Annual Report
Maryland 319 Nonpoint Source Program
State Fiscal Year 2016

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Preface

Nonpoint source (NPS) pollution is defined as polluted stormwater runoff associated with rainfall, snowmelt or irrigation water moving over and through the ground. As this water moves, it picks up and carries pollutants with it, such as sediments, nutrients, toxics, and pathogens. These pollutants eventually reach lakes, rivers, wetlands, coastal waters, ground waters and, most of the time in Maryland, the Chesapeake Bay.

NPS pollution is associated with a variety of activities on the land including farming, logging, mining, urban/construction runoff, onsite sewage systems, streambank degradation, shore erosion and others. For example, stormwater flowing off the land carries the nutrients nitrogen and phosphorus into local streams and eventually into the Chesapeake Bay. Under natural conditions, this is beneficial up to a point. However, if excessive nutrients enter a lake or the Chesapeake Bay, and cause nuisance algae blooms, then these nutrients are considered to be pollutants.

The pollution contributed by nonpoint sources is the main reason why many of Maryland's waters are listed as impaired because Water Quality Standards are not being met for designated uses including fishing, swimming, drinking water, shellfish harvesting among others.

Progress in managing NPS pollution in Maryland is presented in this report. It was produced by the Maryland Department of the Environment (MDE) to meet 319(h) Grant conditions and to demonstrate consistency with three essential elements:

1. EPA Strategic Plan Goal 2 Protecting America's Waters
2. EPA Strategic Plan Objective 2.2 Protect and Restore Watersheds and Aquatic Ecosystems
3. Work plan commitments plus time frame (overall progress is reported in this document).

Abbreviations Used	
319	Clean Water Act, Section 319(h)
AMD	Acid Mine Drainage
BAT	Best Available Technology
BMP	Best Management Practice
COMAR	Code of Maryland Regulations
DNR	Maryland Department of Natural Resources
EPA	Environmental Protection Agency, United States of America
FFY	Federal Fiscal Year (October 1 thru September 30)
MDA	Maryland Department of Agriculture
MDE	Maryland Department of the Environment
MDP	Maryland Department of Planning
MEP	Maximum Extent Practicable
NGO	Non-Government Organization
NPS	Nonpoint Source
RFP	Request for Proposals
SCD	Soil Conservation District
SRA	Sassafras River Association
SRF	State Revolving Fund
SFY	State Fiscal Year (in Maryland, July 1 thru June 30)
SWAP	Small Watershed Area Plan (another name for a watershed-based plan)
SW Conversion	Converting an existing stormwater facility to provide water quality benefits
SW Retrofit	Adding stormwater management to existing development that had none
TMDL	Total Maximum Daily Load
Trust Fund	Maryland Chesapeake and Atlantic Coastal Bays Trust Fund
WIP	Watershed Implementation Plan for the Chesapeake Bay TMDL
WQA	Water Quality Analysis
WRAS	Watershed Restoration Action Strategy (aka watershed-based plan)
WRE	Water Resources Elements (components of a local comprehensive plan)
WWTP	Waste Water Treatment Plant (sewage treatment)

I. Mission and Goals of the NPS Program

Maryland's 2015-2019 Nonpoint Source Management Plan (State NPS Plan), generated by the Maryland Department of the Environment (MDE) and partner agencies, was approved by the US Environmental Protection Agency (EPA) in January 2015. The document's vision, mission, goals are shown on the right. The completed document that was updated in August 4, 2016 is available on the Internet at http://www.mde.state.md.us/programs/Water/319NonPointSource/Pages/Programs/WaterPrograms/319NPS/index.aspx

Maryland's 2015-2019 NPS Management Plan

1.A Vision
Ensuring a clean environment and excellent quality of life for Marylanders.

Maryland's vision is to implement dynamic and effective nonpoint source pollution control programs. These programs are designed to achieve and maintain beneficial use of water; improve and protect habitat for living resources; and protect health through a mixture of water quality and/or technology based programs; regulatory and/or non-regulatory programs; and financial, technical, and educational assistance programs. (*Maryland Nonpoint Source Management Plan*, December 1999)

1.B Mission
Maryland's Nonpoint Source Management Program (Program) mission is to protect and restore the quality of Maryland's air, water, and land resources, while fostering smart growth, a thriving and sustainable economy and healthy communities.

1.C Goals
The Program has the following seven broad goals to advance its mission and vision:

1. Improving and protecting Maryland's water quality.
2. Promoting land redevelopment and community revitalization.
3. Ensuring safe and adequate drinking water.
4. Reducing Maryland citizen's exposure to hazards.
5. Ensuring the safety of fish and shellfish harvested in Maryland.
6. Ensuring the air is safe to breathe.
7. Providing excellent customer services to achieve environmental protection.

The State NPS Plan is designed to meet requirements of the Federal Clean Water Act Section 319 and to be consistent with Maryland commitments and responsibilities in the Chesapeake Bay Agreement, the Chesapeake TMDL, and Maryland's Chesapeake Bay Watershed Implementation Plan (WIP).

To realize the visions in these documents, the State's NPS programs are designed to: achieve and maintain beneficial uses of water; protect public health, and; improve and protect habitat for living resources. The State programs use a mixture of water quality and/or technology based approaches including regulatory and non-regulatory programs, and programs that provide financial, technical, and educational assistance.

Through program management and financial/technical support, Maryland's Section §319(h) NPS Program plays a role in helping to protect and improve of Maryland's water quality. The NPS Program promotes and funds State and local watershed planning/implementation efforts, water quality monitoring to evaluate progress, governmental partnership/cooperation and education/outreach. Program partners include State agencies, local government (counties, municipalities, Soil Conservation Districts), private landowners and watershed associations.

Consistent with these priorities, selection of NPS implementation projects for 319(h) Grant funding incorporates the following goals:

GOAL 1	To support meeting Total Maximum Daily Load (TMDL) nonpoint source reduction targets.
GOAL 2	To significantly contribute to reducing one or more nonpoint source water quality impairments in a water body identified in Maryland's 303(d) list of impaired water bodies leading toward full or partial restoration.
GOAL 3	To implement projects from EPA-accepted watershed-based plans that will produce measurable nonpoint source pollutant load reduction consistent with Goals 1 and 2.

II. Executive Summary[1]

In accordance with the Federal Clean Water Act Section 319, this report documents the activities and accomplishments by the State of Maryland 319 NPS Program. MDE is the lead agency for administering Section 319, including the 319(h) Grant. MDE is also the lead 319 NPS management agency responsible for coordination of policies, funds, and cooperative agreements with state agencies and local governments. Several other state agencies have key responsibilities, including the Maryland Department of Natural Resources (DNR), Maryland Department of Agriculture (MDA), and Maryland Department of Planning (MDP). The 319 NPS Program is housed within MDE's Science Services Administration (SSA).

During the past 26 years, Maryland received about $56.8 million through the 319(h) Grant to support the Maryland's NPS management program including on-the-ground implementation of best management practices (BMPs).

In 319 priority watersheds, overall reported SFY16 reductions of nitrogen, phosphorus, and sediment are significantly greater than goals in *Maryland's 2015-2019 Nonpoint Source Management Plan* (State Plan). In these watersheds, the majority of this success arises from the State's integrated reporting of BMP implementation for the EPA Bay Program. In the numbers below, cover crops account for the difference between "all reported BMPs" and multi-year BMPs:

Nitrogen SFY16 Reduction (lb/yr):
Goal: 50,000. All reported BMPs: 532,212.6. Multi-Year BMPs only: 51,607.6
Phosphorus SFY16 Reduction (lb/yr):
Goal: 2,000. All reported BMPs: 9,892.2. Multi-Year BMPs only: 7,060.5
Sediment SFY16 Reduction (tons/yr):
Goal: 400. All reported BMPs: 3,390.52. Multi-Year BMPs only: 1,771,12

Overall reported funding of NPS implementation in priority watersheds reached $9.6M from the Federal 319(h) Grant and $11.3M from State funding thru the end of SFY16. (excluding match for the 319 Grant)

Ten 319-funded projects completed during SFY16 reported implementing best management practices. The project's estimated pollutant load reductions were: nitrogen 470.8 lbs/yr, phosphorus 122.2 lbs/year and sediment 3,808.67 tons/year.

Three Maryland State agencies reported expending over $69 million for nonpoint source programs and implementation during SFY16. (Departments of Agriculture, Environment and Natural Resources only)

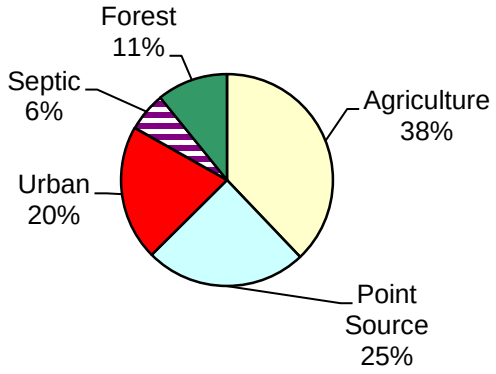
[1] Page revised 5/30/17

III. Overview

Maryland surface waters flow into three major drainage areas:

- The Chesapeake Bay watershed receives runoff from of Maryland's mid section and encompasses more than 90% of the State. Most 319-funded implementation projects are in this watershed. These projects are mostly designed to reduce nitrogen, phosphorus and sediment pollutant loads.
- Maryland's Coastal Bays receives runoff from Maryland's eastern-most coastal plain in Worcester County. During SFY16 , no 319-funded implementation was active.
- Maryland's Appalachian area runoff drains thru the Youghiogheny River and Casselman River watersheds toward the Ohio and Mississippi Rivers. In the Casselman River watershed, the 319(h) Grant continues to help fund acid mine drainage remediation.

Figure 1. Total Nitrogen Sources in Maryland SFY 2016

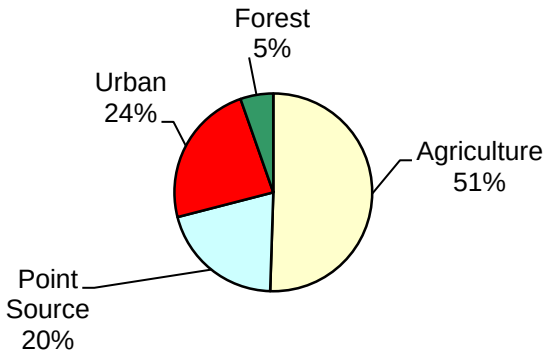


habitats depend on healthy waters supported by healthy watersheds.

However, Maryland's water resources are under stress from a variety of causes -- with nonpoint source pollution being the greatest single factor. The sources of excessive nitrogen and phosphorus in Maryland arise in large part from major land uses as shown in Figures 1 and 2 (Chesapeake Bay Model progress run Phase 5.3.2).[1] The state's waters are increasingly impacted by and remain impaired due largely to nonpoint sources of pollution and related habitat degradation, which are most commonly

Overall, Maryland has over 9,940 miles of non-tidal streams and rivers. These waters and the Chesapeake Bay have provided a rich bounty that been the foundation for much of Maryland's rich heritage and prosperity. The State's water resources continue to provide food and water for its residents, jobs for the economy and a place where people may relax and enjoy the natural environment. Our quality of life, including drinking water, recreation/tourism, commercial and recreational fishing and wildlife

Figure 2. Total Phosphorus Sources in Maryland SFY 2016



[1] Page revised 4/20/17

due to altered land uses. The lands that are altered from natural conditions contribute various forms of nonpoint point source pollution such as excessive levels of the nutrients nitrogen and phosphorus.

The best methods for controlling NPS pollution are commonly called conservation practices or Best Management Practices (BMPs). These BMPs are designed to meet specific needs, like increasing tree cover to capture stormwater, grassed buffers to control sediment and phosphorus that could leave farm fields, or wet stormwater ponds to capture sediment and nutrients in urban runoff. Every year, Maryland reports the cumulative total number of BMPs implemented in the State. The most recent statewide aggregate reporting is summarized in **Appendix – BMP Implementation Progress in Maryland**.

Maryland's NPS management program has responsibilities set forth in the Federal Clean Water Act Section 319. To help meet these responsibilities, the State program has received Federal grant support each year since 1990 and is required to maintain at least a minimum annual level of nonfederal expenditure. A summary that covers the period 1990 thru SFY15 for Maryland is in **Appendix – Financial Information**.

Chapter IV of the Annual Report provides brief summaries of grant-funded NPS Program activities during SFY16 in 319 priority watersheds. More detailed information supporting Chapter IV is in **Appendix – Watersheds**.

Demonstrating improvements in water quality resulting from nonpoint source program implementation and successes in achieving nonpoint source management goals and objectives are important for the program. Each year, at least one success story is submitted to EPA. Maryland's SFY16 success story is based on MDE analysis of monitoring data from Little Laurel Run in Garrett County. The in-stream data documented that pH levels have significantly improved following implementation of acid mine drainage remediation projects that were partially funded by the 319(h) Grant. (see **Appendix – Success Story**).

IV. Major Accomplishments, Successes and Progress

A. Statewide

1. Overall Progress

This annual report is based in part on the milestones from *Maryland's 2015-2019 Nonpoint Source Management Plan* that was approved by EPA in January 2015. It also provides a summary of implementation progress reporting in 319 priority watersheds (see Figure 3). In addition to local input in 319 priority watershed progress, MDE also continues to use data reported by Maryland for use in the Chesapeake Bay Model. To gauge progress toward meeting state and local goals, Maryland tracks implementation progress for selected categories of BMPs that have been recognized by the EPA Chesapeake Bay Program and the Chesapeake Bay States. Every year, Maryland updates the cumulative total of BMPs implemented in each category and the associated nitrogen, phosphorus and sediment load reduction. A summary of Maryland's most recently reported statewide information is in Appendix – BMP Progress. Similar information for the 319 priority watersheds is in Appendix – Watersheds.

2. NPS Management Program Milestones

Maryland's 2015-2019 Nonpoint Source Management Plan includes specific categories of objectives designed to focus effort on reducing and preventing NPS pollution: 1- Regional Coverage, 2- Multiple Scales, 3- Pollutants and Stressors, 4- Pollutant Sources, 5- Types of Waterbodies, 6- Protection and Restoration, 7- Priority Setting, and 8- Program Management and Evaluation. Under these categories are specific objectives with milestones to gage progress. The table below summarizes SFY16 progress for selected milestones.

Table 1. Milestones SFY16 Progress [2]

Obj. #	**Objective Name** (abbreviated)	Goal 2016	Report 2016
3	Annual nitrogen NPS Loads to Bay	Report progress	36,318,537
	Nitrogen: overall reduction in 319 priority watersheds (lb/yr)	100,000	507,470
	Annual phosphorus NPS Loads to Bay	Report progress	2,235,169
	Phosphorus: overall reduction in 319 priority watersheds (lb/yr)	2,000	5,590
	Sediment: 319-funded projects annual reductions (tons/yr)	10	12.93
	Sediment: overall reduction in 319 priority watersheds (tons/yr)	400	2,796
4	Cover crop acreage	386,000	500,094
	Nutrient Management Plan acreage (report includes all 3 Tiers)	565,408	888,209
	Soil Conservation and Water Quality Plan acreage	926,000	923,147
	Septic system upgrades to remove nitrogen (count)	1,200	2,102
	Stormwater retrofits (nitrogen reduction lb/yr) (1)	20,000	8,367
	Local stormwater WLA implementation plans reviewed	5	5
5	319 priority watersheds: implement watershed plans	Report progress	See section IV.B

(1) Underestimate of actual due to complexity of calculating estimate.
See Appendix Milestones for a complete listing of milestones and progress for this state fiscal year.

[2] Table 1 was revised/finalized 4/20/17.

3. Success Stories

During SFY16, MDE reported a success story on improvements in Little Laurel Run, which is a tributary to the Casselman River in Garrett County, Maryland. MDE planned and implemented the work necessary to eliminate the low pH impairment to the stream caused by acid mine drainage. MDE also conducted the before and after water quality monitoring and analysis that was necessary to document the in-stream improvements. See Appendix – Success Story.

4. National Water Quality Initiative [3]

The National Water Quality Initiative (NWQI) focuses on priority watersheds with impaired streams to help farmers and forest landowners voluntarily improve water quality and aquatic habitat. Being in 2012, Maryland's NWQI area has been the Catoctin Creek watershed. It encompasses the southwestern portion of Frederick County and is framed by Catoctin Mountain on the east and South Mountain on the west. The watershed drains 120 square miles, including forested mountain slopes, agricultural valleys, and small towns. Surface waters here are impaired by sediments, nutrients, impacts to biological communities, and fecal coliform. The land use distribution in the watershed is approximately 43% agricultural, 42% forest/herbaceous and 15% urban, with agricultural land mostly planted in row crops and pasture.

In 2012, Maryland was among the first States to create a cooperative monitoring agreement to support the NWQI effort. Since that time, MDE has collaborated with the United States Department of Agriculture/National Resources Conservation Services (USDA/NRCS) to conduct in-stream monitoring in the Catoctin Creek watershed. During SFY16 this included a combination of nutrient synoptic surveys and surface water bi-weekly monitoring.

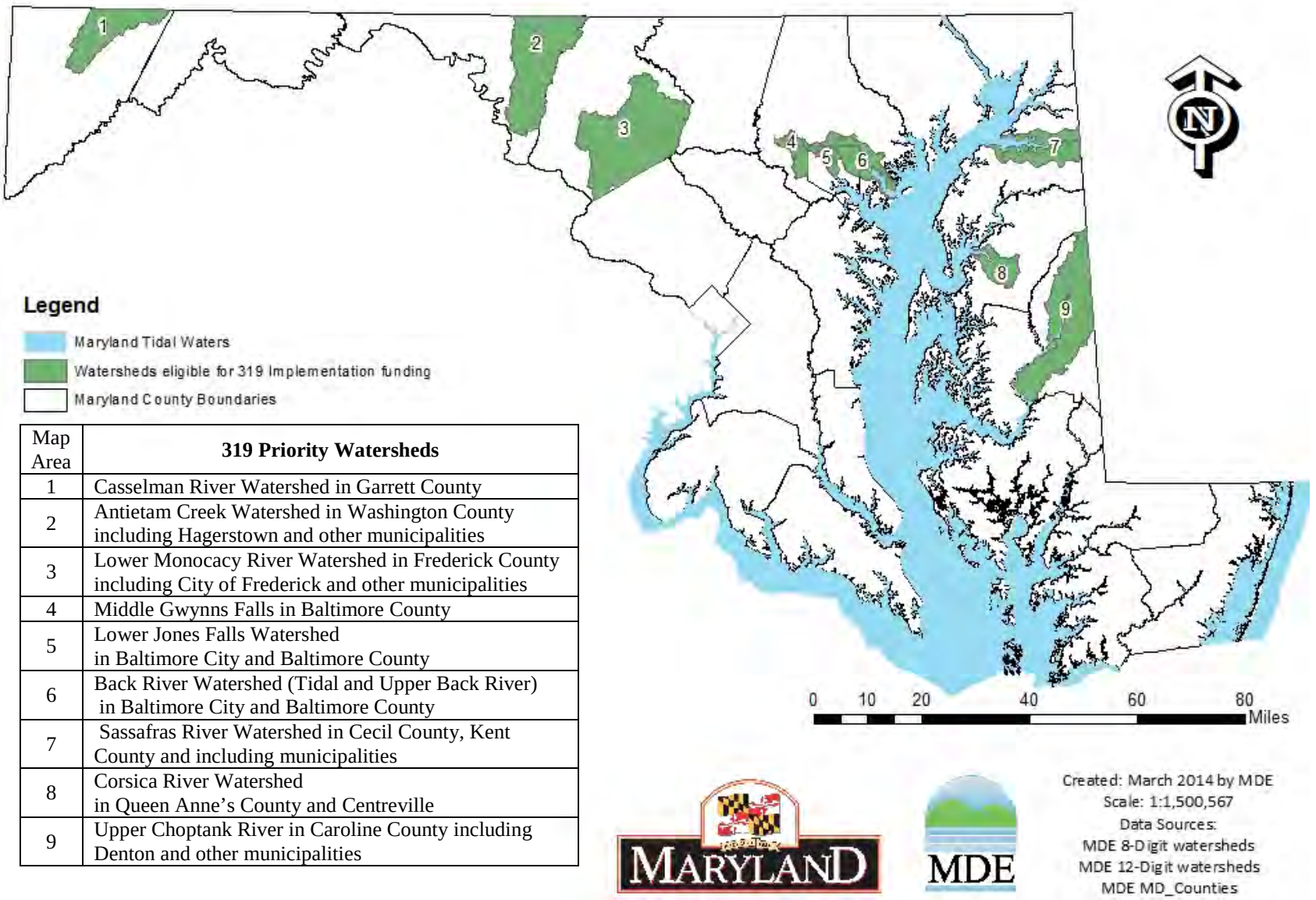
During SFY16, the following NWQI activities were conducted in the Catoctin Creek watershed:

1) MDE successfully negotiated a new interagency agreement with Maryland NRCS to fund water quality sampling and sample analysis. The agreement covers a three year period beginning in 2016.
2) MDE staff conducting the monitoring partially transitioned to new personnel due to significant staff turnover.
3) Sampling during this period was conducted at the same small-watershed sites originally designated for this project.
4) In cooperation with the Frederick Soil Conservation District, MDE identified a farmer who may be willing to allow before/after sampling by MDE to determine if an in-stream watershed quality change can be detected.

Over the period from 1999 thru 2014, Maryland DNR analysis of data from two long term nontidal monitoring stations, not considering flow data, indicate that there has been a trend toward decreased phosphorus but no trend for nitrogen or sediment. [4] This trend analysis includes mostly years that predate the NWQI effort.

[3] Page revised 5/2/17.
[4] Maryland Department of Natural Resources. *Potomac River Water Quality and Habitat Assessment Overall Condition 2012-2014*. Page 6.

Figure 3
319 Priority Watersheds in Maryland
Currently Eligible for 319(h) Grant Implementation Funding



Map Area	319 Priority Watersheds
1	Casselman River Watershed in Garrett County
2	Antietam Creek Watershed in Washington County including Hagerstown and other municipalities
3	Lower Monocacy River Watershed in Frederick County including City of Frederick and other municipalities
4	Middle Gwynns Falls in Baltimore County
5	Lower Jones Falls Watershed in Baltimore City and Baltimore County
6	Back River Watershed (Tidal and Upper Back River) in Baltimore City and Baltimore County
7	Sassafras River Watershed in Cecil County, Kent County and including municipalities
8	Corsica River Watershed in Queen Anne's County and Centreville
9	Upper Choptank River in Caroline County including Denton and other municipalities

B. Watersheds

During SFY16, ten priority watersheds in Maryland are eligible for 319(h) Grant implementation funding. Additionally one watershed plan completed implementation and one watershed plan is being drafted in an effort to seek eligibility. The table below summarizes watershed planning status in each area. The locations of the priority watersheds are mapped in Figure 3. (also see Appendix – Financial Information)

Table 2. Watershed-Based Plans Eligible for 319(h) Grant Implementation Funding

Major Drainage	River Basin	Plan Watershed	Status	Lead Entity	Plan Name	Plan Date	Internet (1)
Chesapeake Bay	Back River	Tidal Back River	Implementing	Baltimore County Dept. of Environmental Protection and Sustainability	*Tidal Back River Small Watershed Action Plan*	2010	http://www.baltimorecountymd.gov/Agencies/environment/watersheds/swap.html
		Upper Back River	Implementing		*Upper Back River Small Watershed Action Plan*	2008	
	Gwynns Falls	Middle Gwynns	Implementing		*Middle Gwynns Falls Small Watershed Action Plan*	2014	
	Jones Falls	Lower Jones Falls	Implementing		*Lower Jones Falls Watershed Small Watershed Action Plan*	2008	
	Loch Raven Reservoir	Spring Branch	Completed		*Spring Branch Subwatershed – Small Watershed Action Plan (Addendum to the Water Quality Management Plan for Loch Raven Watershed)*	2008	
	Choptank River	Upper Choptank	Implementing	Caroline County Planning & Codes	*Upper Choptank River Watershed Based Plan*	2010	http://www.carolinemd.org/138/Planning-Codes
	Chester River	Corsica River	Implementing	Town of Centreville	*Corsica River Watershed Restoration Action Strategy*	2004	www.townofcentreville.org/departments/environment.asp
					Corsica River Targeted Initiative Progress Report: 2005-2011 [includes revised watershed goals]	2012	
	Potomac River	Antietam Creek	Implementing	Washington Co SCD	*Antietam Creek Watershed Restoration Plan*	2012	http://www.conservationplace.com/
		Lower Monocacy River	Implementing	Frederick County Community Development Division	*Lower Monocacy River Watershed Restoration Action Strategy (WRAS) Supplement: EPA A-I Requirements, Frederick County Maryland*	2008	http://www.watershed-alliance.com/mcwa_pubs.html
	Sassafras River	Sassafras River	Implementing	Sassafras River Association	*Sassafras Watershed Action Plan*	2009	www.sassafrasriver.org/swap/
Coastal Bays	Coastal Bays	TBD	Planning	Worcester County	*TBD*	TBD	Not posted
Ohio River Basin	Casselman River	Casselman River	Implementing	MDE Land Management Administration	*Casselman River Watershed Plan for pH Remediation*	2011	http://mde.maryland.gov/programs/Water/319NonPointSource/Pages/casselman.aspx

(1) Internet links in the table are generally associated with the agencies most directly responsible the watershed plan creation and implementation. Additionally, these watershed plans are also available thru MDE: http://mde.maryland.gov/programs/Water/319NonPointSource/Pages/Programs/WaterPrograms/319nps/factsheet.aspx

During SFY16 in the 319 priority watersheds, ten 319(h) Grant-funded projects were completed and six 319(h) Grant-funded implementation projects working as summarized in Table 3. Additional information on all of these projects is provided in the following sections of this report and in Appendix - Watersheds.

Table 3. Pollutant Load Reductions Reported by 319-Funded Projects Completed in SFY16

319 Priority Watershed	319(h) Grant Implementation Project Completed or Working in SFY16	Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment ton/yr
Antietam Creek	5 projects completed, 4 projects working	368.7	115.0	3,806.41
Back River - Tidal	no projects completed or working	0	0	0
Back River - Upper	no project completed, 1 project working	0	0	0
Casselman River	no project completed, 1 project working	0	0	0
Corsica River	2 projects completed, no projects working	65.1	5.8	1.20
Lower Jones Falls	no projects completed or workng	0	0	0
Lower Monocacy River	1 project completed, no projects working	30.3	0.4	0.93
Middle Gwynns Falls	no projects completed or working	0	0	0
Sassafras River	no projects completed or working	0	0	0
Upper Choptank River	2 projects completed, no projects working	6.7	0.9	0.13
TOTAL		470.8	122.2	3,808.67

Also, in 319 priority watersheds, implementation progress was accomplished using funding from sources other than the 319(h) Grant. Table 4 (next page) summarizes the aggregate pollutant load reduction by all NPS projects reported in this document regardless of funding source including annual practices like cover crops. Additional details are summarized in the following sections for these watersheds and in Appendix - Watershed. Tables 5 below summarizes funds invested in NPS implementation in the 319 priority watershed from several funding sources.

Table 5. Overall 319(h) Grant and State Funding Implementing Priority Watershed Plans

319 Priority Watershed	Federal 319(h) Grant (1)	State Revolving Fund	State Trust Fund (2)	Other State NPS Funding	State Funds Total $ (2, 3)
Antietam Creek	$2,621,946.51	$424,600.00	$690,232.99	$0.00	1,114,832.99
Back River - Tidal and Upper	$556,443.00	$3,102,100.00	$2,514,492.67	$0.00	5,845,491.67
	$664,383.81	$0.00		$228,899.00	
Casselman River	$782,734.00	$0.00	$6,440.19	$0.00	6,440.19
Corsica River	$1,919,132.11	$200,000.00	$1,178,127.60	$70,000.00	1,448,127.60
Lower Jones Falls	$139,000.00	$0.00	$296,292.00	$0.00	296,292.00
Lower Monocacy River	$1,387,102.99	$0.00	$328,462.97	$0.00	328,462.97
Middle Gwynns Falls	$320,004.00	$0.00	$706,745.56	$0.00	706,745.56
Sassafras River	$64,000.00	$0.00	$1,429,587.15	$0.00	1,429,587.15
Upper Choptank River	$1,174,095.43	$0.00	$166,976.15	$0.00	166,976.15
TOTAL	$9,628,841.85	$3,726,700.00	$7,317,357.28	$298,899.00	$11,342,956.28

1) Federal includes all 319(h) Grant NPS implementation projects only.

2) State Funds includes all reported State-funded implementation projects before and after watershed plan completion including State Revolving Fund and Chesapeake and Atlantic Coastal Bays Trust Fund, and other State funding (319 table).

3) State Funds exclude match for the 319(h) Grant NPS implementation projects because in Maryland it generally is not associated with a project in the local watershed.

TABLE 4.
SFY16 Pollutant Load Reductions in 319 Priority Watersheds

The table includes three sets of data: multi-year BMPs, cover crops and total for all BMPs (multi-year and annual cover crops).

319 Priority Watershed	Sub Watershed	Agriculture Multi-Year BMPs			Urban BMPs (Multi-Year)			All Multi-Year BMPs		
		Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment ton/yr	Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment ton/yr	Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment ton/yr
Antietam Creek	All in Maryland	10,750.7	1,103.5	544.50	186.5	0.35	0.55	10,937.2	1,103.9	545.05
Back River	Tidal (entire County subwatershed)	0	0	0	1,650.1	415.9	26.72	1,650.1	415.9	26.72
	Upper (Baltimore City and County)	0	0	0	7,324.0	1,718.1	43.35	7,324.0	1,718.1	43.35
Corsica River	All	957.6	78.0	19.10	53.1	1.8	0.41	1,010.7	79.8	19.51
Lower Jones Falls	All (Baltimore City and County)	0	0	0	7,099.6	942.7	3.34	7,099.6	942.7	3.34
Lower Monocacy River	All incl. Lake Linganore, Frederick Co.	7,258.8	710.4	950.24	364.8	0	0	7,623.6	710.4	950.24
Middle Gwynns Falls	All in Baltimore County only	0	0	0	5,646.3	827.6	34.91	5,646.3	827.6	34.91
Sassafras River	All in Maryland only	1,877.1	152.1	78.70	35.2	0	0	1,912.3	152.1	78.70
Upper Choptank River	All in Caroline County only	8,192.8	1,110.0	69.30	211.0	0	0	8,403.8	1,110.0	69.30
TOTAL		29,037.0	3,154.0	1,661.84	22,570.6	3,906.5	109.28	51,607.6	7,060.5	1,771.12
MDE used MAST to estimate pollutant load reductions for BMPs that were reported by MDE to the EPA Bay Program. Urban Baltimore County watersheds are shaded.										

319 Priority Watershed	Sub Watershed	Cover Crops SFY16			TOTAL All BMPs SFY16		
		Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment ton/yr	Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment ton/yr
Antietam Creek	All in Maryland	69,088.8	501.1	394.00	80,026.0	1,605.0	939.05
Back River	Tidal (entire County subwatershed)	0	0	0	1,650.1	415.9	26.72
	Upper (Baltimore City and County)	0	0	0	7,324.0	1,718.1	43.35
Corsica River	All	24,022.9	71.6	20.40	25,033.6	151.4	39.91
Lower Jones Falls	All (Baltimore City and County)	0	0	0	7,099.6	942.7	3.34
Lower Monocacy River	All incl. Lake Linganore, Frederick Co.	181,770.3	1,108.9	950.24	189,393.9	1,819.3	1,900.48
Middle Gwynns Falls	All in Baltimore County only	0	0	0	5,646.3	827.6	34.91
Sassafras River	All in Maryland only	67,572.8	355.5	188.46	69,485.1	507.6	267.16
Upper Choptank River	All in Caroline County only	138,150.2	794.6	66.30	146,554.0	1,904.6	135.60
TOTAL		480,605.0	2,831.7	1,619.40	532,212.6	9,892.2	3,390.52

1. Antietam Creek Watershed

Location

The Antietam Creek watershed encompasses 290 mi^2 in total. It drains part of Washington County, Maryland (118,400 acres, 185 mi^2) with its headwaters in Pennsylvania. The 54 mile-long Creek flows into to the Potomac River and the Chesapeake Bay. Watershed land use in Maryland is 42% agricultural, 31% forest and 27% developed.

Goals, Milestones and Progress

The State NPS Management Plan Objective 5 lists two milestones for Antietam Creek:

1) Annual implementation progress reporting for goals in the 2012 watershed plan by the Washington County SCD (see next page and Appendix Watersheds), and
2) A 2017 assessment of progress and potential watershed plan update.

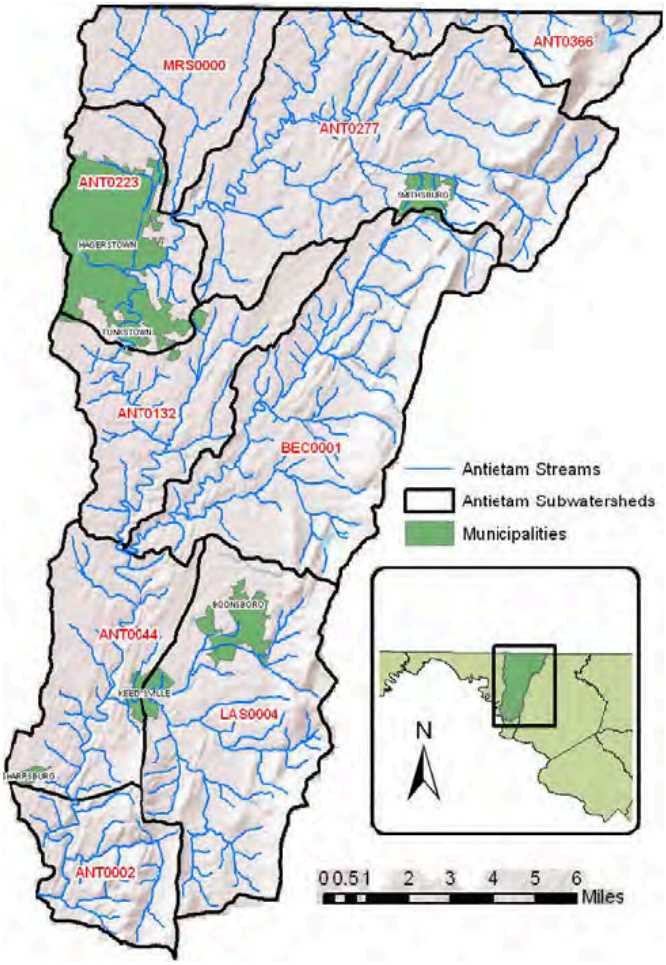


Figure 4. Antietam Creek Watershed.

Figure 5. The photo shows a well-fed cattle trough that was installed as part of a project funded by the FFY11 319(h) Grant project #13. Behind it on this private property are fencing and tree plantings that were installed using non-319 funding. Together these BMPs create an integrated solution designed to maintain cattle on this farm and also keep the cattle out of Little Antietam Creek. Before these BMPs were installed, cattle had relatively free access to the creek because it was their primary water source.

Implementation Status -- Antietam Creek Watershed Plan

Between 2012 and June 2016, over $1.28 million has been invested by State and Federal grants/loans in completed projects to help implement the Antietam Creek Watershed Plan as summarized in the table below. This investment, along with the leveraged nonfederal funds, has yielded significant pollutant load reduction. Also, this annual report includes the first reported bacteria reductions associated with a 319(h) Grant project.

Table 6: Grant Expenditures Summary 2012 to June 2016
Antietam Creek Watershed Plan Implementation

	Grant Project Expenditures				Pollutant Load Reduction			
Grant Name	**Federal Grants $**	**State Grants $**	**Non Federal Match $**	**Total $ Expenditures**	**Nitrogen lb/yr**	**Phosphorus lb/yr**	**Sediment tons/yr**	**E. Coli billion/yr**
319(h) Grant	852,579.97		568,386.98	1,845,566.95	714.9	173.4	3,908.41	166
State Revolving Fund		424,600.00		424,600.00	202.0	10.7	0.0	0.0
Chesapeake & Atlantic Coastal Bays Trust Fund		690,232.99		690,232.99	426.9	50.3	14.80	0
TOTAL	852,579.97	1,114,832.99	568,386.98	2,960,399.94	1,343.8	234.4	3,923.21	166

Table 7: Pollution Load Reduction Progress Reported

Antietam Creek Watershed	**Nitrogen lb/yr**	**Phosphorus lb/yr**	**Sediment tons/yr**	**E. Coli billion/yr**
2012 thru SFY15	23,410.4	875.1	1,255.30	
SFY16 Cover Crops	69,088.8	501.1	394.02	
SFY16 Multi-Year BMPs	10,937.2	1,103.9	545.04	0
All Trust Fund thru SFY16	426.9	50.3	14.8	0
Total	103,863.3	2,530.4	2,209.2	0.0
Watershed Plan Goals (1)			12,923.00	5,411,472
Percent of Goal Achieved			17.1%	0%

All funding sources. Annual BMPs are included in SFY16 only. See Appendix Watershed.

Since the adoption of the watershed plan in 2012, reported pollution load reductions from all implementation has also made significant progress (table left). In the table, the Chesapeake and Atlantic Coastal Bays Trust Fund (Trust Fund) are fully reported for the first time.

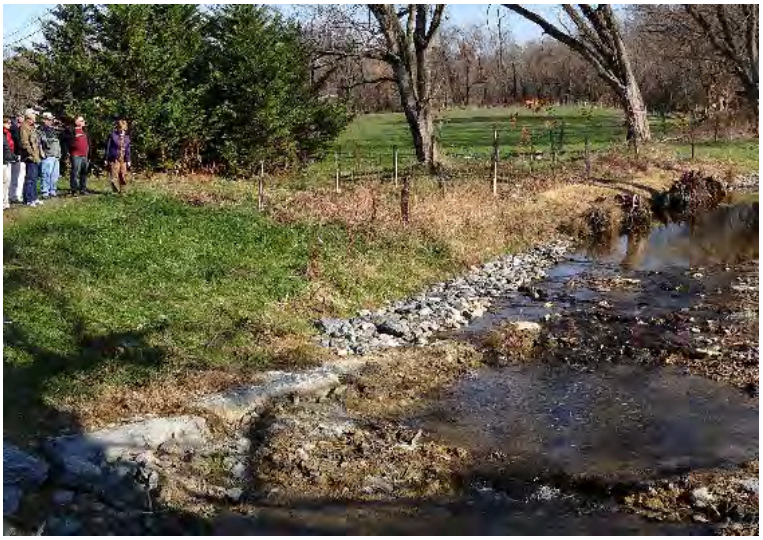


Figure 6. In mid November 2016, EPA and MDE staff revisited one of the stream restoration projects funded by the 319(h) Grant (FFY13 project 10). This site on Beaver Creek, a tributary to Antietam Creek, is on private property next door to a fish hatchery owned/operated by the Maryland Department of Natural Resources. The last plantings in the area shown in the photo where installed this year. (photo by MDE).

2. Back River Watersheds

Location

The Back River watershed is located in Baltimore County and Baltimore City. It has two Small Area Watershed Plans (SWAPs) as shown in the map and table below. EPA accepted the Tidal Back River SWAP in 2010 and the Upper Back River SWAP in 2008.

Implementation

Projects that are implementing watershed plans goals, funded thru three Federal and State grant/loan sources, are summarized on the next page. The pollutant removal goals in both the Tidal Back River and the Upper Back River watershed plans are drawn from the same nutrient TMDL. Both plans have urban BMP implementation goals. Agriculture is nearly absent in both areas. No agricultural BMP implementation was reported during SFY14-16 in either area.

Figure 7. Back River Watersheds.

The following tables were provided by Baltimore County (below and next page). They include implementation from all funding sources, such as 319(h) Grant, State Revolving Fund, the Chesapeake and Atlantic Coastal Bay Trust Fund, and others.

Table 8. Tidal Back River Watershed Plan BMP Goals and Implementation Progress

Management Practice	SWAP Goal	Units	2010-SFY14 Progress	SFY15 Activity	SFY16 Activity	2010-SFY16 Progress
6. Convert Dry Ponds	2	projects	0	2	0	2
10. Stormwater Retrofits	16	projects	0	0	8	8
11. Impervious Cover Removal	0.5	acres	0	0	1.0	1.0
12. Downspout Disconnection	12.0	rooftop acres	0.5	0.1	0.2	0.7
16. Riparian Buffer Trees	156	acres	0	0	0.4	0
17. Shoreline Buffer Trees	181	acres	0	0	0	0
18. & 19. Upland Trees	36.75	acres	15.87	0.15	5.43	21.45
20. Institutional Trees*	2.1	acres	0.5	0	5.0	5.4
33. Shoreline Management	2	projects	1	0	0	1
36. Stream Restoration	3,442	ft	1,523	0	0	1,523

*These trees are double counted from 16.-19. for SWAP progress in this category but not for nutrient reductions.

Table 9. Upper Back River SWAP (Baltimore County Portion) Goal and Implementation Progress						
Management Practice	**SWAP Goal***	**Units**	**2008-SFY14 Progress**	**SFY15 Activity**	**SFY16 Activity**	**Total Progress**
Convert Dry Ponds	17	projects	0	5	7	12
Stormwater Retrofits	50	projects	1	0		1
Downspout Disconnection	180	rooftop acres	2.8	0.5	0.2	4.7
Riparian Buffer Trees	200	acres	2.4	1.2	0.0	3.6
Reforestation	50	acres	12.9	2.3	6.1	21.3
Street Trees	4,000	trees	307	80	88	475
Stream Restoration	66,000	ft	2,000	0	0	2,000

* Baltimore County and Baltimore City are responsible for meeting these goals collectively

Table 10. Pollution Load Reduction Progress Tidal and Upper Back River SWAPs

Pollution Reduction Progress			
Tidal Back River Watershed	Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment lbs/yr
Completed Measures Prior To SWAP			
Unkown, it is unclear in the SWAP			
SWAP Implementation			
2010-SFY14	1,129.0	499.8	1,647,668.1
SFY15	34.9	2.5	660.6
SFY16	146.3	7.7	2,788.6
2011 Fertilizer Act	1,081.7	239.4	0.0
SFY16 Street Sweeping	422.1	168.8	50,653.5
SFY16 Inlet Cleaning	0.0	0.0	0.0
Total Estimated Pollutant Reductions 2010-SFY16	2,814.0	918.2	1,701,770.8
Watershed Plan Goals	6,498	679	
Percent of Goal Achieved	43.3%	135.2%	

Pollution Reduction Progress (Baltimore County Portion)			
Upper Back River Watershed	Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment lbs/yr
Completed Measures Prior To SWAP			
	9,661.0	1,340.6	unkown
SWAP Implementation			
2008-SFY14	607.87	148.52	102,500.93
SFY15	73.51	11.60	1,233.62
SFY16	185.8	19.4	6,803.4
2011 Fertilizer Act	6,472.5	1,432.4	0.0
SFY16 Street Sweeping	600.2	240.1	72,028.2
SFY16 Inlet Cleaning	65.5	26.2	7,864.8
Total Estimated Pollutant Reductions 2010-SFY15	8,005.4	1,878.2	190,431.0
Grand Total Pollutant Reductions	17,666.4	3,218.8	190,431.0
Watershed Plan Goals*	48,189.6	6,055.8	
Percent of Goal Achieved	36.7%	53.2%	

3. Casselman River Watershed

Location

In Maryland, the Casselman River flows about 20 miles from Savage River State Forest into Pennsylvania. The watershed area is 66 square miles and is part of the Mississippi River drainage. Land use in the watershed can be aggregated into three broad categories: forest (89%), agriculture (9%), and developed land (2%).

Goal

MDE's 2011 watershed plan goal is to meet the pH water quality standard of no less than 6.5 pH and no greater than 8.5 pH by increasing alkalinity (mg $CaCO_3$/l). This goal is derived from the Western Maryland pH TMDLs approved in 2008 based on in-stream water quality data collected in 2005 or earlier.

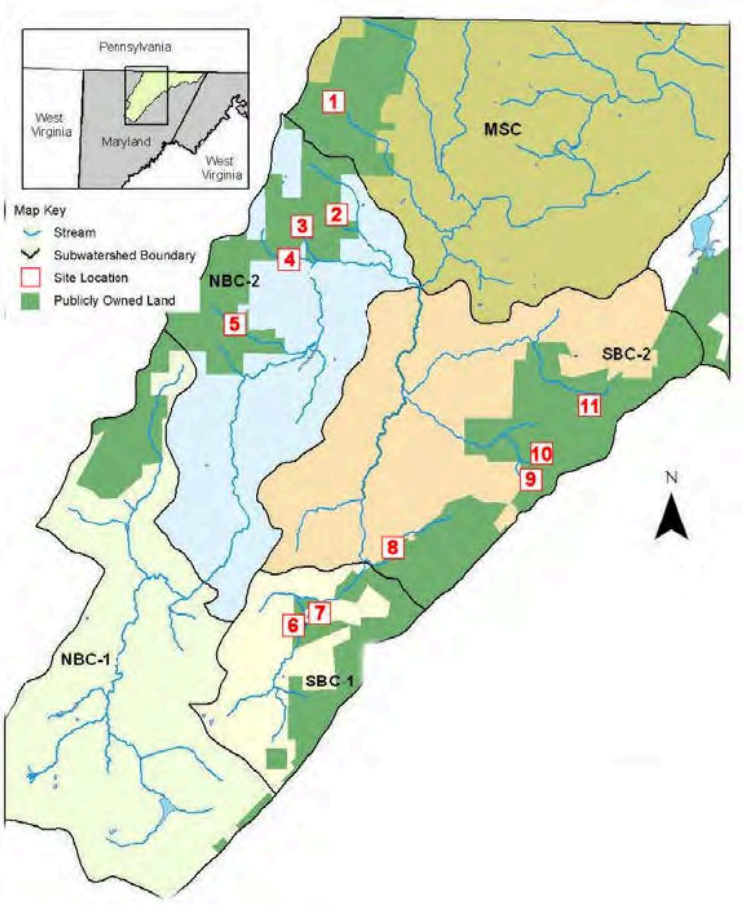


Figure 8. Casselman River watershed and Phase 1 sites.

Implementation

MDE's Phase 1 implementation construction on public land was conducted mostly in 2013 using 319(h) FFY11 Grant funds. Phase 2 implementation construction is entirely on private land using 319(h) FFY2013 Grant funds. Phase 2 began in-the-ground work in 2014 and continued thru SFY16 installing BMPs to mitigate acid mine drainage in streams flowing thru private property. (see Appendix – Watersheds)

Figure 9. The photo (left) shows a site on private land that was constructed to allow stream access for delivery trucks to deposit limestone crushed to sand-sized grains. The limestone sand that remains against the stone wall in the photo will be gradually washed down into the stream by rain. Construction capital costs included 319(h) Grant FFY2011 funds. (photo by MDE Land Management Administration, Abandoned Mine Land Division.)

4. Corsica River Watershed

Location

The Corsica River, which is 6.5 miles in length, is located in Queen Anne's County. The watershed area is 40 square miles and is part of the larger Chester River Watershed. Land use in the watershed aggregates into three broad categories:
- 66% agriculture,
- 26% woodland,
- 8% developed lands.

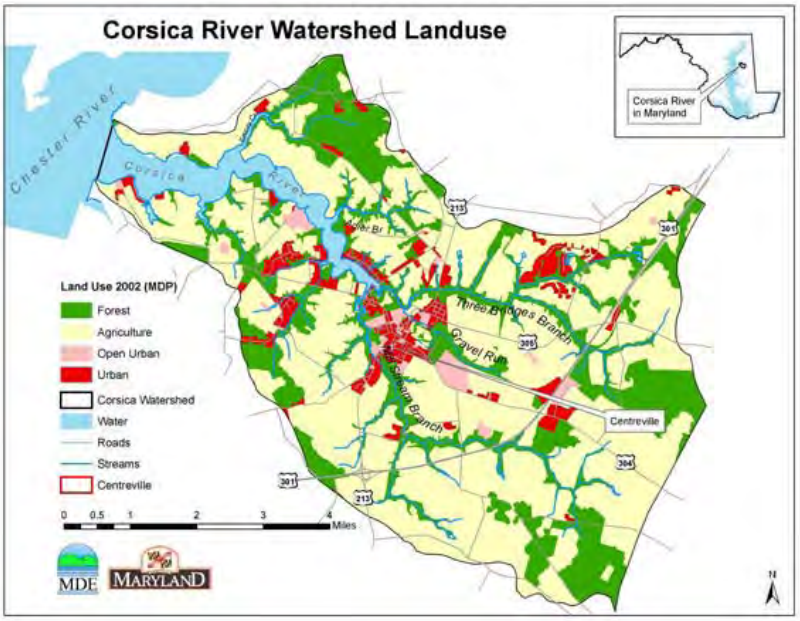


Figure 10. Corsica River Watershed

Goals

Table 11: Pollution Load Reduction Progress			
Corsica River Watershed	**Nitrogen lb/yr**	**Phosphorus lb/yr**	**Sediment tons/yr**
2005 thru SFY15	48,524.3	6,033.3	1,055.81
SFY16 Cover Crops	24,022.9	71.6	20.40
SFY16 Multi-Year BMPs	1,010.7	79.8	19.54
All Trust Fund thru SFY16	669.5	48.5	8.2
Total 2005 thru SFY16	74,227.4	6,233.2	1,103.98
Watershed Plan Goals (1)	NA	NA	NA
Percent of Goal Achieved	NA	NA	NA
All funding sources. Annual BMPs in SFY16 only. See Appendix Watershed.			

Centreville developed the Corsica River watershed plan in 2005 with input from Queen Anne's County, Queen Anne's Soil Conservation District and others. The goal of the watershed plan is to continue meeting the nutrient TMDL. Since the plan was completed, significant pollutant reduction has been accomplished (table on left) primarily thru investment of several million dollars of public funding (table below). In addition, a progress report covering 2005-2011 summarized watershed plan implementation status and updated BMP implementation goals. The report is available: http://www.townofcentreville.org/departments/environment.asp

Table 12: Grant Expenditures Summary - Corsica River Watershed Plan Implementation							
	Grant Project Expenditures				**Pollutant Load Reduction**		
Grant Name	**Federal Grants $**	**State Grants $**	**Non Federal Match $**	**Total $ Expenditures**	**Nitrogen lb/yr**	**Phosphorus lb/yr**	**Sediment tons/yr**
319(h) Grant	1,919,132.11	270,000.00	1,279,421.41	3,233,553.56	215,912.4	13,790.9	1,957.2
State Revolving Fund	0	200,000.00	0	250,000.00	864.0	173.0	0
Chesapeake & Atlantic Coastal Bays Trust Fund		1,178,127.60		1,178,127.60	669.5	48.5	8.2
TOTAL	1,919,132.11	1,648,127.60	1,279,421.41	4,661,681.17	217,445.9	14,012.3	1,965.4

5. Lower Jones Falls Watershed

The Lower Jones Falls watershed encompasses 16,550 acres (25.9 mi^2) in Baltimore County (30.09%) and Baltimore City (69.91%). About 54 miles of streams in the watershed flow into the tidal Patapsco River and the Chesapeake Bay. Land use in the watershed is 55.9% residential (11.1% low density, 23.7% mid density and 21.1% high density). Various developed land uses cover 21.7% of the watershed (6.9% commercial, 2.4% industrial, 10.5% institutional and 1.9% highway). Open land uses account for the remaining 22.2% of the watershed area (6.1% open urban, 13.6% forest, 1.3% agriculture, 0.6% bare ground, 0.6% extractive and 0.3% water). Overall impervious cover is 31.8%.

Implementation Status

In the tables, Baltimore County and City are both responsible for the goals.

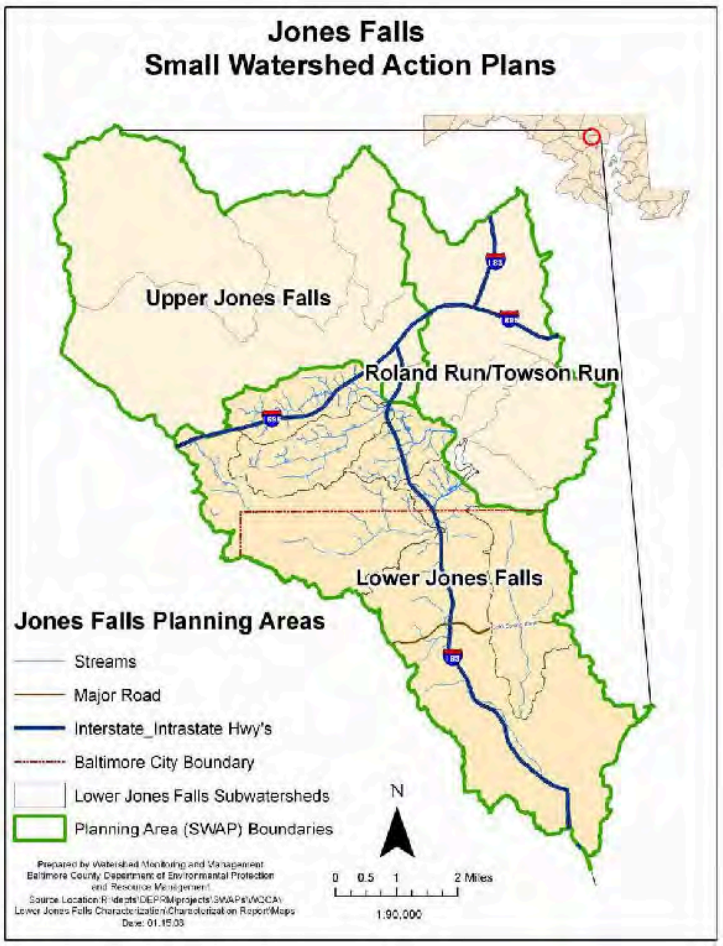


Figure 11. Jones Falls Watershed

Table 13. SWAP Pollution Reduction Progress (Baltimore County Portion)			
Lower Jones Falls Watershed	Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment lbs/yr
Completed Measures Prior To SWAP			
	7,751	1,166	418,556
SWAP Implementation			
FY09-FY14	154.1	2.6	1,437.0
FY15	4.7	0.1	41.1
FY16	27.7	0.1	55.3
2011 Fertilizer Act	7,016.7	920.5	0.0
FY16 Street Sweeping	55.2	22.1	6,629.1
FY16 Inlet Cleaning	0.0	0.0	0.0
Total Est. Pollutant Reductions FY09-FY16	7,258.4	945.4	8,162.5
Grand Total Pollutant Reductions	15,009.4	2,111.4	426,718.5
Watershed Plan Goals*	23,146	3,887	409,800
Percent of Goal Achieved*	64.8%	54.3%	104.1%

See Appendix Watersheds – Lower Jones Falls for additional information.

6. Lower Monocacy River Watershed

Location

The Lower Monocacy River watershed encompasses 194,700 acres (304 mi^2) that drains portions of Frederick County (87%), Montgomery County (10%) and Carroll County (3%). The mainstem of the Monocacy River is 58 miles long. The Monocacy River drains into the tidal Potomac River and then the Chesapeake Bay. Overall impervious cover is 4% but it is concentrated in two subwatersheds: Carroll Creek (18.6%) and Ballenger Creek (13.4%). Land use in the watershed is:

- 47% Agricultural
- 30% Forest
- 22% Developed land uses

Figure 12. Monocacy River Watershed.

Goals and Implementation

Frederick County's 2004 Lower Monocacy River Watershed Restoration Action Plan addresses 168,960 acres (264 mi^2) within the County. The County's 2008 plan supplement incorporated goals from the Lake Linganore sediment TMDL, which is based on data collected in 2002 and earlier.

The table below shows that significant estimated pollutant load reduction was achieved during state fiscal year. However, much of it is associated with cover crops that much be replanted annually to maintain the same level of pollutant reduction over time.

Table 14: Pollution Reduction Progress Reported

Lower Monocacy River Watershed	Nitrogen lb/yr	Phosphorus lb/yr	Sediment tons/yr
Prior Years	29,688.5	2,529.4	1,102.83
SFY16 Cover Crops	181,770.3	1,108.9	950.24
SFY16 Multi-Year BMPs	7,623.6	710.4	466.0
All Trust Fund hru SFY16	1,557.9	90.3	8,345.5
Total Estimated Pollutant Reduction 2008 thru 2014	220,640.3	4,439.0	10,864.6
Watershed Plan Goals (1)	649,998	68,952	10,345
Percent of Goal Achieved	33.9%	6.4%	105.0%

Prior Years data is from 2013 and SFY15 Annual Reports.
Also see Annual Report Appendix Watershed.

Implementation Status – Lower Monocacy River Watershed Plan

Table 15: Grant Expenditures Summary - Lower Monocacy River Watershed Plan Implementation							
Grant Expenditures Summary					**Pollutant Load Reduction**		
Grant Name	**Federal Grants $**	**State Grants $**	**Non Federal Match $**	**Total $ Expenditures**	**Nitrogen lb/yr**	**Phosphorus lb/yr**	**Sediment tons/yr**
319(h) Grant	1,387,102.99		749,963.33	1,973,314.60	3,154.3	418.3	32.28
State Revolving Fund		0		0	0	0	0
Chesapeake & Atlantic Coastal Bays Trust Fund		328,462.97		328,462.97	1,557.9	90.3	8,345.5
TOTAL	1,387,102.99	328,462.97	749,963.33	2,301,777.57	4,712.2	508.6	8377.76

The summary table above indicates that significant estimated pollutant load reductions have been reported as a result of nearly $1.39M in Federal 319(h) Grant funds that leveraged about three quarters of a million dollars in local match in the Lower Monocacy River watershed. (see Appendix - Watersheds)

Not shown in the table is the on-going grant that the Lake Linganore Conservation Society received a State Revolving Fund loan for about $6.3M to retrofit existing stormwater management infrastructure near Lake Linganore in the Eaglehead Planned Unit Development. Construction began in late 2015 and is anticipated to be completed during SFY17. The stormwater improvements involve adding new stormwater infrastructure to reroute runoff away from unstable soils and discharging it into Lake Linganore in a non-erosive manner. The lake is a drinking water source for an eastern portion of Frederick County and the City of Frederick. The project will also help to meet Lake's TMDL for phosphorus and sediments. (see Appendix - Watershed)

7. Middle Gwynns Falls Watershed

The Middle Gwynns Falls watershed encompasses 14,881 acres (23.25 mi^2) in Baltimore County (Baltimore City portion of watershed in not addressed in the watershed plan). About 77.9 miles of streams in the watershed flow into the tidal Patapsco River and then the Chesapeake Bay. The tables below show watershed plan implementation activity.

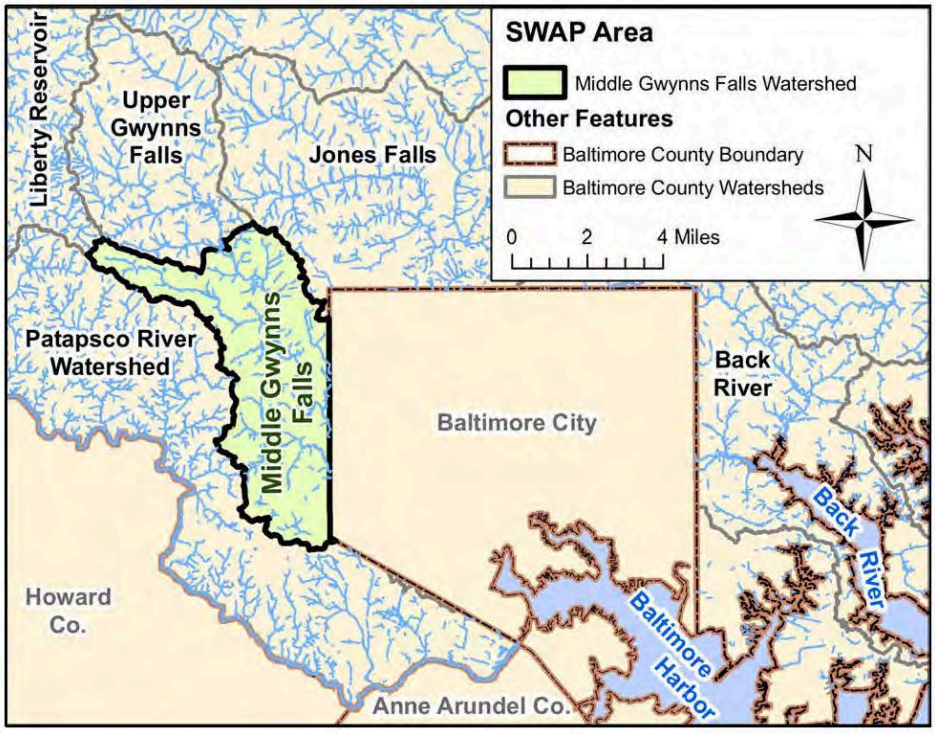


Figure 13. Gwynns Falls watershed in Baltimore County

Implementation Status

Table 16. Middle Gwynns Falls SWAP Pollution Reduction Progress

Middle Gwynns Falls Watershed	Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment lbs/yr	Bacteria *CY 14 only
Completed Measures Prior To SWAP				
Through August 2013	6,128.8	572.2	808,461.0	
SWAP Implementation				
September 2013-FY14	154.4	134.6	88,548.2	
FY15	141.2	8.5	12,501.2	
FY16	302.8	21.4	19,970.3	49% reduction
2011 Fertilizer Act	4,928.0	640.0	0.0	
FY16 Street Sweeping	380.5	152.2	45,661.9	
FY16 Inlet Cleaning	35.0	14.0	4,194.6	
Total Estimated Pollutant Reductions Post-SWAP	5,941.9	970.7	170,876.2	
Grand Total	12,070.7	1,542.9	979,337.2	
Watershed Plan Goals	50,442	4,086	2,179	99.99%
Percent of Goal Achieved	23.9%	37.8%	22.5%	49%

For more information see Appendix Watershed – Middle Gwynns Falls.

8. Sassafras River Watershed Plan

The Sassafras River watershed encompasses 62,000 acres (96.9 mi^2) that drains portions Kent County, MD (57%), Cecil County, MD (28%) and New Castle County, DE (8%) with 13% of the watershed being surface water. The 20.6 mile-long Sassafras River mainstem flows into the Chesapeake Bay. Impervious area covers 2.2% of the watershed. Land use in the watershed is 57% agricultural, 24% forest, 4% developed, 14% water, and 1% wetland.

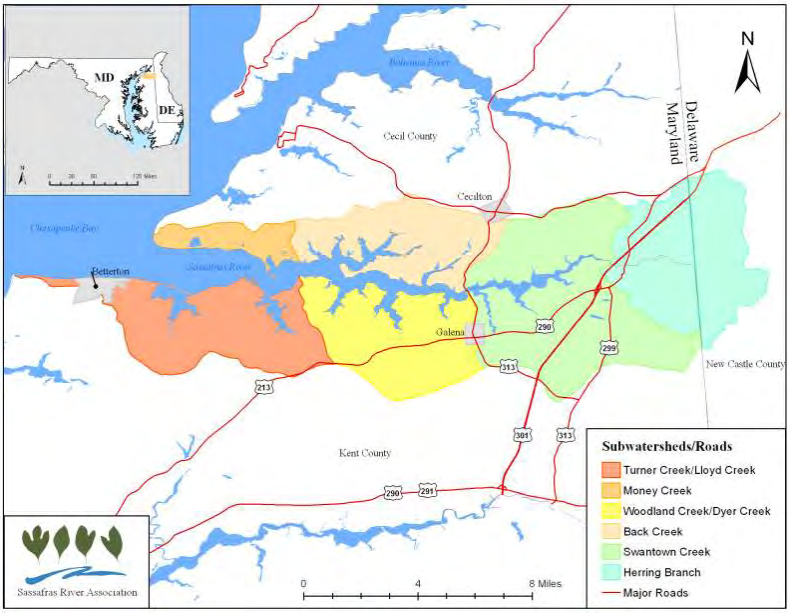


Figure 14. Sassafras River watershed map

Plan Implementation Progress

The 2009 Sassafras River Watershed Action Plan (SWAP) was developed by the Sassafras River Association (SRA), a private nonprofit organization. The SRA is the lead plan implementer. Plan implementation progress is summarized on the next page and details are in Appendix Watershed.

Figure 15. The SRA photo (left) demonstrates construction progress to mitigate gully and stream bank erosion near the Highway 301 weigh station. This is one of several project areas along the highway that the watershed plan recommended for action on pages 39 thru 44.

Implementation Status – Sassafras River Watershed Plan

Table 17: Grant Expenditures Summary - Sassafras River Watershed Plan Implementation							
Grant Project Expenditures					Pollutant Load Reduction		
Grant Name	**Federal Grants $**	**State Grants $**	**Non Federal Match $**	**Total $ Expenditures**	**Nitrogen lb/yr**	**Phosphorus lb/yr**	**Sediment tons/yr**
319(h) Grant	64,000.00		42,666.67	108,333.33	100.7	20.2	2.6
State Revolving Fund	0	0	0	0	0	0	0
Chesapeake & Atlantic Coastal Bays Trust Fund		1,429,587.15		1,429,587.15	11,760.8	8,998.7	118.6
TOTAL	64,000.00	1,429,587.15	42,666.67	1,537,920.48	11,861.5	9,018.9	121.2

The table above shows that, among three State administered funding sources, Maryland's Chesapeake and Atlantic Coastal Bays has had the most significant impact in the Sassafras River watershed. During SFY2016, there were no projects working or completed using 319(h) Grant or the State Revolving Fund.

Table 18: Pollution Reduction Progress			
Sassafras River Watershed	**Nitrogen lb/yr**	**Phosphorus lb/yr**	**Sediment tons/yr**
Previous Years	9,088.2	765.5	352.11
SFY16 Cover Crops	67,572.8	355.5	188.46
SFY16 Multi-Year BMPs	1,912.3	152.1	78.68
All Trust Fund thru SFY16	11,760.8	8,998.7	118.6
Total Estimated Pollutant Reduction	90,334.1	10,271.8	737.9
Watershed Plan Goals (1)	46,475	6,458	721.9
Percent of Goal Achieved	194.4%	159.1%	102.2%
All funding sources. Annual BMPs in SFY16 only. See Appendix Watershed.			

The table to the right shows that pollutant reductions reported during SFY2016 made significant progress to watershed plan goals.

However for nitrogen load reduction, annual cover crops account for more than two thirds of the achievement to date. Consequently, land owner efforts and the funding sources that support their efforts much be maintained indefinitely to continue nitrogen load reduction progress into the future.

Phosphorus and sediment pollutant load reduction thus far seems to be associated with multi-year BMPs. This suggests that annual implementation may account for a smaller percentage of future BMP implementation needs.

According to the SRA's 2016 Sassafras River Report Card the average water quality grade across the watershed improved from "C" to "C+". The SRA uses the Mid-Atlantic Tributary Assessment Coalition protocols and procedures to assess monitoring samples collected by the SRA for both tidal and nontidal sites. Parameters collected include temperature, conductivity, salinity, pH, dissolved oxygen, turbidity, nitrogen, phosphorus and chlorophyll-a. They use the University of Delaware to analyze the nutrient and algae-related parameters. The average of seven tidal monitoring stations increased slightly for the first time since 2010. The grades for 13 of 16 nontidal stations showed higher scores. (see Appendix – Watershed)

9. Upper Choptank River

Location

The Upper Choptank River watershed encompasses 163,458 acres (255 mi^2) and drains parts of three Maryland counties (Caroline, Talbot and Queen Anne's) and parts of Delaware. It flows into the Chesapeake Bay. Impervious area covers 2.2% of the watershed. Land use in the watershed is: 58% agricultural; 31% forest; 8% developed and; 3% water.

Goal

Caroline County's Upper Choptank River watershed plan remains unchanged since 2010. It is based on Tributary Strategy NPS goals and EPA's Chesapeake Bay Program 2002 pollutant load estimates for the Upper Choptank River watershed. The Plan's NPS pollutant load reduction goals are:

- Total nitrogen reduction: 704,000 lbs/year
- Total phosphorus reduction: 34,500 lbs/year.

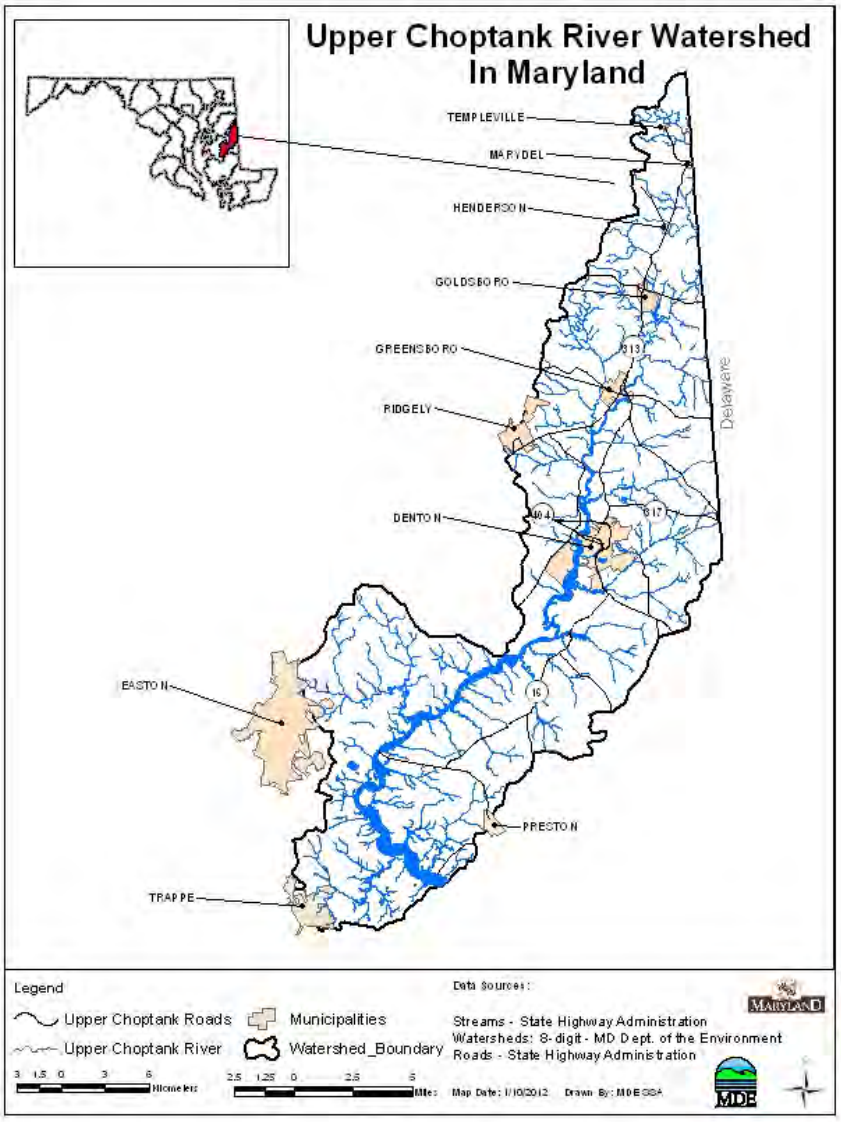


Figure 16. (above) Upper Choptank River Watershed.

Figure 17. Caroline County's photos show installation of roof runoff collection system (above) at the Greensboro Volunteer Fire Company. Runoff is piped to a nearby rain garden being planted (right). This FFY12 319(h) Grant project was completed in early 2016.



Figure 18. As part of the FFY14 319(h) Grant-funded porous asphalt parking lot at the Caroline County Emergency Management Services facility, a kiosk was designed and installed to promote public understanding. In the photos above, local high school students and other volunteers helped to construct a kiosk featuring a live action demonstration with interpretive graphics.

Table 19: Pollution Load Reduction Progress

Upper Choptank River Watershed	Nitrogen lb/yr	Phosphorus lb/yr	Sediment tons/yr
2002 thru SFY15	188,593.0	17,262.9	949.09
SFY2016 Cover Crops	138,150.2	794.6	66.3
SFY16 Multi-Year BMPs	8,403.8	1,110.0	69.3
All Trust Fund thru SFY16	1,856.2	14.3	806.6
Total Estimated Pollutant Reduction	335,147.0	19,167.5	1,084.66
Watershed Plan Goals (1)	704,000	34,500	
Percent of Goal Achieved	47.6%	55.6%	

All funding sources. Annual BMPs in SFY16 only. See Appendix Watershed.

Table 20: Grant Expenditures Summary
Upper Choptank River Watershed Plan Implementation

	Grant Project Expenditures				Pollutant Load Reduction		
Grant Name	Federal Grants $	State Grants $	Non Federal Match $	Total $ Expenditures	Nitrogen lb/yr	Phosphorus lb/yr	Sediment tons/yr
319(h) Grant	1,174,095.43		782,730.29	1,956,825.72	145,137.3	11,988.1	666.91
State Revolving Fund		0		0	0	0	0
Chesapeake & Atlantic Coastal Bays Trust Fund		166,976.15		166,976.15	1,856.2	14.3	806.6
TOTAL	1,174,095.43	166,976.15	782,730.29	2,123,801.87	146,993.5	12,002.4	1,473.55

Implementation Status – Upper Choptank River Watershed Plan

The pollutant load reduction progress table (center left) summarizes overall watershed plan implementation progress based on available reporting excluding annual BMPs like cover crops. The grant expenditures table summary (left) focuses on three funding sources excluding annual BMPs. (See Appendix Watersheds)

V. Areas of Concern/Recommendations/Future Actions

Key challenges addressed by the 319 NPS Program, in collaboration with other state efforts, include increasing NPS pollution in some areas, resource constraints versus measureable environmental results, and reporting NPS Implementation Progress. These issues were presented in the 2013 and 2014 Annual Reports, which are available on MDE's web page at http://www.mde.state.md.us/programs/Water/319NonPointSource/Pages/Programs/WaterPrograms/319NPS/index.aspx Several additional issues relating to timeframe, estimating pollutant load reduction and limitations of the 319(h) Grant are noted below.

A. Timeframe

The SFY16 Annual Report continues to use the timeline initiated in the SFY15 Annual Report to synchronize progress reporting for CWA Section 319(h) NPS Program and the EPA Chesapeake Bay Program (CBP) to the degree that these two programs allow. However, this synchronization is cannot be fully realized because of differing deadline requirements. Therefore, MDE anticipates the following schedule for finalizing this annual report:

- December/January: draft BMP implementation progress data for the state fiscal year is submitted to the EPA Bay Program.
- January: MDE uses the draft data to produce draft annual report.
- February 1: The draft annual report is due to EPA Region 3
- February/March:
    - 1) EPA CBP uses the States' draft BMP progress data to run the Chesapeake Bay model. Based on the model run(s), the data is updated and/or revised. MDE uses the latest data to revise the annual report.
    - 2) EPA Region 3 reviews and comments on the draft annual report. MDE revises the annual report.
- April: BMP progress data is finalized and then Annual Report is finalized thereafter.

B. Completeness, Accuracy and Consistency of BMP implementation and tracking data

Significant effort has been invested by State agencies to improve the completeness and accuracy of BMP implementation data. Some of this work has been funded by an EPA grant under the Chesapeake Bay Regulatory and Accountability Program (CBRAP grant). This grant is used by Maryland to help address issues involving both point sources and nonpoint sources. Several of the work areas called Objectives that address nonpoint source issues are:

- Agriculture NPS
    - Technical assistance for farmers drafting and updating nutrient management plans to meet State requirements. (funded from 7/1/10 thru 6/30/17 under Objective 10)
    - Agricultural Watershed Implementation Plan coordination to meet the Chesapeake Bay TMDL. (funded from 7/1/10 thru 6/30/17 under Objective 11)
    - Poultry manure management assessments and compliance (funded from 7/1/10 thru 6/30/13 under Objective 12)
    - Nutrient management review and compliance (funded 7/1/14 thru 6/30/17 under Objective 23)
    - Best management practice verification (funded 3/15/15 thru 6/30/17)
- Urban NPS
    - Accountability framework development and implementation at the State and local levels such as establishing watershed implementation plans, monitoring progress

of NPS implementation by setting two-milestones and tracking efforts to meet plan goals and milestones (funded July 2012 thru June 2017 under Objective 16)
    - Coordination of among State programs and with local agencies to expedite NPS implementation (funded 7/1/10 thru 6/30/17 under Obj. 9, funded 7/1/11 thru 6/30/13 under Obj. 13 and funded 7/1/12 thru 6/30/17 under Obj. 15).
    - Development, deployment, updating and training for a tool for tracking and envisioning NPS implementation scenarios. The Maryland Automated Scenario Tool (MAST). (Funded 7/1/10 thru 11/21/11 under Obj. 3, funded 3/1/12 thru 12/31/12 under Obj. 18 and funded 7/1/16 thru 6/30/17 under Obj. 36).
- Data Management
    - Enhancing statewide data management integration and efficiency. (funded 1/1/15 thru 6/30/17 under Obj. 26)
    - Proposed completion of development and deployment of the new data management system thru 319 funding (future)

C. Differences in 319 Priority Watershed Plan Implementation and Tracking

Prior to the SFY15 Annual Report, reporting and tracking for NPS implementation in each 319 priority watershed was limited to local capabilities using diverse methods. Reporting was inconsistent and there was no basis for comparison among the watersheds. Beginning with the SFY15 Annual Report, MDE used data collected for the EPA Chesapeake Bay Program to create a consistent reporting method that allows consistent reporting and comparability statewide.

There are significant differences in participation among local jurisdictions. Some participate fully, several participate only indirectly (public newsletters) or not at all. Among these, Baltimore County is fully engaged but is dissatisfied with the tracking methods used for statewide reporting and prefers to supply their own estimates of progress that were used in the watershed-specific reporting in this report. For all 319 priority watersheds except for Baltimore County, MDE used the Maryland Assessment and Scenario Tool (MAST) to estimate BMP pollutant load reductions for nitrogen, phosphorus and sediment for SFY14 thru SFY16. In the Annual Report executive summary and for Milestones Objective 3, MDE used only MAST estimates for all 319 watersheds in aggregate instead of attempting to mesh these two very divergent tracking/reporting methods.

D. Limitation to Using 319(h) Grant Funds for NPS Implementation

As first reported in the 2014 Annual Report, local interest in funding NPS implement use the 319(h) Grant has tended to very limited. Therefore, for 2014 thru SFY16 few 319-funded BMPs have been completed and total pollutant load reduction reported is small compared to other reported funding sources. This annual report demonstrates a continuation of this trend -- the majority of NPS BMP implementation in the 319 priority watersheds is accomplished by other funding sources. This trend is anticipated to continue in future years because funding sources like the State's Chesapeake and Atlantic Coastal Bays Trust Fund and the Maryland Agricultural Cost Share program have significantly more dollars to invest and offer broader eligibility with less burdensome requirements than the 319(h) Grant.