree Planting	Acres	49.06
Vegetated Open Channel	Acres Treated	17.82
Wet Ponds & Wetlands	Acres Treated	1,278.43
Resource Practices		

Dirt&Gravel Road E&S	Feet	-
Forest Harvesting Practices	Acres	93.98
Non-Tidal Algal Flow-way	Acres	-
Tidal Algal Flow-way	Acres	-

MDE is the primary State agency for tracking point source and nonpoint source implementation. Urban BMP Implementation is tracked via several methods including municipal separate storm sewer system (MS4) permit reporting and Direct outreach with county/municipal communities. Forestry BMP data comes from our Department of Natural Resources, which maintains its own internal BMP database.

Similarly, agricultural BMPs come from the Maryland Department of Agriculture's Conservation Tracker database. These practices are assembled and put through a documented QA/QA process before being submitted to EPA for inclusion into the model using the National Environmental Information Exchange Network (NEIEN).

Urban BMPS and certain forestry BMPs are tracked using specific GPS coordinates, others are reported at the county scale. The Chesapeake Bay Program then uses a tool called scenario builder to distribute BMPS inside and outside of the Chesapeake Bay watershed. The BMP scenario is then combined with several other baseline inputs (i.e., animal counts, land use, atmospheric emissions) to come up with projected load reductions associated with all these factors accounted for.

The Maryland Coastal Bays Program is currently working on filling out the BMP tracking tool developed by MDE, based on CAST assumptions, to track BMPs and simulate loads the way CAST tracks progress towards load reduction goals in the Chesapeake Bay watershed. In the Casselman River and Upper Jennings Run, restoration efforts to remediate low pH impairment listings are reported by MDE's Abandoned Mines Program in an annual report and summarized in the priority watershed chapter.

Other Progress Metrics

Other progress metrics, including tracking 319(h) Grant expenditures, is another way in which Maryland tracks NPS pollution reduction progress. You can find detailed information for individual watersheds in the *Priority Watersheds* section of this report (*page 13*). For more detailed information on statewide 319(h) Grant spending, please see Appendix A. For detailed information on individual 319(h) Grant funded projects in Priority Watersheds, see Appendix D.

319 Success Story

Section 319 nonpoint source pollution success stories highlight water bodies identified by states as being primarily nonpoint source-impaired and having achieved documented water quality improvements. Projects leading to Success Stories received funding from Clean Water Act (CWA) section 319 and/or other funding sources dedicated to solving nonpoint source (NPS) impairments. These stories also describe innovative strategies used to reduce NPS pollution, the growth of partnerships and a diversity of funding sources.

The success stories offer an opportunity for states to highlight where their restoration efforts have resulted in water quality improvements in NPS-impaired water bodies. Developing the stories also allows EPA to track the number of NPS-impaired water bodies that are partially or fully restored—which is a key measure in the effort to document how NPS restoration efforts are improving water quality on a segment basis across the nation.

Each year, Maryland is required to demonstrate a successful watershed restoration project. The FY21 success story that Maryland published was entitled, "Limestone Application Treatments Improve Alexander Run," and can be found posted, once available, on MDE's 319 website or on EPA's national website.

Additional Funding | Maryland's 319 NPS Management Program

In addition to 319(h) Grant funds, Maryland supplies significant State resources to finance programs and projects designed to reduce NPS pollution. In particular, Maryland's Chesapeake and Atlantic Coastal Bays Trust Fund (Trust Fund) is one of the State's primary funding sources for reducing NPS pollution. Maryland's Trust fund provides grant money to local governments and Non-profit Organizations for implementing NPS pollution water quality restoration projects.

Maryland's Trust Fund targets the most efficient and cost-effective nonpoint source projects. To date, the Trust Fund has provided more than $453 million for projects that have resulted in cumulative nitrogen, phosphorus, and sediment reductions of 1.35 million, 197 thousand, and 194 million pounds, respectively between SFY 2013 and SFY 2021. For further information, see the Chesapeake and Atlantic Costal Bays Trust Fund website[8].

National Water Quality Initiative | Maryland's 319 NPS Management Program

The National Water Quality Initiative (NWQI) is run by the U.S. Department of Agriculture - National Resources Conservation Services (USDA - NRCS). The NWQI helps farmers and forest landowners voluntarily improve water quality and aquatic habitat by focusing on watersheds with impaired streams. Maryland currently has two watersheds that are primarily agricultural with NWQI status: Catoctin Creek in Frederick County, and Prettyboy Reservoir in Baltimore and Carroll Counties. Surface waters in Catoctin Creek are impaired by sediments, nutrients, impacts to biological communities, and fecal coliform. Prettyboy Reservoir is impaired by mercury and phosphorus, while the streams draining to Prettyboy reservoir are impaired by fecal coliform and temperature.

Maryland was among the first States in 2012 to create a cooperative monitoring agreement to support the NWQI effort. MDE collaborated with NRCS to conduct in-stream monitoring in the Catoctin Creek watershed from 2013 through 2018. The State performed synoptic monitoring from 2013 through 2015 to determine which watersheds had the highest nutrient loadings. From 2016 through 2018, the State conducted bi-weekly ambient surface water monitoring at 25 stations throughout the watershed to

[8] Trust Fund Website: https://dnr.maryland.gov/ccs/Pages/funding/trust-fund.aspx

assess the effectiveness of agricultural BMP implementation. Station locations were identified based on the results of the prior synoptic monitoring and where agricultural BMPs were implemented.

During SFY 2019, the bi-weekly sampling continued at the 25 stations throughout the watershed. Sampling concluded in December 2018. Results from the study can be found in Catoctin Creek Water Quality Monitoring Report, NWQI (MDE 2019). Study results indicate that nutrient loadings may have decreased at some stations downstream of implemented BMPs. However, based on a power analysis conducted to determine the minimum number of required samples to detect a change, two more years of data are needed to reach a statistically significant conclusion.

In the fall of 2020, MDE and NRCS discussed the possibility of establishing a new agreement to perform monitoring in the Prettyboy Reservoir watershed located to the north of Baltimore MD to further assess the effectiveness of agricultural BMP implementation. In January 2021, MDE prepared a map of potential sampling sites for NRCS to evaluate. Due to covid delays, the agencies have continued discussion, however, the specifics have yet to be worked out. MDE is hopeful that a formal cooperative agreement can be developed between NRCS and MDE in the summer 2021.

Maryland's Priority Watersheds | 319 Priority Watersheds

Current Status of Maryland's 319 Priority Watersheds

Maryland tracks progress for 319(h) Grant implementation funding and NPS pollution reductions in its 319 Priority Watersheds (Table 3). As of SFY 2021, twelve watersheds had accepted A-I Watershed Plans and were eligible for 319(h) Grant funding. An additional three watersheds are developing A-I plans to be eligible for future funding through the 319(h) Grant Program.

Maryland uses the Chesapeake Assessment and Scenario Tool (CAST) outputs to estimate its load reductions/increases as more of a "real time" assessment of how our efforts are going. CAST uses a number of data inputs that can affect the loads in our watersheds, BMP implementation being only one of them. Consequently, even with increased BMP implementation the model may assign greater loads to a watershed which offset any reductions achieved through BMP implementation. This variability is reflected in the tables and watershed profiles included in this section.

Another clarification is that the data used for this report comes from CAST and is up to SFY20 which ended on June 30, 2020. The reason being that our final SFY21 progress has not been finalized. Typically our model inputs submission is due Dec. 1st of the following SFY so that there is time allowed to collect information, provide adequate quality assurance/control of the data, and to make sure there are no glaring errors in the modeling results.For detailed funding information, see Appendix A. MDE tracks nitrogen, phosphorus, and sediment reductions for all watersheds regardless of the watershed plan specifications; for all NPS pollution tracking and detailed nitrogen, phosphorus, and sediment loads tracking, see Appendix B. For detailed watershed 319(h) Grant funded project load reductions, see Appendix D.

Table 3[9]: *Summary of changes in Maryland's 319 Priority Watersheds*

Priority Watershed	Plan Start Date	Funding *(Total)* State | 319 | Total	FY21 Load Change *(lbs/yr)* TN | TP | TSS
Antietam Creek	2012	$ 1.2M | $ 3.1M | $ 4.3M	15.6K | -3.6K | 0.2M
Assawoman Bay	2020	$ 0.0M | $ 0.0M | $ 0.0M	0.0K | 0.0K | 0.0M
Back River - *Tidal*	2010	$6.0M | $ 0.6M | $6.6M	7.4K | 1.8K | 2.8M
Back River - *Upper*	2008	$12.7M | $ 1.2M | $13.9M	9.3K | 2.3K | 4.3M
Casselman River	2011	$ 0.0M | $ 0.1M | $ 0.1M	-11.9K | -0.1K | -6.8M
Choptank River - *Upper*	2010	$ 0.7M | $ 0.7M | $ 1.5M	162.6K | 2.4K | 4.3M
Corsica River	2004	$ 1.7M | $ 2.1M | $ 3.8M	29.8K | 3.6K | -1.4M
Gwynns Falls - *Middle*	2014	$12.8M | $ 1.1M | $13.9M	7.4K | 1.1K | 3.7M
Jennings Run - *Upper*	2019	$ 0.0M | $ 0.0M | $ 0.0M	1.3K | 0.1K | 0.2M
Jones Falls - *Lower*	2008	$ 6.8M | $ 0.5M | $ 7.3M	13.3K | 3.5K | 5.9M
Monocacy River - *Lower*	2008	$ 1.7M | $ 1.1M | $ 2.8M	103.7K | 10.9K | -10.0M
Sassafras River	2009	$ 4.6M | $ 0.4M | $ 5.0M	56.5K | -0.6K | 2.6M
Watershed Totals		**$48.3M | $10.9M | $59.1M**	**395.1K | 21.3K | 5.9M**

[9] The load changes in this report were calculated using CAST and are subject to variation as baseline conditions and BMP implementation levels in the model change on an annual basis. This is a representation of the implementation levels of BMPs and load changes based on conditions for FY21.

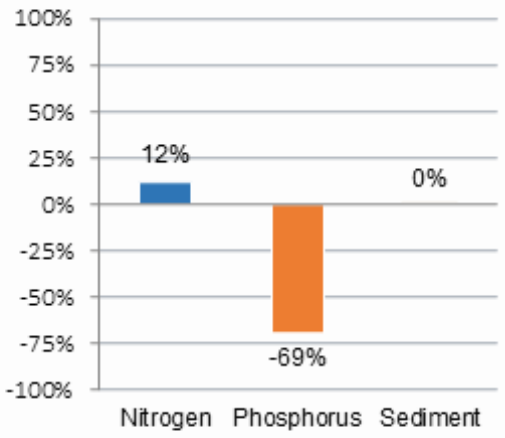
Antietam Creek – Plan Approved 2012 | 319 Priority Watersheds

Watershed Profile

Antietam Creek

Percent Progress Towards Target*

Nitrogen, Phosphorus, Sediment



*Watershed plan includes bacteria – See Appendix B

Land Use

Total Acres | **119K**

Agriculture | **39%**

Developed | **22%**

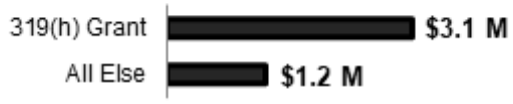
Natural | **38%**

NPS Reduction Progress

From 2012 plan acceptance to 2020, Antietam Creek is 12% toward its 127K lbs/yr nitrogen reduction goal, -69% toward its 5K lbs/yr phosphorus reduction goal, and -3% toward its 71.3 M lbs/yr sediment reduction goal.

Watershed Funding | SFY12 – SFY21

Millions of Dollars



Total Funding Sources and NPS Reductions | *Nitrogen, Phosphorus, Sediment*

Funding Source	Funds	Nitrogen | lbs/yr	Phosphorus | lbs/yr	Sediment | lbs/yr
319(h) Grant	$3.1M	1.5K	0.7K	0.0M
All Else	$1.2M	14.1K	-4.2K	0.2M
Total	**$4.3M**	**15.6K**	**-3.6K**	**0.2M**

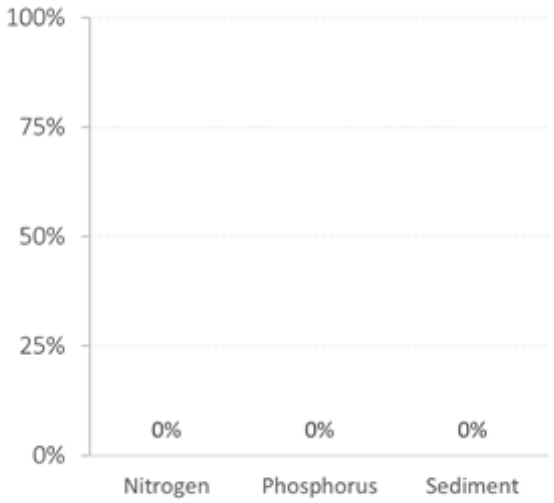
Assawoman Bay – Plan Approved 2020 | 319 Priority Watersheds

Watershed Profile

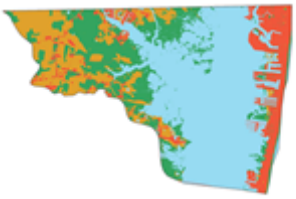
Assawoman Bay

Percent Progress Towards Target

Nitrogen, Phosphorus, Sediment



Land Use



Total Acres | **6K**

Agriculture | **21%**

Developed | **34%**

Natural | **45%**

NPS Reduction Progress

Assawoman Bay will not have progress until two years after its start date, in SFY 2022.

Watershed Funding | SFY20 -- SFY21

Millions of Dollars

319(h) Grant	**$0.0 M**
All Else	**$0.0 M**

Total Funding Sources and NPS Reductions | *Nitrogen, Phosphorus, Sediment*

Funding Source	Funds	Nitrogen | lbs/yr	Phosphorus | lbs/yr	Sediment | lbs/yr
319(h) Grant	$0.0M	0.0K	0.0K	0.0M
All Else	$0.0M	0.0K	0.0K	0.0M
Total	**$0.0M**	**0.0K**	**0.0K**	**0.0M**

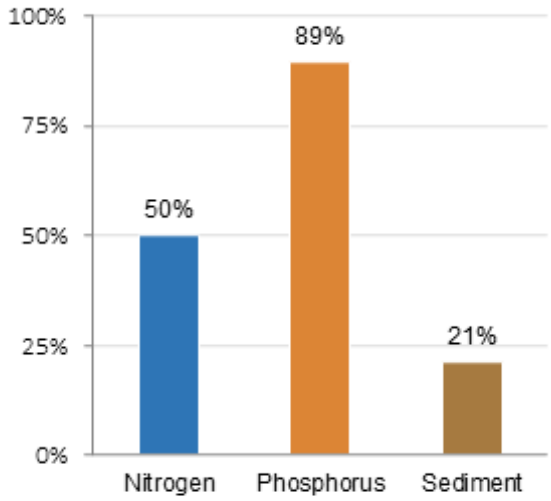
Back River: Tidal – Plan Approved 2010 | 319 Priority Watersheds

Watershed Profile

Back River: Tidal

Percent Progress Towards Target

Nitrogen, Phosphorus, Sediment



Land Use

Total Acres | **16K**

Agriculture | **3%**

Developed | **65%**

Natural | **33%**

NPS Reduction Progress

From 2010 plan acceptance to 2020, Back River: Tidal is 50% toward its 15K lbs/yr nitrogen reduction goal, -89% toward its 2K lbs/yr phosphorus reduction goal, and 21% toward its 13.3 M lbs/yr sediment reduction goal.

Watershed Funding | SFY10 – SFY21

Millions of Dollars *

* Back River: Tidal and Upper funding linked due to project overlap

Total Funding Sources and NPS Reductions | *Nitrogen, Phosphorus, Sediment*

Funding Source	Funds	Nitrogen | lbs/yr	Phosphorus | lbs/yr	Sediment | lbs/yr
319(h) Grant	$1.8M	0.3K	0.1K	0.0M
All Else	$18.8M	7.1K	1.7K	2.8M
Total	**$20.6M**	**7.4K**	**1.8K**	**2.8M**

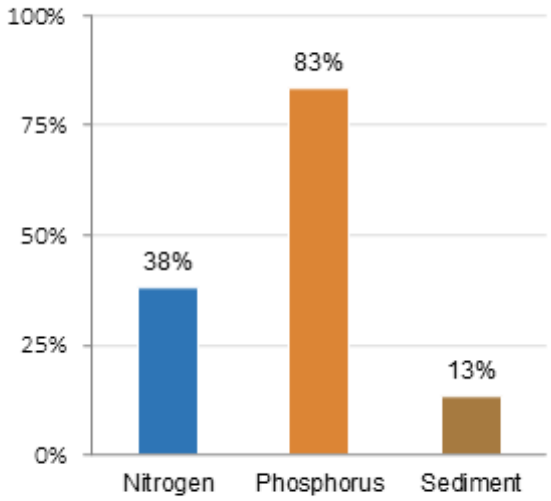
Back River: Upper – Plan Approved 2008 | 319 Priority Watersheds

Watershed Profile

Back River: Upper

Percent Progress Towards Target

Nitrogen, Phosphorus, Sediment



Land Use

Total Acres | **20K**

Agriculture | **0%**

Developed | **85%**

Natural | **15%**

NPS Reduction Progress

From 2008 plan acceptance to 2020, Back River: Upper is 38% toward its 24K lbs/yr nitrogen reduction goal, 83% toward its 3K lbs/yr phosphorus reduction goal, and 13% toward its 32.6 M lbs/yr sediment reduction goal.

Watershed Funding | SFY08 – SFY21

Millions of Dollars *

* Back River: Tidal and Upper funding linked due to project overlap

Total Funding Sources and NPS Reductions | *Nitrogen, Phosphorus, Sediment*

Funding Source	Funds	Nitrogen | lbs/yr	Phosphorus | lbs/yr	Sediment | lbs/yr
319(h) Grant	$1.8M	1.0K	0.3K	0.0M
All Else	$18.8M	8.3K	2.0K	4.3M
Total	**$20.6M**	**9.3K**	**2.3K**	**4.3M**

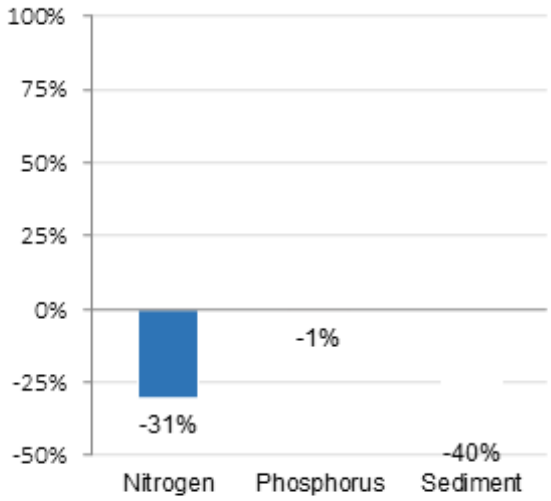
Casselman River – Plan Approved 2011 | 319 Priority Watersheds

Watershed Profile

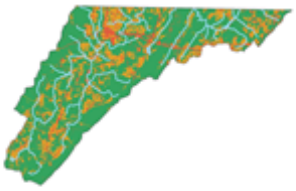
Casselman River

Percent Progress Towards Target*

Nitrogen, Phosphorus, Sediment



Land Use



Total Acres | **59K**

Agriculture | **17%**

Developed | **9%**

Natural | **74%**

NPS Reduction Progress

From 2011 plan acceptance to 2020, Casselman River is -31% toward its 39K lbs/yr nitrogen reduction goal, -1% toward its 6K lbs/yr phosphorus reduction goal, and -40% toward its 17.0 M lbs/yr sediment reduction goal.

Watershed Funding | SFY11 – SFY21

Millions of Dollars

Total Funding Sources and NPS Reductions | *Nitrogen, Phosphorus, Sediment*

Funding Source	Funds	Nitrogen | lbs/yr	Phosphorus | lbs/yr	Sediment | lbs/yr
319(h) Grant	$0.1M	0.0K	0.0K	0.0M
All Else	$0.0M	-11.9K	-0.1K	-6.8M
Total	**$0.1M**	**-11.9K**	**-0.1K**	**-6.8M**

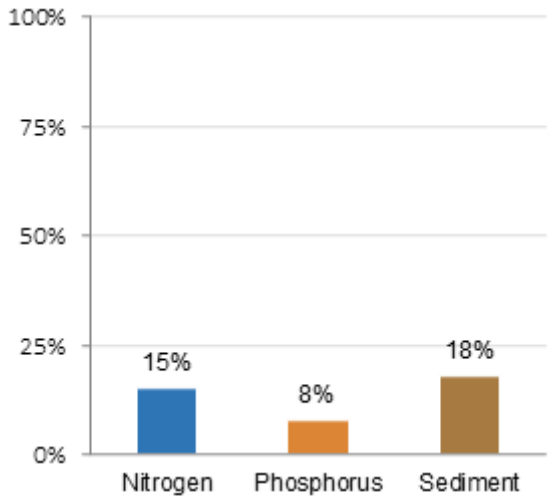
Choptank River: Upper – Plan Approved 2010 | 319 Priority Watersheds

Watershed Profile

Choptank River: Upper

Percent Progress Towards Target

Nitrogen, Phosphorus, Sediment



Land Use

Total Acres | **154K**

Agriculture | **54%**

Developed | **11%**

Natural | **36%**

NPS Reduction Progress

From 2010 plan acceptance to 2020, Choptank River: Upper is 5% toward its 1.1M lbs/yr nitrogen reduction goal, 8% toward its 30K lbs/yr phosphorus reduction goal, and 18% toward its 23.6 M lbs/yr sediment reduction goal.

Watershed Funding | SFY10 – SFY21

Millions of Dollars

Total Funding Sources and NPS Reductions | *Nitrogen, Phosphorus, Sediment*

Funding Source	Funds	Nitrogen | lbs/yr	Phosphorus | lbs/yr	Sediment | lbs/yr
319(h) Grant	$0.7M	1.1K	0.3K	0.0M
All Else	$0.7M	161.6K	2.1K	4.3M
Total	**$1.5M**	**162.6K**	**2.4K**	**4.3M**

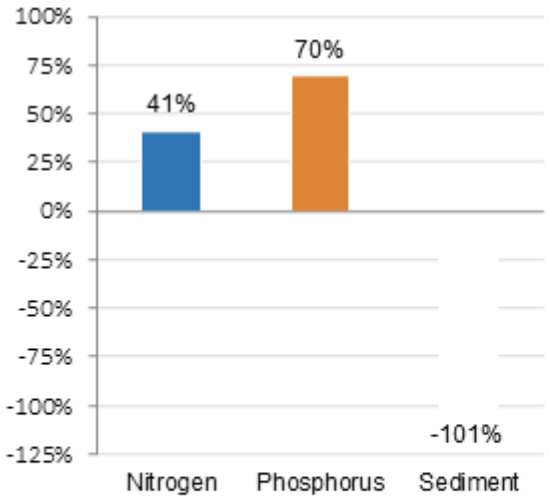
Corsica River – Plan Approved 2004 | 319 Priority Watersheds

Watershed Profile

Corsica River

Percent Progress Towards Target

Nitrogen, Phosphorus, Sediment



Land Use

Total Acres | **23K**

Agriculture | **55%**

Developed | **12%**

Natural | **33%**

NPS Reduction Progress

From 2004 plan acceptance to 2020, Corsica River is 41% toward its 72K lbs/yr nitrogen reduction goal, 80% toward its 5K lbs/yr phosphorus reduction goal, and -101% toward its 1.4 M lbs/yr sediment reduction goal.

Watershed Funding | SFY04 – SFY21

Millions of Dollars

Total Funding Sources and NPS Reductions | *Nitrogen, Phosphorus, Sediment*

Funding Source	Funds	Nitrogen | lbs/yr	Phosphorus | lbs/yr	Sediment | lbs/yr
319(h) Grant	$2.1M	4.9K	0.5K	0.0M
All Else	$1.7M	25.0K	3.1K	-1.4M
Total	**$3.8M**	**29.9K**	**3.6K**	**-1.4M**

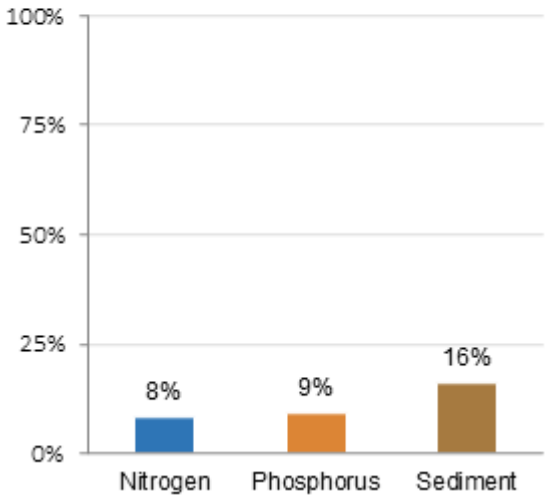
Gwynns Falls: Middle – Plan Approved 2014 | 319 Priority Watersheds

Watershed Profile

Gwynns Falls: Middle

Percent Progress Towards Target

Nitrogen, Phosphorus, Sediment



Land Use

Total Acres | **31K**

Agriculture | **1%**

Developed | **77%**

Natural | **22%**

NPS Reduction Progress

From 2014 plan acceptance to 2020, Gwynns Falls: Middle is 8% toward its 89K lbs/yr nitrogen reduction goal, 9% toward its 12K lbs/yr phosphorus reduction goal, and 16% toward its 23.5 M lbs/yr sediment reduction goal.

Watershed Funding | SFY14 – SFY21

Millions of Dollars

Total Funding Sources and NPS Reductions | *Nitrogen, Phosphorus, Sediment*

Funding Source	Funds	Nitrogen | lbs/yr	Phosphorus | lbs/yr	Sediment | lbs/yr
319(h) Grant	$1.1M	3.9K	1.6K	0.0M
All Else	$12.8M	3.5K	-0.5K	3.7M
Total	**$13.9M**	**7.4K**	**1.1K**	**3.8M**

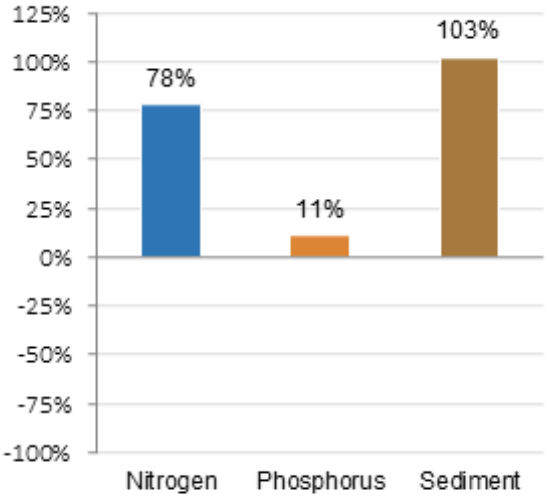
Jennings Run: Upper – Plan Approved 2019 | 319 Priority Watersheds

Watershed Profile

Jennings Run: Upper

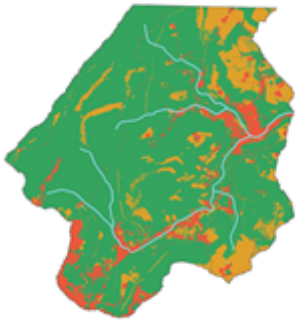
Percent Progress Towards Target*

Nitrogen, Phosphorus, Sediment



*Watershed plan is for pH—See Appendix B

Land Use



Total Acres | **19K**

Agriculture | **7%**

Developed | **12%**

Natural | **80%**

NPS Reduction Progress

From 2019 plan acceptance to 2020, Jennings Run: Upper is 78% toward its 1.7K lbs/yr nitrogen reduction goal, 11% toward its 0.6K lbs/yr phosphorus reduction goal, and 103% toward its - 0.32 M lbs/yr sediment reduction goal.

Watershed Funding | SFY19 – SFY21

Millions of Dollars

319(h) Grant	**$0.0 M**
All Else	**$0.0 M**

Total Funding Sources and NPS Reductions | *Nitrogen, Phosphorus, Sediment*

Funding Source	Funds	Nitrogen | lbs/yr	Phosphorus | lbs/yr	Sediment | lbs/yr
319(h) Grant	$0.0M	0.0K	0.0K	0.0M
All Else	$0.0M	1.3K	0.1K	0.2M
Total	**$0.0M**	**1.3K**	**0.1K**	**0.2M**

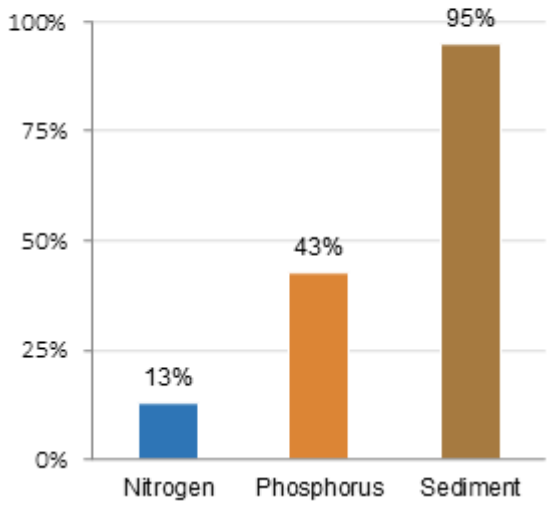
Jones Falls: Lower – Plan Approved 2008 | 319 Priority Watersheds

Watershed Profile

Jones Falls: Lower

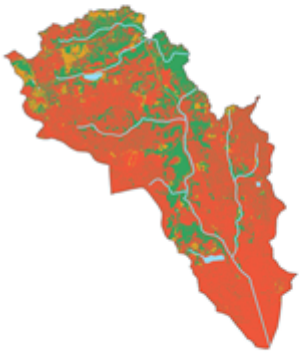
Percent Progress Towards Target*

Nitrogen, Phosphorus, Sediment



*Watershed plan includes bacteria – See Appendix B

Land Use



Total Acres | **37K**

Agriculture | **4%**

Developed | **67%**

Natural | **30%**

NPS Reduction Progress

From 2008 plan acceptance to 2020, Jones Falls: Lower is 13% toward its 103K lbs/yr nitrogen reduction goal, 43% toward its 8K lbs/yr phosphorus reduction goal, and 95% toward its 6.2 M lbs/yr sediment reduction goal.

Watershed Funding | SFY08 – SFY21

Millions of Dollars

Total Funding Sources and NPS Reductions | *Nitrogen, Phosphorus, Sediment*

Funding Source	Funds	Nitrogen | lbs/yr	Phosphorus | lbs/yr	Sediment | lbs/yr
319(h) Grant	$0.5M	0.1K	0.1K	0.0M
All Else	$6.8M	13.2K	3.4K	5.9M
Total	**$7.3M**	**13.3K**	**3.5K**	**5.9M**

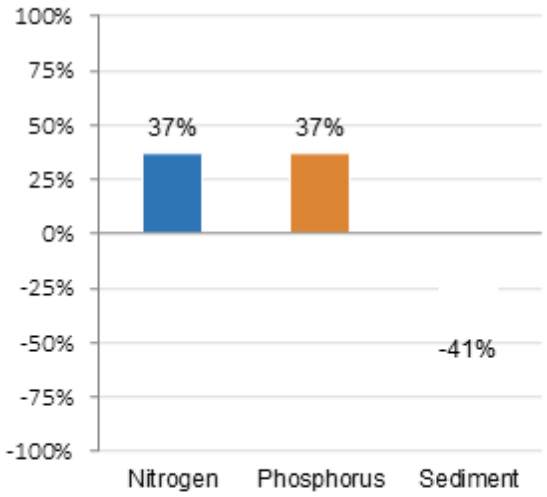
Monocacy River: Lower – Plan Approved 2008 | 319 Priority Watersheds

Watershed Profile

Monocacy River: Lower

Percent Progress Towards Target

Nitrogen, Phosphorus, Sediment



Land Use

Total Acres | **195K**

Agriculture | **34%**

Developed | **26%**

Natural | **39%**

NPS Reduction Progress

From 2008 plan acceptance to 2020, Monocacy River: Lower is 37% toward its 283K lbs/yr nitrogen reduction goal, 37% toward its 30K lbs/yr phosphorus reduction goal, and -41% toward its 24.4 M lbs/yr sediment reduction goal.

Watershed Funding | SFY08 – SFY21

Millions of Dollars

Total Funding Sources and NPS Reductions | *Nitrogen, Phosphorus, Sediment*

Funding Source	Funds	Nitrogen | lbs/yr	Phosphorus | lbs/yr	Sediment | lbs/yr
319(h) Grant	$1.1M	0.7K	0.2K	0.0M
All Else	$1.7M	103.0K	10.7K	-10.0M
Total	**$2.8M**	**103.7K**	**10.9K**	**-10.0M**

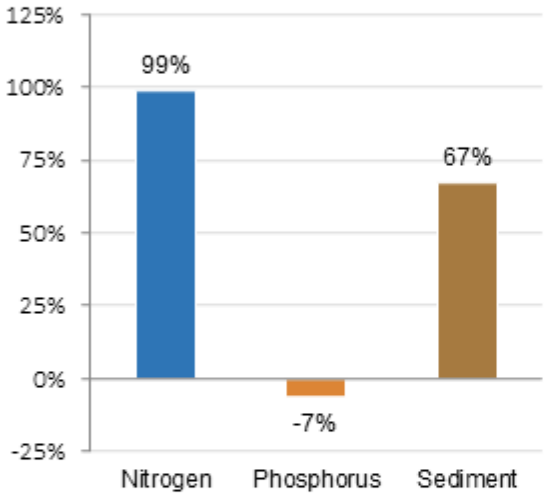
Sassafras River – Plan Approved 2009 | 319 Priority Watersheds

Watershed Profile

Sassafras River

Percent Progress Towards Target

Nitrogen, Phosphorus, Sediment



Land Use

Total Acres | **47K**

Agriculture | **58%**

Developed | **11%**

Natural | **31%**

NPS Reduction Progress

From 2009 plan acceptance to 2020, Sassafras River is 99% toward its 57K lbs/yr nitrogen reduction goal, -7% toward its 9K lbs/yr phosphorus reduction goal, and 67% toward its 3.8 M lbs/yr sediment reduction goal.

Watershed Funding | SFY09 – SFY21

Millions of Dollars

Total Funding Sources and NPS Reductions | *Nitrogen, Phosphorus, Sediment*

Funding Source	Funds	Nitrogen | lbs/yr	Phosphorus | lbs/yr	Sediment | lbs/yr
319(h) Grant	$0.4M	4.2K	0.3K	0.0M
All Else	$4.6M	52.3K	-0.9K	2.6M
Total	**$5.0M**	**56.5K**	**-0.6K**	**2.6M**

Appendix A | Financial Information

319(h) Grant Funding

Maryland tracks annual 319(h) Grant federal vs state contributions since 1990 (Table A - 1). However, tracking Priority Watershed progress did not begin until the first watershed plan for Corsica River was approved in 2004.

Table A - 1: *319(h) Grant funding by State Fiscal Year*

State Fiscal Year	319(h) Grant	Non-Federal Match	Total State and Federal Funds
1990 - 2003	$24,876,369	$16,584,247	$41,460,616
2004	$3,369,190	$2,246,127	$5,615,317
2005	$2,675,598	$1,783,732	$4,459,330
2006	$2,666,655	$1,777,770	$4,444,425
2007	$2,551,736	$1,701,157	$4,252,893
2008	$2,653,500	$1,769,000	$4,422,500
2009	$2,575,782	$1,717,188	$4,292,970
2010	$2,860,785	$1,907,190	$4,767,975
2011	$2,283,639	$1,522,426	$3,806,065
2012	$2,091,000	$1,394,000	$3,485,000
2013	$1,990,999	$1,327,333	$3,318,332
2014	$2,119,118	$1,412,745	$3,531,863
2015	$2,084,277	$1,389,518	$3,473,795
2016	$2,109,728	$1,406,485	$3,516,213
2017	$2,236,500	$1,491,000	$3,727,500
2018	$2,129,000	$1,419,333	$3,548,333
2019	$2,129,000	$1,419,335	$3,548,335
2020	$2,241,500	$1,494,334	$3,735,834
2021	$2,262,200	$1,514,800	$3,777,000
Post 2004 Totals	**$40,768,007**	**$27,178,673**	**$67,946,680**

Maintenance of Effort (MOE) vs Federal 319(h) Grant Funds

Maryland contributes more State funds to NPS pollution reduction on an annual basis compared to what it receives through 319(h) Grant funding (Figure A - 1). In SFY 2021, Maryland's NPS pollution control expenditures totaled over $70 million which is more than EPA's required minimum of $8.4 million in Maintenance of Effort spending. Much of the expenditure came from projects funded through the Water Quality State Revolving Loan Fund.

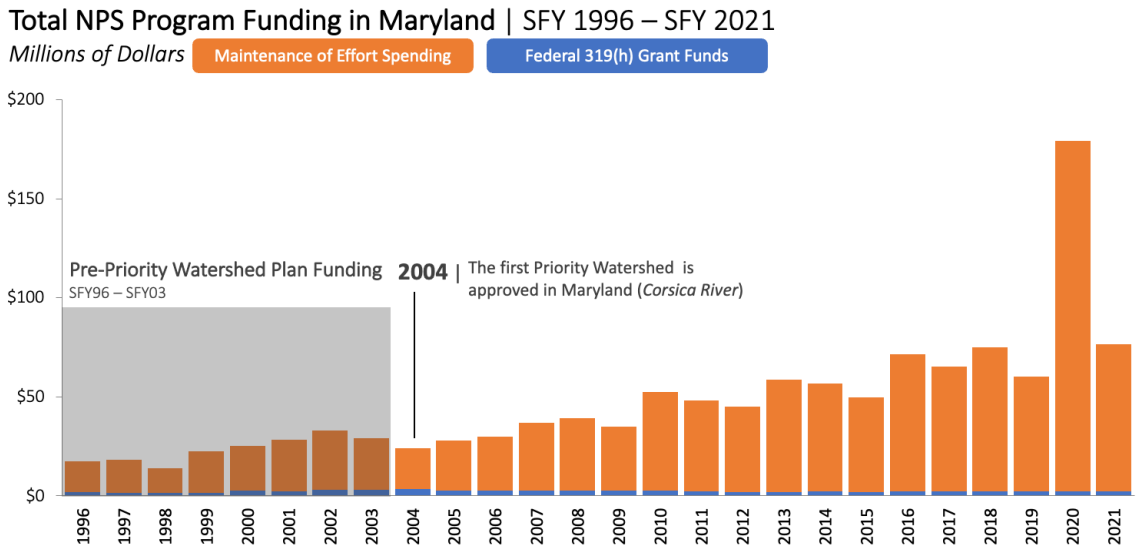


Figure A - 1: *Maryland's Maintenance of Effort funds (MOE) vs. Federal 319(h) Grant dollars received*

Table A - 2: *MOE vs Federal 319(h) Grant dollars received by State Fiscal Year (Millions of Dollars)*

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
319(h) Federal Spending	$3.1	$3.4	$2.7	$2.7	$2.6	$2.7	$2.6	$2.9	$2.3	$2.1	$2.0	$2.1	$2.1	$2.1	$2.2	$2.1	$2.2	$2.3
MOE	$20.8	$25.1	$27.1	$34.2	$36.7	$32.4	$49.4	$45.8	$43.1	$56.7	$54.5	$47.5	$69.4	$63.0	$73.0	$57.9	$177.0	$74.2

Chesapeake and Atlantic Costal Bays Trust Fund

Since its inception in SFY 2009, the Chesapeake and Atlantic Costal Bays Trust Fund (Trust Fund) has contributed $454 million to Maryland NPS programs and pollution reduction practices (Figure A - 2). The Trust Fund is a major source of funding for NPS programs and pollution reduction practices within the State and has contributed over three times the total lifetime funding as the 319(h) Grant, including state match.

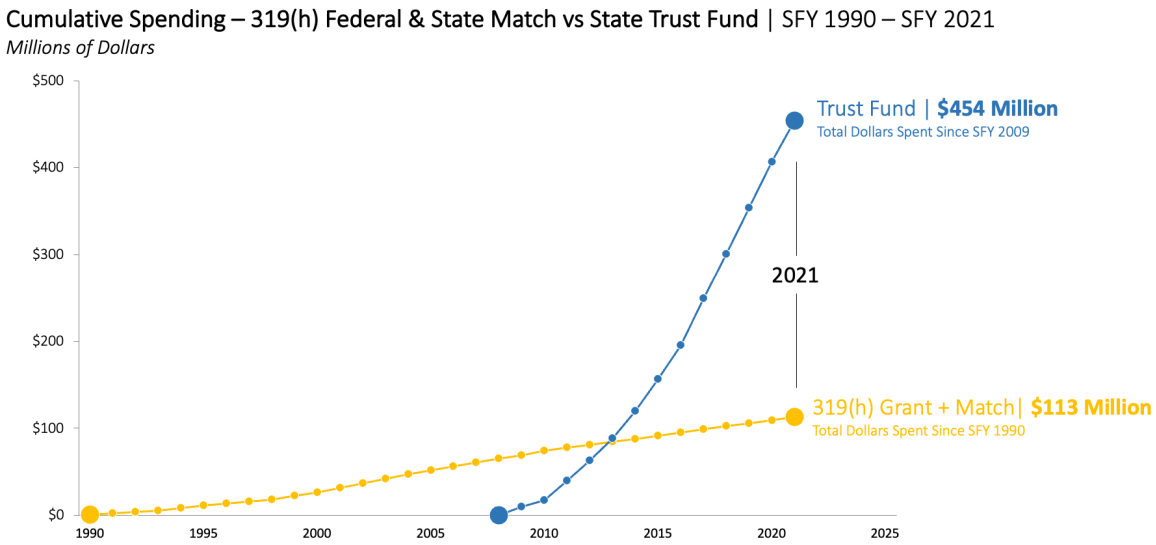


Figure A - 2: *Cumulative spending for 319(h) Grant (including State Match) and Trust Fund*

Initially, the Trust Fund was roughly twice the size of the total 319(h) Grant funding. Yet, since about SFY 2017, the Trust Fund has increased substantially with the latest years funding being about fifteen times greater than the same years 319(h) Grant dollars (Table A - 3).

Table A - 3: *319(h) Grant dollars vs Trust Fund spending by State Fiscal Year (Millions of Dollars)*

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
319(h) Grant + State Match	$4.29	$4.77	$3.81	$3.49	$3.32	$3.53	$3.47	$3.52	$3.73	$3.55	$3.55	$3.74	$3.78
Trust Fund	$9.60	$7.30	$22.64	$23.58	$24.80	$31.50	$36.80	$39.40	$53.47	$51.31	$52.93	$53.63	$47.00

Spending Breakdown by Priority Watershed

Table A - 4: *Spending by Priority Watershed by funding source*

Priority Watershed	Plan Start Date	Chesapeake and Atlantic Bays Trust Fund	State Revolving Fund	Total Non-319 Funds	319(h) Grant	Total Funds
Antietam Creek	2012	$805,673	$424,600	$1,230,273	$3,071,309	$4,301,582
Assawoman Bay	2020	-	-	-	-	-
Back River: Tidal	2010	$6,031,605	$12,724,100	$18,755,705	$1,755,348	$20,511,053
Back River: Upper	2008					
Casselman River	2011	$6,440	$0	$6,440	$83,619	$90,059
Choptank River: Upper	2010	$740,425	$0	$740,425	$720,346	$1,785,771
Corsica River	2004	$1,659,485	$0	$1,659,485	$2,137,406	$3,796,891
Gwynns Falls: Middle	2014	$3,248,000	$9,546,741	$12,794,741	$1,063,940	$13,858,681
Jennings Run: Upper	2019	-	-	-	-	$113,461
Jones Falls: Lower	2008	$6,730,213	$100,664	$6,830,877	$462,309	$7,293,186
Monocacy River: Lower	2008	$1,682,018	$0	$1,682,018	$1,143,305	$2,825,323
Sassafras River	2009	$4,584,724	$0	$4,584,724	$425,748	$5,010,472
Watershed Totals		**$25,488,583**	**$22,796,105**	**$48,284,688**	**$10,863,330**	**$59,586,479**

Appendix B | NPS Load Tracking

Nutrient and Sediment Tracking

Maryland tracks nutrient and sediment reductions for 319 Priority Watersheds using the Chesapeake Assessment Scenario Tool (CAST). In the following tables (*B - 1 to B - 3*), *Reduction Source Document* refers to how the *Percent Reduction Required* (PRR) was determined. All loads are reported as Edge of Stream: the nutrient and sediment entering directly into local waterbodies from the adjoining land.

The percent reduction for *Watershed Plan* was taken from the approved watershed plan. If no such number was given, PRR was calculated as the percent reduction of the watershed's Plan Start Date (PSD) NPS load necessary to achieve the watershed's TMDL for nitrogen, phosphorus, or sediment. If no TMDL was available, or the TMDL was exceeded, PRR was calculated as the percent reduction required of the watershed's PSD NPS load to achieve the watershed's Phase III WIP nutrient or sediment goals.

Maryland uses the Chesapeake Assessment and Scenario Tool (CAST) outputs to estimate its load reductions/increases as more of a "real time" assessment of how our efforts are going. CAST uses a number of data inputs that can affect the loads in our watersheds, BMP implementation being only one of them. Consequently, even with increased BMP implementation the model may assign greater loads to a watershed which offset any reductions achieved through BMP implementation. This variability is reflected in the tables and watershed profiles included in this section. Baseline loads were extracted directly from CAST and represent the load during a watershed's PSD. Target loads were calculated as *((1 – PRR) * Baseline Loads)*. Current Loads represent 2020 Progress loads in CAST for each watershed.

319 Reductions come from the individual project calculations provided to MDE in the watershed work plans; Appendix D contains the source documentation for these reductions. Non-319 Reductions are calculated as *((PSD - Current Loads) - 319 Reductions)*.

Table B - 1: *Nitrogen Tracking (Edge of Stream loads - Pounds/Year)*

Priority Watershed	Plan Start Date	Reduction Source Document	Percent Reduction Required	Baseline Loads	Target Loads	Current Loads (2020)	319 Reductions	Non-319 Reductions	Total Reductions	Target Reductions	Percent Progress
Antietam Creek	2012	Phase III WIP	10%	1,319,242	1,192,629	1,303,638	970	14,635	15,604	126,613	12%
Assawoman Bay	2020	-	-	-	-	-	-	-	-	-	-
Back River: Tidal	2010	Watershed Plan	15%	99,130	84,261	91,708	280	7,142	7,422	14,870	50%
Back River: Upper	2008	Watershed Plan	15%	162,869	138,439	153,603	974	8,291	9,266	24,430	38%
Casselman River	2011	Phase III WIP	11%	349,681	311,118	361,546	0	(11,865)	(11,865)	38,563	-31%
Choptank River: Upper	2010	Watershed Plan	39%	2,723,478	1,661,321	2,560,861	451	162,165	162,616	1,062,156	15%
Corsica River	2004	Local TMDL	22%	324,679	252,431	294,830	4,873	24,976	29,849	72,248	41%
Gwynns Falls: Middle	2014	Watershed Plan	29%	308,514	219,045	301,110	2,210	5,193	7,404	89,469	8%
Jennings Run: Upper	2019	Phase III WIP	2%	83,979	82,259	82,635	0	1,344	1,344	1,720	78%
Jones Falls: Lower	2008	Watershed Plan	22%	459,856	356,849	446,606	0	13,250	13,250	103,008	13%
Monocacy River: Lower	2008	Phase III WIP	8%	3,356,264	3,073,151	3,252,522	632	103,110	103,742	283,113	37%
Sassafras River	2009	Watershed Plan	9%	629,276	572,012	572,806	101	56,369	56,470	57,264	99%
Watershed Totals *(Nitrogen)*			**19%**	**9,816,968**	**7,943,514**	**9,421,867**	**10,492**	**384,609**	**395,101**	**1,873,454**	**21%**

Table B - 2: *Phosphorus Tracking (Edge of Stream loads - Pounds/Year)*

Priority Watershed	Plan Start Date	Reduction Source Document	Percent Reduction Required	Baseline Loads	Target Loads	Current Loads (2020)	319 Reductions	Non-319 Reductions	Total Reductions	Target Reductions	Percent Progress
Antietam Creek	2012	Local TMDL	7%	72,427	67,231	76,014	418	(4,005)	(3,587)	5,196	-69%
Assawoman Bay	2020	-	-	-	-	-	-	-	-	-	-
Back River: Tidal	2010	Watershed Plan	15%	13,304	11,309	11,523	94	1,687	1,781	1,996	89%
Back River: Upper	2008	Watershed Plan	15%	18,284	15,541	15,999	328	1,957	2,285	2,743	83%
Casselman River	2011	Phase III WIP	23%	27,709	21,382	27,775	-	(66)	(66)	6,327	-1%
Choptank River: Upper	2010	Watershed Plan	28%	106,500	76,680	104,125	274	2,101	2,376	29,820	8%
Corsica River	2004	Phase III WIP	35%	14,447	9,353	10,895	538	3,014	3,552	5,094	70%
Gwynns Falls: Middle	2014	Watershed Plan	45%	26,821	14,725	25,734	962	125	1,088	12,096	9%
Jennings Run: Upper	2019	Phase III WIP	13%	4,808	4,198	4,738	-	69	69	610	11%
Jones Falls: Lower	2008	Watershed Plan	30%	27,966	19,716	24,452	-	3,514	3,514	8,250	43%
Monocacy River: Lower	2008	Phase III WIP	26%	114,254	84,463	103,352	84	10,818	10,902	29,791	37%
Sassafras River	2009	Watershed Plan	34%	27,862	18,417	28,478	20	(636)	(616)	9,445	-7%
Watershed Totals *(Phosphorus)*			**24%**	**460,480**	**348,204**	**439,182**	**2,720**	**18,578**	**21,298**	**112,276**	**19%**

Table B - 3: *Sediment Tracking (Edge of Stream loads - Pounds/Year)*

Priority Watershed	Plan Start Date	Reduction Source Document	Percent Reduction Required	Baseline Loads	Target Loads	Current Loads (2020)	319 Reductions	Non-319 Reductions	Total Reductions	Target Reductions	Percent Progress
Antietam Creek	2012	Watershed Plan	52%	137,562,959	66,281,690	137,386,735	10,811,000	(10,634,776)	176,224	71,281,268	0%
Assawoman Bay	2020	-	-	-	-	-	-	-	-	-	-
Back River: Tidal	2010	Local TMDL	68%	19,490,972	6,237,111	16,661,249	428,000	2,401,722	2,829,722	13,253,861	21%
Back River: Upper	2008	Local TMDL	68%	47,994,451	15,358,224	43,693,456	203,000	4,097,995	4,300,995	32,636,227	13%
Casselman River	2011	Phase III WIP	18%	93,835,841	76,877,570	100,633,132	-	(6,797,291)	(6,797,291)	16,958,271	-40%
Choptank River: Upper	2010	Phase III WIP	31%	76,132,325	52,500,449	71,813,502	1,061,000	3,257,823	4,318,823	23,631,876	18%
Corsica River	2004	Phase III WIP	12%	11,026,744	9,658,555	12,414,803	1,520,000	(2,908,060)	(1,388,060)	1,368,189	-101%
Gwynns Falls: Middle	2014	Local TMDL	37%	63,591,505	40,062,648	59,846,248	3,156,000	589,257	3,745,257	23,528,857	16%
Jennings Run: Upper	2019	Phase III WIP	-2%	18,865,565	19,184,930	18,711,484	-	154,081	154,081	(319,365)	103%
Jones Falls: Lower	2008	Watershed Plan	8%	76,178,610	69,931,964	70,253,228	173,000	5,752,382	5,925,382	6,246,646	95%
Monocacy River: Lower	2008	Phase III WIP	9%	270,862,476	246,503,526	280,835,258	75,000	10,047,783)	(9,972,783)	24,358,949	-41%
Sassafras River	2009	Watershed Plan	15%	25,829,495	22,006,729	23,260,179	187,000	2,382,316	2,569,316	3,822,765	67%
Watershed Totals *(Sediment)*			**26%**	**850,668,536**	**630,801,803**	**844,806,868**	**17,614,000**	**5,844,054**	**5,861,668**	**219,866,733**	**3%**

Other NPS Pollution – Bacteria

MDE does not currently have a system for tracking bacteria reductions within priority watersheds. Bacteria concentrations and loads tend to be highly variable and difficult to track, particularly when assessing the effectiveness of restoration. The State will continue to evaluate new tools, technologies, and monitoring designs to track progress towards applicable bacteria TMDLs in the future. This largely applies to the Antietam Creek priority watershed plan, which addresses the Bacteria TMDL for the watershed.

Other NPS Pollution – pH Impairments

The Casselman River and Upper Jennings Run priority watershed plans were developed to address the low pH impairment listings due to acid mine drainage. Rather than directly tracking pH, Maryland tracks pH remediation by evaluating how many streams within these watersheds have been successfully delisted for a pH impairment (Table B - 4)., based on pre and post BMP implementation monitoring. Currently, four water quality segments within the Casselman River watershed have been delisted for pH.

Table B - 4: *Casselman River sub-watersheds delisted for pH impairments*

Casselman River | pH Delistings			
River Name	**HUC-12 Watershed**	**Impairment**	**Listing Category**
Alexander Run	050202040032	pH, Low	2 – Meets water quality criteria for the specified pollutant
Big Laurel Run	050202040033	pH, Low	2 – Meets water quality criteria for the specified pollutant
Spiker Run	050202040034	pH, Low	2 – Meets water quality criteria for the specified pollutant
Tarkiln Run	050202040032	pH, Low	2 – Meets water quality criteria for the specified pollutant

Estimating BMP reductions

The following tables provide information on active Best Management Practices that were accepted in the CAST tool. In many of the priority watersheds received funding and completed projects before any watershed plan was approved, and will other BMPs will have been implemented through a number of different funding sources and partners. The results below use CAST BMP efficiency assumptions that have been altered by local delivery factors for the Priority watersheds to better simulate the potential reductions BMPs would be able to produce if no baseline changes altered. These tables also reflect active BMPS in SFY21 and will change in SFY22 as BMPs are not verified and no longer receive credit.

The BMP implementation numbers are taken from CAST inputs, which may vary year to year as BMPs fail, do not get verified, new reporting partners come online, or get included in other model data inputs (e.g. tree planting BMPS become forests). Annual variability is to be expected.

MD-0207000410 - Antietam Creek Permit Approval 2012/Washington Co.	Duration	Unit	Measure	LBS Reduced Nitrogen	Phosphorus	Sediment
Agriculture Practices						
Nutrient Management						
Core Nitrogen	annual	Acres	42,068.84	48,618.54	-	-
Rate Nitrogen	annual	Acres	4,823.20	1,873.48	-	-
Placement Nitrogen	annual	Acres	1,009.92	826.73	-	-
Timing Nitrogen	annual	Acres	849.79	699.38	-	-
Core Phosphorus	annual	Acres	42,068.84	-	2,831.65	-
Rate Phosphorus	annual	Acres	707.28	-	18.26	-
Placement Phosphorus	annual	Acres	951.90	-	12.03	-
Timing Phosphorus	annual	Acres	-	-	-	-
TOTAL				52,018.13	2,861.95	-
Tillage Management						
Conservation	annual	Acres	6,374.36	13,573.55	1,348.94	5,289,470.41
Continuous High Residue	annual	Acres	20,156.41	60,085.45	5,326.94	32,227,789.68
Low Residue	annual	Acres	-	-	-	-
TOTAL				73,659.01	6,675.88	37,517,260.08
Cover Crop						
Traditional	annual	Acres	9,096.09	41,751.54	88.15	425,136.75
Commodity	annual	Acres	4,844.69	8,596.84	-	-
TOTAL				50,348.38	88.15	425,136.75
Pasture Management						
Alternative Watering	cumulative	Acres	3,253.04	-	-	-
Prescribed Grazing	cumulative	Acres	1,335.85	691.14	130.33	1,789.09
Horse Pasture Management	cumulative	Acres	0.05	0.05	0.02	0.21
Forest Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	12.09	-	2.97	65.19
Grass Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	27.89	2,285.11	491.19	348,051.03
TOTAL				2,976.30	624.50	349,905.52
Forest Buffers	cumulative	Acres in Buffers	898.09	34,727.96	414.05	2,102,625.01
Wetland Restoration	cumulative	Acres	2.58	78.50	1.55	5,108.91
Wetland Creation	cumulative	Acres	6.62	111.34	2.11	7,988.74
Wetland Enhancement and Rehabilitation	cumulative	Acres	-	-	-	-
Land Retirement	cumulative	Acres	1,175.73	14,499.11	(33.04)	1,525,154.62
Grass Buffers	cumulative	Acres in Buffers	120.05	3,733.13	21.21	289,072.48
Tree Planting	cumulative	Acres	223.90	3,167.64	40.22	243,856.85
Alternative Crops	cumulative	Acres	-	-	-	-
Soil and Water Conservation Plan	cumulative	Acres	46,864.74	42,431.81	2,167.49	10,718,559.87
Crop Irrigation Management	cumulative	Acres	-	-	-	-
Manure Incorporation	annual	Acres	1,381.46	2,490.24	136.98	-
Capture & Reuse	annual	Acres	-	-	-	-
Non Urban Stream Restoration	cumulative	Feet	6,025.79	409.21	260.92	845,034.79
Non Urban Shoreline Management	cumulative	Feet	-	-	-	-
TOTAL				104,625.24	3,635.98	16,087,306.79
Agricultural Drainage Management				-	-	-
Denitrifying Ditch Bioreactors	cumulative	Acres	62.53	266.73	-	-
Saturated Buffer	cumulative	Acres	62.53	3,270.59	-	125,374.61
Sorbing Materials in Ag Ditches	cumulative	Acres	62.53	-	10.26	-
Water Control Structures	cumulative	Acres	62.53	274.86	-	-
TOTAL				3,812.18	10.26	125,374.61
Animal Waste Management Systems						
Broiler Mortality Freezers	annual	Dry Tons (Carcasses)	-	-	-	-
Barnyard Runoff Control & Loafing Lot Management	cumulative	Acres	59.52	8,822.63	380.43	162,178.59
Ag Stormwater Management	cumulative	Acres Treated	-	-	-	-
Manure Transport	annual	Dry Tons	721.11	131.62	211.26	-
Dairy Precision Feeding	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Litter Amendments)	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Biofilters)	cumulative	Animal Units	-	-	-	-
Ammonia Emission Reductions (Lagoon Covers)	cumulative	Animal Units	-	-	-	-
TOTAL				8,954.25	591.69	162,178.59
Urban/Suburban Practices						
Stormwater Management						
Runoff Reduction Performance Standard	cumulative	Acres Treated	462.20	1,560.25	152.56	309,628.03
Storm Water Treatment Performance Standard	cumulative	Acres Treated	1,957.48	3,859.36	509.45	1,220,555.28
Wet Ponds & Wetlands	cumulative	Acres Treated	1,782.68	3,197.87	660.86	1,399,517.38
Floating Treatment Wetlands	cumulative	Acres Treated (Wet Pond)	-	-	-	-
Dry Ponds	cumulative	Acres Treated	3,268.77	1,464.90	269.74	427,707.29
Extended Dry Ponds	cumulative	Acres Treated	4,707.71	8,444.97	776.96	3,695,855.02
Infiltration Practices	cumulative	Acres Treated	196.05	1,450.18	137.14	243,695.22
Filtering Practices	cumulative	Acres Treated	127.79	458.31	63.11	133,762.92
BioRetention	cumulative	Acres Treated	49.21	257.38	27.67	48,288.38
BioSwale	cumulative	Acres Treated	14.81	92.95	9.14	15,504.32
Permeable Pavement	cumulative	Acres Treated	0.30	1.25	0.12	274.63
Vegetated Open Channel	cumulative	Acres Treated	17.82	43.93	4.04	13,988.06
Urban Filter Strips	cumulative	Acres Treated	-	-	-	-
Grey Infrastructure (IDDE)	annual	Acres Treated	-	-	-	-
Impervious Disconnection	cumulative	Acres Treated	0.10	0.13	0.01	4.93
Conservation Landscaping Practices	cumulative	Acres Treated	-	-	-	-
TOTAL				20,831.48	2,610.81	7,508,781.46
Erosion and Sediment Control	annual	Acres	-	-	-	-
Impervious Surface Reduction	cumulative	Acres	0.00	0.00	-	0.02
Urban Forest Buffers	cumulative	Acres in Buffers	11.75	102.29	15.17	14,003.71
Urban Tree Planting	cumulative	Acres	117.17	104.88	15.18	11,900.81
Urban Forest Planting	cumulative	Acres	10.37	68.85	9.45	6,556.02
Urban Nutrient Management	annual	Acres	16,983.86	49,189.85	1,960.28	-
Urban Stream Restoration	cumulative	Feet	4,560.56	309.71	197.47	639,556.93
Storm Drain Cleanout	annual	Lbs of Sediment	-	-	-	-
Street Sweeping	annual	Acres	80.80	17.58	2.57	20,262.20
Urban Shoreline Management	cumulative	Feet	-	-	-	-
Septic Connections	cumulative	No. Systems	4.01	50.02	-	-
Septic Denitrification	cumulative	No. Systems	282.49	2,280.50	-	-
Septic Pumping	annual	No. Systems	-	-	-	-
Resource Practices						
Forest Harvesting Practices	annual	Acres	0.08	0.37	0.00	20.57
Dirt&Gravel Road E&S	cumulative	Feet	-	-	-	-
Non-Tidal Algal Flow-way	annual	Acres	-	-	-	-
Tidal Algal Flow-way	annual	Acres	-	-	-	-
TOTAL				52,124.04	2,200.11	692,300.26
Antietam Creek Watershed Load Reduction Summary				369,349.01	19,299.32	62,868,244.06

MD-020600020409 - Corsica River Permit Approval 2006/Queen Anne's Co.	Duration	Unit	Measure	LBS Reduced Nitrogen	Phosphorus	Sediment
Agriculture Practices						
Nutrient Management						
Core Nitrogen	annual	Acres	9,736.23	18,277.73	-	-
Rate Nitrogen	annual	Acres	3,447.79	2,024.58	-	-
Placement Nitrogen	annual	Acres	1,924.27	2,789.38	-	-
Timing Nitrogen	annual	Acres	597.47	742.94	-	-
Core Phosphorus	annual	Acres	9,736.23	-	2,035.07	-
Rate Phosphorus	annual	Acres	17.71	-	1.21	-
Placement Phosphorus	annual	Acres	1,606.06	-	53.90	-
Timing Phosphorus	annual	Acres	-	-	-	-
TOTAL				23,834.62	2,090.17	-
Tillage Management						
Conservation	annual	Acres	2,432.66	2,113.77	392.61	399,882.04
Continuous High Residue	annual	Acres	7,894.58	20,579.05	1,779.04	2,500,476.91
Low Residue	annual	Acres	-	-	-	-
TOTAL				22,692.82	2,171.65	2,900,358.95
Cover Crop						
Traditional	annual	Acres	7,109.71	34,265.62	33.57	8,390.16
Commodity	annual	Acres	1,465.92	2,973.12	-	-
TOTAL				37,238.75	33.57	8,390.16
Pasture Management						
Alternative Watering	cumulative	Acres	42.41	18.96	4.46	6.69
Prescribed Grazing	cumulative	Acres	24.22	19.74	8.92	9.55
Horse Pasture Management	cumulative	Acres	5.25	-	1.66	2.76
Forest Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	1.21	63.75	19.79	11,266.19
Grass Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	1.31	66.69	20.89	12,204.15
TOTAL				169.15	55.71	23,489.35
Forest Buffers	cumulative	Acres in Buffers	104.59	7,550.20	116.28	86,809.90
Wetland Restoration	cumulative	Acres	142.11	6,369.16	170.53	97,636.41
Wetland Creation	cumulative	Acres	66.11	1,704.07	53.53	28,366.45
Wetland Enhancement and Rehabilitation	cumulative	Acres	-	-	-	-
Land Retirement	cumulative	Acres	231.07	4,344.45	11.59	91,532.97
Grass Buffers	cumulative	Acres in Buffers	1,283.99	71,566.35	797.13	1,064,310.56
Tree Planting	cumulative	Acres	17.56	389.10	10.98	6,877.98
Alternative Crops	cumulative	Acres	3.14	66.34	0.36	1,247.55
Soil and Water Conservation Plan	cumulative	Acres	12,194.71	18,765.70	953.14	1,065,982.98
Crop Irrigation Management	cumulative	Acres	-	-	-	-
Manure Incorporation	annual	Acres	1,074.22	2,169.04	99.87	-
Capture & Reuse	annual	Acres	-	-	-	-
Non Urban Stream Restoration	cumulative	Feet	-	-	-	-
Non Urban Shoreline Management	cumulative	Feet	-	-	-	-
TOTAL				97,300.98	1,873.08	2,229,952.05
Agricultural Drainage Management						
Denitrifying Ditch Bioreactors	cumulative	Acres	106.30	463.16	-	-
Saturated Buffer	cumulative	Acres	106.30	6,817.10	14.10	42,969.71
Sorbing Materials in Ag Ditches	cumulative	Acres	106.30	-	24.18	-
Water Control Structures	cumulative	Acres	106.30	688.45	-	-
TOTAL				7,968.71	38.29	42,969.71
Animal Waste Management Systems						
Broiler Mortality Freezers	annual	Dry Tons (Carcasses)	-	-	-	-
Barnyard Runoff Control & Loafing Lot Management	cumulative	Acres	3.06	564.61	50.19	817.45
Ag Stormwater Management	cumulative	Acres Treated	-	-	-	-
Manure Transport	annual	Dry Tons	512.11	1,304.55	49.22	-
Dairy Precision Feeding	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Litter Amendments)	annual	Animal Units	53.93	25.48	0.12	-
Ammonia Emission Reductions (Biofilters)	cumulative	Animal Units	-	-	-	-
Ammonia Emission Reductions (Lagoon Covers)	cumulative	Animal Units	-	-	-	-
TOTAL				1,894.64	99.53	817.45
Urban/Suburban Practices						
Stormwater Management						
Runoff Reduction Performance Standard	cumulative	Acres Treated	0.14	0.74	0.09	32.14
Storm Water Treatment Performance Standard	cumulative	Acres Treated	1,112.64	3,330.87	563.33	229,495.16
Wet Ponds & Wetlands	cumulative	Acres Treated	633.82	1,115.76	284.70	109,755.74
Floating Treatment Wetlands	cumulative	Acres Treated (Wet Pond)	-	-	-	-
Dry Ponds	cumulative	Acres Treated	39.29	17.34	3.88	1,133.79
Extended Dry Ponds	cumulative	Acres Treated	0.04	0.08	0.01	7.38
Infiltration Practices	cumulative	Acres Treated	12.57	91.31	10.67	3,446.00
Filtering Practices	cumulative	Acres Treated	2.87	10.13	1.72	663.77
BioRetention	cumulative	Acres Treated	23.22	119.26	15.85	5,025.79
BioSwale	cumulative	Acres Treated	44.79	276.07	33.61	10,340.93
Permeable Pavement	cumulative	Acres Treated	2.04	8.36	1.02	411.25
Vegetated Open Channel	cumulative	Acres Treated	-	-	-	-
Urban Filter Strips	cumulative	Acres Treated	-	-	-	-
Grey Infrastructure (IDDE)	annual	Acres Treated	-	-	-	-
Impervious Disconnection	cumulative	Acres Treated	-	-	-	-
Conservation Landscaping Practices	cumulative	Acres Treated	-	-	-	-
TOTAL				4,969.92	914.89	360,311.96
Erosion and Sediment Control	annual	Acres	81.98	-	-	195,041.93
Impervious Surface Reduction	cumulative	Acres	-	-	-	-
Urban Forest Buffers	cumulative	Acres in Buffers	1.52	13.02	2.34	422.60
Urban Tree Planting	cumulative	Acres	0.46	0.45	0.08	42.11
Urban Forest Planting	cumulative	Acres	2.02	13.23	2.19	318.05
Urban Nutrient Management	annual	Acres	1,833.63	1,141.53	81.05	-
Urban Stream Restoration	cumulative	Feet	-	-	-	-
Storm Drain Cleanout	annual	Lbs of Sediment	-	-	-	-
Street Sweeping	annual	Acres	-	-	-	-
Urban Shoreline Management	cumulative	Feet	-	-	-	-
Septic Connections	cumulative	Number of Systems	46.15	375.72	-	-
Septic Denitrification	cumulative	Number of Systems	-	-	-	-
Septic Pumping	annual	Number of Systems	-	-	-	-
Resource Practices						
Forest Harvesting Practices	annual	Acres	34.15	128.06	2.26	1,135.18
Dirt&Gravel Road E&S	cumulative	Feet	-	-	-	-
Non-Tidal Algal Flow-way	annual	Acres	-	-	-	-
Tidal Algal Flow-way	annual	Acres	-	-	-	-
TOTAL				1,672.02	87.92	196,959.88
Corsica River Watershed Load Reduction Summary				197,741.61	7,364.80	5,763,249.49

MD-N24510WM0_3650_0001 - Lower Jones Falls Permit Approval 2008/Baltimore City & Co.	Duration	Unit	Measure	LBS Reduced Nitrogen	Phosphorus	Sediment
Agriculture Practices						
Nutrient Management						
Core Nitrogen	annual	Acres	-	-	-	-
Rate Nitrogen	annual	Acres	-	-	-	-
Placement Nitrogen	annual	Acres	-	-	-	-
Timing Nitrogen	annual	Acres	-	-	-	-
Core Phosphorus	annual	Acres	-	-	-	-
Rate Phosphorus	annual	Acres	-	-	-	-
Placement Phosphorus	annual	Acres	-	-	-	-
Timing Phosphorus	annual	Acres	-	-	-	-
TOTAL				-	-	-
Tillage Management						
Conservation	annual	Acres	-	-	-	-
Continuous High Residue	annual	Acres	-	-	-	-
Low Residue	annual	Acres	-	-	-	-
TOTAL				-	-	-
Cover Crop						
Traditional	annual	Acres	-	-	-	-
Commodity	annual	Acres	-	-	-	-
TOTAL				-	-	-
Pasture Management						
Alternative Watering	cumulative	Acres	-	-	-	-
Prescribed Grazing	cumulative	Acres	-	-	-	-
Horse Pasture Management	cumulative	Acres	-	-	-	-
Forest Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	-	-	-	-
Grass Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	-	-	-	-
TOTAL				-	-	-
Forest Buffers	cumulative	Acres in Buffers	-	-	-	-
Wetland Restoration	cumulative	Acres	-	-	-	-
Wetland Creation	cumulative	Acres	-	-	-	-
Wetland Enhancement and Rehabilitation	cumulative	Acres	-	-	-	-
Land Retirement	cumulative	Acres	-	-	-	-
Grass Buffers	cumulative	Acres in Buffers	-	-	-	-
Tree Planting	cumulative	Acres	-	-	-	-
Alternative Crops	cumulative	Acres	-	-	-	-
Soil and Water Conservation Plan	cumulative	Acres	-	-	-	-
Crop Irrigation Management	cumulative	Acres	-	-	-	-
Manure Incorporation	annual	Acres	-	-	-	-
Capture & Reuse	annual	Acres	-	-	-	-
Non Urban Stream Restoration	cumulative	Feet	-	-	-	-
Non Urban Shoreline Management	cumulative	Feet	-	-	-	-
TOTAL				-	-	-
Agricultural Drainage Management						
Denitrifying Ditch Bioreactors	cumulative	Acres	-	-	-	-
Saturated Buffer	cumulative	Acres	-	-	-	-
Sorbing Materials in Ag Ditches	cumulative	Acres	-	-	-	-
Water Control Structures	cumulative	Acres	-	-	-	-
TOTAL				-	-	-
Animal Waste Management Systems						
Broiler Mortality Freezers	annual	Dry Tons (Carcasses)	-	-	-	-
Barnyard Runoff Control & Loafing Lot Management	cumulative	Acres	-	-	-	-
Ag Stormwater Management	cumulative	Acres Treated	-	-	-	-
Manure Transport	annual	Dry Tons	-	-	-	-
Dairy Precision Feeding	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Litter Amendments)	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Biofilters)	cumulative	Animal Units	-	-	-	-
Ammonia Emission Reductions (Lagoon Covers)	cumulative	Animal Units	-	-	-	-
TOTAL				-	-	-
Urban/Suburban Practices						
Stormwater Management						
Runoff Reduction Performance Standard	cumulative	Acres Treated	13.11	34.02	3.69	5,681.01
Storm Water Treatment Performance Standard	cumulative	Acres Treated	108.96	165.10	24.14	44,039.83
Wet Ponds & Wetlands	cumulative	Acres Treated	0.28	0.41	0.09	175.06
Floating Treatment Wetlands	cumulative	Acres Treated (Wet Pond)	-	-	-	-
Dry Ponds	cumulative	Acres Treated	60.19	21.84	4.11	6,201.81
Extended Dry Ponds	cumulative	Acres Treated	0.16	0.23	0.02	96.63
Infiltration Practices	cumulative	Acres Treated	0.68	4.10	0.40	669.68
Filtering Practices	cumulative	Acres Treated	1.92	5.58	0.79	1,582.93
BioRetention	cumulative	Acres Treated	5.70	24.15	2.68	4,402.44
BioSwale	cumulative	Acres Treated	0.01	0.07	0.01	10.76
Permeable Pavement	cumulative	Acres Treated	-	-	-	-
Vegetated Open Channel	cumulative	Acres Treated	-	-	-	-
Urban Filter Strips	cumulative	Acres Treated	-	-	-	-
Grey Infrastructure (IDDE)	annual	Acres Treated	-	-	-	-
Impervious Disconnection	cumulative	Acres Treated	-	-	-	-
Conservation Landscaping Practices	cumulative	Acres Treated	-	-	-	-
TOTAL				255.51	35.92	62,860.15
Erosion and Sediment Control	annual	Acres	37.49	-	-	35,835.69
Impervious Surface Reduction	cumulative	Acres	0.02	0.09	-	30.06
Urban Forest Buffers	cumulative	Acres in Buffers	-	-	-	-
Urban Tree Planting	cumulative	Acres	84.45	8.75	1.67	1,355.85
Urban Forest Planting	cumulative	Acres	2.27	10.37	1.82	739.98
Urban Nutrient Management	annual	Acres	4,090.76	605.22	33.06	-
Urban Stream Restoration	cumulative	Feet	1,911.21	115.16	99.91	238,423.19
Storm Drain Cleanout	annual	Lbs of Sediment	-	-	-	-
Street Sweeping	annual	Acres	-	-	-	-
Urban Shoreline Management	cumulative	Feet	-	-	-	-
Septic Connections	cumulative	Number of Systems	-	-	-	-
Septic Denitrification	cumulative	Number of Systems	-	-	-	-
Septic Pumping	annual	Number of Systems	-	-	-	-
Resource Practices						
Forest Harvesting Practices	annual	Acres	-	-	-	-
Dirt&Gravel Road E&S	cumulative	Feet	-	-	-	-
Non-Tidal Algal Flow-way	annual	Acres	-	-	-	-
Tidal Algal Flow-way	annual	Acres	-	-	-	-
TOTAL				1,029.00	176.26	345,910.74
Lower Jones Falls Watershed Load Reduction Summary				1,284.51	212.18	408,770.90

MD-02140302 - Lower Monocacy Permit Approval 2008/Fredneck Co.	Duration	Unit	Measure	LBS Reduced Nitrogen	Phosphorus	Sediment
Agriculture Practices						
Nutrient Management						
Core Nitrogen	annual	Acres	17,707.64	23,822.09	-	-
Rate Nitrogen	annual	Acres	4,738.07	2,177.62	-	-
Placement Nitrogen	annual	Acres	478.22	449.13	-	-
Timing Nitrogen	annual	Acres	449.52	444.51	-	-
Core Phosphorus	annual	Acres	17,707.64	-	1,461.41	-
Rate Phosphorus	annual	Acres	272.36	-	10.20	-
Placement Phosphorus	annual	Acres	378.78	-	6.89	-
Timing Phosphorus	annual	Acres	-	-	-	-
TOTAL				26,893.35	1,478.51	-
Tillage Management						
Conservation	annual	Acres	4,323.76	11,675.06	906.35	2,980,156.37
Continuous High Residue	annual	Acres	13,693.87	51,760.63	3,711.45	18,186,421.27
Low Residue	annual	Acres	-	-	-	-
TOTAL				63,435.69	4,617.80	21,166,577.64
Cover Crop						
Traditional	annual	Acres	8,536.11	46,498.22	64.74	148,126.81
Commodity	annual	Acres	13,693.87	34,061.67	-	-
TOTAL				80,559.89	64.74	148,126.81
Pasture Management						
Alternative Watering	cumulative	Acres	2,113.14	1,073.16	160.68	2,008.58
Prescribed Grazing	cumulative	Acres	328.40	359.42	74.02	950.72
Horse Pasture Management	cumulative	Acres	35.85	-	6.72	137.75
Forest Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	6.84	406.56	106.17	67,373.88
Grass Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	20.80	1,188.93	312.92	204,823.54
TOTAL				3,028.07	660.52	275,294.47
Forest Buffers	cumulative	Acres in Buffers	777.61	47,958.59	597.02	1,814,184.85
Wetland Restoration	cumulative	Acres	0.00	0.00	0.00	0.03
Wetland Creation	cumulative	Acres	-	-	-	-
Wetland Enhancement and Rehabilitation	cumulative	Acres	-	-	-	-
Land Retirement	cumulative	Acres	1,224.39	21,048.19	58.78	1,452,741.78
Grass Buffers	cumulative	Acres in Buffers	152.42	7,338.87	44.69	362,035.05
Tree Planting	cumulative	Acres	54.00	1,068.26	22.41	56,599.61
Alternative Crops	cumulative	Acres	-	-	-	-
Soil and Water Conservation Plan	cumulative	Acres	32,176.45	-	5,849.36	-
Crop Irrigation Management	cumulative	Acres	-	-	-	-
Manure Incorporation	annual	Acres	2,071.62	4,288.38	223.07	-
Capture & Reuse	annual	Acres	-	-	-	-
Non Urban Stream Restoration	cumulative	Feet	117.53	6.54	5.09	15,174.56
Non Urban Shoreline Management	cumulative	Feet	-	-	-	-
TOTAL				81,708.82	6,800.41	3,700,735.87
Agricultural Drainage Management						
Denitrifying Ditch Bioreactors	cumulative	Acres	177.34	959.39	-	-
Saturated Buffer	cumulative	Acres	177.34	12,141.72	16.91	297,286.44
Sorbing Materials in Ag Ditches	cumulative	Acres	177.34	-	32.24	-
Water Control Structures	cumulative	Acres	177.34	1,047.91	-	-
TOTAL				14,149.03	49.15	297,286.44
Animal Waste Management Systems						
Broiler Mortality Freezers	annual	Dry Tons (Carcasses)	-	-	-	-
Barnyard Runoff Control & Loafing Lot Management	cumulative	Acres	36.47	3,109.34	86.45	102,560.44
Ag Stormwater Management	cumulative	Acres Treated	-	-	-	-
Manure Transport	annual	Dry Tons	0.07	0.03	0.03	-
Dairy Precision Feeding	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Litter Amendments)	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Biofilters)	cumulative	Animal Units	-	-	-	-
Ammonia Emission Reductions (Lagoon Covers)	cumulative	Animal Units	-	-	-	-
TOTAL				3,109.37	86.48	102,560.44
Urban/Suburban Practices						
Stormwater Management						
Runoff Reduction Performance Standard	cumulative	Acres Treated	1,189.01	4,295.98	287.48	737,244.29
Storm Water Treatment Performance Standard	cumulative	Acres Treated	6,036.08	12,753.93	1,147.34	3,486,893.38
Wet Ponds & Wetlands	cumulative	Acres Treated	4,953.03	10,887.26	1,453.67	3,666,549.98
Floating Treatment Wetlands	cumulative	Acres Treated (Wet Pond)	-	-	-	-
Dry Ponds	cumulative	Acres Treated	1,627.48	894.66	106.42	200,795.62
Extended Dry Ponds	cumulative	Acres Treated	4,001.42	8,795.51	523.31	2,962,101.61
Infiltration Practices	cumulative	Acres Treated	652.66	5,917.57	361.75	764,973.69
Filtering Practices	cumulative	Acres Treated	132.26	581.45	51.79	130,546.06
BioRetention	cumulative	Acres Treated	147.04	942.66	65.52	136,063.56
BioSwale	cumulative	Acres Treated	23.59	181.51	11.54	23,288.38
Permeable Pavement	cumulative	Acres Treated	0.52	2.69	0.17	452.74
Vegetated Open Channel	cumulative	Acres Treated	-	-	-	-
Urban Filter Strips	cumulative	Acres Treated	-	-	-	-
Grey Infrastructure (IDDE)	annual	Acres Treated	-	-	-	-
Impervious Disconnection	cumulative	Acres Treated	-	-	-	-
Conservation Landscaping Practices	cumulative	Acres Treated	-	-	-	-
TOTAL				45,253.23	4,008.98	12,108,909.31
Erosion and Sediment Control	annual	Acres	206.97	-	-	1,477,204.54
Impervious Surface Reduction	cumulative	Acres	0.93	5.79	(0.13)	1,875.53
Urban Forest Buffers	cumulative	Acres in Buffers	7.80	80.81	7.77	8,143.71
Urban Tree Planting	cumulative	Acres	190.66	200.73	19.64	-
Urban Forest Planting	cumulative	Acres	78.70	623.22	54.82	42,353.40
Urban Nutrient Management	annual	Acres	14,689.23	12,085.86	500.90	-
Urban Stream Restoration	cumulative	Feet	4,134.35	229.99	178.93	533,816.74
Storm Drain Cleanout	annual	Lbs of Sediment	6.79	0.01	0.00	3.54
Street Sweeping	annual	Acres	20.39	5.40	0.54	4,486.66
Urban Shoreline Management	cumulative	Feet	-	-	-	-
Septic Connections	cumulative	Number of Systems	3.99	41.70	-	-
Septic Denitrification	cumulative	Number of Systems	291.80	1,970.13	-	-
Septic Pumping	annual	Number of Systems	-	-	-	-
Resource Practices						
Forest Harvesting Practices	annual	Acres	-	-	-	-
Dirt&Gravel Road E&S	cumulative	Feet	-	-	-	-
Non-Tidal Algal Flow-way	annual	Acres	-	-	-	-
Tidal Algal Flow-way	annual	Acres	-	-	-	-
TOTAL				15,243.65	762.47	2,067,884.12
Lower Monocacy Watershed Load Reduction Summary				333,381.11	18,529.06	39,867,375.10

MD-020600030902 - Middle Gywnns Falls (Dead Run) Permit Approval 2014/Baltimore City	Duration	Unit	Measure	LBS Reduced Nitrogen	Phosphorus	Sediment
Agriculture Practices						
Nutrient Management						
Core Nitrogen	annual	Acres	138.07	-	-	-
Rate Nitrogen	annual	Acres	27.54	-	-	-
Placement Nitrogen	annual	Acres	1.08	-	-	-
Timing Nitrogen	annual	Acres	2.13	-	-	-
Core Phosphorus	annual	Acres	138.07	-	-	-
Rate Phosphorus	annual	Acres	1.17	-	-	-
Placement Phosphorus	annual	Acres	0.63	-	-	-
Timing Phosphorus	annual	Acres	-	-	-	-
TOTAL				-	-	-
Tillage Management						
Conservation	annual	Acres	19.64	-	-	-
Continuous High Residue	annual	Acres	65.47	-	-	-
Low Residue	annual	Acres	-	-	-	-
TOTAL				-	-	-
Cover Crop						
Traditional	annual	Acres	27.23	-	-	-
Commodity	annual	Acres	9.91	-	-	-
TOTAL				-	-	-
Pasture Management						
Alternative Watering	cumulative	Acres	17.13	-	-	-
Prescribed Grazing	cumulative	Acres	3.75	-	-	-
Horse Pasture Management	cumulative	Acres	2.19	-	-	-
Forest Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	0.02	-	-	-
Grass Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	0.10	-	-	-
TOTAL				-	-	-
Forest Buffers	cumulative	Acres in Buffers	1.07	-	-	-
Wetland Restoration	cumulative	Acres	0.18	-	-	-
Wetland Creation	cumulative	Acres	0.01	-	-	-
Wetland Enhancement and Rehabilitation	cumulative	Acres	-	-	-	-
Land Retirement	cumulative	Acres	3.57	-	-	-
Grass Buffers	cumulative	Acres in Buffers	1.53	-	-	-
Tree Planting	cumulative	Acres	0.12	-	0.00	4.00
Alternative Crops	cumulative	Acres	-	-	-	-
Soil and Water Conservation Plan	cumulative	Acres	157.20	-	-	-
Crop Irrigation Management	cumulative	Acres	-	-	-	-
Manure Incorporation	annual	Acres	0.66	-	-	-
Capture & Reuse	cumulative	Acres	-	-	-	-
Non Urban Stream Restoration	cumulative	Acres	622.44	39.53	34.89	92,272.90
Non Urban Shoreline Management	cumulative	Feet	-	-	-	-
TOTAL				39.53	34.89	92,276.90
Agricultural Drainage Management						
Denitrifying Ditch Bioreactors	cumulative	Acres	0.13	-	-	-
Saturated Buffer	cumulative	Acres	0.13	-	-	-
Sorbing Materials in Ag Ditches	cumulative	Acres	0.13	72.27	5.97	426.87
Water Control Structures	cumulative	Acres	0.13	-	-	-
TOTAL				72.27	5.97	426.87
Animal Waste Management Systems						
Broiler Mortality Freezers	annual	Dry Tons (Carcasses)	-	-	-	-
Barnyard Runoff Control & Loafing Lot Management	cumulative	Acres	0.24	-	-	-
Ag Stormwater Management	cumulative	Acres Treated	-	-	-	-
Manure Transport	annual	Dry Tons	2.04	-	-	-
Dairy Precision Feeding	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Litter Amendments)	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Biofilters)	cumulative	Animal Units	-	-	-	-
Ammonia Emission Reductions (Lagoon Covers)	cumulative	Animal Units	-	-	-	-
TOTAL				-	-	-
Urban/Suburban Practices						
Stormwater Management						
Runoff Reduction Performance Standard	cumulative	Acres Treated	337.92	891.85	100.14	162,459.20
Storm Water Treatment Performance Standard	cumulative	Acres Treated	1,588.83	2,447.49	370.63	712,388.55
Wet Ponds & Wetlands	cumulative	Acres Treated	130.19	191.38	42.40	91,574.18
Floating Treatment Wetlands	cumulative	Acres Treated (Wet Pond)	-	-	-	-
Dry Ponds	cumulative	Acres Treated	2,241.33	822.05	161.13	262,758.65
Extended Dry Ponds	cumulative	Acres Treated	2,712.12	3,986.87	389.92	1,907,727.33
Infiltration Practices	cumulative	Acres Treated	56.25	341.21	34.58	62,650.77
Filtering Practices	cumulative	Acres Treated	0.53	1.55	0.23	494.34
BioRetention	cumulative	Acres Treated	4.65	19.94	2.30	4,087.82
BioSwale	cumulative	Acres Treated	3.23	16.62	1.75	3,029.08
Permeable Pavement	cumulative	Acres Treated	5.05	17.33	1.83	4,145.75
Vegetated Open Channel	cumulative	Acres Treated	-	-	-	-
Urban Filter Strips	cumulative	Acres Treated	-	-	-	-
Grey Infrastructure (IDDE)	annual	Acres Treated	-	-	-	-
Impervious Disconnection	cumulative	Acres Treated	0.14	0.12	0.01	24.96
Conservation Landscaping Practices	cumulative	Acres Treated	-	-	-	-
TOTAL				8,736.42	1,104.92	3,211,340.64
Erosion and Sediment Control	annual	Acres	-	-	-	-
Impervious Surface Reduction	cumulative	Acres	16.69	63.39	-	23,102.14
Urban Forest Buffers	cumulative	Acres in Buffers	7.52	44.72	8.98	6,405.29
Urban Tree Planting	cumulative	Acres	167.19	-	-	-
Urban Forest Planting	cumulative	Acres	75.61	328.93	65.53	26,545.75
Urban Nutrient Management	annual	Acres	11,473.11	-	-	-
Urban Stream Restoration	cumulative	Feet	4,517.96	286.89	253.23	669,757.60
Storm Drain Cleanout	annual	Lbs of Sediment	12,698.32	29.08	6.22	7,590.55
Street Sweeping	annual	Acres	53.89	8.53	1.82	8,159.09
Urban Shoreline Management	cumulative	Feet	1.07	0.09	0.07	175.58
Septic Connections	cumulative	Number of Systems	48.73	337.81	-	-
Septic Denitrification	cumulative	Number of Systems	10.18	46.61	-	-
Septic Pumping	annual	Number of Systems	-	-	-	-
Resource Practices						
Forest Harvesting Practices	annual	Acres	16.67	45.91	-	2,376.82
Dirt&Gravel Road E&S	cumulative	Feet	-	-	-	-
Non-Tidal Algal Flow-way	annual	Acres	-	-	-	-
Tidal Algal Flow-way	annual	Acres	-	-	-	-
TOTAL				1,191.97	335.84	744,112.82
Midlle Gwynns Falls Watershed Load Reduction Summary				10,040.19	1,481.62	4,048,157.23

MD-0206000203 - Sassafras River				LBS Reduced		
Permit Approval 2010/Cecil & Kent Co.	Duration	Unit	Measure	Nitrogen	Phosphorus	Sediment
Agriculture Practices						
Nutrient Management						
Core Nitrogen	annual	Acres	19,229.25	24,112.91	-	-
Rate Nitrogen	annual	Acres	8,175.05	3,713.60	-	-
Placement Nitrogen	annual	Acres	1,304.45	1,296.52	-	-
Timing Nitrogen	annual	Acres	1,290.58	1,275.89	-	-
Core Phosphorus	annual	Acres	19,229.25	-	2,580.31	-
Rate Phosphorus	annual	Acres	177.89	-	9.45	-
Placement Phosphorus	annual	Acres	1,223.28	-	32.09	-
Timing Phosphorus	annual	Acres	-	-	-	-
TOTAL				30,398.91	2,621.84	-
Tillage Management						
Conservation	annual	Acres	5,632.06	5,588.79	978.81	1,611,432.15
Continuous High Residue	annual	Acres	17,472.70	43,055.95	4,124.86	9,632,722.20
Low Residue	annual	Acres	-	-	-	-
TOTAL				48,644.74	5,103.67	11,244,154.35
Cover Crop						
Traditional	annual	Acres	16,161.79	71,711.22	132.58	55,909.10
Commodity	annual	Acres	3,156.05	6,314.25	-	-
TOTAL				78,025.47	132.58	55,909.10
Pasture Management						
Alternative Watering	cumulative	Acres	340.98	160.56	47.33	174.15
Prescribed Grazing	cumulative	Acres	188.08	163.43	76.44	299.20
Horse Pasture Management	cumulative	Acres	5.87	-	1.97	12.32
Forest Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	2.32	227.60	60.94	32,477.60
Grass Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	7.85	448.79	116.13	68,490.97
TOTAL				1,000.38	302.81	101,454.23
Forest Buffers	cumulative	Acres in Buffers	223.03	13,865.74	217.56	293,565.08
Wetland Restoration	cumulative	Acres	66.41	2,821.92	75.83	76,238.41
Wetland Creation	cumulative	Acres	52.61	1,139.97	35.01	34,417.91
Wetland Enhancement and Rehabilitation	cumulative	Acres	-	-	-	-
Land Retirement	cumulative	Acres	1,639.04	25,701.15	106.70	1,024,495.91
Grass Buffers	cumulative	Acres in Buffers	835.31	39,963.35	338.18	1,099,309.19
Tree Planting	cumulative	Acres	97.18	1,799.74	47.64	57,840.76
Alternative Crops	cumulative	Acres	81.29	1,552.12	-	54,522.26
Soil and Water Conservation Plan	cumulative	Acres	27,390.46	35,115.71	1,981.80	3,627,066.04
Crop Irrigation Management	cumulative	Acres	-	-	-	-
Manure Incorporation	annual	Acres	3,058.25	5,252.94	287.08	-
Capture & Reuse	annual	Acres	-	-	-	-
Non Urban Stream Restoration	cumulative	Feet	885.22	58.40	48.48	95,347.18
Non Urban Shoreline Management	cumulative	Feet	-	-	-	-
TOTAL				127,271.03	3,138.27	6,362,802.74
Agricultural Drainage Management						
Denitrifying Ditch Bioreactors	cumulative	Acres	2,693.84	10,804.36	-	-
Saturated Buffer	cumulative	Acres	2,693.84	141,474.32	66.42	2,220,900.18
Sorbing Materials in Ag Ditches	cumulative	Acres	2,693.84	-	585.57	-
Water Control Structures	cumulative	Acres	2,693.84	14,901.54	-	-
TOTAL				167,180.22	651.99	2,220,900.18
Animal Waste Management Systems						
Broiler Mortality Freezers	annual	Dry Tons (Carcasses)	-	-	-	-
Barnyard Runoff Control & Loafing Lot Management	cumulative	Acres	21.41	2,774.08	295.69	33,916.16
Ag Stormwater Management	cumulative	Acres Treated	-	-	-	-
Manure Transport	annual	Dry Tons	5,271.36	(1,643.74)	2,084.86	-
Dairy Precision Feeding	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Litter Amendments)	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Biofilters)	cumulative	Animal Units	-	-	-	-
Ammonia Emission Reductions (Lagoon Covers)	cumulative	Animal Units	-	-	-	-
TOTAL				1,130.35	2,380.55	33,916.16
Urban/Suburban Practices						
Stormwater Management						
Runoff Reduction Performance Standard	cumulative	Acres Treated	20.20	99.15	14.06	9,384.56
Storm Water Treatment Performance Standard	cumulative	Acres Treated	880.77	2,520.97	481.36	380,750.09
Wet Ponds & Wetlands	cumulative	Acres Treated	105.55	179.29	50.21	39,410.13
Floating Treatment Wetlands	cumulative	Acres Treated (Wet Pond)	-	-	-	-
Dry Ponds	cumulative	Acres Treated	2.33	0.99	0.25	145.25
Extended Dry Ponds	cumulative	Acres Treated	25.79	43.81	5.46	9,629.24
Infiltration Practices	cumulative	Acres Treated	2.65	18.58	2.38	1,567.71
Filtering Practices	cumulative	Acres Treated	0.05	0.15	0.03	22.52
BioRetention	cumulative	Acres Treated	0.12	0.60	0.09	56.61
BioSwale	cumulative	Acres Treated	0.01	0.04	0.01	3.25
Permeable Pavement	cumulative	Acres Treated	-	-	-	-
Vegetated Open Channel	cumulative	Acres Treated	-	-	-	-
Urban Filter Strips	cumulative	Acres Treated	-	-	-	-
Grey Infrastructure (IDDE)	annual	Acres Treated	-	-	-	-
Impervious Disconnection	cumulative	Acres Treated	-	-	-	-
Conservation Landscaping Practices	cumulative	Acres Treated	-	-	-	-
TOTAL				2,863.58	553.83	3,417.41
Erosion and Sediment Control	annual	Acres	8.78	-	-	36,600.56
Impervious Surface Reduction	cumulative	Acres	-	-	-	-
Urban Forest Buffers	cumulative	Acres in Buffers	1.62	13.35	2.64	927.62
Urban Tree Planting	cumulative	Acres	0.61	0.57	0.11	17.19
Urban Forest Planting	cumulative	Acres	1.14	7.24	1.31	359.69
Urban Nutrient Management	annual	Acres	3,753.97	2,359.18	187.20	-
Urban Stream Restoration	cumulative	Feet	-	-	-	-
Storm Drain Cleanout	annual	Lbs of Sediment	-	-	-	-
Street Sweeping	annual	Acres	-	-	-	-
Urban Shoreline Management	cumulative	Feet	-	-	-	-
Septic Connections	cumulative	Number of Systems	0.70	6.40	-	-
Septic Denitrification	cumulative	Number of Systems	155.35	920.91	-	-
Septic Pumping	annual	Number of Systems	-	-	-	-
Resource Practices						
Forest Harvesting Practices	annual	Acres	84.32	317.72	6.94	7,544.25
Dirt&Gravel Road E&S	cumulative	Feet	-	-	-	-
Non-Tidal Algal Flow-way	annual	Acres	-	-	-	-
Tidal Algal Flow-way	annual	Acres	-	-	-	-
TOTAL				3,625.36	198.20	45,449.31
Sassafras River Watershed Load Reduction Summary				460,140.04	15,083.76	20,068,003.49

MD-020600030703 - Tidal Back River (Hawk Cove) Permit Approval 2010/Baltimore City	Duration	Unit	Measure	LBS Reduced Nitrogen	Phosphorus	Sediment
Agriculture Practices						
Nutrient Management						
Core Nitrogen	annual	Acres	192.92	-	-	-
Rate Nitrogen	annual	Acres	76.19	-	-	-
Placement Nitrogen	annual	Acres	2.98	-	-	-
Timing Nitrogen	annual	Acres	5.90	-	-	-
Core Phosphorus	annual	Acres	192.92	-	-	-
Rate Phosphorus	annual	Acres	3.23	-	-	-
Placement Phosphorus	annual	Acres	1.74	-	-	-
Timing Phosphorus	annual	Acres	-	-	-	-
TOTAL				-	-	-
Tillage Management						
Conservation	annual	Acres	58.70	-	-	-
Continuous High Residue	annual	Acres	182.12	-	-	-
Low Residue	annual	Acres	-	-	-	-
TOTAL				-	-	-
Cover Crop						
Traditional	annual	Acres	62.91	-	-	-
Commodity	annual	Acres	29.22	-	-	-
TOTAL				-	-	-
Pasture Management						
Alternative Watering	cumulative	Acres	40.57	-	-	-
Prescribed Grazing	cumulative	Acres	9.10	-	-	-
Horse Pasture Management	cumulative	Acres	1.10	-	-	-
Forest Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	0.05	-	-	-
Grass Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	0.30	-	-	-
TOTAL				-	-	-
Forest Buffers	cumulative	Acres in Buffers	3.01	-	-	-
Wetland Restoration	cumulative	Acres	0.44	-	-	-
Wetland Creation	cumulative	Acres	0.03	-	-	-
Wetland Enhancement and Rehabilitation	cumulative	Acres	-	-	-	-
Land Retirement	cumulative	Acres	10.22	-	-	-
Grass Buffers	cumulative	Acres in Buffers	3.92	-	-	-
Tree Planting	cumulative	Acres	0.28	-	0.01	9.85
Alternative Crops	cumulative	Acres	-	-	-	-
Soil and Water Conservation Plan	cumulative	Acres	405.40	-	-	-
Crop Irrigation Management	cumulative	Acres	-	-	-	-
Manure Incorporation	annual	Acres	1.16	0.00	0.00	0.00
Capture & Reuse	annual	Acres	0.00	0.00	0.00	0.00
Non Urban Stream Restoration	cumulative	Feet	408.13	25.92	22.88	60502.55
Non Urban Shoreline Management	cumulative	Feet	0	0	0	0
TOTAL				25.92	22.89	60,512.41
Agricultural Drainage Management						
Denitrifying Ditch Bioreactors	cumulative	Acres	0.37	-	-	-
Saturated Buffer	cumulative	Acres	0.37	-	-	-
Sorbing Materials in Ag Ditches	cumulative	Acres	0.37	199.97	16.51	1,181.13
Water Control Structures	cumulative	Acres	0.37	-	-	-
TOTAL				199.97	16.51	1,181.13
Animal Waste Management Systems						
Broiler Mortality Freezers	annual	Dry Tons (Carcasses)	-	-	-	-
Barnyard Runoff Control & Loafing Lot Management	cumulative	Acres	0.59	-	-	-
Ag Stormwater Management	cumulative	Acres Treated	-	-	-	-
Manure Transport	annual	Dry Tons	5.30	-	-	-
Dairy Precision Feeding	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Litter Amendments)	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Biofilters)	cumulative	Animal Units	-	-	-	-
Ammonia Emission Reductions (Lagoon Covers)	cumulative	Animal Units	-	-	-	-
TOTAL				-	-	-
Urban/Suburban Practices						
Stormwater Management						
Runoff Reduction Performance Standard	cumulative	Acres Treated	717.24	1,893.01	212.56	344,828.80
Storm Water Treatment Performance Standard	cumulative	Acres Treated	2,372.97	3,655.41	553.54	1,063,977.08
Wet Ponds & Wetlands	cumulative	Acres Treated	32.27	47.43	10.51	22,696.82
Floating Treatment Wetlands	cumulative	Acres Treated (Wet Pond)	-	-	-	-
Dry Ponds	cumulative	Acres Treated	423.19	155.21	30.42	49,612.16
Extended Dry Ponds	cumulative	Acres Treated	1,087.12	1,598.09	156.30	764,689.24
Infiltration Practices	cumulative	Acres Treated	9.89	60.01	6.08	11,018.40
Filtering Practices	cumulative	Acres Treated	12.78	37.58	5.55	11,988.38
BioRetention	cumulative	Acres Treated	0.28	1.20	0.14	245.86
BioSwale	cumulative	Acres Treated	1.20	6.18	0.65	1,126.39
Permeable Pavement	cumulative	Acres Treated	0.50	1.70	0.18	407.57
Vegetated Open Channel	cumulative	Acres Treated	-	-	-	-
Urban Filter Strips	cumulative	Acres Treated	-	-	-	-
Grey Infrastructure (IDDE)	annual	Acres Treated	-	-	-	-
Impervious Disconnection	cumulative	Acres Treated	0.00	0.00	0.00	0.74
Conservation Landscaping Practices	cumulative	Acres Treated	-	-	-	-
TOTAL				7,455.83	975.93	2,270,591.45
Erosion and Sediment Control	annual	Acres	49.65	-	-	87.85
Impervious Surface Reduction	cumulative	Acres	6.45	24.50	-	8,927.49
Urban Forest Buffers	cumulative	Acres in Buffers	3.04	18.09	3.63	2,590.80
Urban Tree Planting	cumulative	Acres	38.67	-	-	-
Urban Forest Planting	cumulative	Acres	43.76	190.40	37.93	15,365.98
Urban Nutrient Management	annual	Acres	4,777.73	-	-	-
Urban Stream Restoration	cumulative	Feet	898.02	57.02	50.33	133,125.89
Storm Drain Cleanout	annual	Lbs of Sediment	39,176.08	89.71	19.20	23,417.89
Street Sweeping	annual	Acres	1.01	0.16	0.03	152.38
Urban Shoreline Management	cumulative	Feet	4,916.29	424.37	299.99	806,271.13
Septic Connections	cumulative	Number of Systems	51.70	358.42	-	-
Septic Denitrification	cumulative	Number of Systems	8.02	36.72	-	-
Septic Pumping	annual	Number of Systems	-	-	-	-
Resource Practices						
Forest Harvesting Practices	annual	Acres	5.51	15.17	-	785.46
Dirt&Gravel Road E&S	cumulative	Feet	-	-	-	-
Non-Tidal Algal Flow-way	annual	Acres	-	-	-	-
Tidal Algal Flow-way	annual	Acres	-	-	-	-
TOTAL				1,214.57	411.12	990,724.88
Tidal Back River Watershed Load Reduction Summary				8,896.29	1,426.44	3,323,009.86

MD-020600030703 - Tidal Back River (Hawk Cove) Permit Approval 2010/Baltimore City	Duration	Unit	Measure	LBS Reduced Nitrogen	Phosphorus	Sediment
Agriculture Practices						
Nutrient Management						
Core Nitrogen	annual	Acres	192.92	-	-	-
Rate Nitrogen	annual	Acres	76.19	-	-	-
Placement Nitrogen	annual	Acres	2.98	-	-	-
Timing Nitrogen	annual	Acres	5.90	-	-	-
Core Phosphorus	annual	Acres	192.92	-	-	-
Rate Phosphorus	annual	Acres	3.23	-	-	-
Placement Phosphorus	annual	Acres	1.74	-	-	-
Timing Phosphorus	annual	Acres	-	-	-	-
TOTAL				-	-	-
Tillage Management						
Conservation	annual	Acres	58.70	-	-	-
Continuous High Residue	annual	Acres	182.12	-	-	-
Low Residue	annual	Acres	-	-	-	-
TOTAL				-	-	-
Cover Crop						
Traditional	annual	Acres	62.91	-	-	-
Commodity	annual	Acres	29.22	-	-	-
TOTAL				-	-	-
Pasture Management						
Alternative Watering	cumulative	Acres	40.57	-	-	-
Prescribed Grazing	cumulative	Acres	9.10	-	-	-
Horse Pasture Management	cumulative	Acres	1.10	-	-	-
Forest Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	0.05	-	-	-
Grass Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	0.30	-	-	-
TOTAL				-	-	-
Forest Buffers	cumulative	Acres in Buffers	3.01	-	-	-
Wetland Restoration	cumulative	Acres	0.44	-	-	-
Wetland Creation	cumulative	Acres	0.03	-	-	-
Wetland Enhancement and Rehabilitation	cumulative	Acres	-	-	-	-
Land Retirement	cumulative	Acres	10.22	-	-	-
Grass Buffers	cumulative	Acres in Buffers	3.92	-	-	-
Tree Planting	cumulative	Acres	0.28	-	0.01	9.85
Alternative Crops	cumulative	Acres	-	-	-	-
Soil and Water Conservation Plan	cumulative	Acres	405.40	-	-	-
Crop Irrigation Management	cumulative	Acres	-	-	-	-
Manure Incorporation	annual	Acres	1.16	0.00	0.00	0.00
Capture & Reuse	annual	Acres	0.00	0.00	0.00	0.00
Non Urban Stream Restoration	cumulative	Feet	408.13	25.92	22.88	60502.55
Non Urban Shoreline Management	cumulative	Feet	0	0	0	0
TOTAL				25.92	22.89	60,512.41
Agricultural Drainage Management						
Denitrifying Ditch Bioreactors	cumulative	Acres	0.37	-	-	-
Saturated Buffer	cumulative	Acres	0.37	-	-	-
Sorbing Materials in Ag Ditches	cumulative	Acres	0.37	199.97	16.51	1,181.13
Water Control Structures	cumulative	Acres	0.37	-	-	-
TOTAL				199.97	16.51	1,181.13
Animal Waste Management Systems						
Broiler Mortality Freezers	annual	Dry Tons (Carcasses)	-	-	-	-
Barnyard Runoff Control & Loafing Lot Management	cumulative	Acres	0.59	-	-	-
Ag Stormwater Management	cumulative	Acres Treated	-	-	-	-
Manure Transport	annual	Dry Tons	5.30	-	-	-
Dairy Precision Feeding	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Litter Amendments)	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Biofilters)	cumulative	Animal Units	-	-	-	-
Ammonia Emission Reductions (Lagoon Covers)	cumulative	Animal Units	-	-	-	-
TOTAL				-	-	-
Urban/Suburban Practices						
Stormwater Management						
Runoff Reduction Performance Standard	cumulative	Acres Treated	717.24	1,893.01	212.56	344,828.80
Storm Water Treatment Performance Standard	cumulative	Acres Treated	2,372.97	3,655.41	553.54	1,063,977.08
Wet Ponds & Wetlands	cumulative	Acres Treated	32.27	47.43	10.51	22,696.82
Floating Treatment Wetlands	cumulative	Acres Treated (Wet Pond)	-	-	-	-
Dry Ponds	cumulative	Acres Treated	423.19	155.21	30.42	49,612.16
Extended Dry Ponds	cumulative	Acres Treated	1,087.12	1,598.09	156.30	764,689.24
Infiltration Practices	cumulative	Acres Treated	9.89	60.01	6.08	11,018.40
Filtering Practices	cumulative	Acres Treated	12.78	37.58	5.55	11,988.38
BioRetention	cumulative	Acres Treated	0.28	1.20	0.14	245.86
BioSwale	cumulative	Acres Treated	1.20	6.18	0.65	1,126.39
Permeable Pavement	cumulative	Acres Treated	0.50	1.70	0.18	407.57
Vegetated Open Channel	cumulative	Acres Treated	-	-	-	-
Urban Filter Strips	cumulative	Acres Treated	-	-	-	-
Grey Infrastructure (IDDE)	annual	Acres Treated	-	-	-	-
Impervious Disconnection	cumulative	Acres Treated	0.00	0.00	0.00	0.74
Conservation Landscaping Practices	cumulative	Acres Treated	-	-	-	-
TOTAL				7,455.83	975.93	2,270,591.45
Erosion and Sediment Control	annual	Acres	49.65	-	-	87.85
Impervious Surface Reduction	cumulative	Acres	6.45	24.50	-	8,927.49
Urban Forest Buffers	cumulative	Acres in Buffers	3.04	18.09	3.63	2,590.80
Urban Tree Planting	cumulative	Acres	38.67	-	-	-
Urban Forest Planting	cumulative	Acres	43.76	190.40	37.93	15,365.98
Urban Nutrient Management	annual	Acres	4,777.73	-	-	-
Urban Stream Restoration	cumulative	Feet	898.02	57.02	50.33	133,125.89
Storm Drain Cleanout	annual	Lbs of Sediment	39,176.08	89.71	19.20	23,417.89
Street Sweeping	annual	Acres	1.01	0.16	0.03	152.38
Urban Shoreline Management	cumulative	Feet	4,916.29	424.37	299.99	806,271.13
Septic Connections	cumulative	Number of Systems	51.70	358.42	-	-
Septic Denitrification	cumulative	Number of Systems	8.02	36.72	-	-
Septic Pumping	annual	Number of Systems	-	-	-	-
Resource Practices						
Forest Harvesting Practices	annual	Acres	5.51	15.17	-	785.46
Dirt&Gravel Road E&S	cumulative	Feet	-	-	-	-
Non-Tidal Algal Flow-way	annual	Acres	-	-	-	-
Tidal Algal Flow-way	annual	Acres	-	-	-	-
TOTAL				1,214.57	411.12	990,724.88
Tidal Back River Watershed Load Reduction Summary				8,896.29	1,426.44	3,323,009.86

MD-020600030702 - Upper Back River (Redhouse Creek)				LBS Reduced		
Permit Approval 2009/Baltimore City	Duration	Unit	Measure	Nitrogen	Phosphorus	Sediment
Agriculture Practices						
Nutrient Management						
Core Nitrogen	annual	Acres	5.16	-	-	-
Rate Nitrogen	annual	Acres	2.00	-	-	-
Placement Nitrogen	annual	Acres	0.08	-	-	-
Timing Nitrogen	annual	Acres	0.16	-	-	-
Core Phosphorus	annual	Acres	5.16	-	-	-
Rate Phosphorus	annual	Acres	0.08	-	-	-
Placement Phosphorus	annual	Acres	0.05	-	-	-
Timing Phosphorus	annual	Acres	-	-	-	-
TOTAL				-	-	-
Tillage Management						
Conservation	annual	Acres	1.45	-	-	-
Continuous High Residue	annual	Acres	4.56	-	-	-
Low Residue	annual	Acres	-	-	-	-
TOTAL				-	-	-
Cover Crop						
Traditional	annual	Acres	1.64	-	-	-
Commodity	annual	Acres	0.79	-	-	-
TOTAL				-	-	-
Pasture Management						
Alternative Watering	cumulative	Acres	1.35	-	-	-
Prescribed Grazing	cumulative	Acres	0.25	-	-	-
Horse Pasture Management	cumulative	Acres	0.03	-	-	-
Forest Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	0.00	-	-	-
Grass Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	0.01	-	-	-
TOTAL				-	-	-
Forest Buffers	cumulative	Acres in Buffers	0.08	-	-	-
Wetland Restoration	cumulative	Acres	0.01	-	-	-
Wetland Creation	cumulative	Acres	0.00	-	-	-
Wetland Enhancement and Rehabilitation	cumulative	Acres	-	-	-	-
Land Retirement	cumulative	Acres	0.28	-	-	-
Grass Buffers	cumulative	Acres in Buffers	0.10	-	-	-
Tree Planting	cumulative	Acres	0.01	-	0.00	0.27
Alternative Crops	cumulative	Acres	-	-	-	-
Soil and Water Conservation Plan	cumulative	Acres	10.60	-	-	-
Crop Irrigation Management	cumulative	Acres	-	-	-	-
Manure Incorporation	annual	Acres	0.03	-	-	-
Capture & Reuse	annual	Acres	-	-	-	-
Non Urban Stream Restoration	cumulative	Feet	242.08	15.37	13.57	35,886.02
Non Urban Shoreline Management	cumulative	Feet	-	-	-	-
TOTAL				15.37	13.57	35,886.28
Agricultural Drainage Management						
Denitrifying Ditch Bioreactors	cumulative	Acres	0.01	-	-	-
Saturated Buffer	cumulative	Acres	0.01	-	-	-
Sorbing Materials in Ag Ditches	cumulative	Acres	0.01	5.26	0.43	31.05
Water Control Structures	cumulative	Acres	0.01	-	-	-
TOTAL				5.26	0.43	31.05
Animal Waste Management Systems						
Broiler Mortality Freezers	annual	Dry Tons (Carcasses)	-	-	-	-
Barnyard Runoff Control & Loafing Lot Management	cumulative	Acres	0.01	-	-	-
Ag Stormwater Management	cumulative	Acres Treated	-	-	-	-
Manure Transport	annual	Dry Tons	0.20	-	-	-
Dairy Precision Feeding	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Litter Amendments)	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Biofilters)	cumulative	Animal Units	-	-	-	-
Ammonia Emission Reductions (Lagoon Covers)	cumulative	Animal Units	-	-	-	-
TOTAL				-	-	-
Urban/Suburban Practices						
Stormwater Management						
Runoff Reduction Performance Standard	cumulative	Acres Treated	-	-	-	-
Storm Water Treatment Performance Standard	cumulative	Acres Treated	1,313.14	2,022.82	306.32	588,780.17
Wet Ponds & Wetlands	cumulative	Acres Treated	666.33	979.51	217.02	468,698.19
Floating Treatment Wetlands	cumulative	Acres Treated (Wet Pond)	141.82	24.01	4.54	10,212.01
Dry Ponds	cumulative	Acres Treated	-	-	-	-
Extended Dry Ponds	cumulative	Acres Treated	78.15	114.88	11.24	54,969.32
Infiltration Practices	cumulative	Acres Treated	130.73	792.99	80.36	145,602.57
Filtering Practices	cumulative	Acres Treated	1.08	3.16	0.47	1,009.25
BioRetention	cumulative	Acres Treated	4.19	17.98	2.07	3,685.45
BioSwale	cumulative	Acres Treated	8.29	42.63	4.50	7,770.72
Permeable Pavement	cumulative	Acres Treated	0.81	2.79	0.29	666.81
Vegetated Open Channel	cumulative	Acres Treated	0.20	0.41	0.04	143.10
Urban Filter Strips	cumulative	Acres Treated	-	-	-	-
Grey Infrastructure (IDDE)	annual	Acres Treated	-	-	-	-
Impervious Disconnection	cumulative	Acres Treated	-	-	-	-
Conservation Landscaping Practices	cumulative	Acres Treated	0.00	0.00	0.00	-
TOTAL			-	4,001.18	626.84	1,281,537.59
Erosion and Sediment Control	annual	Acres	12.02	-	-	21.26
Impervious Surface Reduction	cumulative	Acres	1.29	4.90	-	1,785.69
Urban Forest Buffers	cumulative	Acres in Buffers	1.02	6.09	1.22	872.11
Urban Tree Planting	cumulative	Acres	84.80	-	-	-
Urban Forest Planting	cumulative	Acres	19.01	82.73	16.48	6,676.19
Urban Nutrient Management	annual	Acres	8,295.40	-	-	-
Urban Stream Restoration	cumulative	Feet	4,658.15	295.79	261.09	690,539.56
Storm Drain Cleanout	annual	Lbs of Sediment	584.62	1.34	0.29	349.46
Street Sweeping	annual	Acres	124.97	19.78	4.22	18,920.84
Urban Shoreline Management	cumulative	Feet	22.84	1.97	1.39	3,746.46
Septic Connections	cumulative	Number of Systems	3.57	24.76	-	-
Septic Denitrification	cumulative	Number of Systems	2.33	10.70	-	-
Septic Pumping	annual	Number of Systems	-	-	-	-
Resource Practices						
Forest Harvesting Practices	annual	Acres	1.38	3.80	-	196.47
Dirt&Gravel Road E&S	cumulative	Feet	-	-	-	-
Non-Tidal Algal Flow-way	annual	Acres	-	-	-	-
Tidal Algal Flow-way	annual	Acres	-	-	-	-
TOTAL			-	451.84	284.69	723,108.04
Upper Back River Watershed Load Reduction Summary				4,473.65	925.54	2,040,562.96

MD-0206000502 - Upper Choptank River				LBS Reduced		
Permit Approval 2010/Talbot, Caroline, & Queen Anne's Cc	Duration	Unit	Measure	Nitrogen	Phosphorus	Sediment
Agriculture Practices						
Nutrient Management						
Core Nitrogen	annual	Acres	-	-	-	-
Rate Nitrogen	annual	Acres	-	-	-	-
Placement Nitrogen	annual	Acres	-	-	-	-
Timing Nitrogen	annual	Acres	-	-	-	-
Core Phosphorus	annual	Acres	-	-	-	-
Rate Phosphorus	annual	Acres	-	-	-	-
Placement Phosphorus	annual	Acres	-	-	-	-
Timing Phosphorus	annual	Acres	-	-	-	-
TOTAL				-	-	-
Tillage Management						
Conservation	annual	Acres	10,342.48	11,635.81	2,668.84	1,550,698.12
Continuous High Residue	annual	Acres	29,740.59	100,378.67	11,124.31	8,592,026.45
Low Residue	annual	Acres	-	-	-	-
TOTAL				112,014.48	13,793.15	10,142,724.57
Cover Crop						
Traditional	annual	Acres	3,375.10	21,065.66	39.13	5,743.77
Commodity	annual	Acres	2,798.73	7,092.56	-	-
TOTAL				28,158.22	39.13	5,743.77
Pasture Management						
Alternative Watering	cumulative	Acres	51.17	26.65	7.58	60.84
Prescribed Grazing	cumulative	Acres	4.27	3.96	1.80	18.87
Horse Pasture Management	cumulative	Acres	-	-	-	-
Forest Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	0.02	1.27	0.41	169.72
Grass Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	0.63	30.79	9.77	4,928.72
TOTAL				62.66	19.57	5,178.15
Forest Buffers	cumulative	Acres in Buffers	73.68	6,225.50	157.49	56,116.06
Wetland Restoration	cumulative	Acres	139.91	7,554.45	295.55	82,574.22
Wetland Creation	cumulative	Acres	5.92	197.23	9.16	2,295.17
Wetland Enhancement and Rehabilitation	cumulative	Acres	-	-	-	-
Land Retirement	cumulative	Acres	197.22	5,112.01	63.95	68,417.66
Grass Buffers	cumulative	Acres in Buffers	1,966.89	129,018.37	2,631.27	1,485,390.52
Tree Planting	cumulative	Acres	14.10	404.63	16.87	4,990.42
Alternative Crops	cumulative	Acres	-	-	-	-
Soil and Water Conservation Plan	cumulative	Acres	27,434.53	53,809.63	4,027.37	2,155,741.41
Crop Irrigation Management	cumulative	Acres	-	-	-	-
Manure Incorporation	annual	Acres	-	-	-	-
Capture & Reuse	annual	Acres	-	-	-	-
Non Urban Stream Restoration	cumulative	Feet	-	-	-	-
Non Urban Shoreline Management	cumulative	Feet	-	-	-	-
TOTAL				202,321.80	7,201.66	3,855,525.46
Agricultural Drainage Management						
Denitrifying Ditch Bioreactors	cumulative	Acres	438.51	2,474.14	-	-
Saturated Buffer	cumulative	Acres	438.51	36,294.58	169.61	159,886.74
Sorbing Materials in Ag Ditches	cumulative	Acres	438.51	-	188.26	-
Water Control Structures	cumulative	Acres	438.51	3,633.20	-	-
TOTAL				42,401.93	357.87	159,886.74
Animal Waste Management Systems						
Broiler Mortality Freezers	annual	Dry Tons (Carcasses)	-	-	-	-
Barnyard Runoff Control & Loafing Lot Management	cumulative	Acres	5.31	1,235.55	63.11	298.83
Ag Stormwater Management	cumulative	Acres Treated	-	-	-	-
Manure Transport	annual	Dry Tons	213.93	261.67	97.02	-
Dairy Precision Feeding	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Litter Amendments)	annual	Animal Units	16,592.87	7,795.13	10.07	-
Ammonia Emission Reductions (Biofilters)	cumulative	Animal Units	-	-	-	-
Ammonia Emission Reductions (Lagoon Covers)	cumulative	Animal Units	-	-	-	-
TOTAL				9,292.34	170.21	298.83
Urban/Suburban Practices						
Stormwater Management						
Runoff Reduction Performance Standard	cumulative	Acres Treated	-	-	-	-
Storm Water Treatment Performance Standard	cumulative	Acres Treated	1,947.01	6,756.63	714.21	234,257.40
Wet Ponds & Wetlands	cumulative	Acres Treated	0.08	0.18	0.03	8.98
Floating Treatment Wetlands	cumulative	Acres Treated (Wet Pond)	-	-	-	-
Dry Ponds	cumulative	Acres Treated	0.00	0.00	0.00	0.00
Extended Dry Ponds	cumulative	Acres Treated	-	-	-	-
Infiltration Practices	cumulative	Acres Treated	0.00	0.01	0.00	0.11
Filtering Practices	cumulative	Acres Treated	-	-	-	-
BioRetention	cumulative	Acres Treated	-	-	-	-
BioSwale	cumulative	Acres Treated	0.00	0.01	0.00	0.10
Permeable Pavement	cumulative	Acres Treated	-	-	-	-
Vegetated Open Channel	cumulative	Acres Treated	-	-	-	-
Urban Filter Strips	cumulative	Acres Treated	-	-	-	-
Grey Infrastructure (IDDE)	annual	Acres Treated	-	-	-	-
Impervious Disconnection	cumulative	Acres Treated	-	-	-	-
Conservation Landscaping Practices	cumulative	Acres Treated	-	-	-	-
TOTAL				6,756.82	714.24	234,266.59
Erosion and Sediment Control	annual	Acres	32.06	-	-	39,455.41
Impervious Surface Reduction	cumulative	Acres	-	-	-	-
Urban Forest Buffers	cumulative	Acres in Buffers	-	-	-	-
Urban Tree Planting	cumulative	Acres	-	-	-	-
Urban Forest Planting	cumulative	Acres	-	-	-	-
Urban Nutrient Management	annual	Acres	2,600.66	2,186.94	110.89	-
Urban Stream Restoration	cumulative	Feet	-	-	-	-
Storm Drain Cleanout	annual	Lbs of Sediment	-	-	-	-
Street Sweeping	annual	Acres	-	-	-	-
Urban Shoreline Management	cumulative	Feet	-	-	-	-
Septic Connections	cumulative	Number of Systems	-	-	-	-
Septic Denitrification	cumulative	Number of Systems	20.61	130.51	-	-
Septic Pumping	annual	Number of Systems	-	-	-	-
Resource Practices						
Forest Harvesting Practices	annual	Acres	-	-	-	-
Dirt&Gravel Road E&S	cumulative	Feet	-	-	-	-
Non-Tidal Algal Flow-way	annual	Acres	-	-	-	-
Tidal Algal Flow-way	annual	Acres	-	-	-	-
TOTAL				6,756.82	714.24	234,266.59
Upper Choptank Watershed Load Reduction Summary				407,765.08	23,010.06	14,637,890.69

MD-N24001PU3_3680_3890 - Upper Jennings Run Permit Approval 2019/Allegany County	Duration	Unit	Measure	LBS Reduced Nitrogen	Phosphorus	Sediment
Agriculture Practices						
Nutrient Management						
Core Nitrogen	annual	Acres	1,758.30	451.71	-	-
Rate Nitrogen	annual	Acres	186.92	37.44	-	-
Placement Nitrogen	annual	Acres	22.38	4.71	-	-
Timing Nitrogen	annual	Acres	3.32	1.31	-	-
Core Phosphorus	annual	Acres	1,758.30	-	25.76	-
Rate Phosphorus	annual	Acres	11.05	-	0.20	-
Placement Phosphorus	annual	Acres	13.32	-	0.10	-
Timing Phosphorus	annual	Acres	-	-	-	-
TOTAL				495.17	26.06	-
Tillage Management						
Conservation	annual	Acres	73.74	137.65	24.76	137,547.53
Continuous High Residue	annual	Acres	245.81	643.68	108.93	883,442.32
Low Residue	annual	Acres	-	-	-	-
TOTAL				781.32	133.69	1,020,989.85
Cover Crop						
Traditional	annual	Acres	94.32	297.99	1.97	6,198.05
Commodity	annual	Acres	1.24	1.55	-	-
TOTAL				299.54	1.97	6,198.05
Pasture Management						
Alternative Watering	cumulative	Acres	544.81	193.80	7.60	1,056.38
Prescribed Grazing	cumulative	Acres	119.48	93.34	5.00	708.37
Horse Pasture Management	cumulative	Acres	5.71	-	0.20	45.12
Forest Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	0.42	12.40	3.49	2,096.59
Grass Buffers on Fenced Pasture Corridor	cumulative	Acres in Buffers	0.20	20.15	5.94	3,600.16
TOTAL				319.69	22.24	7,506.63
Forest Buffers	cumulative	Acres in Buffers	149.04	4,325.67	80.15	387,803.33
Wetland Restoration	cumulative	Acres	0.38	5.38	0.13	517.83
Wetland Creation	cumulative	Acres	-	-	-	-
Wetland Enhancement and Rehabilitation	cumulative	Acres	-	-	-	-
Land Retirement	cumulative	Acres	144.84	909.34	7.95	188,881.24
Grass Buffers	cumulative	Acres in Buffers	5.89	133.94	0.94	16,389.82
Tree Planting	cumulative	Acres	79.74	649.14	14.48	70,194.23
Alternative Crops	cumulative	Acres	-	-	-	-
Soil and Water Conservation Plan	cumulative	Acres	2,257.29	959.98	63.70	395,530.91
Crop Irrigation Management	cumulative	Acres	-	-	-	-
Manure Incorporation	annual	Acres	1.86	2.13	0.16	-
Capture & Reuse	annual	Acres	-	-	-	-
Non Urban Stream Restoration	cumulative	Feet	484.32	27.58	16.67	42,867.78
Non Urban Shoreline Management	cumulative	Feet	-	-	-	-
TOTAL				7,013.18	184.19	1,102,185.13
Agricultural Drainage Management						
Denitrifying Ditch Bioreactors	cumulative	Acres	9.53	35.71	-	-
Saturated Buffer	cumulative	Acres	9.53	357.10	4.39	44,437.95
Sorbing Materials in Ag Ditches	cumulative	Acres	9.53	-	1.04	-
Water Control Structures	cumulative	Acres	9.53	25.78	-	-
TOTAL				418.60	5.43	44,437.95
Animal Waste Management Systems						
Broiler Mortality Freezers	annual	Dry Tons (Carcasses)	-	-	-	-
Barnyard Runoff Control & Loafing Lot Management	cumulative	Acres	1.13	3.16	-	669.56
Ag Stormwater Management	cumulative	Acres Treated	-	-	-	-
Manure Transport	annual	Dry Tons	-	-	-	-
Dairy Precision Feeding	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Litter Amendments)	annual	Animal Units	-	-	-	-
Ammonia Emission Reductions (Biofilters)	cumulative	Animal Units	-	-	-	-
Ammonia Emission Reductions (Lagoon Covers)	cumulative	Animal Units	-	-	-	-
TOTAL				3.16	-	669.56
Urban/Suburban Practices						
Stormwater Management						
Runoff Reduction Performance Standard	cumulative	Acres Treated	0.22	1.18	0.08	424.26
Storm Water Treatment Performance Standard	cumulative	Acres Treated	6.76	20.78	1.85	11,931.47
Wet Ponds & Wetlands	cumulative	Acres Treated	0.12	0.22	0.03	181.22
Floating Treatment Wetlands	cumulative	Acres Treated (Wet Pond)	-	-	-	-
Dry Ponds	cumulative	Acres Treated	509.05	1,907.17	-	-
Extended Dry Ponds	cumulative	Acres Treated	5.87	10.71	0.62	8,830.33
Infiltration Practices	cumulative	Acres Treated	9.13	68.79	4.15	21,766.15
Filtering Practices	cumulative	Acres Treated	0.92	3.35	0.29	1,840.63
BioRetention	cumulative	Acres Treated	35.41	188.66	12.95	66,625.24
BioSwale	cumulative	Acres Treated	17.23	110.10	6.93	34,574.47
Permeable Pavement	cumulative	Acres Treated	0.22	0.94	0.06	385.56
Vegetated Open Channel	cumulative	Acres Treated	-	-	-	-
Urban Filter Strips	cumulative	Acres Treated	-	-	-	-
Grey Infrastructure (IDDE)	annual	Acres Treated	-	-	-	-
Impervious Disconnection	cumulative	Acres Treated	-	-	-	-
Conservation Landscaping Practices	cumulative	Acres Treated	-	-	-	-
TOTAL				2,311.90	26.96	146,559.32
Erosion and Sediment Control	annual	Acres	3.05	-	-	44,659.26
Impervious Surface Reduction	cumulative	Acres	2.30	10.60	-	7,745.45
Erosion and Sediment Control	annual	Acres	3.05	-	-	44,659.26
Impervious Surface Reduction	cumulative	Acres	2.30	10.60	-	7,745.45
Urban Forest Planting	cumulative	Acres	0.06	0.43	0.04	70.77
Urban Nutrient Management	annual	Acres	2,416.14	1,583.63	60.91	-
Urban Stream Restoration	cumulative	Feet	310.00	17.65	10.67	27,438.51
Storm Drain Cleanout	annual	Lbs of Sediment	-	-	-	-
Street Sweeping	annual	Acres	-	-	-	-
Urban Shoreline Management	cumulative	Feet	-	-	-	-
Septic Connections	cumulative	Number of Systems	7.54	49.14	-	-
Septic Denitrification	cumulative	Number of Systems	15.40	64.88	-	-
Septic Pumping	annual	Number of Systems	-	-	-	-
Resource Practices						
Forest Harvesting Practices	annual	Acres	-	-	-	-
Dirt&Gravel Road E&S	cumulative	Feet	-	-	-	-
Non-Tidal Algal Flow-way	annual	Acres	-	-	-	-
Tidal Algal Flow-way	annual	Acres	-	-	-	-
TOTAL				1,736.95	71.62	132,318.68
Upper Jennings Run Watershed Load Reduction Summary				13,379.51	472.15	2,460,865.16

Appendix C | Milestones and BMP Goals

The following annual milestones coincide with Maryland's NPS Management Program objectives presented in Chapter 2 of Maryland's 2021-2025 Nonpoint Source Management Plan (Plan). The Management Plan is intended to achieve and maintain water quality standards and to maximize water quality benefits among other broad strategic goals presented in Chapter 1 of the Plan. These milestones, in concert with the Plan's goals and objectives, address Key Component #1 of EPA's Section 319 Program Guidance entitled, "Key Components of an Effective State Nonpoint Source Management Program (November 2012).

Each year, the following tables are included in Maryland's 319 Annual Report with updates to reflect annual progress. These results show the results of what was accomplished in the past year, FFY21.

Objective 3: Pollutants & Stressors	Lead	2021
Annual Nitrogen Nonpoint Source Loads to Bay: (SFY20 Results lbs/yr)	MDE	47,997,273
Nitrogen: For all watersheds with EPA-accepted plans, overall total annual reduction by NPS implementation completed during the past year: (Cumulative lbs/yr from plan start)	MDE	1,809,399
Annual Phosphorus Nonpoint Source Loads to Bay: (SFY20 Results lbs/yr)	MDE	3,681,137
Phosphorus: For all watersheds with EPA-accepted plans, overall total annual reduction by NPS implementation completed during the past year: (Cumulative lbs/yr from plan start)	MDE	85,952
Sediment: 319-funded projects Estimated annual reductions in pounds of sediment to local water bodies: Annually determine NPS load reductions of nitrogen and include information in NPS annual report. (Cumulative lbs/yr from plan start)	MDE	17,614,000
Sediment: For all watersheds with EPA-accepted plans, overall total annual reduction by NPS implementation completed during the past year: (Cumulative lbs/yr from plan start)	MDE	737,359,044
Bacteria: Annual Report on Monitoring Results for Maryland Beaches	MDE	https://mde.maryland.gov/programs/water/Beaches/Documents/2021%20beach%20report.pdf
Bacteria: Conduct Annual Meetings of County Beach Management Programs	MDE	Held March 30, 2022
Bacteria: Conduct annual Shoreline Field Surveys near Shellfish Waters to identify pollutant sources of concern (part of a 7-year cycle).	MDE	15 Surveys

Bacteria: Conduct annual Sanitary Surveys of relevant data for all shellfish growing areas. These are reviews of all potential pollution sources in a shellfish growing area, which are informed by Shoreline Field Surveys.	MDE	49 Surveys

Objective 3: Pollutants & Stressors	Lead	2021
Chloride: Development of a Statewide Implementation Strategy in the form of a 5S plan to address chloride impairments in a consistent manner across the State. This path was discussed with Region 3 staff, and MDE's ultimate goal is a 4b plan.	MDE	Begin in 2022
Chloride: Certify 150 individuals over the life of this 5-year NPS State Management Program Plan through the Annual Parking lots and Sidewalks Salt Application Management Training by MDE designee.	MDE	Begin in 2022
Chloride: Track and report the # of personnel trained through the Annual Road Salt Application Management Training by StateHighway Administration.	MDE	81 people
Chloride: Update Maryland's 319 Program webpage to summarize Maryland's existing chloride mitigation activities, information about chloride pollution, and partnerships established within and outside of the State.	MDE	Updates in late 2021, additional updates ongoing
PCBs: Develop one new PCB TMDL over the life of this 5-year NPS State Management Program Plan.	MDE	TBD, none this year
Temperature: Update Maryland's 319 Program webpage to summarize state initiatives designed to reduce temperature. Project Summer 2022 for completion.	MDE	Begin in 2022
Trash: Update Maryland's 319 Program webpage to summarize status of TMDLs designed to reduce trash. Project Summer 2022 for completion.	MDE	Begin in 2022

Objective 4: Pollutant Sources	Lead	2021
Maintain Annual Cover Crop Implementation Acreage Levels	MDA	MD increased it's Cover Crop acreage by 100,000 acres in FY20 to 602,826 acres.
Maintain Annual Nutrient Management Plan Acreage Levels	MDA	NM Plan Core levels were maintained in FY20 at 894,284 acres
Maintain Annual Soil Conservation and Water Quality Plan Acreage Levels	MDA	Slight decrease in plans for FY20, but overall level was maintained at 861,876 acres.
Maintain Annual Manure Transported out of Chesapeake Bay watershed (tons)	MDA	Manure Transport out of the WS increase by 30,000 tons in FY20
Maintain Annual Conservation Tillage (Inc. High Residue) Acreage Levels	MDA	Conservation Tillage levels were maintained in FY20 at 824,584 acres.
Plant Riparian Forest Buffers (Acres/year)	MDA	17,000 ft. of buffer planted which equals roughly 6 acres
Wetland Restoration (Acres/year)	MDA	400 acres created
Phosphorus Management Tool – Maintain use of PMT for operations in the high-risk group, medium-risk group, and low-risk group. (# of operations utilizing the tool by risk group)	MDA	20% of MD farm fields require use of the PMT, that translates to roughly 200,000 acres of fields.
Upgrade septic systems to nitrogen removal technology (systems/year)	MDE	1,094 BAT upgrades
Stormwater retrofits of land without sufficient controls (cumulative pounds of nitrogen reduced/year). (May be refined in future Chesapeake Bay 2-Yr Milestones.)	MDE	Estimated 3,046,490 lbs
Complete the redevelopment of the MS4 geodatabase that will aid MDE in the assessment of management programs and improve current Phase I MS4 stormwater data tracking, collection, and validation of BMPs:	MDE	Ongoing, a final database shell and instructions for reporting were sent to all Phase I MS4s on August 6, 2022 to begin incorporating into future reports
Online BMP Reporting Tool for Non-MS4 local governments:	MDE	Complete: a tool has been created that can be used for these jurisdictions.
SMART Homeowner BMP Tracking Tool: Track number of BMPs	UMD	438 BMPs
Online BMP Reporting Tools for Phase II MS4 and Non-MS4 local governments: Make the tool available to users.	MDE	No Progress

Objective 4: Pollutant Sources	Lead	2021
Local Stormwater WLA Implementation Plans: Review Plans submitted aspart of Phase I MS4 requirements. (Number of jurisdictions, which may include multiple plans for each jurisdiction) **Anticipate salt plans in 2024.**	MDE	6 (2 PCB plans, 4 sediment plans)
Erosion and Sediment site "inspection compliance rate" conducted by MDE(Source: Annual Enforcement & Compliance Report)	MDE	89.5%
Lawn-to-Woodland Program: Track and report the number of landowners assisted and acres forested through the Lawn-to-Woodland Program, which provides landowners with trees, tools and technical assistance for planting and maintaining a healthy tree canopy that will support a myriad of environmental, economic and recreational benefits.	DNR	0 – No funding this year
Maryland's 5 million trees by 2030 initiative (Report status of program and # of trees planted)	MDE	Starts in CY 2022
Planting Forests on 38,000 acres by 2030 from baseline as part of Maryland's revised 2021 Greenhouse Gas Reduction Act (GGRA) plan goals.	DNR	2,115 acres
Coal Mining site "inspection coverage rate" conducted by MDE	MDE	100%
Non-Coal Mining site "inspection coverage rate" conducted by MDE	MDE	93%
Non-tidal wetlands and floodplains permit site "inspection coverage rate"	MDE	18%
Tidal wetlands permit site "inspection coverage rate"	MDE	5.6%

Objective 5: Types of Waterbodies	Lead	2021
Statewide Lakes and Reservoirs		
Lakes/Reservoirs: Triadelphia and Liberty chlorides/temperature monitoring Study (Trends analysis to help determine if we can see drops in salt levels, started in 2019)	MDE	Currently there is not enough data to make meaningful assessments forecast 2025
Patuxent Reservoirs Annual Report of the Technical Advisory Committee	WSSC	2020 Meeting was the most recent
Central Maryland – Chesapeake Bay Drainage	Watersheds with EPA-accepted watershed plans that are eligible for 319(h) Grant implementation funding.	
Antietam Creek Watershed. Water quality goal is to reduce annual pollutant loads: 12,923 tons/yr sediment, approx. 3 million-billion *E. coli* MPN. (see the Washington County Soil Conservation District's 2012 watershed plan Tables 8, 10, 13, 18, and 19)		
Watershed plan milestones: Report progress in the 319 Annual Report.	WCSCD	MDE's NPS program has funded 14 projects in this watershed, the most of any watershed in MD
Assess Implementation Progress toward sediment and bacteria reductionwatershed plan milestones and update plan if needed.		Plan needed updates, those were completed in 2021 and undergoing internal MDE review.
Update watershed implementation plan		Draft completed, submitting to EPA in 2022
Back River – Tidal Watershed. Water quality goal is to reduce annual nutrient loads: 6,498 lbs/yr nitrogen and 679 lbs/yr phosphorus. (see Baltimore County's 2010 watershed plan Table 3-2 and Appendix A-1)		
Watershed plan milestones: Report progress in the 319 Annual Report.	Baltimore County	No new progress
Assess action items progress: Stormwater retrofit and Stream restoration		No action for 2021
Back River – Upper Watershed. Water quality goal is to reduce annual nutrient loads: 48,189.6 lbs/yr nitrogen and 6,055.8 lbs/yrphosphorus. (see Baltimore County's 2008 watershed plan Table 3-2 and Appendix A Table A-2)		
Watershed plan milestones: Report progress in the 319 Annual Report.	Baltimore County	No new progress
Assess plan implementation progress, particularly: open space tree planting,impervious area removal on institutional land.		No action for 2021

Objective 5: Types of Waterbodies	Lead	2021
Choptank River – Upper Watershed. Water quality goal is to reduce nutrient loads from 2002 levels by 39% for nitrogen (704,000 lbs/yr) and 28% for phosphorus (34,5000 lbs/yr). (see Caroline County's 2010 watershed plan, Table 11)		
Watershed plan milestones: Report progress in the 319 Annual Report.	Caroline County	Complete an increase in BMP implementation was observed for most BMP categories. DO monitoring in the Choptank indicates healthy waters according to the Chesapeake Bay Report Card.
Assess BMP implementation progress and update plan if needed.		Several projects occurring in North County Park and Greensboro Volunteer Fire company. Working with Envision the Choptank to provide additional capacity to expand BMP implementation
Conococheague Creek Watershed.		
Plan is being drafted and will come to MDE for review. MDE anticipates review in Spring 2022 and submission to EPA in late summer of 2022 for review. Milestones for implementation will be added upon acceptance.	Washington County	Plan received, but is undergoing internal review in 2022
Corsica River Watershed. Water quality goal is to continue meeting the Corsica TMDL for nitrogen and phosphorus.		
Watershed plan milestones: Conduct outreach to the owners of this plan to increase 319 project implantation and Report progress in the 319 Annual Report.	Centreville	MDE is in contact with members of the Corsica River management team
Assess implementation progress for BMP goals and update plan if needed.		This plan has stalled for several years, but we anticipate new changes in the next year or two
Gwynns Falls – Middle Watershed. Water quality goal for 2017 is to reduce annual nutrient loads: 35,350 lbs/yr nitrogen and 5,915 lbs/yr phosphorus. (see Baltimore County's 2014 watershed plan Table 3-24 and Appendix A Table A-2)		
Report implementation progress in the 319 Annual Report.	Baltimore County	Most recent project in Scott's Level Branch is expected to finish construction in 2022.
Jones Falls – Lower Watershed. Water quality goal is to reduce annual pollutant loads: 23,146 lbs/yr nitrogen, 3,887 lbs/yr phosphorus, 204.9 tons/yr sediment. (see Baltimore County's 2008 watershed plan Table 5.4)		
Watershed plan milestones: Report progress in the 319 Annual Report.	Baltimore County	No new 319 projects in this watershed
Monocacy River – Lower Watershed. Water quality goal is to reduce annual pollutant loads: 649,998 lbs/yr nitrogen, 68,952 lbs/yr phosphorus, 10,345 tons/yr sediment. (see Frederick County's 2008 watershed plan page 16 and Table "X" p34)		
Watershed plan milestones: Conduct outreach to the owners of this plan to increase 319 project implantation and Report progress in the 319 Annual Report.	Frederick County	Outreach effort in 2022
Assess implementation progress and update plan if needed.		No new 319 projects in this watershed

Sassafras River Watershed. Water quality goal is to reduce annual pollutant loads: 462,225 lbs/yr nitrogen, 12,602 lb/yr phosphorus, 1,143 tons/yr sediment. (see the Sassafras River Association's 2009 watershed plan Table 5.4)		
Watershed plan milestones: Conduct outreach to the owners of this plan to increase 319 project implantation and Report progress in the 319 Annual Report.	SR Assoc.	Outreach effort in 2022
Central Maryland – Chesapeake Bay Drainage	Plans not designed to seek 319(h) implementation funds.	
Phase III Watershed Implementation Plan for the Chesapeake Bay TMDL.		
Evaluate 2025 progress for pollutant load reductions to be achieved for nonpoint sources of nitrogen, phosphorus, and sediment. Report Annually.	MDE	Our FY20 NPS annual progress Nitrogen and phosphorus loads decreased due to BMP implementation, which is steadily increasing in Maryland.

Western Maryland – Casselman River and Youghiogheny River	Watersheds with EPA-accepted watershed plans that areeligible for 319(h) grant implementation funding.	
Casselman River Watershed Management Plan Water quality goal is to meet the pH water quality standard.(see MDE's 2011 watershed plan Chapter 3.2)		
Watershed plan milestones: Report progress in the 319 Annual Report, including, number/percentage of pH-impaired stream segments, NPS Program Success Stories and implementation progress.	MDE	Complete, 10 stream segments were orginally impaired, now 5 are meeting WQ Standards for pH and sand dumps were refreshed.
Percentage of impaired stream segments remediated and meet the State water quality standard for pH.	MDE	50%
Report 303(d) stream segments that achieve pH criteria via Maryland's Integrated Report.	MDE	In text; complete
Cherry Creek Watershed Protection Plan Water quality goal to be determined when the plan is finalized.		
Plan completion anticipated in 2022. Potential milestones TBD.	MDE	Drafted, waiting review, but may not be submitted due to influx of BIL money into our Abandoned Mine Lands program.
Upper Jennings Run Watershed Plan Water quality goal to be determined when the plan is finalized.		
Tentatively accepted pH mitigation Plan is being updated to include sediment. Report progress in the 319 Annual Report.	MDE	NA – Plan update to begin in 2022 (Same as Cherry Creek WS Plan) Sampling expect to continue as BIL money will fund projects identified in the 319 watershed plan for pH.

Coastal Region – Coastal Bays and Atlantic Ocean		
Coastal Bays Conservation and Management Plan Water quality goal to be determined when plans are finalized.		
Assawoman Bay is conditionally approved: Report progress in the 319 Annual Report.	MCBP	No Progress (paperwork for grant award being processed)
Next steps are to create plans for Assateague, Isle of Wight, Newport, and Sinepuxent Bays. Report progress on creation of these plans and incorporate updates to milestones for any new plans in updates to this NPS plan.	MCBP	No Progress

Objective 6: Protection and Restoration	Lead	2021
Report for biological monitoring of approximately 30 sites annually to support implementation of Maryland's Antidegradation Policy in areas with pending significant development projects. Produce a report of results annually.	MDE	Final Report Accepted by EPA
303(d) Program Vision: For the 2020 reporting cycle and beyond, in addition to the traditional TMDL development priorities and schedules for waters in need of restoration, Maryland will identify protection planning priorities and approaches along with schedules to help prevent impairments in healthy waters, in a manner consistent with each State's systematic prioritization. (See Objective 7, Priorities, for a related objective)	MDE	Cherry Creek identified as a priority
Develop Antidegradation Review process for individual projects identified under a County's Comprehensive Plan.	MDE	Complete
Fully integrate the Antidegradation review into the General Permit for Discharges of Stormwater Associated With Construction Activity (Maryland General Permit No. 14-GP	MDE	Complete
Conduct State Clearinghouse reviews of state and federally funded projectsto ensure consistency with the State Anti-degradation Policy (approximately400/year)	MDE	449 reviews completed

Objective 7: Priority Setting	Lead	2021
Biological monitoring to support implementation of Maryland's Antidegradation Policy in areas with pending significant development projects. Produce a list of about 30 high-priority monitoring sites annually.	MDE	Provided in monitoring plan updates
Award 319(h) Grant funding annually according to prioritization criteria. Provide scopes of work for each selected project.	MDE	Completed for FY21
303(d) Program Vision: Priorities - For the 2020 integrated reporting cycle and beyond, Maryland will review, systematically prioritize, and report priority watersheds or waters for restoration and protection in the biennial integrated reports to facilitate State strategic planning for achieving water quality goals.	MDE	Completed for FY21
303(d) Program Vision: Alternatives - By 2022, Maryland will use alternative approaches, in addition to TMDLs, that incorporate adaptive management and are tailored to specific circumstances where such approaches are bettersuited to implement priority watershed or water actions that achieve the water quality goals, including identifying and reducing nonpoint sources of pollution. (Assess alternatives to influence priorities)	MDE	Ongoing

Objective 8: Program Management and Evaluation	Lead	2021
319 Semi-Annual Reports: Report semi-annually on progress on implementing the active Section 319 grant work plans ensuring status reports (evaluations) are current for at least 90% of the active grant projects in the GRTS database.	MDE	2 semi-annual reports submitted and approved for FY21
MDE will continue to input current information in the Watershed Plan Tracker (WPT) throughout the five-year life of this Plan to ensure accuracy of data.	MDE	Ongoing
Chesapeake Bay Two-Year Milestones: As part of the CB partnership process, Maryland submits a 2-year milestone evaluation as well as new milestones or revisions for the subsequent 2-year timeframe on odd years. Maryland's 2-year milestones will be maintained on our website, along with evaluations by the Chesapeake Bay program, here: https://mde.maryland.gov/programs/Water/TMDL/TMDLImplementation/Pages/milestones.aspx	MDE	Updates to 2020-21 posted, new 2022-23 MS posted Jan. 2022
Produce Maryland's Integrated Water Quality Monitoring and Assessment Report every even calendar year (Integrated Report). Post the report on theInternet following EPA approval.	MDE	Submitted 1/27/22 to EPA
Number of water bodies identified in Integrated Report as being primarily NPS impaired that are partially or fully-restored: Partially or fully restore water bodies identified in state's Integrated Report primarily impaired by NPS. (cumulative watersheds) Partially restored means at least one water quality criterion is achieved in cases where the waterbody has multiple waterquality criteria violations (Cumulative starting in 2021).	MDE	0
Report NPS BMP implementation progress annually.	MDE	Reported 12/1/2021 CBPO via the National Environmental Exchange Network (NEIEN)
BMP Implementation Verification Protocols: Revised documentation due to EPAChesapeake Bay Program	MDE	Submitted 12/1/2021
Produce Maryland's 319 NPS Program Annual Report (319 Annual Report).Annually report if findings necessitate a future NPS Management Program Plan update. Post the report on the Internet following EPA review.	MDE	Draft Submitted 2/23/22
Report progress achieved toward goals for 319-eligible watershed plans inMaryland's 319 Annual Report.	MDE	See Priority Watersheds section above
Report significant findings from targeted watershed monitoring in Maryland's 319 Annual Report.	MDE	Included in Monitoring report
Report at least one success story documenting water quality and/or ecological improvement annually. If none can be documented during a given year, then report at least two programmatic success stories within the same required year.	MDE	1 – Baltimore County Stream Restoration Project Helps Restore Scotts Level Branch to its Natural State

Evaluate progress on each of these 319 Program milestones and report the status in Maryland's NPS Program Annual Report.	MDE	Complete
Maintain/increase State agency investment in NPS programs and implementation. Report annually on total state expenditures by state fiscal year. (See Annual ReportAppendix A)	MDE	Included in Appendix A
Continuing Planning Process (CPP) update for consistency with this NPS Program Management Strategy	MDE	Complete
State Monitoring Strategy Update	MDE	Included in State Management Plan for 2023
Diversity, Equity, Inclusion, and Environmental Justice (DEIJ): Based on the lessons learned in the Envision the Choptank circuit rider project, update the NPS management plan to include more specific DEIJ goals for the nonpoint source program.	MDE	Begin in 2022, project award awaiting legal review.

Appendix D | Priority Watershed Details

This appendix provides details for projects funding by the 319(h) Grant (*pages D - 2 to D - 7*). Table D - 1 (*Table 3 in the main report*) provides a summary of the 319 Priority Watershed status.

For details on total spending by priority watershed, see Appendix A; for details on total NPS reduction by watershed, see Appendix B. Projects generally take two years to complete from the initial funding date.

Maryland uses the Chesapeake Assessment and Scenario Tool (CAST) outputs to estimate its load reductions/increases as more of a "real time" assessment of how our efforts are going. CAST uses a number of data inputs that can affect the loads in our watersheds, BMP implementation being only one of them. Consequently, even with increased BMP implementation the model may assign greater loads to a watershed which offset any reductions achieved through BMP implementation. This variability is reflected in the tables and watershed profiles included in this section.

Table D - 1: *Summary of Maryland's 319 Priority Watersheds*

Priority Watershed	Plan Start Date	**Funding** *(Total)* State | 319 | Total	**Reductions** *(lbs/yr)* TN | TP | TSS
Antietam Creek	2012	$ 1.2M | $ 3.1M | $ 4.3M	15.6K | -3.6K | 0.2M
Assawoman Bay	2020	$ 0.0M | $ 0.0M | $ 0.0M	0.0K | 0.0K | 0.0M
Back River - *Tidal*	2010	$6.0M | $ 0.6M | $6.6M	7.4K | 1.8K | 2.8M
Back River - *Upper*	2008	$12.7M | $ 1.2M | $13.9M	9.3K | 2.3K | 4.3M
Casselman River	2011	$ 0.0M | $ 0.1M | $ 0.1M	-11.9K | -0.1K | -6.8M
Choptank River - *Upper*	2010	$ 0.7M | $ 0.7M | $ 1.5M	162.6K | 2.4K | 4.3M
Corsica River	2004	$ 1.7M | $ 2.1M | $ 3.8M	29.8K | 3.6K | -1.4M
Gwynns Falls - *Middle*	2014	$12.8M | $ 1.1M | $13.9M	7.4K | 1.1K | 3.7M
Jennings Run - *Upper*	2019	$ 0.0M | $ 0.0M | $ 0.0M	1.3K | 0.1K | 0.2M
Jones Falls - *Lower*	2008	$ 6.8M | $ 0.5M | $ 7.3M	13.3K | 3.5K | 5.9M
Monocacy River - *Lower*	2008	$ 1.7M | $ 1.1M | $ 2.8M	103.7K | 10.9K | -10.0M
Sassafras River	2009	$ 4.6M | $ 0.4M | $ 5.0M	56.5K | -0.6K | 2.6M
Watershed Totals		**$48.3M | $10.9M | $59.1M**	**395.1K | 21.3K | 5.9M**

Project Details | 319(h) Grant Funded Projects

The following tables (*D - 2 to D - 7)* provide detailed project information for different 319(h) Grant funded projects occurring between the watershed plan approval date and SFY 2021. Estimated load reductions come from the approved watershed plans.

Table D - 2: *Antietam Creek 319(h) Grant funded projects*

Antietam Creek | Watershed Plan Approved 2012							
Project	**State Fiscal Year**	**Grant Funding Source**	**319(h) Grant**	**Nitrogen (lbs/yr)**	**Phosphorus (lbs/yr)**	**Sediment (Thousand lbs/yr)**	**Bacteria (Billion/yr)**
Shank/Anderson Project Phase 2 of 3	2012	319 FFY11	$64,266	28	3	7,134	166
Devils Backbone Park Stream Restoration	2012	319 FFY11	$267,964	300	102	465	0
Kiwanis Park Stream Stabilization Phase 2	2013	319 FFY12	$46,000	34	10	36	0
Greensburg Rd Little Antietam Creek Restoration	2013	319 FFY12	$240,000	110	37	171	0
Barr Property Stream Restoration Ph1	2014	319 FFY13	$148,930	24	5	6	0
Kiwanis Park Stream Stabilization Phase 1	2015	319 FFY14	$124,998	34	10	34	0
Devils Backbone Park Stream Restoration	2015	319 FFY14	$390,000	300	102	465	0
Barr Property Stream Restoration Ph2	2016	319 FFY15	$139,257	24	5	6	0
Shank/Anderson Project Phase 3 of 3	2016	319 FFY15	$448,365	158	57	1,590	0
WCSCD Winders Ph2 of 3	2017	319 FFY16	$39,480	0	0	0	0
Little Grove Creek Stream Restoration	2019	319 FFY18	$221,178	71	65	42	0
Winders Property Phase 2 of 3	2019	319 FFY18	$52,585	126	17	2	105
Antietam-Beaver Creek Clagett Property	2020	319 FFY19	$400,000	128	116	423	0
Mayo/Bumpers Property Stream Restoration	2021	319 FFY20	$488,286	132	120	437	0
Watershed Totals			**$3,071,309**	**1,469**	**649**	**10,811**	**271**

Table D - 3: *Assawoman Bay 319(h) Grant funded projects*

Assawoman Bay| Watershed Plan Approved 2020							
Proposed Project	**State Fiscal Year**	**Grant Funding Source**	**319(h) Grant**	**Nitrogen (lbs/yr)**	**Phosphorus (lbs/yr)**	**Sediment (Thousand lbs/yr)**	**Bacteria (Billion/yr)**
Grey's Creek Project	2020	319 FFY20	$106,000	50	16	1,105	0
Back Creek Project	2020	319 FFY20	$250,000	612	36	25,000	0
Watershed Totals			**$356,000**	**662**	**52**	**26,105**	**0**

Table D - 4: *Back River: Tidal 319(h) Grant funded projects*

Back River: Tidal | Watershed Plan Approved 2010							
Project	**State Fiscal Year**	**Grant Funding Source**	**319(h) Grant**	**Nitrogen (lbs/yr)**	**Phosphorus (lbs/yr)**	**Sediment (Thousand lbs/yr)**	**Bacteria (Billion/yr)**
Bread & Cheese Creek stream restoration & stormwater control	2011	319 FFY10	$556,443	280	94	428	0
Watershed Totals			**$556,443**	**280**	**94**	**428**	**0**

Table D - 5: *Back River: Upper 319(h) Grant funded projects*

Back River: Upper | Watershed Plan Approved 2008							
Project	**State Fiscal Year**	**Grant Funding Source**	**319(h) Grant**	**Nitrogen (lbs/yr)**	**Phosphorus (lbs/yr)**	**Sediment (Thousand lbs/yr)**	**Bacteria (Billion/yr)**
Redhouse Run/St. Patricks stream restoration	2008	319 FFY07	$418,500	609	32	11	0
Upper Back River Stormwater conversions	2009	319 FFY08	$422,373	52	12	4	0
Herring Run/Overlook Park stream restoration & buffer planting	2015	319 FFY14	$358,032	314	284	188	0
Watershed Totals			**$1,198,905**	**975**	**328**	**203**	**0**

Table D - 6: *Casselman River 319(h) Grant funded projects*

Casselman River | Watershed Plan Approved 2012							
Project	**State Fiscal Year**	**Grant Funding Source**	**319(h) Grant**	**Nitrogen (lbs/yr)**	**Phosphorus (lbs/yr)**	**Sediment (Thousand lbs/yr)**	**Bacteria (Billion/yr)**
AMD pH Remediation GIS Tool	2012	319 FFY11	$83,619	0	0	0	0
Watershed Totals			**$83,619**	**0**	**0**	**0**	**0**

Table D - 7: *Choptank River: Upper 319(h) Grant funded projects*

Choptank River: Upper | Watershed Plan Approved 2010							
Project	**State Fiscal Year**	**Grant Funding Source**	**319(h) Grant**	**Nitrogen** (lbs/yr)	**Phosphorus** (lbs/yr)	**Sediment** (Thousand lbs/yr)	**Bacteria** (Billion/yr)
DPW Stormwater Retrofits	2011	319 FFY10	$46,440	11	8	2	0
U. Choptank Watershed Restoration	2013	319 FFY12	$140,001	8	1	0	0
Volunteer Fire Comp. SWM upgrades	2013	319 FFY12	$37,834	1	0	0	0
U. Choptank Watershed Restoration	2014	319 FFY13	$140,001	16	3	0	0
Dept. Emergency Services Porous Parking	2015	319 FFY14	$137,770	5	0	94	0
Lockerman School SWM Retrofit	2018	318 FFY17	$100,000	0	1	0	0
Morton Farm Bio-Retention/Swale	2018	318 FFY17	$88,220	598	33	23	0
North County Park Design	2020	319 FFY20	$80,080	409	262	942	0
Greensboro Volunteer Fire Department	2020	319 FFY21	$325,000	8	1	1	0
Watershed Totals			**$1,095,346**	**1,056**	**309**	**1,062**	**0**

Table D - 8: *Corsica River 319(h) Grant funded projects*

Corsica River | Watershed Plan Approved 2004							
Project	**State Fiscal Year**	**Grant Funding Source**	**319(h) Grant**	**Nitrogen (lbs/yr)**	**Phosphorus (lbs/yr)**	**Sediment (Thousand lbs/yr)**	**Bacteria (Billion/yr)**
Agricultural Technical Assistance	2005	319 FFY04	$32,380	0	0	0	0
Watershed Restoration	2006	319 FFY05	$232,666	0	0	0	0
Agricultural Technical Assistance	2006	319 FFY05	$145,554	767	79	0	0
Watershed Restoration	2007	319 FFY06	$241,975	62	6	0	0
Agricultural Technical Assistance	2007	319 FFY06	$14,273	2,413	233	0	0
Corsica and Beyond	2007	319 FFY06	$124,281	0	0	0	0
Agricultural Technical Assistance	2008	319 FFY07	$48,472	286	10	1,510	0
Agricultural Technical Assistance	2009	319 FFY08	$50,780	46	3	0	0
Bioretention Swale	2009	319 FFY08	$50,000	0	0	1	0
Watershed Restoration	2010	319 FFY09	$270,427	5	1	1	0
Agricultural Technical Assistance	2010	319 FFY09	$58,539	149	10	0	0
Agricultural Technical Assistance	2011	319 FFY10	$61,590	887	84	0	0
Watershed Restoration	2012	319 FFY11	$298,998	58	5	2	0
Agricultural Technical Assistance	2012	319 FFY11	$69,546	127	17	0	0
Board of Education Bioretention	2012	319 FFY11	$93,198	5	0	0	0
Watershed Restoration	2013	319 FFY12	$115,002	7	1	0	0
Agricultural Technical Assistance	2013	319 FFY12	$67,512	0	0	0	0
Board of Ed. Phase 2: Kramer Center	2013	319 FFY12	$114,276	61	8	6	0
Agricultural Technical Assistance	2014	319 FFY13	$47,937	0	1	0	0
Watershed Totals			**$2,137,406**	**4,873**	**458**	**1,520**	**0**

Table D - 9: *Gwynns Falls: Middle 319(h) Grant funded projects*

Gwynns Falls: Middle | Watershed Plan Approved 2014							
Project	**State Fiscal Year**	**Grant Funding Source**	**319(h) Grant**	**Nitrogen (lbs/yr)**	**Phosphorus (lbs/yr)**	**Sediment (Thousand lbs/yr)**	**Bacteria (Billion/yr)**
Scotts Level Marriottsville Road Stream Restoration	2017	319 FFY16	$613,940	2,127	728	1,386	0
Scotts Level Upper Scotts Level Park Stream Restoration	2019	319 FFY18	$450,000	1,798	826	1,770	0
Watershed Totals			**$1,063,940**	**3,925**	**1,554**	**3,156**	**0**

Table D - 10: *Jennings Run: Upper 319(h) Grant funded projects*

Jennings Run: Upper | Watershed Plan Approved 2019							
Project	**State Fiscal Year**	**Grant Funding Source**	**319(h) Grant**	**Nitrogen (lbs/yr)**	**Phosphorus (lbs/yr)**	**Sediment (Thousand lbs/yr)**	**Bacteria (Billion/yr)**
No 319(h) Projects as of SFY 2020							
Watershed Totals			-	-	-	-	-

Table D - 11: *Jones Falls: Lower 319(h) Grant funded projects*

Jones Falls: Lower | Watershed Plan Approved 2008							
Project	**State Fiscal Year**	**Grant Funding Source**	**319(h) Grant**	**Nitrogen (lbs/yr)**	**Phosphorus (lbs/yr)**	**Sediment (Thousand lbs/yr)**	**Bacteria (Billion/yr)**
Roland Run Stream Restoration	2020	319 FFY19	$462,309	90	91	173	0
Watershed Totals			**$462,309**	**90**	**91**	**173**	**0**

Table D - 12: *Monocacy River: Lower 319(h) Grant funded projects*

Monocacy River: Lower | Watershed Plan Approved 2008							
Project	**State Fiscal Year**	**Grant Funding Source**	**319(h) Grant**	**Nitrogen (lbs/yr)**	**Phosphorus (lbs/yr)**	**Sediment (Thousand lbs/yr)**	**Bacteria (Billion/yr)**
Urban Wetlands, Bennett Creek Pilot	2008	319 FFY07	$223,364	101	19	3	0
Urban Wetlands, Bennett Creek Pilot	2009	319 FFY08	$234,545	150	31	6	0
Green Infrastructure	2011	319 FFY10	$318,396	351	34	8	0
Neighborhood Green Infrastructure	2014	319 FFY13	$97,000	30	0	2	0
Rock Creek Stream Restoration	2018	319 FFY17	$270,000	94	85	56	0
Watershed Totals			**$1,143,305**	**726**	**169**	**75**	**0**

Table D - 13: *Sassafras River 319(h) Grant funded projects*

Sassafras River | Watershed Plan Approved 2009							
Project	**State Fiscal Year**	**Grant Funding Source**	**319(h) Grant**	**Nitrogen** (lbs/yr)	**Phosphorus** (lbs/yr)	**Sediment** (Thousand lbs/yr)	**Bacteria** (Billion/yr)
Galena Elementary School stormwater wetland	2013	319 FFY12	$15,000	1	0	0	0
Phipps Treatment Wetlands & sediment traps	2014	319 FFY13	$50,000	99	20	5	0
Harbor View / Colchester Farms	2018	319 FFY17	$216,234	2,220	136	111	0
Starkey Farm Watershed Restoration	2018	319 FFY17	$144,514	1,884	98	71	0
Watershed Totals			**$425,748**	**4,204**	**254**	**187**	**0**

Appendix E | Priority Watershed Monitoring

INTRODUCTION: *Targeted Watershed Program Background*

The Targeted Watershed Program was originally conceived to demonstrate how focusing resources into comprehensive watershed restoration projects could improve water quality and habitat for living resources. As part of the program, monitoring activities were designed to establish baseline conditions within watersheds to ultimately evaluate the effectiveness of best management practices (BMPs). Monitoring associated with the Targeted Watershed Program initially focused on defining the status and trends in water quality and living resources within each watershed.

The challenge for the program and many others like it nationwide, such as the Rural Clean Water Program and the National Non-Point Source Monitoring Program, has been determining how to augment status and trends monitoring data and make it applicable to management decisions. The Targeted Watershed Program began to address these concerns in 1992 based on the belief that more specific information about watershed conditions was necessary to effectively target restoration efforts and ultimately quantify the effect of these practices.

With the idea of collecting more specific information about watershed conditions, the watershed wide "synoptic" monitoring tool has been developed to identify stream nutrient and contaminant "hot spots" and associated smaller drainage areas. In using the "synoptic" technique as a screening tool, monitoring resources and BMP implementation can be more focused and efficient in addressing non-point contaminant issues.

The Corsica River Targeted Watershed Project was originally a "Pilot Program". It was developed to test management strategies and activities designed to restore the Corsica River, a tributary to the Chester River and Chesapeake Bay in Queen Anne's County, to the designated uses of fishable, swimmable, and shellfish harvest waters. The goal of the Corsica River Monitoring Project is to demonstrate the success of management strategies and implementation activities throughout the watershed in meeting the nutrient and sediment total maximum daily loads (TMDLs) and remove this watershed from the federally impaired waters 303(d) list.

In addition, the Targeted Watershed Program is continuing to develop regional nutrient synoptic monitoring that compliment regional coarse scale TMDL follow-up monitoring. The monitoring results have been used to identify opportunities for fine scale implementation activities. Several BMP specific effectiveness-monitoring projects are also continuing in watersheds with EPA approved watershed restoration plans. The program continues to provide technical support to counties grappling with incorporating TMDL goals into their comprehensive plans.

Another area of focus is low pH associated with acid mine drainage (AMD) in the Jennings Run and Cherry Creek watersheds in Western Maryland. Monitoring has been conducted to assess the effectiveness of various types of AMD BMP implementation. The goal is to show improvement in both water quality and benthic fauna in the hopes of removing these impaired AMD affected streams from the 303(d) list.

GOALS AND OBJECTIVES

Outstanding Management Need: To demonstrate observable water quality improvements in response to implementation actions. Given the lessons learned, it is unclear whether this can be accomplished in a reproducible manner at a watershed scale under the current voluntary management framework.

In addition to this broad management need, this project supports implementation targeting, pollution source assessments, and project-scale evaluation of implementation.

Goal: The goal of this project continues to be demonstration of focusing resources into comprehensive restoration projects to improve water quality and habitat for living resources. The emphasis continues to be on restoring impaired water bodies with TMDLs and the support of local efforts to address TMDL implementation goals.

Objectives:
Field Evaluation Services: Continue to provide assessment services to assist in identifying water quality, living resource and habitat problems, identify pollutant source areas, and prioritize potential restoration sites. Assess effectiveness of restoration activities and efficiencies of BMPs being implemented to address impairments of watersheds on the 303d list of impaired waters. Support development of assessment and implementation in targeted watersheds and associated watershed planning.

Strategic Evaluation: In coordination with EPA and other interested parties, continue to evaluate the viability of the targeted watershed concept to generate "success stories" in terms of observable improvement in water quality criteria (physical, chemical, and biological). This includes the continuous review of results documented by this project, development of monitoring design methods to quantify expected outcomes as a function of anticipated levels of implementation, the re-evaluation of the scale at which future Targeted Watershed Projects should be conducted to guarantee observable results, and the systematic evaluation of potential future monitoring initiatives involving other stakeholders (EPA, State agencies, others).

Corsica Monitoring: Continue to provide long term evaluation services in the Corsica River watershed to help document progress toward achieving TMDL goals.

Objective 1: Quality Assurance Project Plan (QAPP).

Activity	Milestones	Timeline	Responsible Party	Deliverables / Outputs

Draft or revise current QAPP that meets EPA requirements	Submit a draft QAPP to EPA.	7/1/21	MDE	Quarterly Report: Provide a copy of the draft QAPP Final Report: 1) If no changes are made to the draft QAPP prior to the end of the project, in the Final Report include a copy of the draft QAPP as originally submitted to EPA. 2) If EPA comments lead to changes in the draft QAPP, in the Final Report include a copy of the revised QAPP.

Objective #2*: Continue to provide assessment services that assist in identifying water quality, living resource and habitat problems, identify pollutant source areas, and prioritize potential restoration sites. Assess effectiveness of restoration activities and efficiencies of best management practices (BMPs) being Implemented to address impairments of watersheds on the 303d list of impaired waters.*

Responsible Party: MDE	*Timeframe*: July 1, 2020, to June 30, 2021	
Watershed	**Milestones**	**Deliverables / Outputs**
Watersheds with TMDLs	○ Synoptic surveys in non-tidal watersheds with TMDLs. Primarily collect whole and filtered water samples for total and dissolved nutrients, (if warranted – also collect chlorides, sulfates, bacteria and/or other constituents). In addition, collect in-situ water quality parameters and stream discharge at up to 200 sites twice per year (400 samples annually).	○ Quarterly activity report detailing number of samples collected, lab analytical results, and other activities. Annual activity report as above with data interpretation. Final report to include maps of delineated subwatersheds.
	ACCOMPLISHMENTS	
	○ Synoptic surveys: ○ *Antietam Watershed:* ▪ *Fall 2020 –and Antietam Spring 2021.*	Quarterly activity report detailing number of samples collected lab analytical results, and other activities. Annual activity report as above with data interpretation.
Watershed	**Milestones**	**Deliverables / Outputs**
Jennings Run and Cherry Creek in Western Maryland (pH TMDL)	*Jennings Run and Cherry Creek*: Collect monthly surface water samples for closed pH, ANC, conductivity, alkalinity, chloride, sulfate, and metals at 16 Jennings	Quarterly status report detailing number of samples collected, and other activities.

	Run sites and 4 Cherry Creek sites (*The goal of the study is to have both pre and post implementation data for each site. Pre implementation collections are currently underway in Jennings Run. The treatment system in Cherry Creek is anticipated to be rebuilt for better efficiency after a few years but requires sufficient water quality data beforehand.*)	Annual activity report (final report) as above.
	ACCOMPLISHMENTS	
		Quarterly status report detailing number of samples collected, and other activities. Annual activity report (final report) as above.

METHODS

Watersheds with TMDLs

Synoptic Sampling

Synoptic water chemistry samples were collected in early spring and early fall in the watersheds of interest. Synoptic sampling is conducted under "base flow" conditions. Therefore, sampling is delayed for a minimum of 24 hours after rainfall events totaling more than ¼ inches. Grab samples of whole water were collected just below the water surface at mid-stream and filtered using a Whatman 934/AH filter. The samples were stored on ice and frozen on the day of collection. Filtered samples were analyzed by the Chesapeake Biological Laboratory (CBL) for dissolved inorganic nitrogen (NO23) and dissolved inorganic phosphorus (PO_4). All analyses were conducted in accordance with U.S. Environmental Protection Agency (EPA) protocols. Stream discharge measurements were taken at the time of all water chemistry samples. Water temperature, dissolved oxygen, pH, and conductivity were measured in the field with a YSI at selected sites at the time of water collection. Where sites are nested in a watershed, the mapped concentration data for the downstream site is shown only for the area between the sites. The downstream sites therefore illustrate the cumulative impact from all upstream activities.

Jennings Run and Cherry Creek in Western Maryland (pH TMDL)

Evaluate Acid Mine Drainage BMP Implementation

Acid mine drainage (AMD) has been found to negatively impact stream segments within the Jennings Run and Cherry Creek watersheds in Western Maryland.

Jennings Run and Cherry Creek Watersheds: In order to address the low pH associated with AMD in the Jennings Run and Cherry Creek watersheds, best management practices (BMPs – lime dosers, leach beds, and sand dumps) will be installed in 2022 within the impaired segments of Jennings Run, Cherry Creek

and their tributaries listed on the 303(d) list. Pre-Implementation water quality samples are currently being collected once per month in these stream segments since 2018 for Jennings Run, and since 2021 for Cherry Creek. Post-implementation monitoring will be initiated after remediation is installed to assess and fine tune water quality downstream of BMP implementation.

The analysis in the Jennings Run and Cherry Creek watersheds will include Acid Neutralization Capacity (ANC), closed pH, alkalinity, conductivity, iron, manganese, aluminum, calcium, magnesium, chloride and sulfate. Appalachian Laboratory (AL) will perform all specified analysis in accordance with standard protocols [US EPA 1987, Handbook of methods for acid deposition studies: Laboratory analyses for surface water chemistry for the United States National Acid Precipitation Assessment Program (EPA 600/4-87/026), APHA Standard Methods, and US EPA 1999, Methods and Guidance for Analysis of Water (EPA 821-C-99-004)].

In addition, biological community evaluations will be conducted in the Jennings Run and Cherry Creek watersheds, both pre and post implementation, to help better assess stream health and quality. All field sampling will be performed under guidance established by the MBSS. The Maryland Biological Stream Survey Sampling Manual, February 2000, will serve as the authority. MBSS methods include qualitative sampling of best available habitats incorporating approximately 20 square feet of substrate within each 75 meter designated station. All samples will be collected from riffle areas, as practical, because this is typically the most productive habitat in stream ecosystems. A 600-micron mesh D-net will be used to trap organisms dislodged from the sample area. The composited sample is condensed in the field with a standard .5-micron sieve bucket, placed in a sample jar with appropriate field label, and preserved with alcohol. Each sample is then sub-sampled to approximately 100 individual macroinvertebrates in the laboratory using a random-grid picking/sorting process. Most organisms are identified to genus, if possible, using stereoscopes. Chironomidae are slide-mounted and identified using compound microscopes. Habitat conditions will be assessed using standard MBSS methodology. In-situ water quality parameters will be recorded at each station with a multi-parameter field instrument.

RESULTS

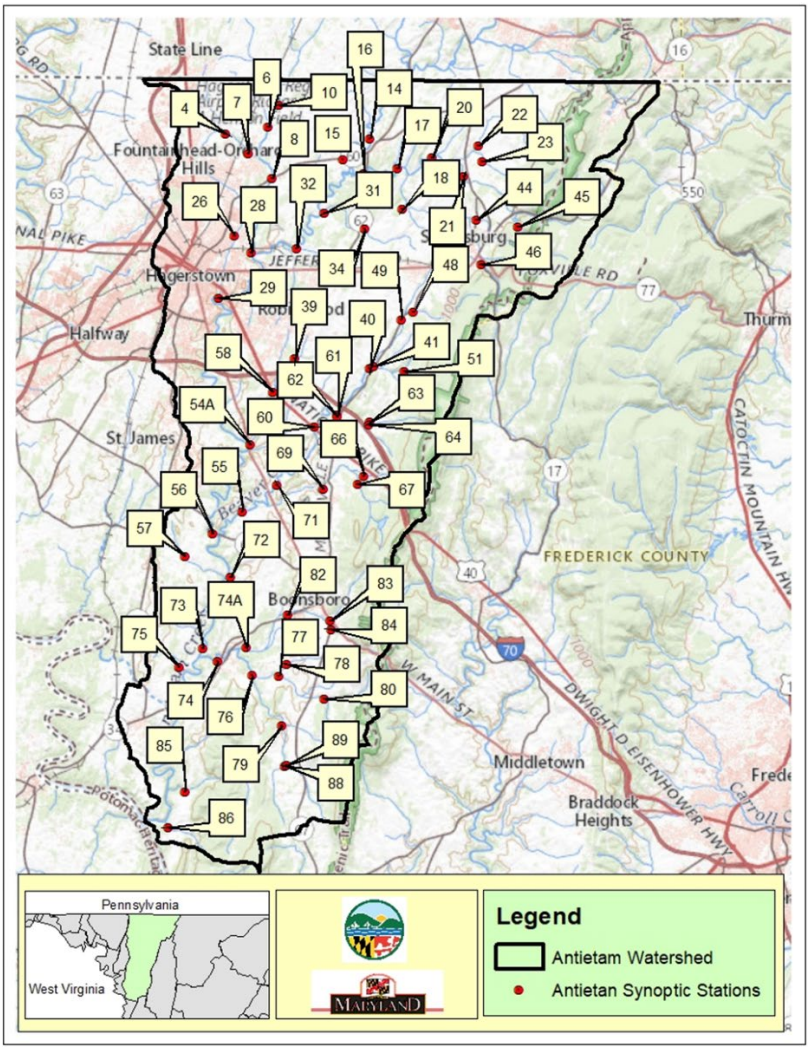
Synoptic Sampling

In this reporting period, two synoptic surveys were completed in the Antietam Watershed. Sample collection details are in Table E1. Station locations are mapped in Figure E1. Site locations for each sample collected and their corresponding GPS coordinates for this watershed is provided in Table E6.

Table E1. Watershed Planning Nutrient Synoptic Survey Samples Collected: 07/01/20 – 06/30/21

Antietam Watershed, Fall 2020	**56**
Antietam Watershed, Spring 2021	**59**
Totals =	**115**

Figure E1. Antietam Synoptic Stations



Jennings Run and Cherry Creek in Western Maryland (pH TMDL)

Evaluate Acid Mine Drainage BMP Implementation

Figure E2 shows Phase I of the AMD BMP implementation to address pH impairments in Jennings Run. There are 16 stations total and were sampled monthly. Figure E3 shows monitoring stations in Cherry Creek. There are 4 stations and were also sampled monthly. Site locations are in Tables E7 – E8.

Figure E2: Jennings Run Watershed Phase I Stations

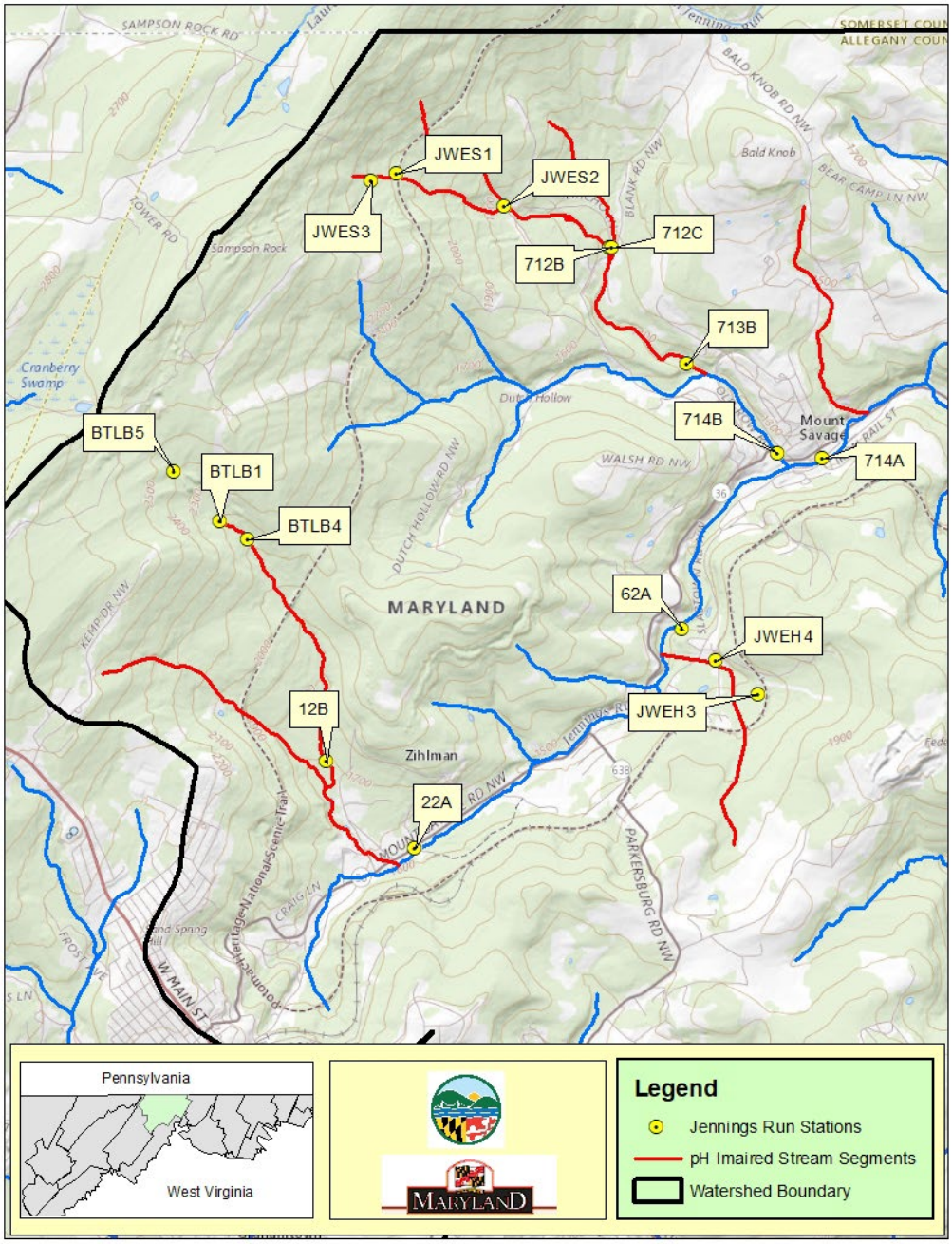
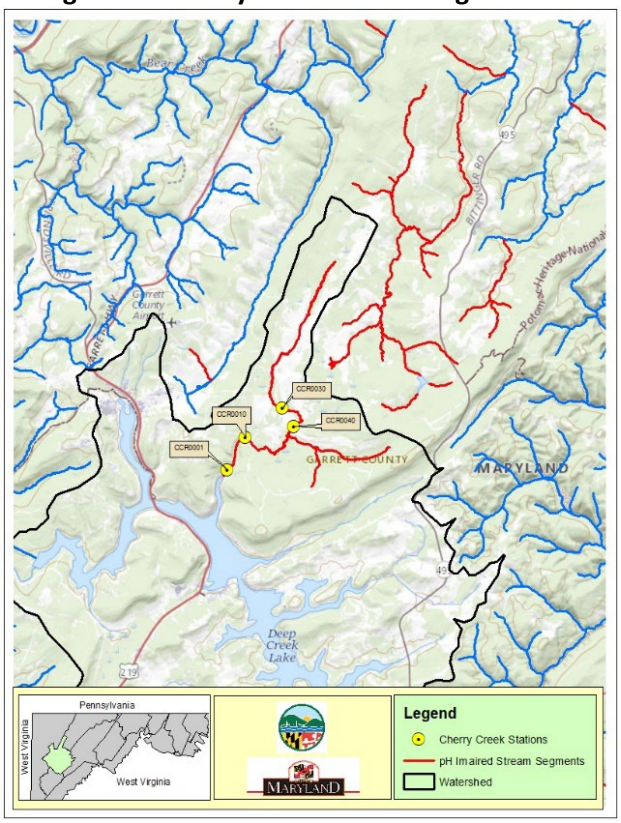


Figure E3: Cherry Creek Monitoring Stations



DISCUSSION

Watersheds with TMDLs

Synoptic Sampling

Supporting activities in watersheds with approved implementation plans is a protection and restoration goal. As noted, two nutrient synoptic survey areas have been completed in conjunction with TMDL watershed plan development and implementation monitoring. These synoptic surveys provide a finer resolution than the TMDL follow-up monitoring and can be used to help focus targeted TMDL BMP implementation in first and second order stream reaches. The data from these nutrient synoptic surveys have been disseminated to the associated counties and state agencies. It will be used to help determine watershed scale BMP implementation effectiveness and target areas that may respond to further BMP implementation. Data generated by this work will assist the department with follow-up monitoring in watersheds where TMDLs have been written and approved.

Jennings Run and Cherry Creek in Western Maryland (pH TMDL)

Evaluate Acid Mine Drainage BMP Implementation

Jennings Run and Cherry Creek Watersheds

To address the low pH associated with AMD in the Jennings Run and Cherry Creek watersheds, best management practices (BMPs – lime dosers, leach beds, and sand dumps) are slated to be installed in the fall / winter of 2022 in the headwaters of the impaired streams listed on the State of Maryland's 303(d) list based on the MDE Bureau of Mines plans. Pre-Implementation water quality samples are currently being collected once per month in these stream segments since 2018 for Jennings Run and since 2020 for Cherry Creek.

Objective #3: *Corsica River Watershed Implementation Monitoring*

a. Long-Term Monitoring of Three Non-Tidal Tributaries
b. Synoptic Surveys

The Corsica River Targeted Watershed Project is a Governor's Initiative and has been named an EPA National Non-Point Source Monitoring Project. The Targeted Watershed Project is committed to the evaluating this watershed throughout the course of this initiative. It aims to determine effectiveness of the Corsica River Watershed Management Plan in making progress towards satisfying the TMDL and removing the watershed from the list of impaired waters. Experience gained in this watershed will be transferable to many other watersheds across the state.

Corsica River Watershed

3a: Long-Term Monitoring of Three Non-Tidal Tributaries

Responsible Party: MDE	*Timeframe*: July 1, 2020, to June 30, 2021	
Watershed	**Milestones**	**Deliverables / Outputs**
Corsica River (Queen Anne's Co.) *TMDL - Nutrient and sediment*	*Long-Term Monitoring of Three Non-Tidal Tributaries* ○ Collect weekly grab (whole and filtered) and flow weighted composite samples for total and dissolved nutrient analysis at three Corsica non-tidal tributary sites. Collect weekly grab (whole and filtered) for total and dissolved nutrient analysis at one control site.	○ Quarterly Status and Final Reports list the number of samples collected, lab analytical results, and other activities.
	ACCOMPLISHMENTS	
	○ Collected 208 weekly grab and 138 flow weighted composite samples for total and dissolved nutrient and sediment analysis at three Corsica non-tidal tributary sites and one control site.	○ Quarterly Status Reports list the number of samples collected, lab analytical results, and other activities ○ Annual activity report as above with data interpretation when appropriate

3b: Synoptic Surveys in the Corsica River Watershed

Responsible Party: MDE	*Timeframe*: July 1, 2020 to June 30, 2021	
Watershed	**Milestones**	**Deliverables / Outputs**
Corsica River (Queen Anne's Co.)	*Synoptic Surveys in the Corsica River Watershed*	○ Quarterly Status and Final Reports list the number of samples collected, lab

TMDL - Nutrient and sediment	○ Conduct semi-annual nutrient synoptic surveys at up to 40 sites (80 samples). ○ Conduct "focused" monitoring of identified "hot spots"	analytical results, and other activities.
	ACCOMPLISHMENTS	
	○ Collected Corsica synoptic samples.	○ Quarterly Status Reports list the number of samples collected, lab analytical results, and other activities

METHODS

3a: Long-Term Monitoring of Three Non-Tidal Tributaries

Base flow and flow weighted composite samples are collected using ISCO, Inc. automated samplers and flow meters installed at 3 of the 4 sites. A rating curve specific to each stream that equates stream height to stream volume has been programmed into the ISCO flow meters at each site. The ISCO Flow meter reads the stream height and calculates the estimated instantaneous volume. After a specified volume has passed the site, the sampler will be initiated to sample a small volume of water. Samples are composited over the course of a week during base flow. Composite samples are preserved in the sampler using sulfuric acid. Once collected, samples are iced and refrigerated on the day of collection. The University of Maryland, Chesapeake Biological Laboratory (CBL) analyzes the samples for Total Nitrogen and Total Phosphorus (TN/TP).

3b: Synoptic Surveys in the Corsica River Watershed

Synoptic nutrient samples are collected at approximately forty sites previously identified during the 2003 WRAS nutrient synoptic survey throughout the Corsica watershed. Sampling is conducted during a period of high ground water recharge in the spring and during a period of minimal ground water recharge in the fall. Sampling is delayed for 24 hours if there is a more than a ¼ inch of rain in the previous 24 hours. Surface water grab samples are collected just below the water surface at mid-stream at all sites. Whole samples are analyzed for total nitrogen/total phosphorus (TN/TP). Filtered samples were analyzed for dissolved NO23, PO4, and NH3, by CBL. All synoptic samples are stored on ice and frozen on the day of collection. Water temperature, dissolved oxygen, pH, and conductivity were measured in the field with a YSI at all sites at the time of water sampling. Discharge measurements are also taken at each site using a YSI flow meter. The velocity measurements are taken in ten to fifteen intervals across a transect on a straight reach, as free as possible of in-channel obstructions.

RESULTS

Corsica River Long-Term Monitoring of Three Non-Tidal Tributaries

Weekly water quality samples (grab and composite) were collected from three main Corsica tributary outlets (Old Mill Stream Branch (OMS), Gravel Branch (GVL), and Three Bridges Branch (TBB) and one adjoining control site (Jarman Branch, (JB) – (*only grab samples collected at Jarman Branch*) as shown in Figure E4. Tables E2 and E3 detail the number of samples collected for the weekly grab and composite non-tidal. Figures E5 where the data is graphed, shows a small steady increase in Nitrogen and Phosphorous for the weekly grab samples. Composite data for the reporting period has not yet been graphed due to delays in the labs due to the ongoing pandemic. All data that is available is in AWQMS.

Table E2. Corsica Watershed Weekly Grab Samples Collected: 07/01/20 – 06/30/21

Station	Whole	Filtered
Old Mill Stream	52	52
Gravel Branch	52	52
Three Bridges Branch	52	52
Jarman Branch	52	52
Totals	**208**	**208**

Table E3. Corsica Watershed Weekly Composite Samples Collected: 07/01/20 – 06/30/21

Station	Composite
Old Mill Stream Branch	43
Gravel Branch	45
Three Bridges Branch	50
Totals	**138**

Figure E4. Corsica and Jarman Branch Watersheds

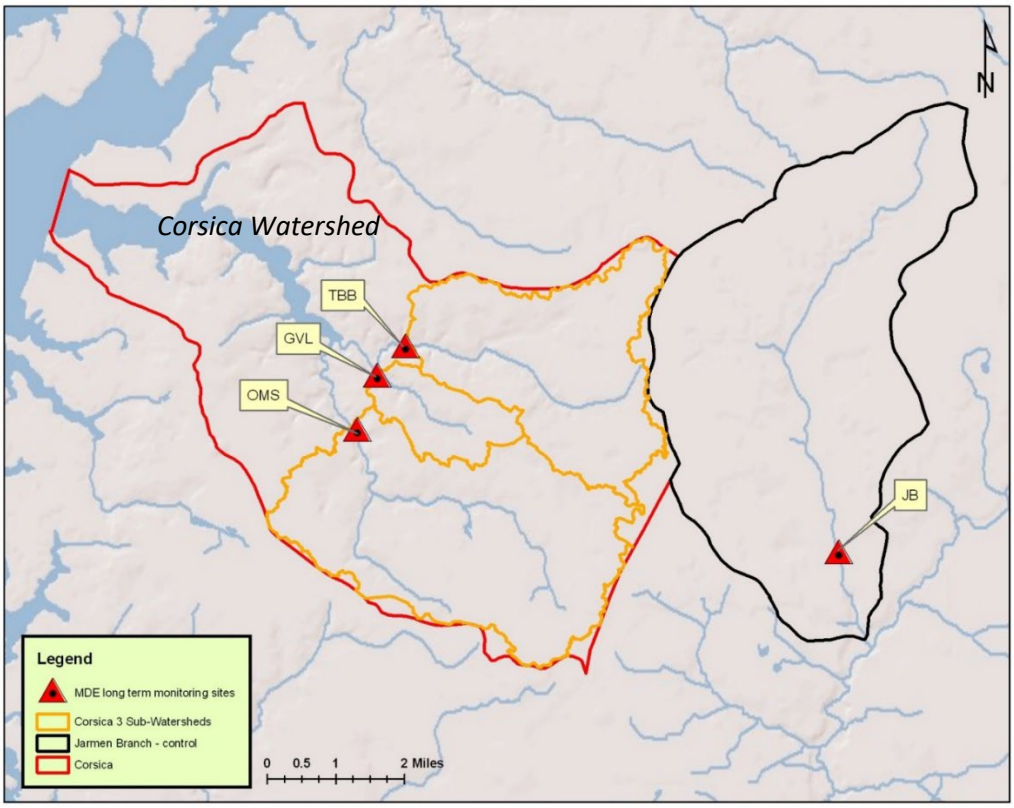
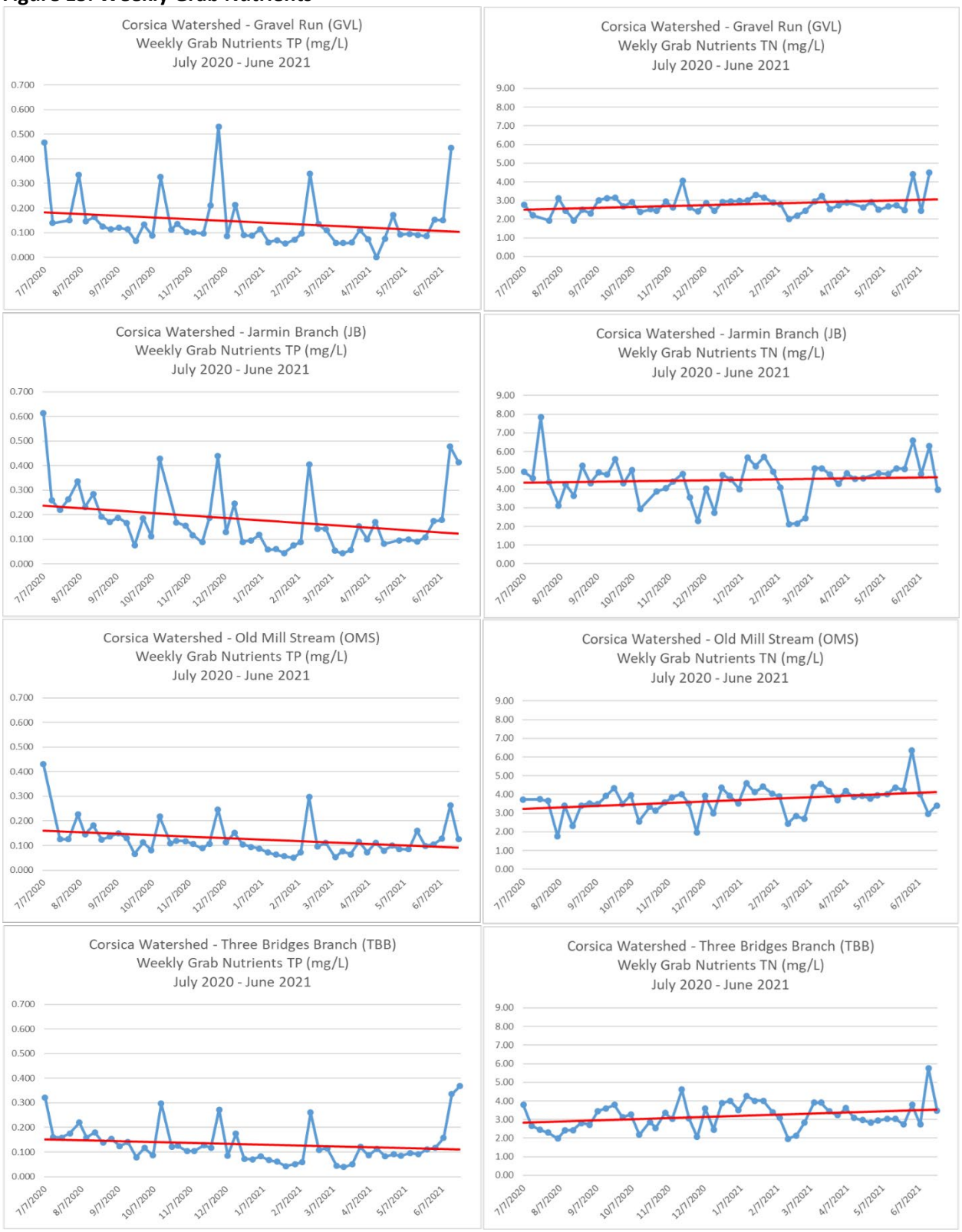


Figure E5. Weekly Grab Nutrients



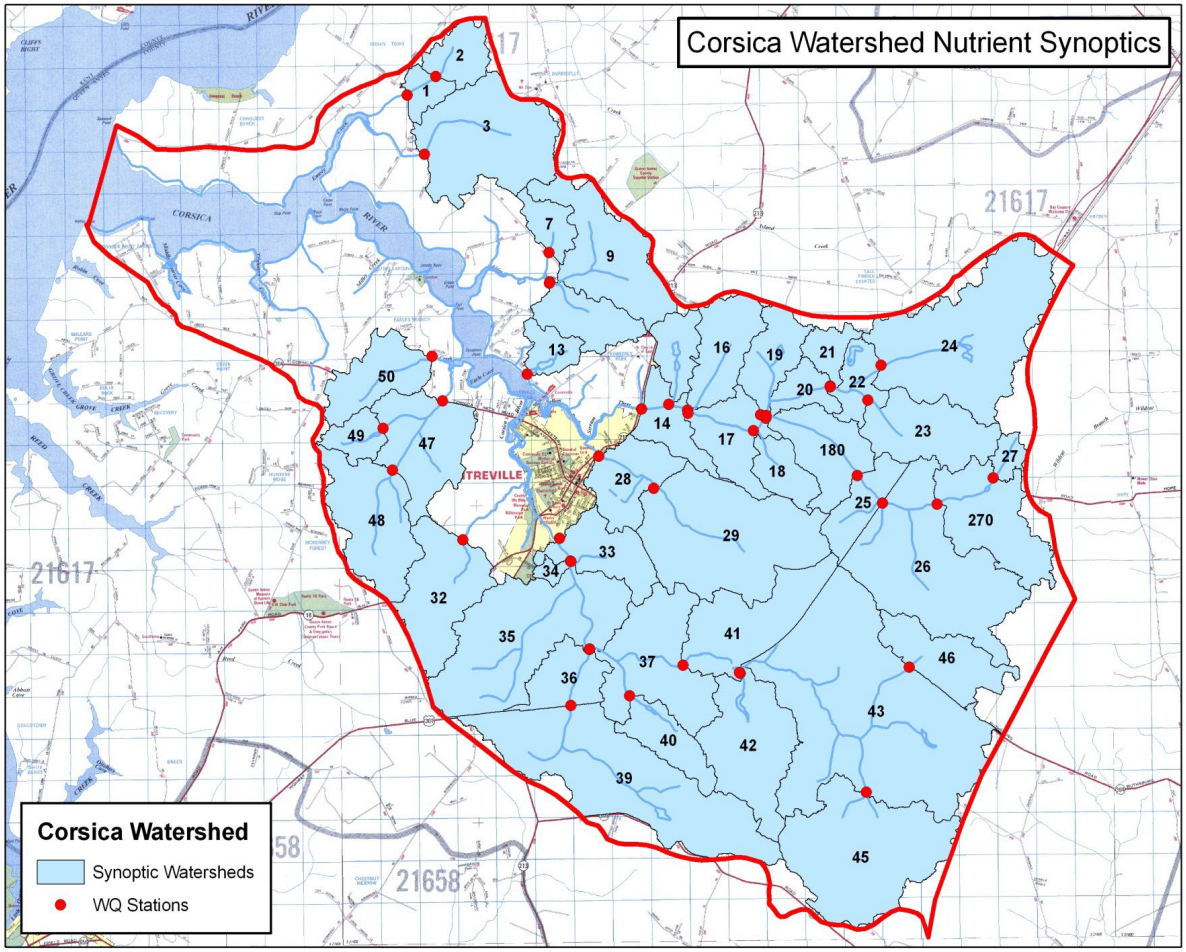
3b: Synoptic Surveys in the Corsica River Watershed

Corsica watershed semi-annual (Fall 2020 and Spring 2021) nutrient synoptic surveys were completed. Table E4 details the number of samples collected. The stations are mapped in Figure E6. Station details can be found in the Appendix, Table 5.

Table E4. Corsica Nutrient Synoptic Survey Samples Collected: 07/01/20 – 06/30/21

Date	Whole	Filtered
FALL 2020	36	36
SPRING 2021	32	32
Synoptic Totals	**68**	**68**

Figure E6. Corsica Synoptic Stations



DISCUSSION

3a: Long-Term Monitoring of Three Non-Tidal Tributaries

BMP implementation efforts in the Corsica River Watershed have increased substantially over the last twelve years. Cover crop planting has increased because of regulation changes removing the cap on how many acres farmers are able to plant. A focused effort by the local Soil Conservation District made the one-on-one connections with farmers needed for a successful cover crop program. Rain garden and rain barrel installations have significantly increased but leveled off due to lack of funding. Storm water retrofit projects in the city of Centreville and Queen Anne's County have increased substantially reducing pollution, sedimentation, and the flash rain runoff component caused by storms. Sixteen septic system nutrient reducing retro-fit systems have been installed throughout the watershed. Having substantial effort put into BMP implementation and associated water quality monitoring to document the effects reductions in nutrients are beginning to be observed.

Dr. Jean Spooner from North Carolina State University has shown that in two (TBB and GVL) of the three Corsica River non-tidal headwater tributaries, there have been observed, statistically significant, reductions in both nitrogen and phosphorous over the last eight years. These two headwater tributaries watersheds are the smallest of the three. It has been suggested that since these two watersheds are smaller, groundwater transport lag time would be shorter and thus nutrient reductions may be observed in the streams in less time. It is very difficult to specifically relate this reduction in nutrients to BMP implementation but, empirical data suggests that this could be the case. We had a statistician complete data analysis for 2012 through 2017. The report can be found at: https://www.potomacriver.org/publications/updating-the-statistical-analysis-of-non-tidal-nutrient-monitoring-data-in-the-corsica-river-watershed/.

Through continued monitoring, it is the scope of this long-term project to document, through water quality monitoring and BMP tracking, the cumulative effects of BMP implementation in reducing nutrients in the Corsica River watershed and assessing the status of the established TMDL.