LIST OF APPENDICES

Name	General Description of Contents
BMP Implementation Progress	Aggregated statewide reported BMPs
Financial Information	319(h) Grant and Maintenance of Effort summaries
Integrated Report	Final 2014 Integrated Report Executive Summary
Milestones	MD 2015-2019 NPS Management Plan – milestone implementation progress
Success Story	Big Laurel Run
Watershed: - Antietam Creek - Back River Tidal - Back River Upper - Casselman River - Corsica River - Lower Jones Falls - Lower Monocacy River - Middle Gwynns Falls - Sassafras River - Upper Choptank River	Each watershed listed is eligible for 319(h) Grant implementation funding. The appendix addresses several topics: - Introduction: Watershed plan context and goals, watershed-specific milestones from Maryland's 2015-2019 NPS Management Plan Objective 5. - Grant-funded Implementation Projects summary for the 319(h) Grant, State Revolving Fund, and Chesapeake and Atlantic Coastal Bays Trust Fund - BMP implementation reported with estimated pollution load reductions

Appendix - BMP Progress - State Fiscal Year 2015
BMP Implementation Progress In Maryland

From MDE's Analyzing and Tracking Nonpoint Source Data Project, FFY15 319(h) Grant
Robin Pellicano, March 2015

NOTE: Also see Appendix - Milestones for additional BMP implementation progress information.

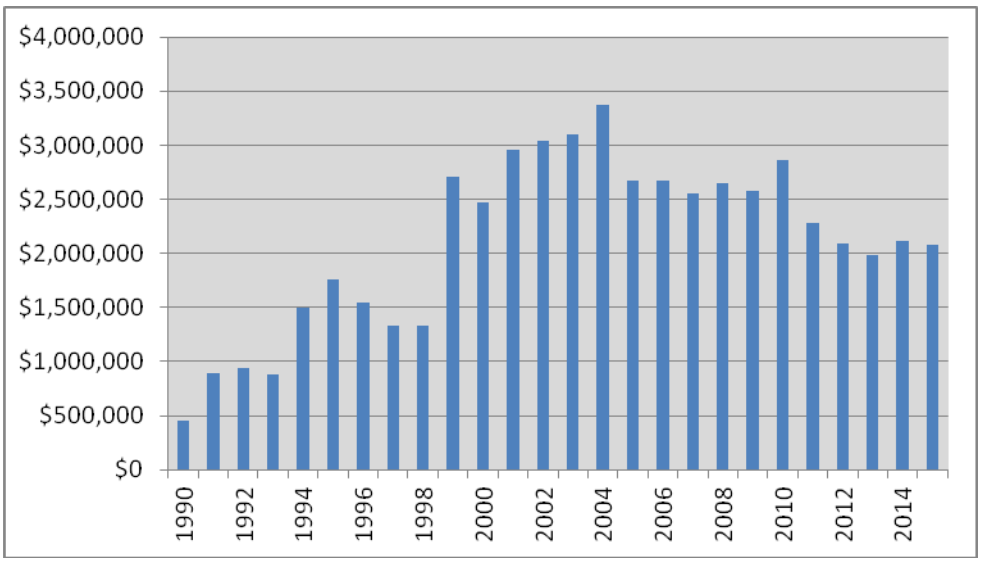
Type of Practice	Statewide Total	Nitrogen Reduction Approx. (lb/yr)	Phosphorus Reduction Approx. (lb/yr)
Animal Composters on Ag Lands	34	305	7
Animal Waste Management Systems-Livestock	826	994,300	112,585
Animal Waste Management Systems-Poultry	528	118,741	13,445
Cover Crops	457,522	825,493	37,725
Dry Detention Ponds and Hydro Structures	50,020	18,264	2,261
Dry Extended Detention Ponds	33,918	74,309	7,665
Filtering Practices	6,851	20,012	1,858
Forest Conservation	111,525	0	0
Forest Harvesting Practices	10,038	6,871	89
Grassed Buffers	52,435	513,305	60,740
Infiltration Practices	18,972	69,274	6,002
Nutrient Management Plan Implementation	877,015	998,304	175,834
Retirement Of Highly Erodible Lands	27,086	128,051	1,344
Riparian Forest Buffers on Ag Lands	22,776	264,444	32,472
Riparian Forest Buffers on Urban Lands	922	1,088	3,154
Runoff Control	1,417	1,035	64
Septic Connections to Sewers	1,629	11,896	0
Septic Denitrification	8,597	39,546	0
Soil Conservation Water Quality Plans	888,252	1,011,095	178,087
Stream Protection w/Fencing	718	9,808	960
Stream Protection w/o Fencing	52,329	357,396	34,972
Stream Restoration	238,148	10,843	19
Tree Planting on Agricultural Lands	19,259	223,609	27,458
Water Control Structures	2,743	20,608	0
Wet Ponds	69,039	151,253	15,601
Wetland Restoration on Ag Lands	9,729	112,960	13,871

1. For each type of practice in the table, data represents cumulative totals through June 2015 using CBP Model Phase 5.3.2.
2. Nutrient load reduction estimates for each type of practice represent the affect of each BMP acting independently. The nutrient reduction estimates do not account for the potential aggregate affect of multiple BMPs interacting together. For example, an agricultural field may have both cover crops and grassed buffers.
3. These values do not constitute all BMPs implemented. Some BMP reductions are not able to be easily calculated.
4. 2015 Progress incorporated changes in BMP implementation which included decreases in some BMPs from past years.

Appendix – Financial Information

Contents

Federal 319(h) Grant Funds Awarded To Maryland By Federal Fiscal Year Appropriated 1990 thru 2015



Grant funding from the Federal Clean Water Act Section 319(h) was first awarded to the State of Maryland in 1990. The chart above shows the Federal funds in each grant award. The table on the next page lists the award amounts and the amount of nonfederal match for each award. The year shown for each grant award is the Federal Fiscal Year (FFY) that the federal funds were appropriated. Upon award, each grant has a maximum life of five years.

As the chart shows, grant award received by Maryland from the FFY 2013 allocation was the smallest since FFY1998 (not adjusted for inflation). This smaller award is a result of a reduction in the national 319(h) Grant appropriation, which similarly affected all States. The allocation to Maryland is based on a national formula for distribution of 319 (h) Grant funds among the States, which has remained unchanged since the early 1990s.

Appendix – Financial Information

Award Amounts for Federal 319(h) Grant Funds Awarded To Maryland

Since 1990, about $52.7 million in Federal 319(h) Grant funds have been awarded to Maryland as shown in the table below.

Federal 319(h) Grant Funds Awarded To Maryland By Federal Fiscal Year Appropriated

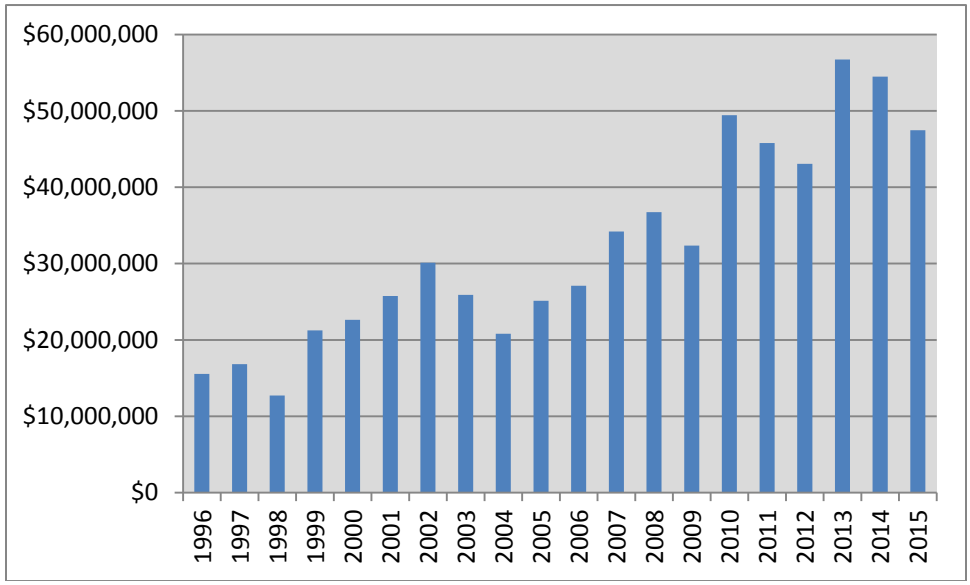
Federal Fiscal Year (1)	National Budget 319(h) Grant (millions)	319(h) Grant Allocated to Maryland (2)	Non-Federal Match By Maryland (3)	Total Grant + Match In Maryland
1990	$38.0	$447,771	$298,514	$746,285
1991	$51.0	$890,039	$593,359	$1,483,398
1992	$52.5	$939,298	$626,199	$1,565,497
1993	$50.0	$877,070	$584,713	$1,461,783
1994	$80.0	$1,494,413	$996,275	$2,490,688
1995	$100.0	$1,755,964	$1,170,643	$2,926,607
1996	$100.0	$1,541,980	$1,027,987	$2,569,967
1997	$100.0	$1,327,699	$885,133	$2,212,832
1998	$105.0	$1,327,699	$885,133	$2,212,832
1999	$200.0	$2,708,298	$1,805,532	$4,513,830
2000	$200.0	$2,467,576	$1,645,051	$4,112,627
2001	$237.5	$2,958,486	$1,972,324	$4,930,810
2002	$237.5	$3,035,576	$2,023,717	$5,059,293
2003	$238.5	$3,104,500	$2,069,667	$5,174,167
2004	$237.0	$3,369,190	$2,246,127	$5,615,317
2005	$207.3	$2,675,598	$1,783,732	$4,459,330
2006	$204.3	$2,666,655	$1,777,770	$4,444,425
2007	$199.3	$2,551,736	$1,701,157	$4,252,893
2008	$200.9	$2,653,500	$1,769,000	$4,422,500
2009	$200.9	$2,575,782	$1,717,188	$4,292,970
2010	$200.9	$2,860,785	$1,907,190	$4,767,975
2011	$175.5	$2,283,639	$1,522,426	$3,806,065
2012	$164.5	$2,091,000	$1,394,000	$3,485,000
2013	$155.9	$1,981,000	$1,320,667	$3,301,667
2014	$159.3	$2,119,118	$1,412,745	$3,531,863
2015	$159	$2,074,277	$1,382,851	$3,457,128
Total	$4,054.8	$54,778,649	$36,519,099	$91,297,748

1) Federal Fiscal Year is the year of appropriation. Shaded rows are grant years that have closed in Maryland. Other years shown in the table are active grant years in Maryland.
2) Federal grant amount awarded to Maryland by Federal Fiscal Year.
3) Matching funds required for each grant award (40%) from nonfederal sources.

Appendix – Financial Information

Expenditures Reported By The State Of Maryland
For NPS Programs and Projects Excluding 319(h) Grant & Match

Summary 1996 thru 2015



The Federal Clean Water Act's 1987 Amendments include provisions to ensure that the States do not use Section 319(h) Grants to replace State expenditures that already were occurring. This Maintenance Of Effort (MOE) requirement ensures that each State's NPS expenditures are at least equal to or greater than the baseline level set in the 1990s. Maryland's minimum Maintenance Of Effort is $8,447,270 annually.

As a prerequisite for receiving the next 319(h) Grant award, each State is required to document that their nonfederal expenditures for NPS programs and projects in the previous year, not counting match, meet their MOE. MOE expenditures reported by Maryland are cumulative expenditures in a single State fiscal year (July 1 through June 30) by three State agencies: Maryland Department of Agriculture (MDA); Maryland Department of the Environment, and Maryland Department of Natural Resources (DNR).

The chart above shows that Maryland consistently surpasses its MOE. In 2013, NPS expenditures by DNR's Chesapeake and Atlantic Coastal Bays Trust Fund were included in the MOE for the first time. Expenditures for nonpoint programs and projects by other State agencies, local governments, private organizations or other entities have not been included in Maryland's MOE reporting to EPA. Therefore, it is likely that the total annual expenditure for nonpoint source programs and projects in Maryland is significantly greater than the dollar amount reported to meet MOE requirements.

Appendix – Financial Information

319(h) Grant Implementation Funding Distribution 2002 thru SFY2015

The following table summarizes 319(h) Grant budget allocations of Federal funds for implementation by watershed, county and region of Maryland. This view is an indicator of efforts by State grant managers, with the essential cooperation of local implementers, to direct Federal 319(h) Grant funds to watersheds that are eligible for the funds. The table does not address actual expenditures of either Federal or nonfederal funds associated with the projects. Additional context for table and the following analysis includes:

- Implementation Funding including in the table includes expenditures for entire completed implementation projects, which may include design, construction, staff (project management) and related supplies, travel, etc.
- Expenditures for 319 implementation funding included:
    - Watersheds currently eligible for 319 implementation funding.
- Expenditures implementation funding not included:
    - Watershed plan implementation is complete and no longer eligible
    - Watershed received 319 implementation funding in 2002 or later but are not currently eligible.
- State Targeting Priorities (see below)
- Local Priorities for Seeking 319(h) Grant Funds (see below)

State Targeting Priorities

- Agricultural Technical Assistance. MDE and the Maryland Dept. of Agriculture (MDA) cooperated in the 1990s and early 2000s to prioritize watersheds for 319 funding to support technical staff in Soil Conservation District Offices who facilitated implementation of BMPs. This targeting included Antietam Creek and Upper Choptank River.
- Success Story Targeting. In approximately 2009, MDE assessed types of impairment and geographic areas to find combinations that were most likely to be correctable in the near term. Based on the assessment, MDE determined that acid mine drainage (AMD) tended to be a discrete impairment that could be mitigated within several years of monitoring and implementation so that success could be demonstrated. Then considering addition AMD prioritization assessments by technical experts in MDE and the existing ability for MDE to carry out watershed planning and impairment mitigation, two areas in Garrett County were selected for implementation: Aaron Run and Casselman River watersheds.
- Local Cooperation. With the exception of AMD mitigation (above), MDE relies on local jurisdiction willingness and interest to: 1) conduct watershed planning that leads to eligibility for 319(h) Grant implementation funding and 2) assume responsibility to implement the watershed plan and compete for 319 implementation project funding. MDE encourages local jurisdictions in this regard by offering technical assistance and 319 grant funding opportunities (within the limits of available resources). Baltimore County had the greatest interest in achieving watershed plan eligibility of any jurisdiction in Maryland. Additionally, several jurisdictions have competed for implementation funding most frequently and successfully: Baltimore County, Caroline County, Centreville/Queen Anne's County, and Washington County Soil Conservation District.

Appendix – Financial Information

Watershed Planning Efforts to Seek Eligibility for 319(h) Grant Implementation Funding

Beginning in 2005, fifteen watershed planning efforts focused on meeting eligibility requirements for Federal 319(h) Grant implementation funding. The list below summarizes the current status of those efforts. Numerous watershed planning efforts by jurisdictions and agencies during the same time period that did not involve seeking 319-eligibility are not listed.

List of Watershed Planning Efforts Focused On Eligibility for 319(h) Grant Implementation Funding 2005 thru 2015			
Watershed Plan Responsible Entity	**# of Plans**	**Significant Contributor**	**Status June 2015**
Baltimore County	1	na	implemented
	4	na	eligible
Calvert County	1	na	not eligible
Caroline County	1	MDE	eligible
Centreville / Queen Anne's County	1	DNR	eligible
Frederick County	1	na	eligible
MDE	1	na	eligible
Prince George's County	1	na	not eligible
Sassafras River Association	1	na	eligible
Washington County Soil Conservation District	1	MDE	eligible
Worcester County	1	MDE	not eligible
	1	na	drafting

319(h) Grant Implementation Budget Funding Distribution 2002 thru SFY2015

Based on Completed Implementation Projects Total Expenditures*

Expenditures within a Local Jurisdiction				Chesapeake Bay		Coastal Bays		Ohio River Basin	
Name	# of Eligible Watershed Plans	Federal Grant Budget $	%	Eligible Watershed	Federal Grant $	Eligible Watershed	Federal Grant $	Eligible Watershed	Federal Grant $
Allegany	0	0							
Anne Arundel	0	0							
Baltimore City	2	139,000	1%	Back River - Upper	0				
				Jones Falls - Lower	139,000				
Baltimore County	4	1,520,831	16%	Back River - Tidal	556,443				
				Back River - Upper	644,384				
				Gwynns Falls - Middle	320,004				
				Jone Falls - Lower	0				
Calvert	0	0							
Caroline	1	998,812	11%	Choptank River - Upper	998,812				
Carroll	0	0							
Cecil	1	0		Sassafras River	0				
Charles	0	0							
Dorcester	0	0							
Frederick	1	1,297,996	14%	Monocacy River - Lower	1,297,996				
Garrett	1	1,635,115	17%	Aaron Run	936,000			Casselman River	699,115
Harford	0	0							
Howard	0	0							
Kent	1	64,000	1%	Sassafras River	64,000				
Montgomery	0	0							
Prince George's	0	0							
Queen Anne's	1	1,559,220	17%	Corsica River	1,559,220				
Somerset	0	0							
St Mary's	0	0							
Talbot	0	0							
Washington	1	2,151,928	23%	Antietam Creek	2,151,928				
Wicomico	0	0							
Worcester	0	0				Coastal Bays	0		
	Overall TOTAL	9,366,902	100%	Drainage Area Total $	8,667,787		0		699,115
				Percent of Total $	93%		0%		7%

Region	Count	Total $	%
Central Md	4	1,659,831	18%
Eastern Shore	3	2,622,032	28%
Southern Md	0	0	0%
Western Md	3	5,085,039	54%
Maryland TOTAL	10	9,366,902	100%

* Note: Table includes only watersheds that are currently eligible for Federal Clean Water Act Section 319(h). Other watersheds that previously received 319 implementation funds (Deer Creek, St. Clements Bay, etc.) are not included.)

Appendix –Integrated Report

Draft Executive Summary extracted from *Maryland's Final 2014 Integrated Report of Surface Water Quality*.

Maryland's Integrated Report is available on the Internet:
http://mde.maryland.gov/programs/Water/TMDL/Integrated303dReports/Pages/Programs/WaterPrograms/TMDL/Maryland%20303%20dlist/index.aspx

Additionally, MDE posts water quality assessment maps on the Internet to assist users in visualizing the locations of impairments for categories like bacteria and nutrients:
http://www.mde.state.md.us/programs/Water/TMDL/Integrated303dReports/Pages/WaterQualityMappingCenter.aspx

Maryland's Final 2014 Integrated Report of Surface Water Quality

Submitted in Accordance with Sections 303(d), 305(b), and 314 of the Clean Water Act

Maryland Dept. of the Environment
1800 Washington Blvd
Baltimore, MD 21230

Larry Hogan, Governor
Boyd Rutherford, Lt. Governor

Ben Grumbles, Secretary

Submittal Date: April 16, 2015
EPA Approval Date: October 16, 2015

EXECUTIVE SUMMARY

Maryland's 2014 Integrated Report (IR) is submitted in compliance with sections 303(d), 305(b) and 314 of the federal Clean Water Act (CWA). This biennial report describes ongoing efforts to monitor, assess, track and restore the chemical, physical and biological integrity of Maryland waters. This report presents the current status of water quality in Maryland by placing all waters of the State into one of five categories.[1] In addition, the report provides information about the progress on addressing impaired waters (Categories 4 & 5) by documenting:

- Completed Total Maximum Daily Loads (TMDLs), which re-categorize impairments from Category 5 (impaired and needs a TMDL: the "list of impaired waters") to Category 4a (TMDL completed, but still impaired).
- Analyses of new water quality data that shows areas previously identified as impaired that are attaining standards. This can result from remediation, changes in water quality standards, or improved monitoring and/or data analysis.
- Assessment methodologies and watershed segmentation that enhance the use of available data and provide consistency with management and implementation strategies.
- Statewide water quality statistics for Maryland's surface waters.

The 2014 IR incorporates several changes this year which include the implementation of revised assessment methodologies for bacteria and biological data. In addition, there are newly developed guidelines for biological data submission and a brand new assessment methodology for stream temperature (for Use Class III and III-P only). For the 2014 IR, Maryland made a significant effort to incorporate more non-state government data than has ever been used in a previous Maryland IR. Datasets used included those collected by federal agencies, county governments, water utility agencies, and non-profit watershed organizations. As with the previous IR, the 2014 IR includes a GIS submittal that provides coverages for streams, impoundments, and estuarine waters which depict assessment information at appropriate scales. MDE also continues to make Integrated Reporting data available to the public in user-friendly formats. Through the use of MDE's searchable IR database and the interactive online pollutant maps, users can query IR information and explore water quality information in a graphic format. The searchable IR database and clickable map application are available online at http://www.mde.maryland.gov/programs/water/tmdl/integrated303dreports/pages/303d.aspx and the interactive pollutant maps can be found at http://www.mde.state.md.us/programs/Water/TMDL/Integrated303dReports/Pages/ImpairmentMaps.aspx.

These changes are all part of an on-going effort to improve Maryland's reporting and assessment activities required under the CWA. Further, Maryland continues to work closely with EPA's Chesapeake Bay Program (CBP) and other state partners (VA, PA, D.C., NY, and DE) on the assessment process for the Chesapeake Bay water quality criteria. Maryland has adopted an assessment

[1] The Integrated Report places all waters of the State into one of five "categories": Category 1 indicates that a water body is meeting all standards, Category 2 means it is meeting some but not all standards, Category 3 indicates that there is insufficient data to determine whether standards are being met, Category 4 means that water quality standards are not being met but a TMDL is not needed, either because it has already been completed, other more immediate fixes are available, or the impairment is not load related, and finally, Category 5 indicates that a water body is impaired and a TMDL is needed.

process that was created and agreed to by the partner states and the CBP. This assessment process split the Chesapeake Bay into 53 new segments (in the Maryland portion) based on the salinity regime. The current Chesapeake Bay assessments will continue to evolve as new assessment methodologies are developed and as additional data are collected. More details on the Chesapeake Bay assessments can be found at: http://www.chesapeakebay.net/about/programs/monitoring.

There are 138 additions to the list of Category 5 (impaired, TMDL needed) waters in 2014. Seventy-one of these new Category 5 waterbody-pollutant combinations (also referred to as listings) resulted from the newly implemented temperature assessment methodology for Use Class III and III-P streams. Another thirty-five of these new Category 5 listings resulted from MDE's Biological Stressor Identification Analyses. Of these 35 new 'biostressor' listings, ten are for chlorides, eight are for total suspended solids, seven are for sulfates, six are for total phosphorus, and four are listed for pH. In addition, there are eight new PCB listings for fish tissue, seven fecal coliform listings in shellfish harvesting waters, six mercury listings for fish tissue, three listings for high pH in streams, and one new heptachlor epoxide listing. Finally, there are seven new Category 5 listings for failures to attain the aquatic life designated use (pollutant(s) not yet specified).

Table 1: Changes to Category 5 Listings from 2012 to 2014

Integrated Report Year/Status	Category 5 Listings
2012 Total Category 5 Listings	**195**
2014 New Category 5 Listings	138
2014 New Delistings (Category 5 to Category 2 or 3) *(See Table 2)*	-38
Approved TMDLs* (Category 5 to Category 4a, since the 2012 IR)	-33
2014 Grand Total Category 5 Listings	**262**

*Other TMDLs may have been approved during this time but they did not address waters on Category 5.

Thirty-eight waterbody-pollutant combinations were removed from Category 5 (impaired, TMDL needed) in 2014.[2] Twenty-one biological listings without a specified impairing substance have been replaced by specific pollutant listings enumerated by the Biological Stressor Identification analyses (BSID). Four other listings have been removed from Category 5 as it was determined that manganese is not impairing the drinking water designated use. Another listing, the Atkisson Reservoir – sediment listing, was moved to Category 3 after an evaluation of more recent information demonstrated that Atkisson Reservoir is currently functioning as a beneficial wetland. One other Category 5 listing was removed from the IR altogether (Edgewater Village Lake – total phosphorus) because the impoundment is classified as a stormwater retention pond. Two more listings, for chromium, were delisted based on a series of studies which demonstrated that chromium was not impairing the aquatic life use in the Northwest Branch and Bear Creek portions of the Patapsco River (tidal). The remaining nine delistings are a combination of waters that meet aquatic life standards for total phosphorus (four delistings), sediment-related parameters (two delistings), biological evaluations (one delisting), copper (one delisting), and mercury in fish tissue (one delisting). Many of these listings were originally based on

[2] The number thirty-eight does not include partial delistings whereby a smaller geographic portion of a Category 5 (impaired) listing was split out from the original assessment unit and delisted. These partial delistings are provided in Section C.3. This number also does not include listings that were addressed by a TMDL (moved to Category 4a), nor does it include listings that were in Categories 4a, 4b, or 4c but which now meet standards.

limited data (especially those listings originating in the 1996 and 1998 303(d) Lists). In many cases, it is not possible to attribute these waters now meeting standards to a particular restoration action. It is possible that the extensive restoration practices that have been applied statewide might be playing a contributory role but it may also be true that these listings were made based upon insufficient data. Table 2 shows the general water body-pollutant combinations that have been delisted from Category 5.

Table 2: 2014 Delistings (water body-pollutant combinations removed from Category 5 (impaired, TMDL needed) and placed in Category 2 or 3 (non-impaired).

Type of Impairment Listing	Number of Listings Removed from Category 5
Generic Biological Listings – specific pollutant now specified (BSID process)	21
Total Phosphorus – Meeting standards	4
Manganese - Drinking water standards met in finished water	4
Sediments – Meeting standards	2
Chromium – Meeting standards	2
Biological Listing - now meeting aquatic life designated use	1
Hg - Fish Tissue Concentrations now meeting fishing designated use	1
Copper - Meeting standards	1
Sediments – Moved to Category 3 – lack of impairment data, potential use change	1
Total Phosphorus – Removed the IR completely – impoundment properly classified as a stormwater pond	1
2014 Total Number of Delistings	**38**

Another notable set of delistings, which were not counted in Table 2[3], are several that occurred in the tidal portion of the Patapsco River (PATMH). Specifically, the Category 4b (impaired, technological fix) nickel listing, which was associated with three separate industrial point sources, was delisted on the basis of recent discharge monitoring report (DMR) data and ambient water quality monitoring data. In addition, the Category 4b listing for copper has also been partly delisted on the basis of DMR and ambient water quality data. In both cases, these data demonstrated that effluent limits were being met and that nearfield water met ambient water quality criteria. For more details on the Category 4b delistings in PATMH please see Section C.3.

Another particularly noteworthy delisting that was not counted in Table 2 was the removal of the low pH impairment to the mainstem of Aaron Run in Garrett County, MD. This is the first instance where a specific restoration project, undertaken by the State, has been directly linked to designated use attainment (aquatic life). In this case, MDE's Bureau of Mines Division coordinated the construction of several acid mine drainage treatment systems which increased stream pH to levels within the pH criteria range. As part of this restoration effort, DNR Fisheries transplanted brook trout from nearby streams to Aaron Run which, based on recent reports, are not only surviving but also reproducing.

Water quality successes are also being documented from the effort at addressing nutrient impairments throughout the state. Though many Maryland waters are still listed as impaired (most are in Category 4a

[3] These specific listings started (in 2012) in Category 4b and were moved to Category 2 (meeting some standards). Table 2 only counts those listings that moved from Category 5 to Categories 2 or 3. Likewise, listings that started in Category 4a or 4c, were also excluded from Table 2.

– impaired, TMDL completed) for nitrogen and/or phosphorus, trend analyses completed by the United States Geological Survey (USGS) demonstrate significant long-term (30-year) reductions at many of the monitoring locations in Maryland and in the larger Chesapeake Bay watershed. In addition, based on reported implementation efforts, Maryland has achieved 41% of its nitrogen and 62% of its phosphorus reduction goals as assigned by the Phase II Watershed Implementation Plan.

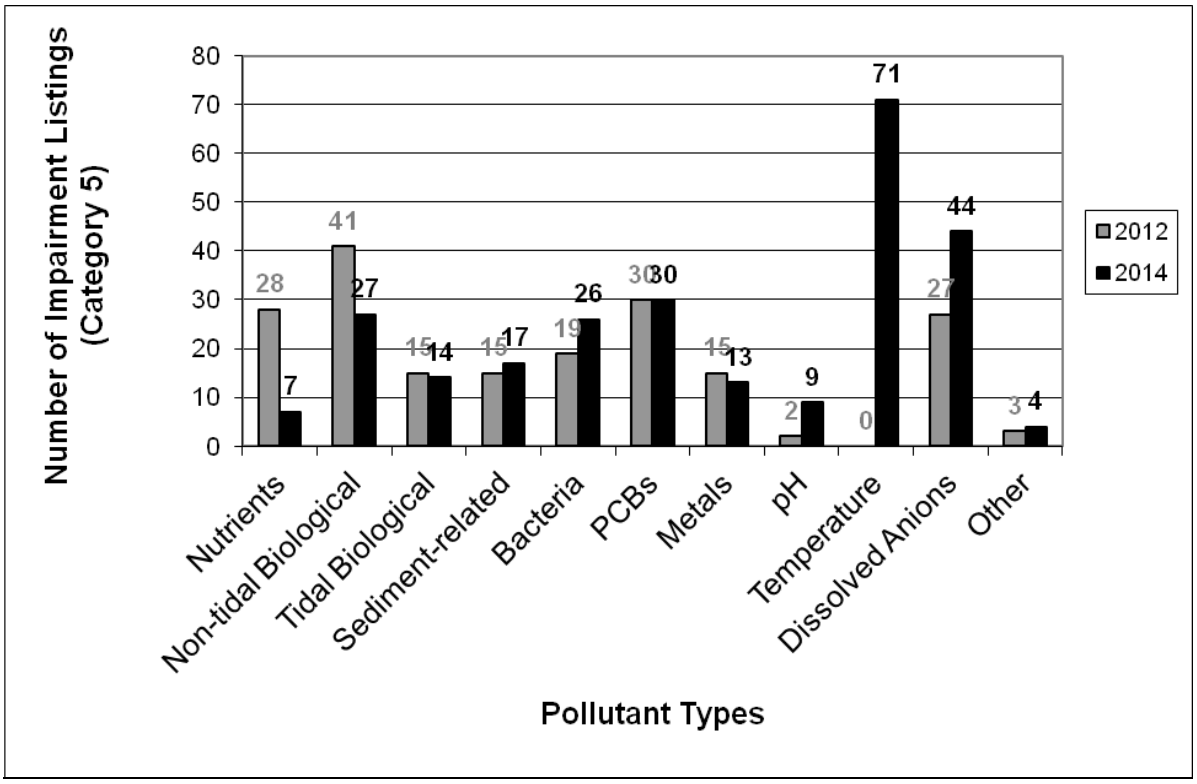


Figure 1: Comparison of the Number of Category 5 (impaired, TMDL not yet completed) Listings Between the 2012 and 2014 Integrated Reporting Cycles per Pollutant Group.

There have also been some notable developments in Maryland's water programs since the last Integrated Reporting cycle in 2012. Maryland completed a total of 36 TMDLs, Water Quality Analyses and Biostressor Identification Analyses in 2012 and 2013 that addressed previous Category 5 assessments. Twelve of the 36 meet specific requirements of the memorandum of understanding (MOU) with EPA that sets TMDL production schedules for Maryland. Also, in February 2014, the Maryland Department of the Environment (MDE), in cooperation with Delaware and Virginia, completed an updated series of TMDLs addressing Maryland's entire portion of the Coastal Bays and establishing pollution limits for both nitrogen and phosphorus. These TMDLs were subsequently approved by EPA in August of 2014 and are captured within this report. In addition, Maryland has made efforts to improve assessment resolution of the Chesapeake Bay water quality segments by incorporating non-government data for the first time, starting with the 2014 Bay assessments. Specifically, data collected by the South River Federation (SRF) was combined with data collected by DNR which demonstrated, for the first time, that the 30-day mean dissolved oxygen criterion was met in the South River.

Since the Chesapeake Bay TMDL was completed in December 2010, Maryland has continued to evaluate and compare the new Chesapeake Bay TMDLs with the previously approved nutrient TMDLs. For these segments, MDE will be determining which TMDL should be the TMDL of record and will, in

the future, develop documentation to describe this evaluation. This documentation will undergo a public review period either as part of a future Integrated Report or as a stand-alone document. For a brief synopsis of this evaluation please read Section C.3.1. In addition, MDE has provided Parts G and H (in this IR) to help explain the history of the Chesapeake Bay listings and TMDLs. Included in this historical recount is how completed TMDLs impacted MD's MOU with EPA and how specific segments were affected (Part H).

Other notable new actions taken by the State include:

- Completion of the Phase II Chesapeake Bay Watershed Implementation Plan that proposes localized loading reductions and strategies for meeting the water quality goals of the Chesapeake Bay TMDL.
- The continuing work of the Marcellus Shale Safe Drilling Initiative to provide additional baseline monitoring, studies, and recommendations for dealing with environmental liability issues as well as best practices for all aspects of gas drilling to protect both the environment and public health.
- An increase in the Bay Restoration Fund (BRF) fee to help fund enhanced nutrient removal at minor waste water treatment plants.
- Passage of the Sustainable Growth and Agricultural Preservation Act of 2012 (the septic law) which creates a planning requirement for jurisdictions to identify areas planned for certain types of development (septic versus sewered) in an effort to limit new areas served by septic systems, a largely unchecked source of nutrient pollution.
- A 640 percent increase in the level of funding for the Chesapeake and Coastal Bays Trust Fund which finances projects that support Maryland's Watershed Implementation Plan by reducing nonpoint source pollution.
- Revision of the statewide nutrient management regulations to achieve consistency in the way all sources of nutrients are managed to help Maryland meet the nitrogen and phosphorus reduction goals in the Watershed Implementation Plans (WIP).
- The Maryland Agricultural Certainty Program, passed during the 2013 legislative session, offers farmers who voluntarily implement advanced best management practices (BMPs) the certainty that they can conduct their business without additional regulations for ten years. The goal of this program is to accelerate implementation of agricultural best management practices in order to meet nutrient and sediment reduction requirements under the WIP while preserving the economic viability of Maryland's farms.
- Passage of the lawn fertilizer law which limits nitrogen and phosphorus in fertilizer products, requires certification of lawn care professionals, and establishes application restrictions for both homeowners and professionals.

In addition to these efforts, the Maryland State legislature passed House Bill 987 requiring that the 10 most populated jurisdictions in Maryland charge citizens, businesses, and organizations a stormwater utility fee. This fee is specifically aimed at reducing the area's fastest growing source of pollution, stormwater from urban and suburban development. Funds generated by this fee will be used to complete stream restoration projects, create bioretention facilities such as rain gardens, and to maintain current stormwater infrastructure, all toward the larger effort of improving local and Chesapeake Bay water quality.

Appendix – Milestones
NPS Management Plan Tracking in the Annual Report

Maryland's 2015-2019 NPS Management Plan that was approved by EPA in January 2015 included included many new NPS milestones to track progress associated with the:

Chesapeake Bay TMDL
Chesapeake Bay Agreement
NPS Management statewide

Progress tracking is generally based on the state fiscal year July thru June. State management plan milestones are listed in this appendix with progress reported for the 2014-2015 period in two broad categories:

- Maryland 2014-2015 BMP Milestones. These milestones are aimed at gauging in-the-ground implementation progress during a 2-year period consistent with EPA Chesapeake Bay Program guidance. Following this, a series of additional sets of 2-year milestones will follow until 2025 when Chesapeake Bay goals are to be achieved.
- Maryland 2015-2019 NPS Program – Statewide Milestones. These milestones are designed to help meet a series of objectives named on the State NPS management plan, including:
    - Objective 3: Pollutants and Stressors
    - Objective 4: Pollutant Sources
    - Objective 5: Types of Waterbodies
    - Objective 6: Protection and Restoration
    - Objective 7: Priority Setting
    - Objective 8: Program Management and Evaluation

Maryland 2014-2015 BMP Milestones

4/12/2016

BMP NAME	UNITS	FY14-15 Milestone Incremental	Δ 2015-2013 Progress/ Implementation	Comment/Interpretation
Agriculture				
Alternative Crops	ACRE	141	40	
Barnyard Runoff Control	ACRE	252	111	
Conservation Plans/SCWQP	ACRE	926,207	888,252	
Conservation Tillage	ACRE	765,058	767,511	
Cover Crops	ACRE	386,007	457,522	
Cropland Irrigation Management	ACRE	105,864	118,586	In 2014; Interim BMP which does not show in the CBP Progress
Dairy Manure Incorporation	ACRE	10,340	23,657	Same as Dairy Manure Injection; Interim BMP which does not show in the CBP Progress
Decision/Precision Agriculture	ACRE	299,212	NA1	
Enhanced Nutrient Management	ACRE	207,393	NA1	
Forest Buffers	ACRE	353	437	
Grass Buffers; Vegetated Open Channel	ACRE	866	800	
Heavy Use Poultry Area Concrete Pads	Operations	31	NA2	
Horse Pasture Management	ACRE	713	148	
Irrigation Water Capture Reuse	ACRE	560	561	Interim BMP which does not show in the CBP Progress
Land Retirement to hay without nutrient	ACRE	973	2,063	Same as Retirement of Highly Erodible Land
Loafing Lot Management	ACRE	55	20	Livestock Heavy Use Area Protection
Manure Transport	TON	44,000	48,842	Transport Outside the watershed
Mortality Composters	Operations	34	35	Same as Composting Facility
Non Urban Stream Restoration	FEET	11,071	7,957	Same as Streambank Restoration
Nutrient Management -Cropland	ACRE	458,628	NA1	Tier NM = 877,015
Nutrient Management -Pasture	ACRE	76,714	NA1	
Off Stream Watering Without Fencing	ACRE	1,832	3,728	Same as Stream Protection without Fencing, Same as Watering Facility
Phytase	%			
Poultry Litter Incorporation	ACRE	62,080	128,487	Same as Poultry Manure Incorporation ; Interim BMP which does not show in the CBP Progress
Precision Intensive Rotational Grazing	ACRE	637	0	
Prescribed Grazing	ACRE	4,184	1,353	
Shoreline Erosion Control	FEET	5,838	0	
Sorbing Materials in Ag Ditches	ACRE	386	785	In 2014; Interim BMP which does not show in the CBP Progress
Stream Access Control with Fencing	ACRE	565	0	This BMP is capped at 718 acres due to land acres it can be applied to in the model
Tree Planting; Vegetative Environmental Buffers - Poultry	ACRE	48	40	
Urban Nutrient Management	ACRE	220,000	214,847	Commercial Applicators
Waste Structures, Livestock	Structures	55	67	Roughly 125 AU/structure for livestock
Waste Structures, Poultry	Structures	12	53	Roughly 270 AU/structure for poultry; This implementation is based on reported AU not CBP Output
Water Control Structures	ACRE	2,411	1,005	
Wetland Restoration	ACRE	645	469	
Natural Filters on Public Lands				
Wetland Restoration	ACRE	135	NA3	
Streamside Forest and Grass Buffers (No	ACRE	28	NA3	
Urban and Forest BMPs				
Stormwater Retrofits - ALL	ACRE	12,000	2,686	The acres implemented are impervious where the Milestone included pervious
Septic Systems				
Septic Denitrification	COUNT	2,400	3,461	

NA1 - This BMP no longer is reportable with in the CBP Model. It has been replaced with the Tier Nutrient Management BMP of which 2015 had 877,015 acres
NA2 - This BMP is not reportable in the CBP; Its tracked within MDA but not reported
NA3 - This BMP is captured with the Stormwater Retrofit Category

Maryland 2015-2019 NPS Program – Statewide Milestones Objective 3: Pollutants & Stressors	Lead	Goal 2015	Report 2015	Annual Publication link to
Annual Nitrogen Nonpoint Source Loads to Bay: Used to show progress on nutrient load reductions. (reported for state fiscal year)	MDE	report progress	36,180,015	
Nitrogen: For all watersheds with EPA-accepted plans, overall total annual reduction by NPS implementation completed during the past year. (Cumulative lbs/yr nitrogen starting 2015 excluding annual practices)	MDE	50,000	552,125.0	
Annual Phosphorus Nonpoint Source Loads to Bay: Used to show progress on nutrient load reductions. (reported for state fiscal year)	MDE	report progress	2,289,574	
Phosphorus: For all watersheds with EPA-accepted plans, overall total annual reduction by NPS implementation completed during the past year. (Cumulative lbs/yr nitrogen starting 2015 excluding annual practices)	MDE	1,000	6,701.3	
Sediment: 319-funded projects estimated annual reductions... (Cumulative starting in 2015 tons/yr)	MDE	5	16.75	
Sediment: For all watersheds with EPA-accepted plans, overall total annual reduction by NPS implementation... (Cumulative tons/yr sediment starting 2015 excluding annual practices.)	MDE	200	1,632.56	
Bacteria: Annual Report on Monitoring Results for Maryland Beaches	MDE	report findings	see report (web link)	http://www.mde.maryland.gov/programs/water/beaches/pages/beacheshome.aspx
Bacteria: Conduct Annual Meeting of County Beach Management Programs	MDE	report findings	conducted 3/2015	http://www.mde.maryland.gov/programs/water/beaches/pages/beacheshome.aspx
Bacteria: Conduct Shoreline Field Surveys near Shellfish Waters to identify potential pollutant sources of concern (part of a 7-year cycle).	MDE	report findings	posted on Internet	http://mde.maryland.gov/programs/Marylander/CitizensInfoCenterHome/Pages/citizensinfocenter/fishandshellfish/pop_up/shellfishmaps.aspx
Bacteria: Conduct Sanitary Surveys of relevant data for all shellfish growning areas	MDE	report findings	posted on Internet	http://mde.maryland.gov/programs/Marylander/CitizensInfoCenterHome/Pages/citizensinfocenter/fishandshellfish/pop_up/shellfishmaps.aspx
Chloride: Number of water bodies that have a detailed watershed assessment based on monitoring data. (Cumulative starting in 2015)	MDE	2	3 in progress	
Chloride: TMDL development (Cumulative # of new TMDLs starting 2015)	MDE	2	0	
Chloride: Annual Road Salt Application Management Training by State Highway Administration.	MDE	report result		
PCBs: TMDL development (Cumulative # of new TMDLs starting 2015)	MDE	6	3	
PCBs: Conduct monitoring in an attempt to locate upland sites contaminated by high concentrations of PCBs. Annually report monitoring plans and findings.	MDE	report status	being conducted	
Mercury: Update Maryland's 319 Program webpage to summarize Maryland's existing mercury mitigation activities.	MDE	report status	not initated	
Mercury: Update Maryland's 319 Program webpage to summarize regional, national and international initiatives designed to reduce mercury.	MDE	NA	future	
Mercury Gap Analysis: Based on findings and refinement of previous two years research in support of webpage enhancements identify any gaps, which might reflect recommendations of other's studies of opportunities to further reduce existing sources of mercury. Report summary findings in an Annual Report appendix.	MDE	NA	future	
Mercury in Fish Tissue: Report Median statewide mercury concentration in black bass (including largemouth and smallmouth) for the previous 5 years. The fish tissue contaminant concentration is a quantitative measure of the average contaminant level for the compounds most responsible for fish consumption advisories in waters of the State of Maryland to protect human health.	MDE	report findings		

Maryland 2015-2019 NPS Program – Statewide Milestones Objective 4: Pollutant Sources	Lead	Goal 2015	Report 2015	Annual Publication link to
Agricultural Milestones				
Maintain Annual Cover Crop Implementation Acreage Levels	MDA	386,000	457,522	
Maintain Annual Nutrient Management Plan Acreage Levels	MDA	448,570	877,015	
Maintain Annual Soil Conservation and Water Quality Plan Acreage Levels (acres)	MDA	926,000	888,252	
Maintain Annual Manure Transported out of Chesapeake Bay watershed (tons)	MDA	44,000		
Maintain Annual Conservation Tillage Acreage Levels	MDA	765,000		
Plant Riparian Forest Buffers (Acres/year)	MDA	350		
Wetland Restoration (Acres treated/year)	MDA	645		
Phosphorus Management Tool regulation adoption	MDA	report status		
On-site Disposal Systems				
Upgrade septic systems to nitrogen removal technology (systems/year)	MDE	1,200	1,731	http://mde.maryland.gov/programs/Water/BayRestorationFund/AnnualReports/Pages/Water/CBWRF/annualreports/index.aspx
Refine septic system nitrogen reduction strategy for the Chesapeake Bay	MDE	report status	future	
Adopt online system for reporting installation of Best Available Technology OSDSs.	MDE	report status	in development	
Facilitate refinement of septic system information and submit it to the EPA Chesapeake Bay Program (numbers, locations and types of systems)	MDE	report status	in progress	
Urban/Suburban Stormwater and Erosion & Sediment Control				
Stormwater retrofits of land without sufficient controls (pounds nitrogen reduced/year)	MDE	18,000	8,218	
Refine stormwater nitrogen and phosphorus reduction strategies for the Chesapeake Bay	MDE	NA	future	
Complete the development of an MS4 geodatabase that will aid MDE in the assessment of management programs and improve current Phase I data tracking, collection and validation of BMPs:	MDE	report status	in development	
Online BMP Reporting Tool for Non-MS4 local governments:	MDE	report status	in development	
Outreach to non-MS4 jurisdictions on reporting stormwater controls on new development and retrofitting development with insufficient controls.	MDE	report result	in progress	
Historical BMP Cleanup as part of the Chesapeake Bay Midpoint Assessment	MDE	report status	completed	
SMART Homeowner BMP Tracking Tool: Make the tool available to users.	UME	report status	pilot in operation	http://extension.umd.edu/watershed/smart-tool
Online BMP Reporting Tools for MS4 and Non-MS4 local governments: Make the tool available to users.	MDE	report status	in development	
Issue tentative determination for Phase II MS4 permits.	MDE	report status		
Local Stormwater WLA Implementation Plans: Review Plans submitted as part of Phase I MS4 requirements. (Number of jurisdictions, which may include multiple plans for each jurisdiction)	MDE	4	4	
Erosion and Sediment site “inspection coverage rate” conducted by MDE (Source: Annual Enforcement & Compliance Report)	MDE	report rate	12%	http://www.mde.state.md.us/AboutMDE/DepartmentalReports/Pages/AboutMDE/enfcomp.aspx

Maryland 2015-2019 NPS Program – Statewide Milestones Objective 4: Pollutant Sources	Lead	Goal 2015	Report 2015	Annual Publication link to
Forestry				
Develop Lawn-to-Woodland Program, Program rules and partners in place	DNR	report status	Statewide Program with focus areas	
Update Maryland's 5-year Forest State Assessment & Strategy	DNR	report status	Drafted and submitted to US Forest Service	
Planting Forests on 43,960 acres by 2020 from 2006 baseline as part of Maryland's Greenhouse Gas Reduction Act (GGRA) plan goals.	DNR	report acres	Statewide management on target	
Bay WIP Targets: Add Phase III Watershed Implementation Plan targets to this table of Milestones in 2019 and track in future 319 NPS Management Plan milestones. The GGRA metric will be used as the common measure between now and 2019.	DNR		future	
Resource Extraction				
Coal Mining site "inspection coverage rate" conducted by MDE	MDE	report rate	100%	http://www.mde.state.md.us/AboutMDE/DepartmentalReports/Pages/AboutMDE/enfcomp.
Non-Coal Mining site "inspection coverage rate" conducted by MDE	MDE	report rate	96%	http://www.mde.state.md.us/AboutMDE/DepartmentalReports/Pages/AboutMDE/enfcomp.
Hydromodifications				
Non-tidal wetlands and floodplains permit site "inspection coverage rate"	MDE	report rate	39%	http://www.mde.state.md.us/AboutMDE/DepartmentalReports/Pages/AboutMDE/enfcomp.
Tidal wetlands permit site "inspection coverage rate"	MDE	report rate	12%	http://www.mde.state.md.us/AboutMDE/DepartmentalReports/Pages/AboutMDE/enfcomp.

Maryland 2015-2019 NPS Program – Statewide Milestones Objective 5: Types of Waterbodies	Lead	Goal 2015	Report 2015	Link to publications
Statewide Lakes and Reservoirs				
Lakes/Reservoirs: Local Phase I MS4 jurisdiction stormwater waste load allocation (WLA) implementation plans for reservoir TMDLs developed and reviewed by MDE. (Report the plans submitted and reviewed).	MDE	report results	Nine (9) received and reviewed	
Patuxent Reservoirs Annual Report of the Technical Advisory Committee	WSSC	report	no report done in SFY15	
Central Maryland - Chesapeake Bay Drainage	Watersheds with EPA-accepted watershed plans that are el			
Antietam Creek Watershed	Plan is eligible for 319(h) Grant implementation funding.			http://mde.maryland.gov/programs/Water/319NonPointSource/Pages/Programs/WaterPrograms/319nps/factsheet.aspx
Watershed plan milestones: Report progress in the 319 Annual Report.	WCSCD	report	see Annual Report	
Assess Implementation Progress toward sediment and bacteria reduction watershed plan milestones and update the plan if needed.		future	NA	
Back River - Tidal Watershed	Plan is eligible for 319(h) Grant implementation funding.			http://mde.maryland.gov/programs/Water/319NonPointSource/Pages/Programs/WaterPrograms/319nps/factsheet.aspx
Watershed plan milestones: Report progress in the 319 Annual Report.	Baltimore County	report	see Annual Report	
Assess action items progress: #2 lawn fertilizer, #3 bayscape education, #34 outfall inspections, #53 outfall inspections, and #60 incentives.		assess	see Annual Report	
Assess action item progress: #37 hot spots		future	NA	
Assess action item progress: #10 stormwater retrofits		future	NA	
Assess action item progress: #31 wetland plantings		future	NA	
Back River - Upper Watershed	Plan is eligible for 319(h) Grant implementation funding.			http://mde.maryland.gov/programs/Water/319NonPointSource/Pages/Programs/WaterPrograms/319nps/factsheet.aspx
Watershed plan milestones: Report progress in the 319 Annual Report.	Baltimore County	report	see Annual Report	
Assess plan implementation progress, particularly: open space tree planting, impervious area removal on institution land.		future	NA	
Assess hotspot investigation and follow-up		future	NA	
Choptank River - Upper Watershed	Plan is eligible for 319(h) Grant implementation funding.			http://mde.maryland.gov/programs/Water/319NonPointSource/Pages/Programs/WaterPrograms/319nps/factsheet.aspx
Watershed plan milestones: Report progress in the 319 Annual Report.	Caroline County	report	see Annual Report	
Assess plan implementation progress and update plan if needed.		assess	see Annual Report	
Corsica River Watershed	Plan is eligible for 319(h) Grant implementation funding.			http://mde.maryland.gov/programs/Water/319NonPointSource/Pages/Programs/WaterPrograms/319nps/factsheet.aspx
Watershed plan milestones: Report progress in the 319 Annual Report.	Caroline County	report	see Annual Report	
Assess plan implementation progress and update plan if needed.		future	NA	
Gwynns Falls - Middle Watershed	Plan is eligible for 319(h) Grant implementation funding.			http://mde.maryland.gov/programs/Water/319NonPointSource/Pages/Programs/WaterPrograms/319nps/factsheet.aspx
Report implementation progress in the 319 Annual Report.	Baltimore County	report	see Annual Report	
Jones Falls - Lower Watershed	Plan is eligible for 319(h) Grant implementation funding.			http://mde.maryland.gov/programs/Water/319NonPointSource/Pages/Programs/WaterPrograms/319nps/factsheet.aspx
Watershed plan milestones: Report progress in the 319 Annual Report.	Baltimore County	report	see Annual Report	

Maryland 2015-2019 NPS Program – Statewide Milestones Objective 5: Types of Waterbodies	Lead	Goal 2015	Report 2015	Link to publications
Monocacy River - Lower Watershed	Plan is eligible for 319(h) Grant implementation funding.			http://mde.maryland.gov/programs/Water/319NonPointSource/Pages/Programs/WaterPrograms/319nps/factsheet.aspx
Watershed plan milestones: Report progress in the 319 Annual Report.	Frederick County	report	see Annual Report	
Assess plan implementation progress and update plan if needed.		future	NA	
Sassafras River Watershed	Plan is eligible for 319(h) Grant implementation funding.			http://mde.maryland.gov/programs/Water/319NonPointSource/Pages/Programs/WaterPrograms/319nps/factsheet.aspx
Watershed plan milestones: Report progress in the 319 Annual Report.	SR Assoc.	report	see Annual Report	
Central Maryland - Chesapeake Bay Drainage	Plans not designed to seek 319(h) implementation funds.			
Phase III Watershed Implementation Plan for the Chesapeake Bay TMDL: Develop and submit draft and final versions of Maryland's Phase III WIP to EPA. Includes the 2017 Interim Strategy for pollutant load reductions to be achieved for particular nonpoint sources of nitrogen, phosphorus and sediment. Progress will be assessed and findings will be provided in a report.	MDE	NA	future	
Western Maryland - Casselman River and Youghiogeny River				
Casselman River Watershed	Plan is eligible for 319(h) Grant implementation funding.			http://mde.maryland.gov/programs/Water/319NonPointSource/Pages/Programs/WaterPrograms/319nps/factsheet.aspx
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	report	see Annual Report	
Percentage of impaired stream segments in watershed that are remediated and meet the State water quality standard for pH.		50%	0%	
Report 303(d) stream segments that achieve pH criteria via Maryland's Integrated Report.		future (SFY16)	NA	
Deep Creek Lake Watershed Plan	Plan not designed to seek 319(h) Grant implementation funding.			
Plan completion anticipated in 2014. Potential milestones TBD.	DNR	NA	no milestones in plan	http://www.dnr.state.md.us/ccs/dcl_wmp.asp
Coastal Region - Coastal Bays and Atlantic Ocean				
Coastal Bays Conservation and Management Plan	Plan not designed to seek 319(h) Grant implementation funding.			
Plan completion anticipated in 2014-2015. Potential milestones TBD.	MCBP	NA	milestones TBD	http://www.mdcoastalbays.org/

Maryland 2015-2019 NPS Program – Statewide Milestones Objective 6: Protection and Restoration	Lead	Goal 2015	Report 2015	Annual Publication link to
Conduct 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	monitor & report	18 sites (319 FFY14 project #5)	https://iaspub.epa.gov/apex/grts/f?p=GRTS:199
303(d) Program Vision: For the 2016 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		future	
Expand Antidegradation pilot project with MDE Waterways and Wetlands Program beyond Central Maryland.	MDE		future	
Revise Maryland's Antidegradation regulations to be more clear and protective.	MDE			
Conduct State Clearinghouse reviews of state and federally funded projects to ensure consistency with the State Anti-degradation Policy (approximately 400/year)	MDE	report results	496 reviews, all kinds, 2015 calendar year	

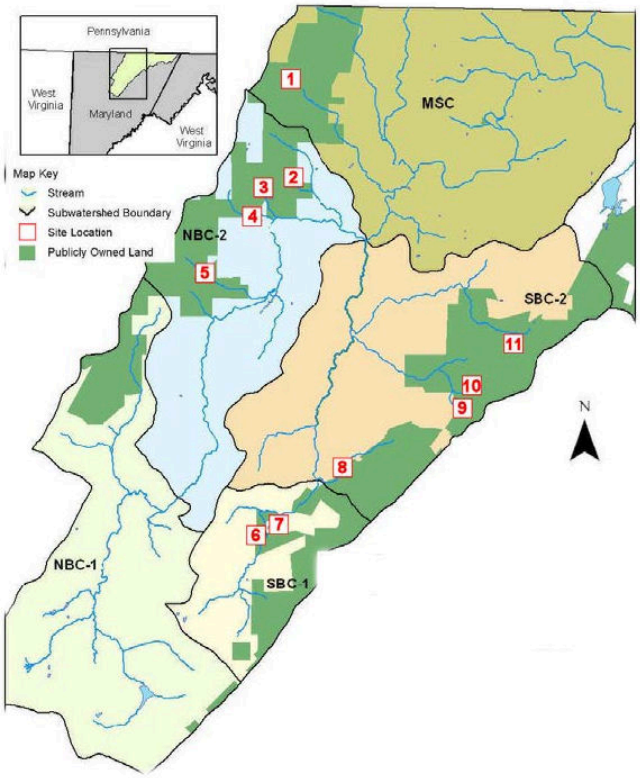
Maryland 2015-2019 NPS Program – Statewide Milestones Objective 7: Priority Setting	Lead	Goal 2015	Report 2015	Annual Publication link to
Biological monitoring to support implementation of Maryland's Antidegradation Policy in areas with pending significant development projects. Produce a list of about 30 high-priority monitoring sites annually.	MDE	list & report	see Objective 6, first goal listed	
Award 319(h) Grant funding annually according to prioritization criteria. Provide scopes of work for each seleced project.	MDE	report	(1)	https://iaspub.epa.gov/apex/grts/f?p=GRTS:199
303(d) Program Vision: Priorites - For the 2016 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 facilitiate State strategic planning for acheiving water quality goals.	MDE		future	
303(d) Program Vision: Alternatives - By 2018, Maryland will use alternative approaches, in addition to TMDLs, that incorporate adaptive management and are tailored to specific circumstances where such approaches are better suited to implement priority watershed or water actions that acheive the water quality goals, including identifying and reducing nonpoint sources of pollution. (Assess alternatives to influence priorities)	MDE		future	

Footnotes:
(1) On the web page (see link), select "Find Projects". Then select for Fiscal Year "2015", for EPA Region "03", for State "Maryland", then click on "Go". Then click on "View" to see a project information report, which includes a link to download that project's workplan.

Maryland 2015-2019 NPS Program – Statewide Milestones Objective 8: Program Management and Evaluation	Lead	Goal 2015	Report 2015	Annual Publication link to
Chesapeake Bay Two-Year Milestones: Maryland has set benchmarks to gauge BMP implementation and programmatic progress for 2014-2015… For future two-year periods, including the 2017 Mid-Point Assessment, progress compared to the milestones will be assessed and reported. Based on the findings, milestones will be updated for the following two-year period. (2017 Interim loading target has already been set)	MDE	assess progress, report findings	see SFY15 Annual Report, Appendix - Milestones, 2014-2015 BMP Milestones	
Produce Maryland's Integrated Water Quality Monitoring and Assessment Report every even calendar year (Integrated Report). Post the report on the Internet following EPA approval.	MDE		2014 Report: EPA approved Oct. 2015	http://mde.maryland.gov/programs/Water/TMDL/Integrated303dReports/Pages/Programs/WaterPrograms/TMDL/Maryland%20303%20dlist/index.aspx
Number of water bodies identified in Integrated Report as being primarily NPS impaired that are particially or fully restored: Partially or fully restore water bodies identified in state's Integrated Report primarily impaired by NPS. Partially restored means at least one water quality criterion is achieved in cases where the waterbody has multiple water quality criteria violations. (Cumulative starting in 2015)	MDE	0	2014 Integrated Report Table 10 New Delistings indicates that causes (NPS or other) are generally not known.	
Report NPS BMP implementation progress annually	MDE	report	see SFY15 Annual Rpt	
BMP Implementation Verification Protocols: Draft documentation due to EPA Chesapeake Bay Program	MDE	report	Completed. Gaps will be addressed in future	
Produce Maryland's 319 NPS Program Annual Report (319 Annual Report). Annually reort if findings necessitate a future NPS Management Program Plan update. Post the report on the Internet following EPA review.	MDE	report	Final is posted each year following EPA review.	http://mde.maryland.gov/programs/Water/319NonPointSource/Pages/Programs/WaterPrograms/319NPS/index.aspx
Report progress achieved toward goals for 319-eligible water plans in Maryland's 319 Annual Report.	MDE	report	see SFY15 Annual Rpt	
Report significant findings from targeted watershed monitoring plan in Maryland's 319 Annual Report.	MDE	report	available upon request	
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 for that time period.	MDE	report	see Annual Report Appendix - Success Story	
Evaluate progress on each of these 319 Program milestones and report the status in Maryland's NPS Program Annual Report.	MDE	report	see Annual Rpt Appendix - Milestones	
Evaluate Local Chesapeake Bay 2014-2015 2-year Milestones for Bay Restoration (post local milestones and State evaluation to MDE webpage)	MDE		see link to web page	http://mde.maryland.gov/programs/Water/TMDL/ChesapeakeBayTMDL/Pages/programs/waterprograms/tmdl/cb_tmdl/index.aspx
Adopt State Chesapeake Bay 2016-2017 2-Year Milestones as 319 Plan Milestones by reference (Document via 319 Annual Report)	MDE		future	
Evaluate Local Chesapeake Bay 2016-2017 2-year Milestones for Bay Restoration (post local milestones and State evaluation to MDE webpage)	MDE		future	
Adopt State Chesapeake Bay 2018-2019 2-Year Milestones as 319 Plan Milestones by reference (Document via 319 Annual Report)	MDE		future	
Maintain/increase State agency investment in NPS programs and implementation. Report status by state fiscal year. (See Annual Report Appendix A)	MDE	report	Annual Report Appendix - Financial Information	
303(d) Program Vision: Integration - By 2016, in cooperation with EPA, identify and coordinate implementation of key point source and nonpoint source control actions that foster effective integration across CWA programs, other statutory programs (e.g. CERCLA, RCRA, SDWA, CAA), and the water quality efforts of other Federal departments and agencies (e.g. Agriculture, Interior, Commerce) to achieve Maryland's water quality goals.	MDE		future	
Continuing Planning Process (CPP) update for consistency with this NPS Program Management Strategy	MDE		future	
State Monitoring Strategy Update	MDE		future	
See Objective 4 (Pollutants and Stressors) for additional evaluation milestones				
See Objective 3 (Pollutant Sources) for additional evaluation milestones				

Appendix – Success Story (Draft under EPA review)

Big Laurel Run pH Impairment Remedied by Successful Acid Mine Drainage Treatment



Waterbody Improved

Maryland's Big Laurel Run, a tributary to Casselman River in Garrett County, was impaired by low pH associated with acid mine drainage (AMD). An assessment of an AMD seep impacting the headwaters of Big Laurel Run determined that this area was a good candidate for mitigation. Successful implementation of several AMD mitigation measures rapidly brought the stream into compliance with the State water quality standard for pH. Two years after project completion, Big Laurel Run's native brook trout population has shown signs of improvement in spite of temperature and habitat limitations in the stream. (In the map on the left, Sites 9 and 10 are approximate location s of BMPs placed at Big Laurel Run.)

Problem

Western Maryland's Casselman River watershed drains to Pennsylvania toward the Ohio River. Prior to WWII, the River and its tributaries were commonly high quality waterways that supported native brook trout. During several following decades, coal mining changed local hydrology resulting in acid mine drainage (AMD) reaching many tributaries causing pH declines in numerous streams. The Casselman River watershed was listed for pH impairment in 1996 and it was also listed for chloride impairment in 2010. In 2014, the South Branch Casselman River watershed was listed for temperature impairment because some streams did not consistently meet the Use Class III temperature requirements for native brook trout.

Big Laurel Run is tributary to the Casselman River's South Branch. Its headwaters are located in a part of Maryland's Savage River State Forest in an area affected by acid mine drainage from abandoned deep coal mines. Water quality monitoring in 2011-2013 near the headwaters demonstrated that in-stream pH was consistently in the range of 4.5 to 6.0, which is below Maryland's water quality pH standard of 6.5 to 8.0. The low-pH waters flow about six miles to the mainstem of the South Branch Casselman River, which supports a healthy brook trout population and is designated as a high quality Tier II waterway in Maryland regulation.

An assessment of Maryland's Casselman River tributaries conducted in 2004-2006 reported that Big Laurel Run was a high priority for AMD mitigation. In 2008 an additional assessment was

conducted by the Maryland Department of Natural Resource Fisheries Service. They determined that improving pH in Big Laurel Run could expand the stream area available for healthy native brook trout population even though the stream's physical habitat was not optimal.

Project Highlights

In late 2008, the Maryland Department of the Environment (MDE) initiated watershed planning to make the Casselman River watershed eligible for 319(h) Grant implementation funds. The planning process included assessment of potential AMD mitigation sites, which included Big Laurel Run in the highest priority for action. The plan also analyzed AMD mitigation technologies. Two mitigation technologies were recommended in order to keep capital, operation and maintenance costs low: limestone leach beds and limestone sand application. The latter involves constructing a driveway for a dump truck to pull up adjacent to the stream so that measured quantities of limestone sand can be delivered directly to stream edge. Then, natural variation in stream flow distributes the particles of limestone downstream. The extent limestone sand application is determined by periodic monitoring of in-stream pH. (Photo above is installation of the siphon to feed stream water into the limestone leach bed. Photo immediately below is the siphon site after construction during a visit by EPA and MDE November 2014.)

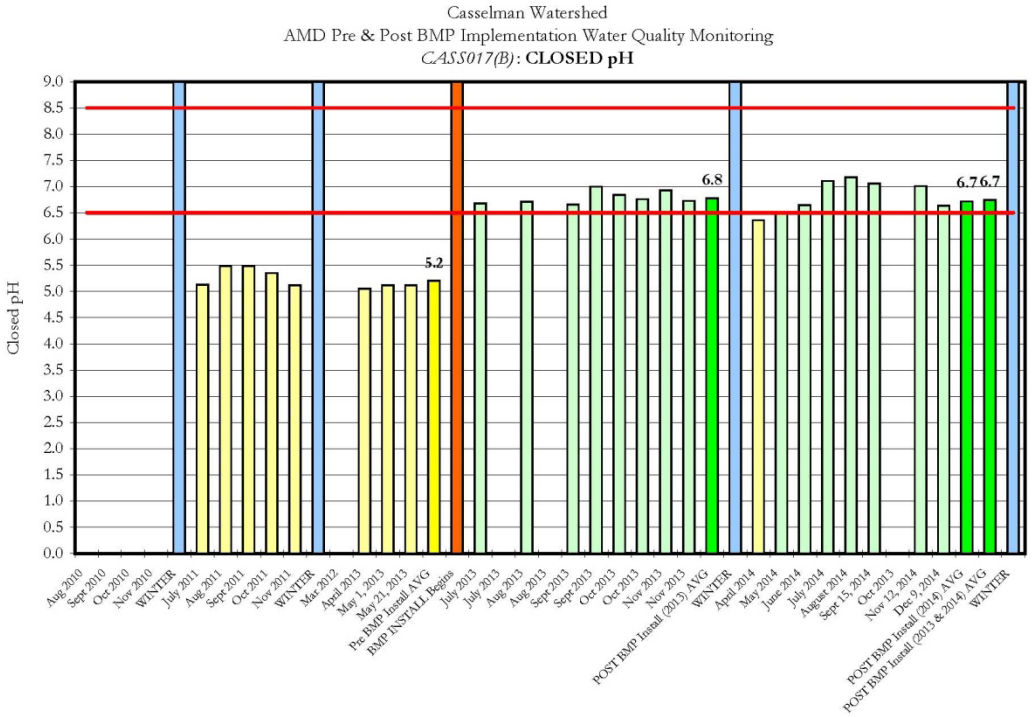
In early 2011, EPA accepted the *Casselman River Watershed Plan for pH Remediation* and 319(h) Grant funds for implementation were approved for a project to mitigate AMD-impacted areas in the Casselman River watershed. Big Laurel Run headwaters area was selected as one of the first projects for construction because the land was publicly owned, the site was accessible and permit requirements were attainable. (see map)

Construction was conducted from late 2011 thru early 2012 at Big Laurel Run to implement two technologies recommended by the watershed plan. A limestone leach bed was constructed. It employs a siphon to draw low pH water from the stream feeding the water thru the leach bed where gravity flow returns pH-adjusted water to the stream. Additionally, two limestone sand application sites were constructed with one on each branch of the stream's headwaters. During 2013 and 2014, deliveries of limestone sand to these two sites totaled nearly 65 tons. (Photo above right showed a delivery of limestone sand to the edge of the stream. The retaining wall and vehicle access was constructed with 319(h) Grant funds.)

Results

After completion of the acid mine drainage mitigation projects, water quality data collected in 2013 and 2014 in Big Laurel Run demonstrated that the water quality standard for pH is being met. The average pH before the project was 5.4 and the average after was 6.8. The graph shows the change in pH over several years. Another result of the project is that the average acid neutralizing capacity in Big Laurel Run increased from less than 10 ueq/L before AMD mitigation to more than 150 ueq/L after the project.

Additionally, limited fishery improvement has been identified by the Maryland Fisheries Service. Native brook trout young of the year abundance in Big Laurel Run increased by a factor of 1.3 in 2014 compared to conditions in 2008 before implementation. They also found that the adult population numbers and density remained about the same and that most previously existing sub-optimal habitat conditions persisted throughout the study period.



Partners and Funding

MDE's Abandoned Mine Land Division (AMLD) and MDE's Water Quality Protection and Restoration Program (WQRP) cooperated to write the *Casselman River Watershed Plan for pH Remediation*. AMLD used $55,000 from the FFY2008 319(h) Grant for their part of the planning effort.

Implementation of the eleven Phase 1 Casselman River watershed AMD mitigation sites was led by AMLD using $644,115 from the FFY2009 319(h) Grant. The Garrett Soil Conservation District was hired to oversee contractor hiring, construction management and inspection of projects. Capital cost of the Big Laurel Run portion of the 319 project included $8,000 for the two limestone sand application sites and $60,000 for the limestone leach bed and siphon system.

Other partners contributed work at no cost to the project. Watershed plan drafting by MDE WQPR staff was funded by the 319(h) Grant through ongoing projects that support the State NPS management program. Also, before/after water quality monitoring by MDE's Field Services Program were funded by separate on-going 319(h) Grant projects. The Maryland Fisheries Service assessment services work was independently funded by the State. (Photo on right is EPA and MDE site visit at the limestone leach bed after completion of construction November 2014.)

For additional information contact:

Connie Loucks, Maryland Department of the Environment, Abandoned Mine Land Division, 301-689-1461 or connie.loucks@maryland.gov

Ken Shanks, Maryland Department of the Environment, Watershed Protection and Restoration Program, 410-537-4216 or kenneth.shanks@maryland.gov

Appendix – Watersheds

Watershed Name	General Description of Contents
- Antietam Creek - Back River Tidal - Back River Upper - Casselman River - Corsica River - Lower Jones Falls - Lower Monocacy River - Middle Gwynns Falls - Sassafras River - Upper Choptank River	Each watershed listed is eligible for 319(h) Grant implementation funding. The appendix addresses several topics: - Introduction: Watershed plan context and goals, watershed-specific milestones from Maryland's 2015-2019 NPS Management Plan Objective 5. - Grant-funded Implementation Projects summary for the 319(h) Grant, State Revolving Fund, and Chesapeake and Atlantic Coastal Bays Trust Fund - BMP implementation reported with estimated pollution load reductions

Appendix
Watershed Eligible for 319(h) Grant Implementation Funding

Antietam Creek in Washington County, Maryland

Contents

Introduction

The *Antietam Creek Watershed Restoration Plan* was completed by the Washington County Soil Conservation District, with technical assistance by MDE, in September 2012. EPA accepted the plan in September 2012. The watershed covered by the Antietam Creek watershed plan is the drainage in Maryland only. In Maryland, the Antietam Creek watershed is entirely within Washington County. Pennsylvania is not addressed in the watershed plan.

Sediment reduction goal is 12,923 tons (Antietam Creek watershed plan Table 8, page 27).

Bacteria reduction goal is 5,411,472 billion E. Coli bacteria MPN/year (Antietam Creek watershed plan Table 10, page 34). (MPN is most probable number)

Base Year for watershed plan implementation is 2012. The watershed plan accounts for pollutant reductions and BMP implementation prior to that year in setting the watershed plan goals. Pollutant load reductions and BMP implementation reported beginning 2012 can be counted toward meeting watershed plan goals.

Milestones

Maryland's 2015-2019 NPS Management Plan Objective 5 includes two milestones for this watershed:

- Annually: Report progress in the 319 Annual Report, and
- 2017: Assess implementation progress toward sediment and bacteria reduction watershed plan milestones and update the plan if needed. (This reiterates a pre-existing milestone in the watershed plan.)

Pollution Load Reduction Progress

The Annual Report table Pollution Load Reduction Progress is repeated on the next page with additional details and notes added. In general, estimates of the pollution load reduction in the watershed for two primary sources:

1) State Fiscal Year reporting Chesapeake Bay WIP implementation progress for NPS BMP implementation used for EPA's Chesapeake Bay model. For this annual report, data was available for SFY14 and SFY15 only. Annual BMPs like cover crops are counted only for the current reporting year.
2) 319 projects reporting multi-year BMP load reductions 2013 or earlier are counted. Not included are 319 projects focused on implementing annual BMPs (cover crops). For SFY14 and SFY15, 319-funded NPS BMP implementation reported directly to MDE and WIP implementation reporting received by MDE are assessed to ensure that no double counting occurs.
3) NPS BMP implementation not funded by the 319(h) Grant that was reported by watershed plan implementers in the 2013 Annual Report.

1994-2015 Completed 319(h) Grant NPS Implementation Projects -- Antietam Creek Watershed

Project Summary			Project Expenditures					Pollutant Load Reduction			
Area/Lead	Name/Dsescription	End Date	Grant Funding Source	Grant Funds		Non Federal $ Match	Total $	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)	Bacteria (MPN/yr)
				Federal $	State $						
Md Dept of Agriculture (MDA) with Washington County Soil Conservation District (SCD)	Antietam Creek Watershed Project		319 FFY1994 #6								
		1996	319 FFY1995 #13	112,821.00		Federal grant budget for project is presented. Expenditure data is unavailable.		Projects and pollutant load reduction from projects reported prior to 2012 (shaded grey in table) were accounted for in the watershed plan. Therefore, these reductions are not counted toward implementing the watershed plan. However, available pollutant load reduction data is presented.			
		1998	319 FFY1996 #15	52,774.00							
		1998	319 FFY1997 #16	91,531.00							
		1999	319 FFY1998 #17	105,337.00							
		2000	319 FFY1999 #12	120,360.00							
		2001	319 FFY2000 #8	99,733.00							
		2002	319 FFY2001 #9	125,859.00							
		2003	319 FFY2002 #6	134,423.00							
		2004	319 FFY2003 #7	124,859.00							
		2005	319 FFY2004 #11	106,189.90		70,793.27	176,983.17				
		2007	319 FFY2004 #27	129,225.23		86,150.15	215,375.38	77,692	5,686	0	0
		2006	319 FFY2005 #5	119,446.79		79,631.19	199,077.98	4,718	720	0	0
		2008	319 FFY2007 #5	139,258.68		92,839.12	232,097.80	65,216	5,862	81.2	0
		2010	319 FFY2008 #6	155,838.12		103,892.08	259,730.20	71,239	5,553	0	0
	MDA Antietam Creek Watershed Proj	2010	319 FFY2009 #3	151,110.82		100,740.55	251,851.37	64,590	5,067	0	0
Washington Co. SCD	Antietam Creek Watershed Plan	2012	319 FFY2008 #20	29,264.39		19,509.59	48,773.98	0	0	0	0
	Kiwanis Park Stream Stabilization Ph1	2015	319 FFY2014 #7	124,340.97		82,893.98	207,234.95	34.2	10.3	16.75	0
Washington County	Greensburg Rd Little Antietam Creek Restoration	2014	319 FFY2012 #11	229,555.73		153,037.15	382,592.88	110	37.4	85	0
			TOTAL overall	2,151,927.63	0.00	789,487.09	1,973,717.72	283,599.2	22,935.7	183	0
			TOTALS for projects counted toward watershed plan implementation.	383,161.09	0.00	255,440.73	638,601.82	144	47.70	102	0

SFY 2015 319(h) Grant NPS Implementation Project Activity - Antietam Creek Watershed

Project Summary			Project Funding					Projected Pollutant Load Reduction			
Area/Lead	Name/Dsescription	End Date	Grant Funding Source	Grant Budgeted		Non Federal $ Match	Total $ Budgeted	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)	Bacteria (MPN/yr)
				Federal $	State $						
Washington County	Devils Backbone Park Stream Restoration	TBD	319 FFY14 #8	390,000		260,000	650,000	300	102	232.5	0
Washington County SCD	Barr Property Stream Restoration Ph1	TBD	319 FFY13 #10	148,930		99,287	248,217	47.5	9.9	5.5	0
	Shank/Anderson Project Phase 2 of 3	TBD	319 FFY11 #13	64,266		42,844	107,110	16.5	1.9	2.4	166 billion
	Kiwanis Park Stream Stabilization Ph2	TBD	319 FFY12 #13	46,000		30,667	76,667	34.2	10.3	16.75	0
	Barr Property Stream Restoration Ph2	TBD	319 FFY15 #6	139,257		92,838	232,095	23.75	4.95	2.76	0
	Shank/Anderson Project Phase 3 of 3	TBD	319 FFY15 #7	448,365		298,910	747,275	157.7	56.7	795	0
			TOTALS	1,236,818	0	824,546	2,061,364	579.7	185.8	1,054.9	166 billion

Antietam Creek Watershed
2011-2015 Completed State Revolving Fund NPS Implementation Projects

Project Summary			Project Expenditures				Pollutant Load Reduction			
Area/Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match $	Total $	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)	Bacteria (MPN)
				Federal $	State $						
Washington County	Lehmans Mill Road Stream Bank Stabilization	2012	SRF Grant	0.00	191,700.00	0.00	191,700.00	101	5.35	0	0
	Burnside Bridge Rd Stream Bank Stabilization	2012	SRF Grant	0.00	232,900.00	0.00	232,900.00	101	5.35	0	0
TOTAL for completed projects				$0.00	$424,600	$0.00	$424,600.00	202	11	0	0

Summary of State Revolving Fund Projects Activity in 2015 - Antietam Creek Watershed

Project Summary			Project Funding					Projected Pollutant Load Reduction			
Area/Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match $	Total $	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)	Bacteria (MPN)
				Federal $	State $						
	no SRF-funded projects now working										

Antietam Creek Watershed
Chesapeake and Atlantic Coastal Bays Trust Fund
SFY 2015 NPS Implementation Project Status (1)

State FY	Partner	Project	Project_Type	County	Trust_Fund	Status	Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment ton/yr
FY14	Washington County	Fountaindale Elementary (Washington County Board of Education Riparian Buffers)	Tree Planting Projects	Washington	$625.50	Complete	5.9	0.24	0.045
FY14	Washington County	Smithsburg Middle/High School Complex (Washington Co. Board of Education Riparian Buffers)	Tree Planting Projects	Washington	$2,341.87	Complete	44.25	1.83	0.34
FY14	Washington County	Northern Middle School (Washington County Board of Education Riparian Buffers)	Tree Planting Projects	Washington	$780.62	Complete	35.4	1.46	0.27
FY13	Chesapeake Bay Foundation	Maryland Watershed Restoration Project: Hidden Hollow Farm	Tree Planting Projects	Washington	$1,485.00	Complete	111.75	10.68	4.65
					$5,232.99	TOTAL COMPLETED	197.3	14.2	5.31
FY14	City of Hagerstown	Bioretention Facility near Clean Water Circle	Stormwater Management	Washington	$455,000	Design/Planning	100.5	20.9	5.8
FY15	MD Forestry Conservancy District I	Klein Reforestation	Tree Planting Projects	Washington	$7,000	On-going	0	1	0.288
FY14	Chesapeake Bay Trust	Hagertown's G3 Project	Tree Planting Projects	Washington	$107,720	Design/Planning	11.78	0.48	0.04
FY14	City of Hagerstown	Wet Swales near Hagerstown Light Dept.	Stormwater Management	Washington	$45,000	Design/Planning	36.9	9.3	2.7
FY14	Chesapeake Bay Trust	Hagertown's G3 Project	Tree Planting Projects	Washington	$68,667	Design/Planning	0	0	0
FY13	Town of Boonsboro	Boonsboro Community Tree Planting In The Park Project	Tree Planting Projects	Washington	$15,000	Construction	80.4	5.42	0.95
	(1) Maryland DNR Trust Fund database 10/26/15.				$698,387	TOTAL WORKING	129.1	15.2	3.69

Antietam Creek Watershed
In Washington County, Maryland
SFY2015 Agricultural BMP Implementation

Agricultural Best Management Practices (1)	Unit	BMPs Reported	Estimated Pollutant Load Reduction: Nitrogen Total (lbs)	Phosphorus Total (lbs)	Sediment Total (tons)	E. coli billion/yr
Alternative Crops	acres	0				
Amendments for the Treatment of Ag Waste	AU	0				
Animal Mortality Facility	count	0				
Conservation Cover	acres	0				
Conservation Plans/SCWQP	acres	3,015	7259.5	732.5	631.47	0
Cover Crops	acres	5,387	61,113.20	443.30	348.53	0
Critical Area Planting	acres	0				
Dead Bird Composting Facility	count	0				
Fencing	feet	6,160	888.7	63.1	15.01	0
Field Border	acres	0				
Filter Strip	acres	0				
Grassed Waterway	acres	0				
Horse Pasture Management	acres	0				
Loafing Lot Management System	acres	0.18	21.9	3	0.15	0
Pasture & Hay Planting	acres	0				
Prescribed Grazing	acres	0				
P-sorbing Materials	acres	0				
Riparian Forest Buffer	acres	0				
Riparian Herbaceous Cover	acres	0				
Roof Runoff Structure	count	3	365.9	50.8	2.49	0
Stream Restoration Ag	feet	0				
Tree/Shrub Establishment	acres	0				
Waste Storage Facility	count	4				
Wastewater Treatment Strip	acres	0				
Water Control Structure	count	1	157.8	0	0	0
Watering Facility	count	8	58.7	10.6	3.44	0
Wetland Creation	acres					
Wetland Restoration	acres					
Windbreak/Shelterbelt Establishment	feet					
Total Pollutant Load Reduction			69,866	1,303.3	1,001.1	0.0
Total Annual Practices (2)			61,113	443	349	0
Total Multi-year Practices			8,752	860	653	0

(1) "SFY15 Total" column is 12/30/15 MDA data.

(2) Annual Practices: cover crops, nutrient mgmt, manure transport, conservation tillage & high residue tillage.

Antietam Creek Watershed Plan
Agricultural BMP Implementation Goals

Management Practice	Sediment Goal Table 14	Bacteria Goal Table 18	Units	SFY2015 Progress
Soil Conservation WQ Plans	3,050	15,460	acres	3,015
Cover Crops	4,000		acres/yr	5,387
Stream Protection Fenced	780	780	acres	
Grass Buffers	295	35	acres	0
Riparian Forest Buffers		260	acres	0
Runoff Control Systems		12	count	3
Stream Restoration			feet	0
Animal Waste Mgmt Systems		26	count	4
Conservation Tillage	6,200		acres	0
Erodible Land Retirement	130		acres	
Livestock Stream Crossing		17	count	
No-Till	4,800		acres	
Stream protection no fence	1,300	1,300	acres	

Units of measure shaded red differ from State reporting units.

Antietam Creek Watershed
In Washington County, Maryland
SFY2015 Urban BMP Implementation

Urban Best Management Practice	Unit	BMPs Reported	Estimated Pollutant Load Reduction			
			Nitrogen lb/yr	Phosphorus lb/yr	Sediment tons/yr	Bacteria billion/yr
Bioretention	acres	4.78	74.57	1.43	1.41	
Bioswale	acres	0				
Disconnection of Rofftop Runoff	acres	0.03	0.23	0.03	0.00	
Dry Detention Ponds & Hydro Structures	acres	0				
Dry Extended Detention Ponds	acres	0				
Dry Well	acres	0.06	1.29	0.07	0.02	
Filtering Practices	acres	3.26	24.45	0.033	0.85	
Forest Conservation	acres	0				
Forest Harvesting Practices	acres	76				
Infiltration Practices	acres	0.26	5.59	0.29	0.08	
Permeable Pavement	acres	0				
Rain Garden	acres	0.06	0.94	0.02	0.02	
Reduction of Impervious Surface	acres	0				
Riparian Forest Buffers on Urban Lands	acres	0				
Septics Connections to Sewers	count	0				
Septics Denitrification Critical Area	count	0				
Septic Denitrification outside of 1000 ft	count	30	99			
Septic Denitrification within 1000 ft	count	4	22			
Stream Restoration Urban	feet	0				
Street Sweeping	acres	0				
Tree Planting	acres	0				
Urban Forest Buffer	acres	0				
Wet Extended Detention	acres	19.04	66.64	0	3.72	
Wet Ponds & Wetlands	acres	0				
TOTAL Pollutant Load Reduction			294.71	1.87	6.09	0.00

(1) "BMPs Reported" column is 12/9/15 MDE data and WCSCD 1/12/16 input.
(2) Load reductions are edge of stream estimates calculated by MDE using MAST.

Antietam Creek Watershed Plan
Urban BMP Implementation Goals

Urban Best Management Practice	Sediment Goal Table 14	Bacteria Goal Table 18	Units	SFY2015 Progress
Forest Harvest Practices	250		acres	76.00
Septic System Upgrades		645	count	34

Antietam Creek Watershed In Washington County, Maryland SFY2014 Agricultural BMP Implementation			Nitrogen Reduction		Phosphorus Reduction		Sediment Reduction		Bacteria Reduction	
Agricultural Best Management Practices (1)	**Unit**	SFY14 Total	lb/acre	Total (lbs)	lb/acre	Total (lbs)	lb/acre	Total (tons)		
Alternative Crops	acres	0			100304		8.5E+07			
Amendments for the Treatment of Ag Waste	AU	0			100288		8.5E+07			
Animal Mortality Facility	count	0			16.1		248.4			
Conservation Cover	acres	0								
Conservation Plans/SCWQP	acres	2,887	3.6	10393.2	0.1	288.7	248.4	358.57		
Cover Crops	acres	5,462	5.28	28883.1						
Critical Area Planting	acres	0.25								
Dead Bird Composting Facility	count	0								
Fencing	feet	8,905	192.04	1375	16.1	115.3	6070.7	21.73		
Field Border	acres	0								
Filter Strip	acres	0.12								
Grassed Waterway	acres	1	5.33	5.33	1.2	1.2	1302.2	0.65		
Horse Pasture Management	acres	0								
Loafing Lot Management System	acres	0.3	171.8	51.54	23.9	7.17	1662.4	0.25		
Pasture & Hay Planting	acres	0								
Prescribed Grazing	acres	0								
P-sorbing Materials	acres	0								
Riparian Forest Buffer	acres	2.5	26.9	67.25	1.4	3.5	1719.5	2.15		
Riparian Herbaceous Cover	acres	7.3	207.6	1515.48	17.1	124.83	6760	24.67		
Roof Runoff Structure	count	2	171.8	343.6	23.9	47.8	1662	1.66		
Stream Restoration Ag	feet	0								
Tree/Shrub Establishment	acres	0								
Waste Storage Facility	count	4								
Wastewater Treatment Strip	acres	0								
Water Control Structure	count	1	186	186						
Watering Facility	count	5	7.9	39.5	1.3	6.5	861	2.15		
Wetland Creation	acres	0								
Wetland Restoration	acres	0								
Windbreak/Shelterbelt Establishment	feet	0								
Total Pollutant Load Reduction				42,860		595.0		411.8		
Total SFY14 Annual Practices (2)				28,883		0		0		0
Total SFY14 Multi-year Practices				13,977		595		412		0

(1) "SFY14 Total" column MDA data May 2015.

(2) Annual Practices: cover crops, nutrient mgmt, manure transport, conservation tillage & high residue tillage.

Antietam Creek Watershed Plan Agricultural BMP Implementation Goals				
Management Practice	Sediment Goal Table 14	Bacteria Goal Table 18	Units	SFY2014 Progress
Soil Conservation WQ Plans	3,050	15,460	acres	2,887
Cover Crops	4,000		acres/yr	5,462
Stream Protection Fenced	780	780	acres	
Grass Buffers	295	35	acres	0
Riparian Forest Buffers		260	acres	2.5
Runoff Control Systems		12	count	2
Stream Restoration			feet	0
Animal Waste Mgmt Systems		26	count	4
Conservation Tillage	6,200		acres	0
Erodible Land Retirement	130		acres	
Livestock Stream Crossing		17	count	
No-Till	4,800		acres	
Stream protection no fence	1,300	1,300	acres	

Units of measure shaded red differ from State reporting units.

Antietam Creek Watershed
In Washington County, Maryland
SFY2014 Urban BMP Implementation

Urban Best Management Practice	Unit	BMPs Reported	Estimated Pollutant Load Reduction			
			Nitrogen lb/yr	Phosphorus lb/yr	Sediment tons/yr	Bacteria MPN billion/yr
Bioretention	acres	1.10	18.59	0.55	0.36	
Bioswale	acres	0				
Disconnection of Rofftop Runoff	acres	0				
Dry Detention Ponds & Hydro Structures	acres	2.57	2.57	0	0.09	
Dry Extended Detention Ponds	acres	0.73	2.85	0.07	0.15	
Dry Well	acres	0				
Filtering Practices	acres	0.61	4.76	0.18	0.16	
Forest Conservation	acres	0				
Forest Harvesting Practices	acres	0				
Infiltration Practices	acres	0.13	2.16	0.07	0.04	
Permeable Pavement	acres	0				
Reduction of Impervious Surface	acres	0				
Riparian Forest Buffers on Urban Lands	acres	1.00	26.9	1.4	0.86	
Septics Connections to Sewers	count	0				
Septics Denitrification Critical Area	count	0				
Septic Denitrification outside of 1000 ft	count	10	33			
Septic Denitrification within 1000 ft	count	17	93.5			
Stream Restoration Urban	feet	0				
Street Sweeping	acres	0				
Tree Planting	acres	0				
Urban Forest Buffer	acres	0				
Wet Ponds & Wetlands	acres	0				
TOTAL Pollutant Load Reduction			184.33	2.27	1.65	0

(1) "BMPs Reported" column MDE data May 2015.

Antietam Creek Watershed Plan
Urban BMP Implementation Goals

Urban Best Management Practice	Sediment Goal Table 14	Bacteria Goal Table 18	Units	SFY2014 Progress
Forest Harvest Practices	250		acres	0.00
Septic System Upgrades		645	count	27

Appendix
Watershed Eligible for 319(h) Grant Implementation Funding

Tidal Back River in Baltimore County, Maryland

Contents

Introduction

The Tidal Back River Small Watershed Action Plan was completed by Baltimore County in February 2010 and was accept by EPA in August 2010. The watershed covered is entirely in Baltimore County, Maryland.

Pollutant reduction goals from the watershed plan Table 3-2 on page 23:

- Nitrogen reduction goal is 6,498 pounds per year.
- Phosphorus reduction goal is 679 pounds per year.

BMP implementation goals in the Tidal Back River watershed plan Appendix A, Table A-1. The measurable BMP goals are in specific numbered restoration actions: 6, 10, 12, 16, 17, 18, 19, 20, and 36.

Base Year for watershed plan implementation is 1998. Pollutant load reductions reported beginning that year can be counted toward meeting watershed plan goals. The watershed plan (EPA accepted 2010) in Section 1.3 pages 3 and 4 indicate that the plan's nutrient goals are from the TMDL for nitrogen and phosphorus (EPA approved 2005). The TMDL is based on water quality data collected 1992-1997. (See TMDL Section 4.1 page 18, and also Section 2.6 pages 6-17.)

Urban BMP tracking/reporting

Tracking and progress reporting of urban BMPs for the *Tidal Back River Small Watershed Action Plan* is conducted by Baltimore County. The data for watershed implementation progress and estimated pollution load reductions used in this annual report were supplied by Baltimore County. The County uses its own methods for estimating pollutant load reductions associated with the management practices that were implemented. Baltimore County's documentation on their pollutant load reduction estimation methods appears at the end of this appendix. Additional

questions on the County's estimates should be directed to the County's Department of Environmental Protection & Sustainability, Watershed Management and Monitoring Section, Nathan Forand at nforand@baltimorecountymd.gov

Tidal Back River Watershed Plan					
Goal and Implementation Progress					
Management Practice	**SWAP Goal**	**Units**	**2010-SFY14 Progress**	**SFY15 Activity**	**2010-SFY15 Progress**
6. Convert Dry Ponds	2	projects	0	2	2
10. Stormwater Retrofits	16	projects	10	0	10
12. Downspout Disconnection	12.0	rooftop acres	0.8	0.1	0.9
16. Riparian Buffer Trees	156	acres	0	0	0
17. Shoreline Buffer Trees	181	acres	0	0	0
18. & 19. Upland Trees	36.75	acres	17.19	1.4	18.6
20. Institutional Trees	2.1	acres	4.1	0	4.1
33. Shoreline Management	2	projects	1	0	1
36. Stream Restoration	3,442	ft	1,523	0	1,523
Baltimore County data received by MDE 1/11/2016.					

Agricultural BMP tracking/reporting

The *Tidal Back River Small Watershed Action Plan* does not include goals associated with agriculture, in part because agriculture represents less than 5% of the watershed's land cover. For the 2014-2015 period (state fiscal year), the Maryland Department of Agriculture (MDA) reports that no agricultural BMPs tracked by the EPA Chesapeake Bay Program were implemented in the Tidal Back River watershed.

Milestones

The *Tidal Back River Small Watershed Action Plan* includes some goals with milestone dates for reporting or progress achievement. The watershed milestones that were reiterated in *Maryland's 2015-2019 NPS Management Plan* under Objective 5 are listed below:

- Annually: Report progress in the 319 Annual Report,
- 2015: Assess progress for several action items (contact Baltimore County for status)
    - #2 lawn fertilizer
    - #3 bayscape education
    - #34 outfall inspections
    - #53 outfall inspections, and
    - #60 incentives.
- Assess progress for several action items in future years
    - 2016: #37 hot spots
    - 2018: #10 stormwater retrofits
    - 2019: #31 wetland plantings.

Back River Small Area Watershed Plans Summary	
Upper Back River Watershed	**Tidal Back River Watershed**
Lead NPS Implementers: Baltimore County, Baltimore City Other NPS implementers report progress thru the Lead. Pollutant Load Reduction Goals - Total nitrogen: 48,190 pounds - Total phosphorus: 6,056 pounds Total drainage area: 27,716.7 acres (43.3 mi^2) - Total open tidal water: NA - Baltimore Co.: 55.5%; Baltimore City: 44.5%. - Impervious cover: 30.7 % Land Use - Agriculture: --- - Commercial: 9.9% - Forest: 11.5% - Industrial: 6.5% - Institutional: 8.0% - Residential low density: 8.5% - Residential mid density: 26.5% - Residential high density: 20.4% - Urban open: 6.2% - Water/Wetlands: ---	Lead NPS Implementer: Baltimore County Other NPS implementers report progress thru the Lead. Pollutant Load Reduction Goals - Total nitrogen: 6,498 pounds - Total phosphorus: 679 pounds Total Drainage area: 7,720 acres (12 mi^2) - Total open tidal water: 3,947 acres (6.2 mi^2) - Baltimore County: 100% - Impervious cover: 18.4% Land Use - Agriculture: 4.4% - Commercial: 7.2% - Forest: 32.1% - Industrial: 3.5% - Institutional: 4.4% - Residential low density: 2.4% - Residential mid density: 23.0% - Residential high density: 8.6% - Urban other: 11.4% - Water/Wetlands: 3.0%

Water Quality Monitoring Activity, Overall Condition, Trends

According to a report by MDE's Field Services Program at an MDE-SERV meeting August 20, 2015, five large fish kills in May (involving 20-500 each) coincided with a brief, intense rain event after a prolonged period of dry, unseasonable hot conditions. Affected water bodies included the tidal headwaters of Back River in Baltimore County, as well as four tidal headwaters in the Washington DC metropolitan area: Anacostia River at Bladensburg in Prince Georges County, and Rock Creek, Sligo Creek, and Long Branch in Montgomery County. Low dissolved oxygen was detected at the Tidal Back River and Anacostia events, presumably caused by the accumulation of biological oxygen demanding material. The last three events are suspected of being caused by a concentrated flush of a pollution "cocktail" that accumulated within each respective urban stormwater system. There was no apparent evidence of discrete discharge or mishap during the investigations. The MDE Inspection and Compliance Division and Montgomery DEP also assisted with the investigations.

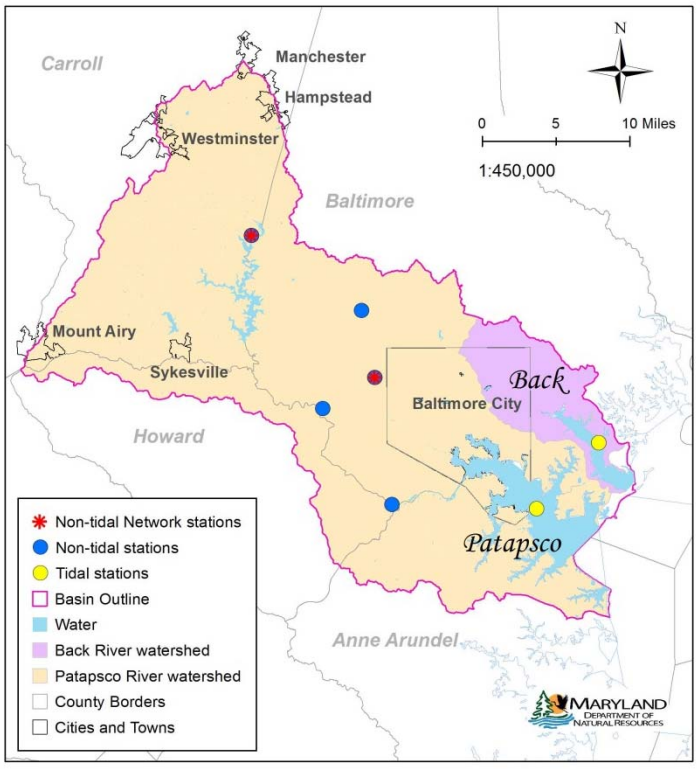
Information extracted from Maryland Dept. of Natural Resources' publication: *Patapsco and Back Rivers Water Quality and Habitat Assessment*, page 39, November 2012.

"The Back River WWTP is the dominant source of nitrogen and phosphorus to the Back River. Upgrades to the wastewater treatment plant in 1998 improved N loadings but they remain above loadings caps. Further upgrades are planned for completion by 2017. An intensive study of the historical loadings to Back River found that non-point sources were also important, especially to phosphorus loads. The study also found that nutrients entering the river are deposited to the sediments, where they accumulate and are available to fuel algal growth at later times. As the

result, water quality improvements following loadings reductions will be delayed by as much as 3-6 years. The study recommends management actions that make reductions in non-point source loads."

"Water quality improved with substantial decreases in N levels in the tidal main river, but N levels are still too high to allow for nitrogen limitation of algal growth. P levels also improved. Habitat requirements for underwater grasses were met for P but habitat quality was impaired due to poor sediment levels, algal densities and water clarity. Water clarity degraded. Algal densities may have degraded from 1999-2010, but may also have improved from 1985-2010. Bottom dissolved oxygen levels were good on average, but habitat quality for benthic animals was impaired in summer months. Also, the very high summer dissolved oxygen levels are more indicative of poor than good habitat quality due to high nutrients fueling high algal production. Virtually no underwater grass beds have been measured in the Back River. Benthic animal populations at the long-term tidal water quality station in the main river are impaired and have degraded, though other locations have healthy benthic animal communities."

Information extracted from Maryland Dept. of Natural Resources' publication: *Patapsco River and Back River Water Quality and Habitat Assessment Overall Condition 2012-2014.*



The map shows that the Maryland Department of the Natural Resources (DNR) operates one long-term tidal monitoring station in the Back River watershed. According to DNR's report:

"Current conditions are determined from the most recent three years of data; trends are determined from the 1999-2014 data."

"Water quality in the tidal waters of the Back River is poor because nitrogen and sediment levels are too high. However, nitrogen and phosphorus levels have improved. Habitat quality is poor for underwater grasses due to high algal densities and poor water clarity. Summer dissolved oxygen levels in Back River are good but indicate poor habitat quality due to excessive algal densities."

"Underwater grasses have been very limited or not present in the Back River during this period. Bottom dwelling animals were healthy during this period in Back River at a long-term monitoring station. The health of the bottom dwelling animal population also improved at the long-term station."

DNR also reported the following summary of trends in their report Table 2:

	Water Quality			Habitat Quality		
River	**Nitrogen**	**Phosporus**	**Sediments**	**Algal Densities**	**Water Clarity**	**Summer Bottom DO**
Patapsco	Fail	Meet	Decreasing Meet	Fail	Fail	Fail
Back	Decreasing Fail	Decreasing Meet	Fail	Fail	Fail	Meet

DNR report: Table 2. Summary of tidal water quality and habitat quality indicators.

Annual trends for 1999-2014 for nitrogen (total nitrogen), phosphorus (total phosphorus), sediment (total suspended solids), algal densities (chlorophyll *a*), and water clarity (Secchi depth).

Summer bottom dissolved oxygen (DO) trends are for June through September data only.

Trends are either 'Increasing' or 'Decreasing' if significant at $p \leq 0.01$; blanks indicate no significant trend. Improving trends are in green, degrading trends are in red.

Nitrogen (dissolved inorganic nitrogen) levels below the level for nitrogen limitation 'Meet' criteria, otherwise 'Fail' criteria for 2012-2014 data.

Phosphorus (dissolved inorganic phosphorus), sediment (total suspended solids), algal densities (chlorophyll *a*) and water clarity (Secchi depth) either 'Meet' or 'Fail' submerged aquatic vegetation (SAV) habitat requirements for 2012-2014 data.

Summer (June through September) bottom dissolved oxygen levels either 'Meet' or 'Fail' EPA open-water 30-day dissolved oxygen criteria.

2012-2015 Completed NPS Implementation Projects -- Back River Tidal Watershed
319(h) Grant

Project Summary			Project Expenditures					Reported Pollutant Load Reduction		
Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match $	Total $	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal $	State $					
Baltimore County	Bread & Cheese Creek stream restoration & stormwater control	2013	319 FFY2010 #11	556,443	0	370,962	1,000,000	280.07	94.19	214
TOTAL reported for completed projects				556,443	0	370,962	1,000,000	280	94.2	214

SFY 2015 319(h) Grant Activity for NPS Implementation Projects - Back River Tidal Watershed

Project Summary			Project Funding					Future Pollutant Load Reduction		
Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match	Total	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal	State					
Baltimore County	No 319 project working									

2012-2015 Completed NPS Implementation Projects -- Back River Tidal Watershed
State Revolving Fund (SRF)

Project Summary			Project Expenditures					Reported Pollutant Load Reduction		
Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match $	Total $	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal $	State $					
Baltimore County	Pleasure Island Beach Shoreline	2012	SRF Grant	$0	$2,717,100	$0	$4,285,123	1,010	53.5	0
	Tidal Back River Greening (7 schools, 1 park & ride, 1 community center)		SRF Grant	0	385,000	0	1,500,000	441	113	24
TOTAL reported for completed projects				0	3,102,100	0	5,785,123	1,451	166.5	24

SFY 2015 SRF Activity for NPS Implementation Projects - Back River Tidal Watershed

Project Summary			Project Funding					Future Pollutant Load Reduction		
Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match	Total	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal	State					
Baltimore County	(no currently working SRF project)									

Back River TIDAL Watershed
Chesapeake and Atlantic Coastal Bays Trust Fund
SFY 2015 NPS Implementation Project Status (1)

Partner	Project	Project_Type	County	Trust_Fund	Status	Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment ton/yr
Baltimore County	Bread and Cheese Creek Water Quality Enhancement and Stream Restoration	Stream Restoration	Baltimore	$193,557.00	Complete	200	30	6.7515
Baltimore County	Monitoring Water Quality Improvements at Bread and Cheese Creek	Monitoring	Baltimore	$5,400.00	Complete	0	0	0
Baltimore County	Bread & Cheese Creek Stream Restoration	Stream Restoration	Baltimore	$250,000.00	Complete	346.20	116	0.132
Alliance for the Chesapeake Bay	Gallery Church Baltimore	Tree Planting Projects	Baltimore	$1,763.16	Complete	1.32	0.05	0.00434
				$450,720.16	TOTAL COMPLETED	547.5	146	6.89
	no Trust Fund grant project currently working			0		0	0	0
(1) Maryland DNR Trust Fund database 10/27/15.				0	TOTAL WORKING	0	0	0

Pollutant Reduction Documentation for Baltimore County's SFY15 Annual Report to MDE

1. Upland Tree Planting

Baltimore County currently follows the Scenario Builder documentation for the current CBWM which credits tree planting through a land use change (CBP 2013). When calculating reductions for individual tree plantings, an equivalency of 100 tree = 1 acre is used.

Land Use Change

The land use change involves calculating the pollutant loads for TN, TP and TSS of the area planted pre and post planting. Typically the area planted is grass or other "urban pervious". Using the current CBWM pollutant loading rates for "urban pervious" at the site's geography/watershed, pre-planting pollutant loads are calculated. Using the loading rates for "forest" at the site's geography/watershed, post-planting pollutant loads are calculated. The differences in these loads for each pollutant, pre and post planting, represent the pollutant load reductions attributed to the land use change in lbs/acre/year.

2. Buffer Tree Planting

Baltimore County currently follows the Scenario Builder documentation for the current CBWM which credits urban buffers through a land use change and pollutant reduction efficiency (CBP 2013).

Land Use Change

Land use change involves calculating pollutant loads for TN, TP and TSS for the area pre and post planting. Typically the buffer area planted is grass or other "urban pervious". Current CBWM pollutant loading rates at the site's geography/watershed are used to calculate pre and post planting pollutant loads. The loading rates for "urban pervious" are used for pre-planting pollutant loads and the loading rates for "forest" are used for post planting pollutant loads. The differences in these loads for each pollutant, pre and post planting, represent the pollutant load reductions attributed to the land use change.

Reduction Efficiency

The reduction efficiency involves applying a percent reduction to the pre-planting pollutant loads for TN, TP and TSS contributed by the area to be planted. A watershed-wide pollutant loading rate is used to calculate this contribution. A reduction efficiency of 25%, 25% and 50% for TN, TP and TSS respectively is applied to these calculated loads to estimate the pollutant load reductions associated with the reduction efficiency. Efficiencies of 19% for N, 45% for P and 60% for TSS are used for tidal buffers.

3. Shoreline Management (essentially protocol 1 from the expert panel report):

To obtain nutrient reduction numbers associated with a shoreline enhancement project, it must first be determined how much erosion the project is theoretically preventing. To obtain an estimate of the volume of annual erosion at a given shoreline site, the equation V=LEB is used.

Where 'V' = volume eroded, 'L' = length of shoreline, 'E' = erosion rate and 'B' equals bank height.

Lengths of shoreline and bank height for each shoreline enhancement project are taken from engineering and project plans prepared by consultants for Baltimore County DEPRM. Erosion rates from DNRs shoreline website, http://shorelines.dnr.state.md.us/, are used.

The equation above yields a volume expressed in cubic feet per year. Cubic feet are converted to pounds using a soil bulk density of 93.6 lb/ft^3 (p. 9). Pounds are then converted to tons using a factor of 0.0005.

Nitrogen and Phosphorus loading rates for shorelines are taken from *'Eroding Bank Nutrient Verification Study for the Lower Chesapeake Bay'* [1], published February 1992. The mean total N and total P loading concentrations in the study are 0.73 lb/ton and 0.48 lb/ton respectively (p. 44).

[1] Ibison, N.A., J.C. Baumer, C.L. Hill, N.H. Berger, J.E. Frye. 1992. Eroding Bank Nutrient Verification Study for the Lower Chesapeake Bay. Department of Conservation and Recreation, Division of Soil and Water Conservation. Gloucester Point, VA.

4. Stream Restoration

Interim rates used:
TN: 0.075 lbs/ln ft
TP: 0.068 lbs/ln ft
TSS (coastal): 15.13 lbs/ln ft
TSS (non-coastal): 44.88 lbs/ln ft

5. Downspout Disconnection

Starting in 2015, Baltimore County is updating methods for calculating pollutant reductions to follow the USWG guidance document. Since the disconnection flow path is not known for historic projects, a conservative estimate of 15 feet will be used which yields a P_E of 0.2" as per Table 5.6 (MDE 2000). Rooftop drainage areas are also not known for historic projects so a default of 250 square feet will be used. In order to use the retrofit removal adjustor curves developed by the Retrofit Expert Panel for determining pollutant removal rate, the runoff depth captured per impervious acre must be calculated using the following formula from the Retrofit Expert Panel Report:

$$\text{Runoff Depth per Impervious Acre} = (RS)(12) \div IA$$

Where:
RS = Runoff Storage Volume
IA = Impervious Area

RS (or ESD_V) is determined using the following equation from the Maryland Stormwater Design Manual Section 5.2.2 (MDE 2000):

$$RS = \frac{(P_E)(R_V)(A)}{12}$$

Where:
P_E = Rainfall target from Table 5.6 of the 2000 Maryland Stormwater Design Manual

R_V = the dimensionless runoff coefficient = 0.05 + 0.009(I) where I is % impervious cover (100% for downspout disconnection)
A = rooftop drainage area (in square feet or acres)

Using our default value of P_E=0.2, calculating for R_V yields 0.95 and our default drainage area of 250 square feet, then calculating for RS (or ESD_V) looks like this:

$$\frac{(0.2\text{in})(0.95)(250\text{ft}^2)}{12\text{in/ft}} = 3.95\text{ft}^3$$

Calculating for default runoff depth per impervious acre looks like this:

$$\frac{(3.95\text{ft}^3)(12\text{in/ft})}{250\text{ft}^2} = 0.190\text{in}$$

This value can be used to determine reduction percentage using the retrofit removal adjuster curves from the Retrofit Expert Panel Report. Downspout disconnection is considered a runoff reduction practice and will use these curves to determine reduction percentages. We are using a default runoff depth per impervious acre so the percent reductions are uniform across the board. These reduction efficiency percentages are shown in Table 3-1 below.

Default Reduction Efficiencies for Downspout Disconnection

	TN	**TP**	**TSS**
Reduction Efficiency	22%	26%	28%

6. Rain Barrels

Starting in 2015, Baltimore County is updating methods for calculating pollutant reductions to follow the USWG guidance document (Urban Stormwater Workgroup 2014). Using default values of 55 gallons (7.35 ft^3) for rain barrel capacity and 250 sq. ft. of rooftop drainage, a runoff depth captured per impervious acre of 0.35 inch can be calculated using the equation presented in the Retrofit Expert Panel Report (Retrofit Expert Panel 2012):

$$= \frac{(RS)(12)}{IA} \qquad = \frac{(7.35\text{ft}^3)(12)}{250\text{ft}^2} \quad = 0.35 \text{ inches}$$

This value can be used to determine a reduction percentage using the retrofit removal adjuster curves from the Retrofit Expert Panel Report. Rain barrels are considered a runoff reduction practice and will use the runoff reduction curves to determine reduction percentages. When using the default runoff depth per impervious acre of 0.35, reductions are uniform across the board. These reduction efficiency percentages are shown in Table 3-1 below.

Default Reduction Efficiencies for Rain Barrels

	TN	**TP**	**TSS**
Reduction Efficiency	36%	42%	45%

7. Rain Gardens

Starting in 2015, Baltimore County is updating methods for calculating pollutant reductions to follow the USWG homeowner BMP guidance document which recommends defining the drainage area (DA) and rainfall depth treated by each rain garden and then using the retrofit adjustor curves from the retrofit expert panel report. In order to use the retrofit removal adjustor curves the runoff depth captured per impervious acre must be calculated using the following formula from the Retrofit Expert Panel Report:

$$= (RS)(12) \div IA$$

Where:
RS = Runoff Storage Volume
IA = Impervious Area

RS (or ESD_V) is determined using the following equation from the Maryland Stormwater Design Manual Section 5.2.2 (MDE 2000):

$$= \frac{(P_E)(R_V)(DA)}{12}$$

R_V = the dimensionless runoff coefficient = 0.05 + 0.009(I) where I is % impervious cover
DA = drainage area
For rain gardens P_E, or runoff treated, is determined using the following equation:

P_E = 10" X Af ÷ DA where Af is the surface area of the rain garden and DA is drainage area.

For historic rain garden projects where the surface area is unknown, a default calculation will be used. The Maryland Stormwater Design Manual stipulates on p. 5.105 that the surface area of a rain garden be at least 2% of the contributing drainage area (MDE 2000). The Chesapeake Stormwater Networks document Homeowner Guide for a More Bay-Friendly Property recommends on p. 22 designing a rain garden's surface area be a minimum of 12% of the rooftop drainage area. The default calculation used takes the average of these percentages, 7%, and applies it to the impervious area drainage to the garden to determine estimated garden surface area.

8. Dry Pond Conversions and Retrofits

Reductions are calculated as per the Urban Stormwater Retrofit Expert Panel Report guidance using runoff storage volume, impervious drainage and the adjuster curves to determine the removal percentages for N, P and TSS respectively. Load to the facility is calculated using the National Land Cover Database (NLCD) as released on October 10, 2014 and reclassified to match those used by the Chesapeake Bay Program Phase 5 Watershed Model. Pollutant loads from the October 2011 MAST run, which used Chesapeake Bay Program Phase 5 Watershed Model data, were used to calculate land use loads and loading rates by land use for the 14 8-digit watersheds in Baltimore County.

For conversions, the pollutant reduction of the converted dry pond, calculated using CBP approved BMP efficiency rates, is subtracted from the reductions calculated for the new practice.

Appendix
Watershed Eligible for 319(h) Grant Implementation Funding

Upper Back River in Baltimore County, Maryland

Contents

Introduction

The Upper Back River Small Watershed Action Plan was completed by Baltimore County in November 2008 and was accept by EPA in January 2009. The watershed covered is in Baltimore City and Baltimore County, Maryland.

Pollutant reduction goals from the watershed plan Table 3-2 on page 3-8:

- Nitrogen reduction goal is 48,190 pounds per year.
- Phosphorus reduction goal is 6,056 pounds per year.

BMP implementation goals in the Upper Back River watershed plan are in two different places:

- Table 3-4 and Table 3-5 on pages 3-11 and 3-12.
- Appendix A Table A-2.

Base Year for watershed plan implementation is 1998. Pollutant load reductions reported beginning that year can be counted toward meeting watershed plan goals. The watershed plan (EPA accepted 2010) in Section 1.3 pages 3 and 4 indicate that the plan's nutrient goals are from the TMDL for nitrogen and phosphorus (EPA approved 2005). The TMDL is based on water quality data collected 1992-1997. (See TMDL Section 4.1 page 18, and also Section 2.6 pages 6-17.)

Urban BMP tracking/reporting

Tracking and progress reporting of urban BMPs for the *Tidal Back River Small Watershed Action Plan* is conducted by Baltimore County. The data for watershed implementation progress and estimated pollution load reductions used in this annual report were supplied by Baltimore County. The County uses its own methods for estimating pollutant load reductions associated with the management practices that were implemented. Baltimore County's documentation on their pollutant load reduction estimation methods appears at the end of this appendix.

Additional questions on the County's estimates should be directed to the County's Department of Environmental Protection & Sustainability, Watershed Management and Monitoring Section, Nathan Forand at nforand@baltimorecountymd.gov

Upper Back River Watershed Plan					
Goal and Implementation Progress					
Management Practice	**SWAP Goal**	**Units**	**2008-SFY14 Progress**	**SFY15 Activity**	**2008-SFY15 Progress**
Convert Dry Ponds	17	projects	0	7	7
Stormwater Retrofits	50	projects	1	0	1
Downspout Disconnection	180	rooftop acres	4.0	0.7	4.7
Riparian Buffer Trees	200	acres	2.4	1.2	3.6
Reforestation	50	acres	11.9	0.8	12.7
Street Trees	4,000	acres	307	80	387
Stream Restoration	66,000	ft	2,000	0	2,000
Baltimore County data received by MDE 1/28/2016.					

Agricultural BMP tracking/reporting

The *Upper Back River Small Watershed Action Plan* does not include goals associated with agriculture, in part because agriculture represents less than one percent of the watershed's land cover. For the 2014-2015 period (state fiscal year), the Maryland Department of Agriculture (MDA) reports that no agricultural BMPs tracked by the EPA Chesapeake Bay Program were implemented in the Upper Back River watershed.

Milestones

Maryland's 2015-2019 NPS Management Plan Objective 3 milestones for this watershed:

- Annually: Report progress in the 319 Annual Report,
- Assess progress for several action items in future years:
    - 2018: plan implementation progress particularly for open space tree planting, and impervious area removal on institutional land.
    - 2019: hotspot investigation and follow-up.

(continued next page)

Back River Small Area Watershed Plans Summary	
Upper Back River Watershed	**Tidal Back River Watershed**
Lead NPS Implementers: Baltimore County, Baltimore City Other NPS implementers report progress thru the Lead. Pollutant Load Reduction Goals - Total nitrogen: 48,190 pounds - Total phosphorus: 6,056 pounds Total drainage area: 27,716.7 acres (43.3 mi^2) - Total open tidal water: NA - Baltimore Co.: 55.5%; Baltimore City: 44.5%. - Impervious cover: 30.7 % Land Use - Agriculture: --- - Commercial: 9.9% - Forest: 11.5% - Industrial: 6.5% - Institutional: 8.0% - Residential low density: 8.5% - Residential mid density: 26.5% - Residential high density: 20.4% - Urban open: 6.2% - Water/Wetlands: ---	Lead NPS Implementer: Baltimore County Other NPS implementers report progress thru the Lead. Pollutant Load Reduction Goals - Total nitrogen: 6,498 pounds - Total phosphorus: 679 pounds Total Drainage area: 7,720 acres (12 mi^2) - Total open tidal water: 3,947 acres (6.2 mi^2) - Baltimore County: 100% - Impervious cover: 18.4% Land Use - Agriculture: 4.4% - Commercial: 7.2% - Forest: 32.1% - Industrial: 3.5% - Institutional: 4.4% - Residential low density: 2.4% - Residential mid density: 23.0% - Residential high density: 8.6% - Urban other: 11.4% - Water/Wetlands: 3.0%

Back River Upper Watershed
2001-2015 Completed 319(h) Grant NPS Implementation Projects

Project Summary			Project Expenditures					Pollutant Load Reduction		
Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Non Federal Match	Total	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal	State					
Baltimore County	Redhouse Run/Overlea stream restoration & stormwater control	2001	319 FFY2000 #16	$130,000.00		$86,667	$530,000.00	52	9.46	2.67
			Other		$228,899.00					
	Redhouse Run/St. Patricks stream restoration	2011	319 FFY2007 #18	$418,500.00		$279,000	$883,016.00	609	32.1	5.37
	Upper Back River Stormwater conversions	2012	319 FFY2008 #21	$95,883.81		$63,923	$159,806.35	51.7	11.5	2.06
TOTAL reported for completed projects				$644,383.81	$228,899.00	$429,589.21	$1,572,822.35	712.7	53.1	10.1

For nitrogen and phosphorus pollutant loads, BMPs installed 1998 or later can be counted toward watershed plan implementation.

2015 319(h) Grant Project Activity - Back River Upper Watershed

Project Summary			Project Funding					Projected Pollutant Load Reduction		
Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Non Federal Match	Total	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal	State					
Baltimore County	Herring Run/Overlook Park stream restoration & buffer planting	TBD	319 FFY2011 #7	$358,032		$238,688	TBD	200.5	29.6	6.75

2012-2015 Completed NPS Implementation Projects -- Back River Upper Watershed
State Revolving Fund (SRF)

Project Summary			Project Expenditures					Reported Pollutant Load Reduction		
Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match $	Total $	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal $	State $					
Baltimore City	no reported SRF project									
Baltimore County	no reported SRF project									
TOTAL reported for completed projects				0	0	0	0	0	0.0	0

SFY 2015 SRF Activity for NPS Implementation Projects - Back River Upper Watershed

Project Summary			Project Funding					Future Pollutant Load Reduction		
Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match	Total	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal	State					
Baltimore City	No SRF project currently funded									

Back River UPPER Watershed
Chesapeake and Atlantic Coastal Bays Trust Fund
SFY 2015 NPS Implementation Project Status (1)

State FY	Partner	Project	Project_Type	County	Trust_Fund	Status	Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment ton/yr
FY14	Baltimore City Rec & Parks	Patterson HS	Tree Planting Projects	Baltimore City	$1,682.77	Complete	1.1775	0.05	0.0085
FY14	Baltimore City Rec & Parks	Armistead Gardens ES/MS	Tree Planting Projects	Baltimore City	$2,994.02	Complete	1.1775	0.05	0.0085
FY14	Baltimore City Rec & Parks	Herring Run Park @ Armistead Gardens	Tree Planting Projects	Baltimore City	$7,300.66	Complete	3.72	0.25	0.041
FY14	Baltimore City Rec & Parks	Moravia Park ES	Tree Planting Projects	Baltimore City	$16,847.67	Complete	7.065	0.3	0.051
FY14	Baltimore City Rec & Parks	Herring Run Park @ Shannon & Lyndale	Tree Planting Projects	Baltimore City	$8,199.20	Complete	4.18	0.28	0.046
FY14	Baltimore City Rec & Parks	Vanguard Collegiate/Maritime Academy	Tree Planting Projects	Baltimore City	$5,615.89	Complete	2.355	0.1	0.017
FY13	Parks and People Foundation	Students Restoring Urban Stream: Herring Run Park	Tree Planting Projects	Baltimore City	$16,305.00	Complete	6.6	0.44	0.07
FY14	Baltimore City Rec & Parks	Hazelwood EMS	Tree Planting Projects	Baltimore City	$8,985.42	Complete	3.77	0.16	0.027
FY14	Baltimore County	Victory Villa ES	Tree Planting Projects	Baltimore	$5,220.15	Complete	4.584	0.312	0.0504
FY10	Baltimore County DEPS	Red House Run Stream Restoration	Stream Restoration	Baltimore	$186,121.00	Complete	606	32	0.0025
FY14	Baltimore City Rec & Parks	Chinquapin Run Park @ Kitmore	Tree Planting Projects	Baltimore City	$6,739.07	Complete	3.438	0.234	0.0378
FY13	Alliance for the Chesapeake Bay	Trees and Environmental Education: Northwood & Kelway	Tree Planting Projects	Baltimore City	$8,065.32	Complete	8	0.55	0.9
FY14	Baltimore City Rec & Parks	Baltimore IT Academy	Tree Planting Projects	Baltimore City	$2,994.02	Complete	1.1304	0.048	0.00816
FY14	Alliance for the Chesapeake Bay	St. Matthew's Catholic	Tree Planting Projects	Baltimore City	$11,746.20	Complete	0.8949	0.0361	0.002945
FY13	Alliance for the Chesapeake Bay	Trees and Environmental Education: Chinquapin Run Park	Tree Planting Projects	Baltimore City	$8,065.31	Complete	8.6	0.59	0.09
FY14	Baltimore City Rec & Parks	NACA Freedom and Democracy Academy	Tree Planting Projects	Baltimore City	$8,423.84	Complete	4.239	0.18	0.0306
FY14	Baltimore County	Villa Cresta ES	Tree Planting Projects	Baltimore	$4,640.13	Complete	2.5212	0.1716	0.02772
					$309,945.67	TOTAL COMPLETED	669.45	35.75	1.42
FY13	Parks & People Foundation	Green Space Creation at Moravia Park Elementary (Remove Impervious 5)	Stormwater Management	Baltimore City	$300,000.00	Construction	8.87	1.09	0.435
FY15	Blue Water Baltimore	Baltimore International Academy	Stormwater Management	Baltimore City	$202,262.84	Design/Planning	2	0.53	0.15
FY15	Blue Water Baltimore	St. Anthony of Padua	Stormwater Management	Baltimore City	$135,268.00	Design/Planning	0	0	0
FY15	Blue Water Baltimore	St. Matthew Church	Stormwater Management	Baltimore City	$327,322.72	Design/Planning	2.04	0.34	0.09
FY15	Blue Water Baltimore	Faith Presbyterian	Stormwater Management	Baltimore City	$76,910.00	Design/Planning	1.543	0.218	0.097
FY15	Blue Water Baltimore	Natural History Society of Maryland	Stormwater Management	Baltimore	$96,072.26	Design/Planning	2.94	0.38	0.1
FY15	Blue Water Baltimore	St. Pius X	Stormwater Management	Baltimore	$91,923.00	Design/Planning	2.096	299	0.133
FY14	Baltimore County	Herring Run at Overlook Park Stream Restoration and Buffer Planting Phase II	Stream Restoration	Baltimore	$1,471,368.00	Design/Planning	454.200012	209.199997	34.700001
FY12	Baltimore County	Herring Run at Overlook Park Stream Restoration and Buffer Planting	Stream Restoration	Baltimore	$386,043.00	Design/Planning	65	11	3.92
FY14	Chesapeake Bay Trust	Greening Watershed Neighborhoods	Tree Planting Projects	Baltimore	$117,161.00	Design/Planning	42.389999	1.71	0.14
	(1) Maryland DNR Trust Fund database 10/27/15.				$3,204,330.82	TOTAL WORKING	581.08	523.47	39.77

Pollutant Reduction Documentation for Baltimore County's SFY15 Annual Report to MDE

1. Upland Tree Planting

Baltimore County currently follows the Scenario Builder documentation for the current CBWM which credits tree planting through a land use change (CBP 2013). When calculating reductions for individual tree plantings, an equivalency of 100 tree = 1 acre is used.

Land Use Change

The land use change involves calculating the pollutant loads for TN, TP and TSS of the area planted pre and post planting. Typically the area planted is grass or other "urban pervious". Using the current CBWM pollutant loading rates for "urban pervious" at the site's geography/watershed, pre-planting pollutant loads are calculated. Using the loading rates for "forest" at the site's geography/watershed, post-planting pollutant loads are calculated. The differences in these loads for each pollutant, pre and post planting, represent the pollutant load reductions attributed to the land use change in lbs/acre/year.

2. Buffer Tree Planting

Baltimore County currently follows the Scenario Builder documentation for the current CBWM which credits urban buffers through a land use change and pollutant reduction efficiency (CBP 2013).

Land Use Change

Land use change involves calculating pollutant loads for TN, TP and TSS for the area pre and post planting. Typically the buffer area planted is grass or other "urban pervious". Current CBWM pollutant loading rates at the site's geography/watershed are used to calculate pre and post planting pollutant loads. The loading rates for "urban pervious" are used for pre-planting pollutant loads and the loading rates for "forest" are used for post planting pollutant loads. The differences in these loads for each pollutant, pre and post planting, represent the pollutant load reductions attributed to the land use change.

Reduction Efficiency

The reduction efficiency involves applying a percent reduction to the pre-planting pollutant loads for TN, TP and TSS contributed by the area to be planted. A watershed-wide pollutant loading rate is used to calculate this contribution. A reduction efficiency of 25%, 25% and 50% for TN, TP and TSS respectively is applied to these calculated loads to estimate the pollutant load reductions associated with the reduction efficiency. Efficiencies of 19% for N, 45% for P and 60% for TSS are used for tidal buffers.

3. Shoreline Management (essentially protocol 1 from the expert panel report):

To obtain nutrient reduction numbers associated with a shoreline enhancement project, it must first be determined how much erosion the project is theoretically preventing. To obtain an estimate of the volume of annual erosion at a given shoreline site, the equation V=LEB is used.

Where 'V' = volume eroded, 'L' = length of shoreline, 'E' = erosion rate and 'B' equals bank height.

Lengths of shoreline and bank height for each shoreline enhancement project are taken from engineering and project plans prepared by consultants for Baltimore County DEPRM. Erosion rates from DNRs shoreline website, http://shorelines.dnr.state.md.us/, are used.

The equation above yields a volume expressed in cubic feet per year. Cubic feet are converted to pounds using a soil bulk density of 93.6 lb/ft^3 (p. 9). Pounds are then converted to tons using a factor of 0.0005.

Nitrogen and Phosphorus loading rates for shorelines are taken from *'Eroding Bank Nutrient Verification Study for the Lower Chesapeake Bay'* [1], published February 1992. The mean total N and total P loading concentrations in the study are 0.73 lb/ton and 0.48 lb/ton respectively (p. 44).

[1] Ibison, N.A., J.C. Baumer, C.L. Hill, N.H. Berger, J.E. Frye. 1992. Eroding Bank Nutrient Verification Study for the Lower Chesapeake Bay. Department of Conservation and Recreation, Division of Soil and Water Conservation. Gloucester Point, VA.

4. Stream Restoration

Interim rates used:
TN: 0.075 lbs/ln ft
TP: 0.068 lbs/ln ft
TSS (coastal): 15.13 lbs/ln ft
TSS (non-coastal): 44.88 lbs/ln ft

5. Downspout Disconnection

Starting in 2015, Baltimore County is updating methods for calculating pollutant reductions to follow the USWG guidance document. Since the disconnection flow path is not known for historic projects, a conservative estimate of 15 feet will be used which yields a P_E of 0.2" as per Table 5.6 (MDE 2000). Rooftop drainage areas are also not known for historic projects so a default of 250 square feet will be used. In order to use the retrofit removal adjustor curves developed by the Retrofit Expert Panel for determining pollutant removal rate, the runoff depth captured per impervious acre must be calculated using the following formula from the Retrofit Expert Panel Report:

$$\text{Runoff Depth per Impervious Acre} = (RS)(12) \div IA$$

Where:
RS = Runoff Storage Volume
IA = Impervious Area

RS (or ESD_V) is determined using the following equation from the Maryland Stormwater Design Manual Section 5.2.2 (MDE 2000):

$$RS = \frac{(P_E)(R_V)(A)}{12}$$

Where:
P_E = Rainfall target from Table 5.6 of the 2000 Maryland Stormwater Design Manual

R_V = the dimensionless runoff coefficient = 0.05 + 0.009(I) where I is % impervious cover (100% for downspout disconnection)
A = rooftop drainage area (in square feet or acres)

Using our default value of P_E=0.2, calculating for R_V yields 0.95 and our default drainage area of 250 square feet, then calculating for RS (or ESD_V) looks like this:

$$\frac{(0.2\text{in})(0.95)(250\text{ft}^2)}{12\text{in/ft}} = 3.95\text{ft}^3$$

Calculating for default runoff depth per impervious acre looks like this:

$$\frac{(3.95\text{ft}^3)(12\text{in/ft})}{250\text{ft}^2} = 0.190\text{in}$$

This value can be used to determine reduction percentage using the retrofit removal adjuster curves from the Retrofit Expert Panel Report. Downspout disconnection is considered a runoff reduction practice and will use these curves to determine reduction percentages. We are using a default runoff depth per impervious acre so the percent reductions are uniform across the board. These reduction efficiency percentages are shown in Table 3-1 below.

Default Reduction Efficiencies for Downspout Disconnection

	TN	**TP**	**TSS**
Reduction Efficiency	22%	26%	28%

6. Rain Barrels

Starting in 2015, Baltimore County is updating methods for calculating pollutant reductions to follow the USWG guidance document (Urban Stormwater Workgroup 2014). Using default values of 55 gallons (7.35 ft^3) for rain barrel capacity and 250 sq. ft. of rooftop drainage, a runoff depth captured per impervious acre of 0.35 inch can be calculated using the equation presented in the Retrofit Expert Panel Report (Retrofit Expert Panel 2012):

$$= \frac{(RS)(12)}{IA} \qquad = \frac{(7.35\text{ft}^3)(12)}{250\text{ft}^2} \quad = 0.35 \text{ inches}$$

This value can be used to determine a reduction percentage using the retrofit removal adjuster curves from the Retrofit Expert Panel Report. Rain barrels are considered a runoff reduction practice and will use the runoff reduction curves to determine reduction percentages. When using the default runoff depth per impervious acre of 0.35, reductions are uniform across the board. These reduction efficiency percentages are shown in Table 3-1 below.

Default Reduction Efficiencies for Rain Barrels

	TN	**TP**	**TSS**
Reduction Efficiency	36%	42%	45%

7. Rain Gardens

Starting in 2015, Baltimore County is updating methods for calculating pollutant reductions to follow the USWG homeowner BMP guidance document which recommends defining the drainage area (DA) and rainfall depth treated by each rain garden and then using the retrofit adjustor curves from the retrofit expert panel report. In order to use the retrofit removal adjustor curves the runoff depth captured per impervious acre must be calculated using the following formula from the Retrofit Expert Panel Report:

$$= (RS)(12) \div IA$$

Where:
RS = Runoff Storage Volume
IA = Impervious Area

RS (or ESD_V) is determined using the following equation from the Maryland Stormwater Design Manual Section 5.2.2 (MDE 2000):

$$= \frac{(P_E)(R_V)(DA)}{12}$$

R_V = the dimensionless runoff coefficient = 0.05 + 0.009(I) where I is % impervious cover
DA = drainage area
For rain gardens P_E, or runoff treated, is determined using the following equation:

P_E = 10" X Af ÷ DA where Af is the surface area of the rain garden and DA is drainage area.

For historic rain garden projects where the surface area is unknown, a default calculation will be used. The Maryland Stormwater Design Manual stipulates on p. 5.105 that the surface area of a rain garden be at least 2% of the contributing drainage area (MDE 2000). The Chesapeake Stormwater Networks document Homeowner Guide for a More Bay-Friendly Property recommends on p. 22 designing a rain garden's surface area be a minimum of 12% of the rooftop drainage area. The default calculation used takes the average of these percentages, 7%, and applies it to the impervious area drainage to the garden to determine estimated garden surface area.

8. Dry Pond Conversions and Retrofits

Reductions are calculated as per the Urban Stormwater Retrofit Expert Panel Report guidance using runoff storage volume, impervious drainage and the adjuster curves to determine the removal percentages for N, P and TSS respectively. Load to the facility is calculated using the National Land Cover Database (NLCD) as released on October 10, 2014 and reclassified to match those used by the Chesapeake Bay Program Phase 5 Watershed Model. Pollutant loads from the October 2011 MAST run, which used Chesapeake Bay Program Phase 5 Watershed Model data, were used to calculate land use loads and loading rates by land use for the 14 8-digit watersheds in Baltimore County.

For conversions, the pollutant reduction of the converted dry pond, calculated using CBP approved BMP efficiency rates, is subtracted from the reductions calculated for the new practice.

Appendix
Watershed Eligible for 319(h) Grant Implementation Funding

Casselman River Watershed in Garrett County, Maryland

Contents

Introduction

The *Casselman River Watershed Based Plan for pH Remediation* was completed by MDE in January 2011, MDE revised the plan in March 2011, and EPA accepted the plan in March 2011. The part of the watershed encompassed by the watershed plan is in Garrett County, Maryland. The downstream portion of the Casselman River watershed in Pennsylvania is not addressed in the MDE plan.

Pollution reduction goals are in watershed plan Chapter 3 Section 3.2 on page 11.

BMP implementation goals are in watershed plan Chapter 5 Table 9 on page 35.

Base Year for watershed plan implementation is 2006. Pollutant load reductions that year and thereafter can be counted toward meeting watershed plan goals. The watershed plan in Section 3.1 Section 10 indicates the plan's goal is from the pH TMDL and the TMDL model run used data thru 2005. The TMDL document also indicates that data thru 2005 was used in the TMDL model. (see TMDL Table 2-4 page 15 and Section 2.2.1 page 25.)

Maryland's 2015-2019 NPS Management Plan Objective 5 includes several milestones for this watershed:

- Report Annually: Report progress in the 319 Annual Report including number/percentage of pH impaired stream segments, NPS Program Success Stories and implementation progress.
- 2015 Goal is 50% for percentage of impaired stream segments in watershed that are remediated and meet the State water quality standard for pH.
- Report 303(d) stream segments that achieve pH criteria via Maryland's Integrated Report.

BMPs for Nutrient/Sediment Control

The Casselman watershed plan does not include goals regarding nutrients or sediment. During SFY 2014-2015 in the Casselman River watershed, MDE received no reporting from responsible agencies (Garrett County, MDA, Garrett Soil Conservation District) indicating that any BMPs for nutrient or sediment control were implemented.

Grant-Funded Implementation Projects

Grant Expenditures Summary - Casselman 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	pH
319(h) Grant	699,115.00		466,076.67	1,165,191.67				
State Revolving Fund		0		0				
Chesapeake & Atlantic Coastal Bays Trust Fund		6,440.19		6,440.19	22.1	0.9	0.17	
TOTAL	699,115.00	6,440.19	466,076.67	1,171,631.86	22.1	0.9	0.2	

The table above summarizes expenditures by completed grant-funded implementation projects in the Casselman River watershed. Additional details are on the following pages:

- 319(h) Grant implementation projects table
- Casselman pH Impairment List and Mitigation Status SFY15 (This table contains draft information that is likely to be revised by MDE.)
- Trust Fund implementation project table

Water Quality Monitoring Activity, Overall Condition, Trends

Monitoring in the Casselman River watershed by MDE focuses on pH and pH-related parameters. The following pages include the following:

- Map: Casselman Watershed AMD Associated MDE/MBSS Monitoring Sites
- Table of 2015 monitoring data: MDE Casselman Monitoring Project – AMD/BMP
- Graphs of selected monitoring stations data 2010-2014 pH and Acid Neutralizing Capacity (ANC)
    - CASS001
    - CASS005
    - CASS006
    - CASS008
    - CASS012
    - CASS017

As shown in the table, Phase 1 BMP implementation on publicly owned land is consistently showing positive results. The most recent implementation efforts in Phase 2 to implement BMPs on private land are beginning to show some positive results but addition work remains to be accomplished. Also see the 2014 Annual Report Appendix Watershed, which presents graphs of monitoring data in prior years.

Casselman River Watershed
2006-2015 Completed 319(h) Grant NPS Implementation Projects

Project Summary			Project Expenditures					Pollutant Load Reduction		
Area/Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Non Federal Match	Total	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal	State					
MDE	Casselman Watershed pH Plan	2011	FFY2008	$55,000.00		$36,666.67	$91,666.67			
	AMD pH Remediation Phase 1	2014	319 FFY09 #6	$644,115		$429,410	$1,073,525	0	0	0
			TOTALS	$699,115.00	$0.00	$466,076.67	$1,165,191.67	0.00	0.00	0.00

SRF 2015 319(h) Grant NPS Implementation Project Activity - Casselman River Watershed

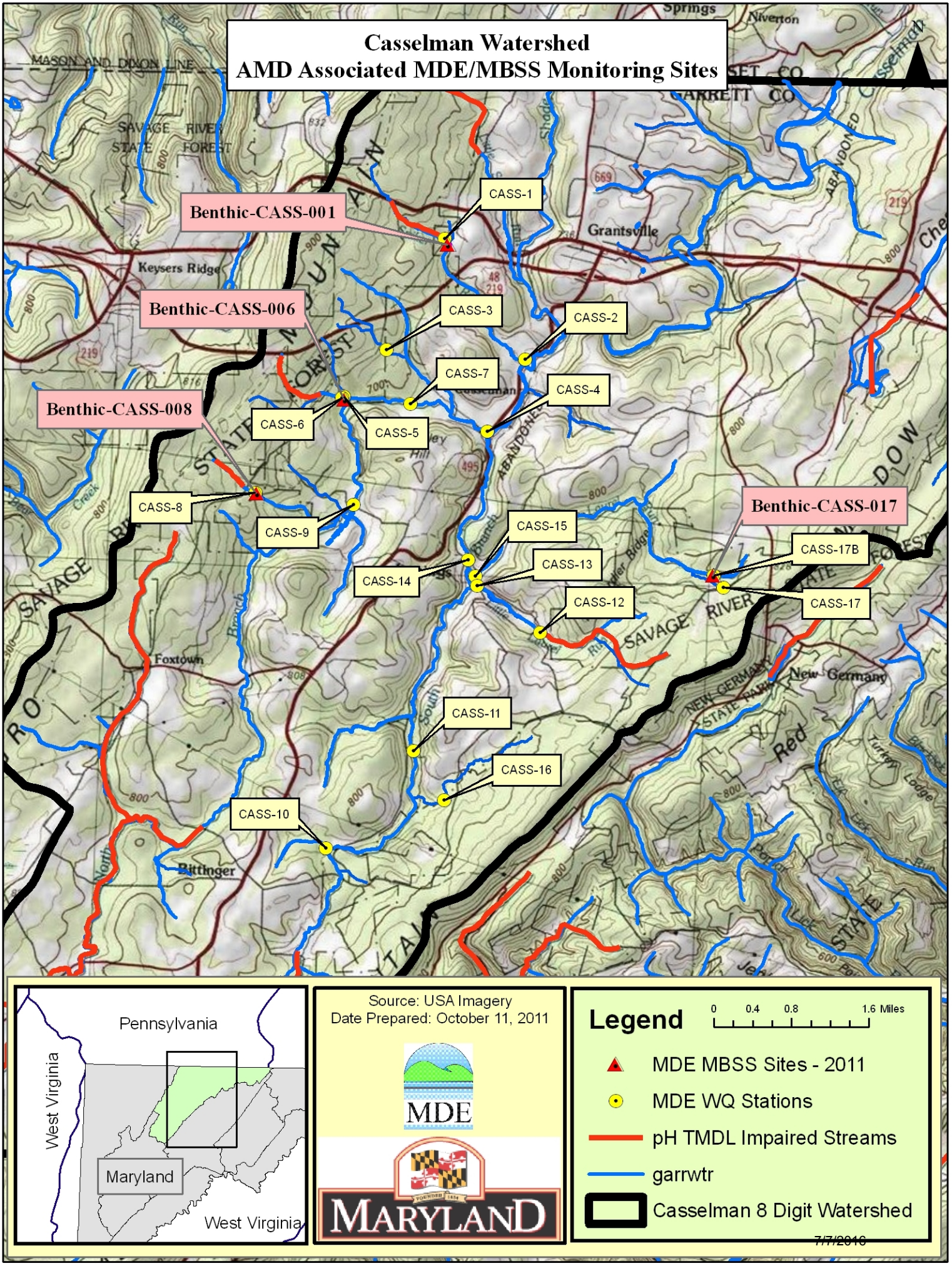
Project Summary			Project Funding					Pollutant Load Reduction		
Area/Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Non Federal Match	Total	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal	State					
MDE	AMD pH Remediation GIS Tool	TBD	319 FFY11#14	$83,619		$55,746	$139,365			
	AMD pH Remediation Phase 2	TBD	319 FFY13 #5	$401,307		$267,538	$668,845	0	0	0

Casselman pH Impairment List and Mitigation Status SFY15									
Plan Shed (2)	Maryland 2014 Integrated Report (1)			Mitigation Status	BMPs (draft data subject to review/revision)				
	Name	8-Digit Segment	Impairment		Site Name	Type	Phase	Comlpete	BMP cost
NBC-2	North Branch Casselman River	MD-050202040030	4a - pH	Implementing	Amish Rd North	Leach bed	1	2013	$45,610
					Amish Rd South	Leach bed	1	2013	$305,000
					Bowser	Limestone sand dump	2	2014	
					Bowser	Leach bed	2	2015	
	Alexander Run	MD-050202040032	4a - pH	Implementing	Amish Rd Alexander Run	Limestone sand dump	1	2013	$11,000
					Synder	Limestone sand dump	2	2014	
	Tarkiln Run	MD-050202040032	4a - pH	Implementing	Tarkin Run	Limestone sand dump	1	2013	$8,000
MSC	Spiker Run	MD-050202040034	4a - pH	Implementing	Spiker Run	Leach bed/sand dump	1	2013	$46,900
	Little Shade Run	MD-050202040034	4a - pH	planning					
SBC-1	South Branch Casselman River	MD-050202040031	4a - pH	Implementing	Maynardier Ridge Rd	Leach bed	1	2013	$114,300
					Maynardier Ridge Rd W of Bea	Limestone sand dump	1	2013	$8,000
					Koch	Limestone sand dump	2	2014	
					Beeman	Limestone sand dump	2	2015	
					Beeman	Leach bed	2	2015	
SBC-2	Little Laurel Run	MD-050202040033	4a - pH	Implementing	West Shale Rd South	Limestone sand dump	1	2013	$45,000
					West Shale Rd North	Limestone sand dump	1	2013	$6,500
	Big Laurel Run	MD-050202040033	not listed	mitigation operating	Big Laurel Run West Shale Roa	Limestone sand dump	1	2013	$8,000
					Big Laurel Run West Shale Roa	Leach bed	1	2013	
CEP	Meadow Run	MD-050202040035	4a - pH	planning					

(1) Final 2014 Integrated Report 4a - impaired, TMDL completed.
(2) Watershed Plan subwatershed designations:
NBC-1 North Branch Casselman River headwaters
NBC-2 North Branch Casselman River lower reaches
SBC-1 South Branch Casselman River headwaters
SBC-2 South Branch Casselman River lower reaches
MSC Mainstem Casselman River
CEP Casselman River eastern portion

Casselman River Watershed
Chesapeake and Atlantic Coastal Bays Trust Fund
SFY 2015 NPS Implementation Project Status (1)

Partner	Project	Project_Type	County	Trust_Fund	Status	Nitrogen lbs/yr	Phosphorus Annual_l_1	Sediment Annual_Ton
Ecosystem Recovery Institute	Hope property	Tree Planting Projects	Garrett	$6,440.19	Complete	22.129999	0.92	0.17
			TOTAL COMPLETED	$6,440.19		22.13	0.92	0.17
no Trust Fund grant project currently working				$0.00		0	0	0
(1) Maryland DNR Trust Fund database 10/27/15.					TOTAL WORKING	0.00	0.00	0.00


Casselman Watershed
AMD Associated MDE/MBSS Monitoring Sites
Benthic-CASS-001
Benthic-CASS-006
Benthic-CASS-008
Benthic-CASS-017
CASS-1
CASS-2
CASS-3
CASS-4
CASS-5
CASS-6
CASS-7
CASS-8
CASS-9
CASS-10
CASS-11
CASS-12
CASS-13
CASS-14
CASS-15
CASS-16
CASS-17
CASS-17B
Grantsville
Keysers Ridge
Foxtown
Bittinger
New Germany
SAVAGE RIVER
MASON AND DIXON LINE
GARRETT CO
Pennsylvania
West Virginia
Maryland
West Virginia
Source: USA Imagery
Date Prepared: October 11, 2011
MDE
MARYLAND
Legend
0 0.4 0.8 1.6 Miles
MDE MBSS Sites - 2011
MDE WQ Stations
pH TMDL Impaired Streams
garrwtr
Casselman 8 Digit Watershed
7/7/2016

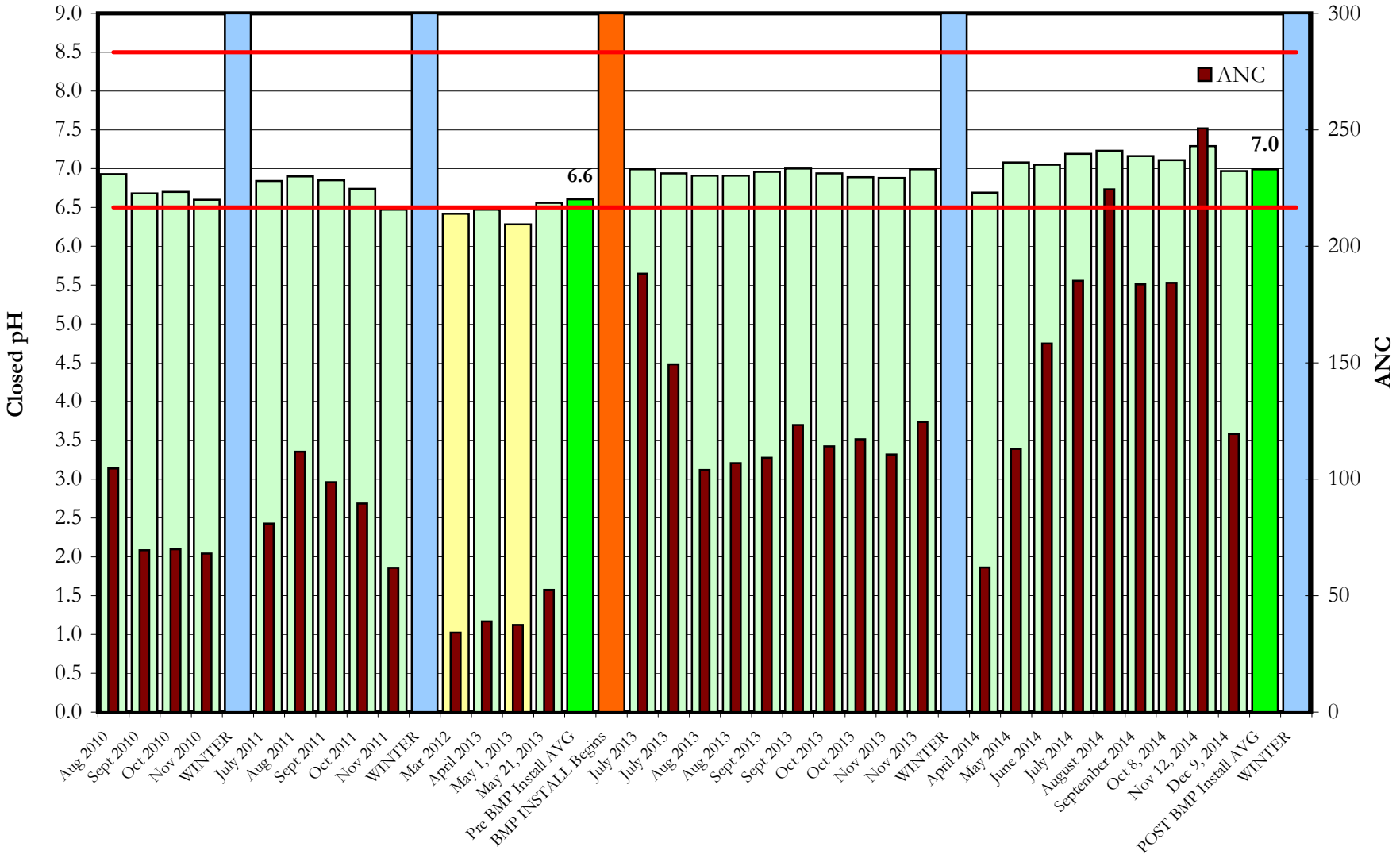
MDE Casselman Monitoring Project - AMD/BMP

Station Code	Bottle #	Layer Code	Depth	Date	Time	ANC (µeq/L)	Alkalinity (mg/L CaCO3)	Chloride (mg/L)	Sulfate (mg/L)	Specific Conductance (µS/cm)	Closed pH
PHASE II SITES											
UTSCA104D	C-104D	S	0	4/14/2015	12:10	-3.9	1.8	1.739	7.642	31.2	**5.02**
UTSCA104D	C-104D	S	0	5/4/2015	8:25	-0.2	2.0	1.505	7.932	29.3	**5.06**
UTSCA104D	C-104D	S	0	6/8/2015	8:40	3271.9	146.3			542.5	7.66
UTSCA104E	C-104E	S	0	4/14/2015	12:35	107.3	7.3	9.744	16.259	88.5	**6.39**
UTSCA104E	C-104E	S	0	5/4/2015	8:55	108.2	7.3	7.541	16.433	82.0	**6.39**
UTSCA104E	C-104E	S	0	6/8/2015	9:15	305.9	15.2			87.1	6.50
UNA0015	C-14A	S	0	4/14/2015	14:20	-4.9	1.9	1.660	8.360	33.4	**4.94**
UNA0015	C-14A	S	0	5/4/2015	11:10	-8.8	1.5	1.768	8.891	33.1	**5.13**
UNA0015	C-14A	S	0	6/8/2015	11:35	-17.4	0.9			38.1	**4.87**
UNA0013	C-14B	S	0	4/14/2015	14:35	12.4	2.5	1.958	8.458	33.9	**5.45**
UNA0013	C-14B	S	0	5/4/2015	11:30	4.7	2.5	1.954	9.450	34.8	**5.40**
UNA0013	C-14B	S	0	6/8/2015	12:00	13.2	1.8			36.5	**5.77**
UCM0009	C-14C	S	0	4/14/2015	14:55	-0.4	2.0	1.568	7.702	30.1	**5.16**
UCM0009	C-14C	S	0	5/4/2015	11:55	-3.7	1.5	1.557	8.343	30.8	**5.17**
UCM0009	C-14C	S	0	6/8/2015	12:25	4.5	1.7			31.9	**5.53**
UNA0018	C-15A	S	0	4/14/2015	14:00	-56.8	0.0	0.952	7.465	34.8	**4.32**
UNA0018	C-15A	S	0	5/4/2015	10:45	-48.4	0.0	1.038	8.394	35.2	**4.44**
UNA0018	C-15A	S	0	6/8/2015	11:10	-54.1	0.0			43.3	**4.33**
UTNBC16A	C-16A	S	0	4/14/2015	13:40	128.3	8.0	9.734	13.151	81.9	6.90
UTNBC16A	C-16A	S	0	5/4/2015	10:10	126.9	8.2	8.815	12.896	78.5	6.95
UTNBC16A	C-16A	S	0	6/8/2015	10:40	270.5	13.4			106.0	7.37
UTSCA40A	C-40A	S	0	4/14/2015	13:15	6.4	2.5	0.991	22.951	65.2	**5.55**
UTSCA40A	C-40A	S	0	5/4/2015	9:40	2.1	2.0	0.763	18.377	51.2	**5.33**
UTSCA40A	C-40A	S	0	6/8/2015	10:00	76.0	4.9			59.9	6.55
PHASE I SITES											
SPI0018	CASS-001	S	0	4/15/2015	8:10	104.2	6.9	35.156	8.133	153.8	6.92
SPI0018	CASS-001	S	0	5/5/2015	8:40	107.2	6.6	28.783	8.200	135.0	6.88
SPI0018	CASS-001	S	0	6/9/2015	8:50	205.2	10.5			158.9	7.19
SPI0001	CASS-002	S	0	4/15/2015	13:00	326.7	17.7	54.311	28.753	273.3	7.42
SPI0001	CASS-002	S	0	5/5/2015	13:30	342.3	19.1	39.294	31.201	248.6	7.59
SPI0001	CASS-002	S	0	6/9/2015	13:05	658.1	30.3			336.7	7.80
UUB0003	CASS-003	S	0	4/15/2015	8:55	205.7	2.0	48.311	8.805	207.6	7.46
UUB0003	CASS-003	S	0	5/5/2015	9:15	207.2	11.3	34.111	8.367	162.0	7.50
UUB0003	CASS-003	S	0	6/9/2015	9:25	567.1	26.8			302.6	8.04
NBC0000	CASS-004	S	0	4/15/2015	12:15	132.9	8.6	13.760	15.156	100.2	7.14
NBC0000	CASS-004	S	0	5/5/2015	12:45	155.1	8.8	12.728	15.918	100.4	7.28
NBC0000	CASS-004	S	0	6/9/2015	12:05	389.2	19.0			147.3	7.70
UTI0003	CASS-005	S	0	4/15/2015	9:30	259.6	14.4	255.364	13.627	1001.6	7.07
UTI0003	CASS-005	S	0	5/5/2015	9:40	311.7	16.2	205.895	13.981	826.9	7.14
UTI0003	CASS-005	S	0	6/9/2015	9:55	781.0	35.8			1063.0	7.49
TAR0001	CASS-006	S	0	4/15/2015	10:05	93.8	6.6	23.552	8.881	114.5	7.04
TAR0001	CASS-006	S	0	5/5/2015	10:25	97.7	6.5	20.259	8.904	103.0	7.11
TAR0001	CASS-006	S	0	6/9/2015	10:25	361.3	17.3			149.2	7.56
NBC0009	CASS-007	S	0	4/15/2015	12:35	119.9	7.6	12.746	14.051	93.5	7.10
NBC0009	CASS-007	S	0	5/5/2015	13:05	135.3	8.0	11.534	14.556	92.1	7.22
NBC0009	CASS-007	S	0	6/9/2015	12:30	433.6	20.9			153.5	7.67
ALE0006	CASS-008	S	0	4/15/2015	11:00	58.6	4.7	8.317	12.329	28.4	6.66
ALE0006	CASS-008	S	0	5/5/2015	11:35	77.3	5.7	0.788	7.068	30.3	6.77
ALE0006	CASS-008	S	0	6/9/2015	11:00	402.6	19.6			61.3	7.65
NBC0029	CASS-009	S	0	4/15/2015	11:40	98.1	7.1	0.765	6.915	69.6	6.97
NBC0029	CASS-009	S	0	5/5/2015	12:10	111.3	7.2	7.320	11.887	69.6	7.12
NBC0029	CASS-009	S	0	6/9/2015	11:30	263.1	13.2			102.8	7.45
SCA0059	CASS-010	S	0	4/16/2015	11:05	156.1	8.9	4.741	20.092	86.4	7.10
SCA0041	CASS-010	S	0	5/6/2015	11:45	161.7	8.9	4.356	21.074	87.7	7.12
SCA0059	CASS-010	S	0	6/10/2015	11:30	330.7	16.7			116.2	7.39
SCA0041	CASS-011	S	0	4/16/2015	10:35	204.2	11.1	6.191	18.236	91.1	7.26
LLR0009	CASS-011	S	0	5/6/2015	11:20	212.7	11.3	4.955	19.350	90.1	7.33
SCA0041	CASS-011	S	0	6/10/2015	11:05	415.3	20.4			118.8	7.48
LLR0009	CASS-012	S	0	4/16/2015	9:55	32.9	3.6	0.652	6.978	25.7	6.51
LLR0001	CASS-012	S	0	5/6/2015	10:30	31.0	3.7	0.614	6.695	24.8	6.65
LLR0009	CASS-012	S	0	6/10/2015	10:10	54.2	4.3			30.0	6.66
LLR0001	CASS-013	S	0	4/16/2015	9:25	147.9	8.6	1.039	8.912	43.7	7.09
SCA0059	CASS-013	S	0	5/6/2015	9:55	142.9	8.2	0.928	8.386	41.6	7.16
LLR0001	CASS-013	S	0	6/10/2015	9:50	255.6	13.3			54.6	7.30
SCA0014	CASS-014	S	0	4/16/2015	8:35	243.4	13.1	6.504	15.003	87.9	7.29
SCA0014	CASS-014	S	0	5/6/2015	8:55	260.3	13.1	5.142	15.332	85.4	7.35
SCA0014	CASS-014	S	0	6/10/2015	9:00	485.4	23.4			122.9	7.48
BIL0001	CASS-015	S	0	4/16/2015	9:00	194.5	10.8	4.901	13.248	73.8	7.28
BIL0001	CASS-015	S	0	5/6/2015	9:25	205.7	11.0	3.750	12.636	68.9	7.42
BIL0001	CASS-015	S	0	6/10/2015	9:25	397.6	19.7			91.5	7.53
USJ0003	CASS-016B	S	0	4/16/2015	11:35	190.5	10.7	1.195	13.394	58.5	7.22
USJ0003	CASS-016B	S	0	5/6/2015	12:20	196.3	10.6	1.090	13.493	60.0	7.23
USJ0003	CASS-016B	S	0	6/10/2015	12:05	336.1	16.9			69.0	6.96
BIL0033	CASS-017B	S	0	4/16/2015	12:20	91.2	6.4	9.480	8.603	66.2	6.60
BIL0033	CASS-017B	S	0	5/6/2015	13:05	100.3	6.2	8.123	8.351	61.6	6.62
BIL0033	CASS-017B	S	0	6/10/2015	12:40	228.3	12.0			77.4	7.51

Casselman Watershed

AMD Pre & Post BMP Implementation Water Quality Monitoring

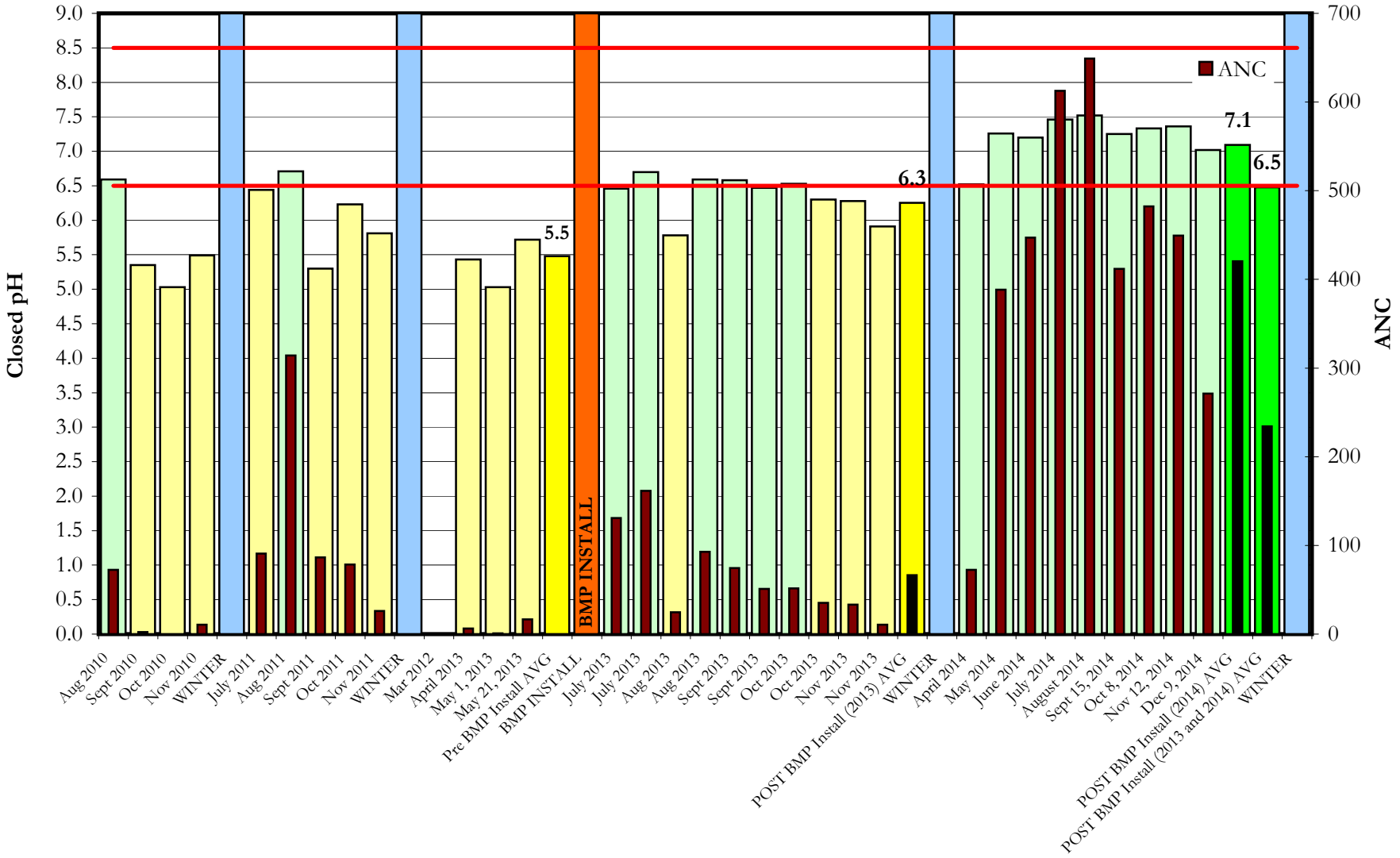
CASS001 : **CLOSED pH and ANC**



Casselman Watershed

AMD Pre & Post BMP Implementation Water Quality Monitoring

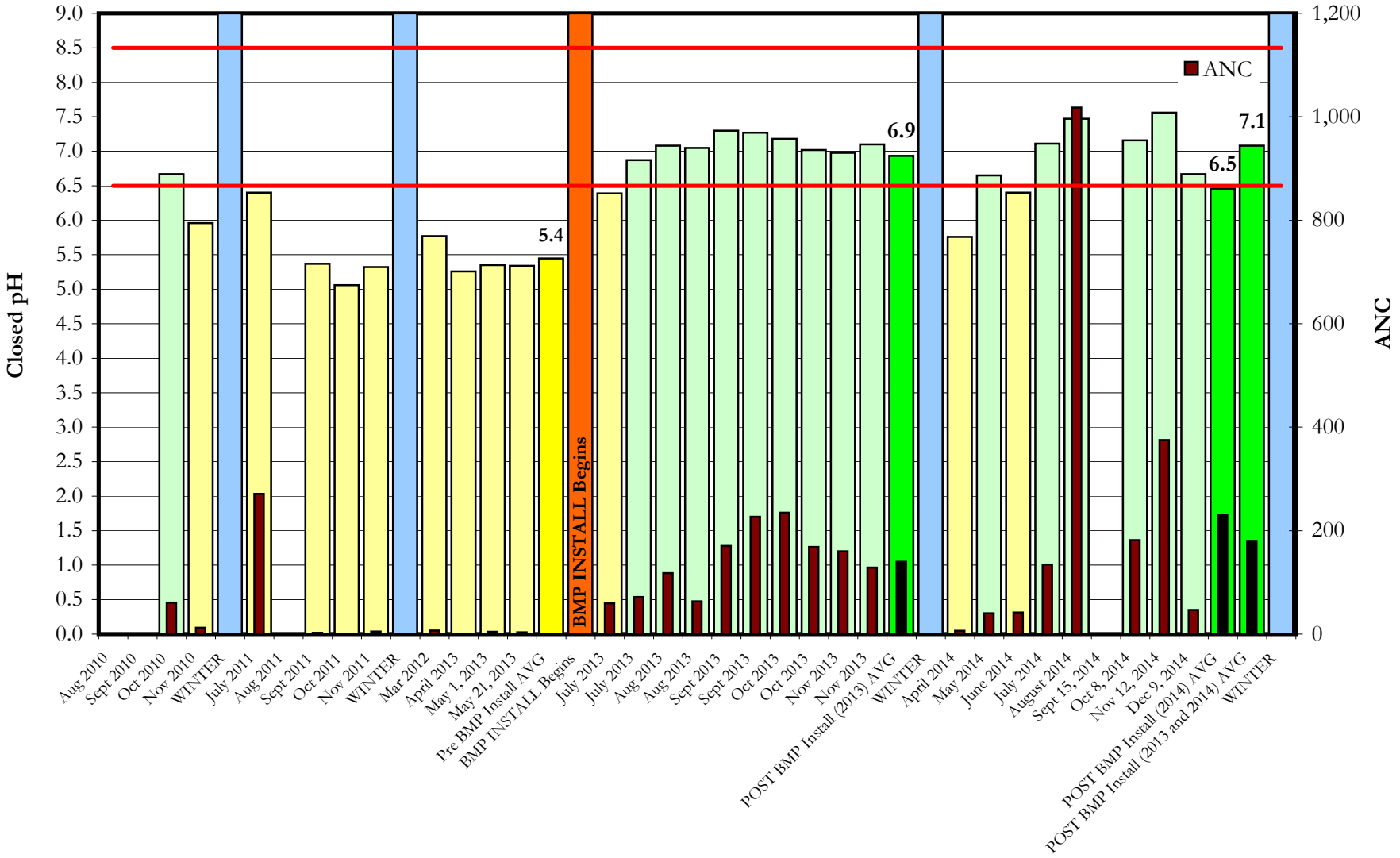
CASS005: **CLOSED pH and ANC**



Casselman Watershed

AMD Pre & Post BMP Implementation Water Quality Monitoring

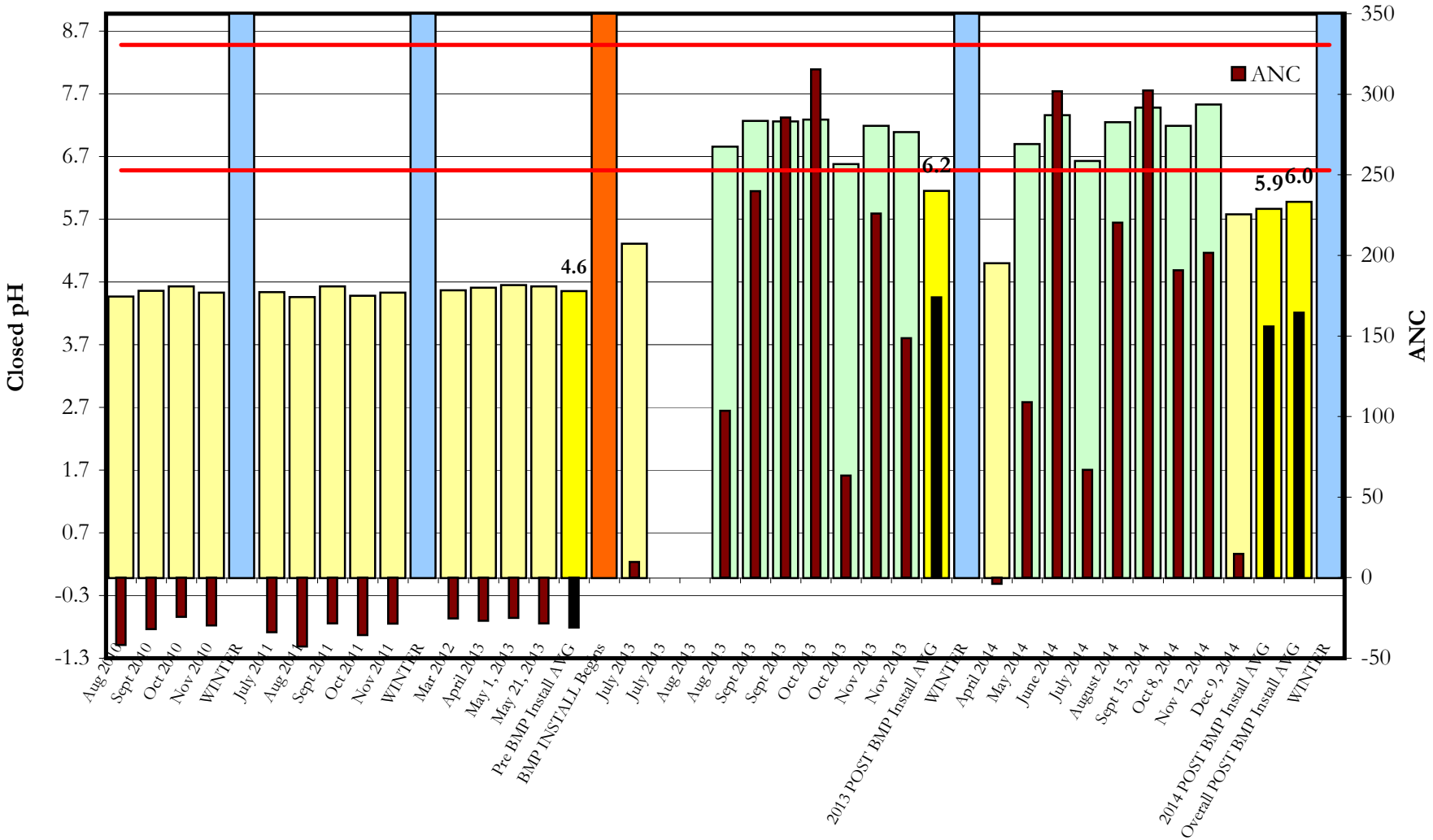
CASS006: **CLOSED pH and ANC**



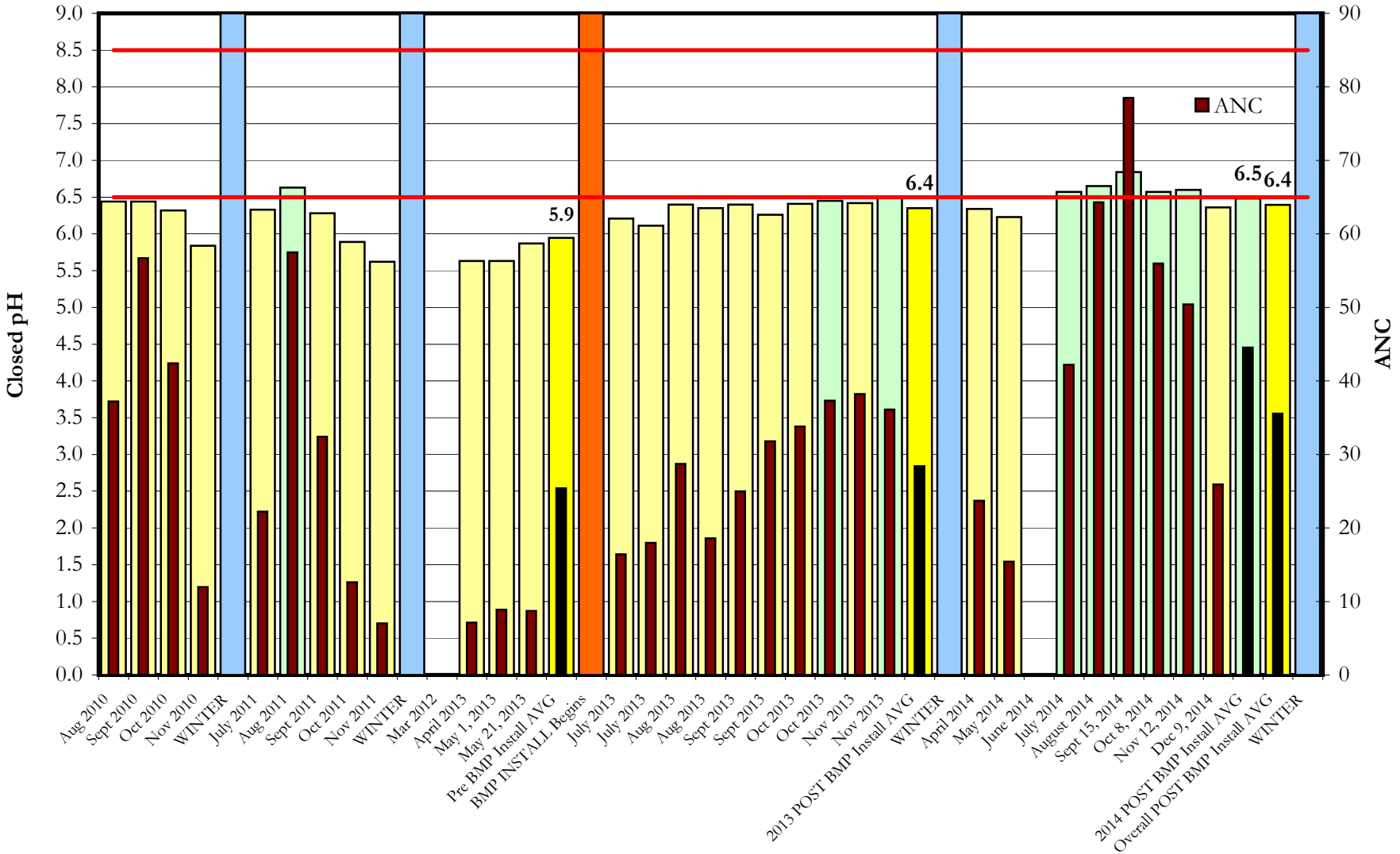
Casselman Watershed

AMD Pre & Post BMP Implementation Water Quality Monitoring

CASS008 : **CLOSED pH and ANC**



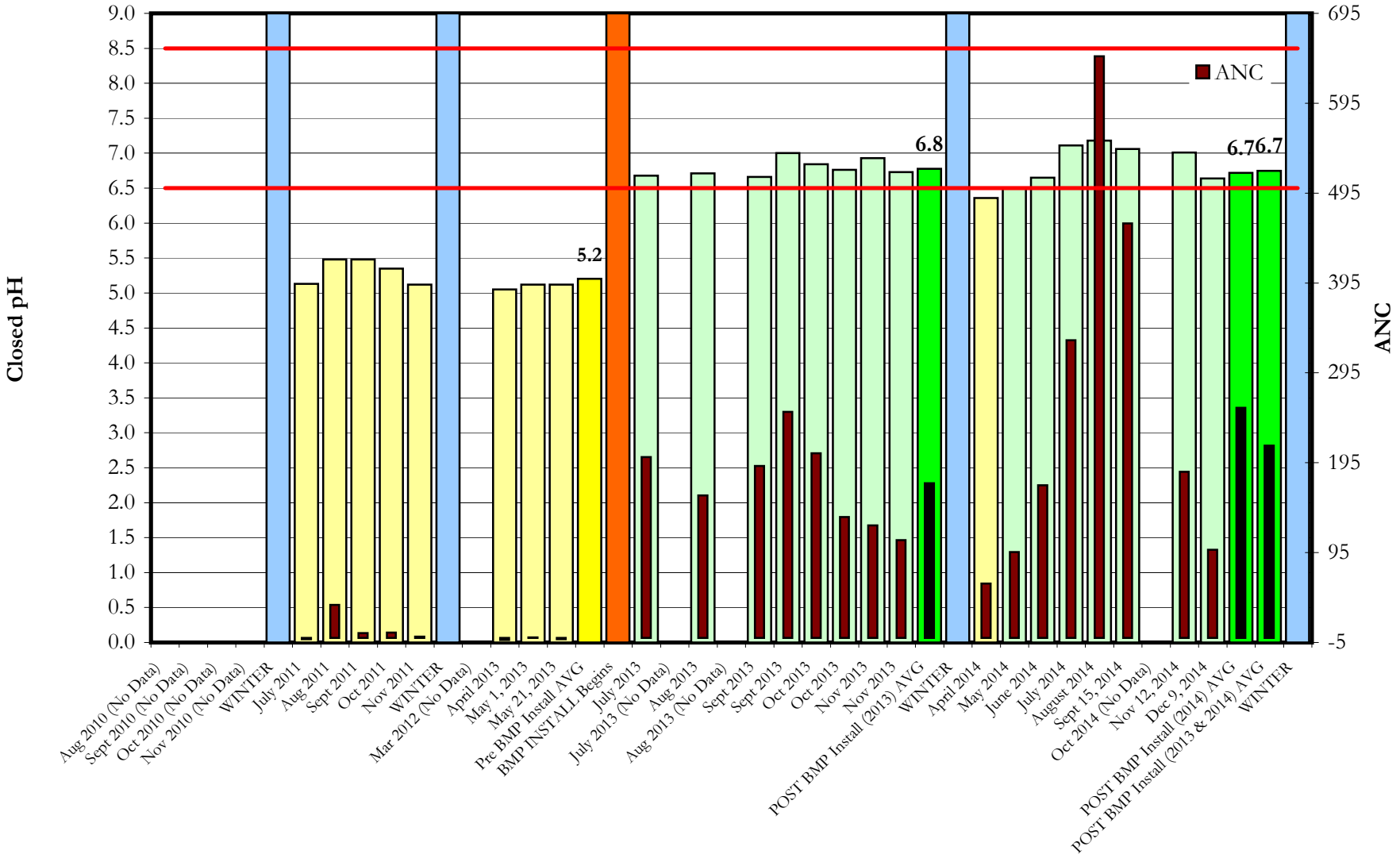
Casselman Watershed
AMD Pre & Post BMP Implementation Water Quality Monitoring
CASS012: **CLOSED pH and ANC**



Casselman Watershed

AMD Pre & Post BMP Implementation Water Quality Monitoring

CASS017: **CLOSED pH and ANC**



7/7/2016

Appendix
Watershed Eligible for 319(h) Grant Implementation Funding

Corsica River Watershed in Centreville and Queen Anne's County, Maryland

Contents

Introduction

Centreville developed the *Corsica River Watershed Restoration Action Strategy* in 2005 with input from Queen Anne's County, Queen Anne's Soil Conservation District and others. The watershed plan (action strategy) encompasses the entire Corsica River watershed in the Town of Centreville and in Queen Anne's County.

The watershed plan's pollutant reduction goals, on pages 23-24, refer to the TMDL for nitrogen and phosphorus that was approved 5/9/2000. The TMDL document indicates that the Corsica River watershed ambient NPS nutrient loads already met the TMDL load allocation as summarized below. Therefore, the nitrogen and phosphorus TMDLs are benchmarks to prevent water quality degradation.

268,211 lb/yr = Total NPS nitrogen load, TMDL page 4
268,211 lb/yr = nitrogen TMDL load allocation, TMDL page 22
0 lb/yr = NPS nitrogen reduction goal based on TMDL

19,380 lb/yr = Total NPS phosphorus load, TMDL page 4
19,380 lb/yr = phosphorus TMDL load allocation, TMDL page 22
0 lb/yr = NPS phosphorus reduction goal based on TMDL

Current BMP implementation goals are in the *Corsica River Targeted Initiative Progress Report*: 2005-2011 on pages 16-17. On these pages, the table "Comprehensive Implementation Strategies for the Corsica River: 2012 to 2016" sets BMPs implementation goals that replace the goals in the 2005 watershed plan. The progress report also summarizes watershed plan implementation status thru 2011. The report is available: http://www.townofcentreville.org/departments/environment.asp

Base Year for watershed plan implementation is 2005. All stakeholders agreed that the baseline year is 2005. Also note that the Corsica nutrient TMDL approved in 2000 was based on 1997

water quality data. (See TMDL Section 2.2 pages 5-9. Also see the 2005 watershed plan pages 23-24.)

Milestones

Maryland's 2015-2019 NPS Management Plan Objective 5 includes two milestones for this watershed:

- Annually: Report progress in the 319 Annual Report, and
- In 2016 assess plan implementation progress and in 2017 update plan if needed.

Pollution Load Reduction Progress

The Annual Report table Pollution Load Reduction Progress is repeated on the next page with additional details and notes added. In general, estimates of the pollution load reduction in the watershed for two primary sources:

1) State Fiscal Year reporting Chesapeake Bay WIP implementation progress for NPS BMP implementation used for EPA's Chesapeake Bay model. For this annual report, data was available for SFY14 and SFY15 only. Annual BMPs like cover crops are counted only for the current reporting year.
2) 319 projects reporting multi-year BMP load reductions 2013 or earlier are counted. Not included are 319 projects focused on implementing annual BMPs (cover crops). For SFY14 and SFY15, 319-funded NPS BMP implementation reported directly to MDE and WIP implementation reporting received by MDE are assessed to ensure that no double counting occurs.
3) NPS BMP implementation not funded by the 319(h) Grant that was reported by watershed plan implementers in the 2013 Annual Report.

Water Quality Monitoring Activity, Overall Condition, Trends

Nontidal

In 2013, Maryland reported that nontidal monitoring from 2005 thru 2011 in the three major tributaries to the tidal Corsica River had identified significant trends in decreasing nitrogen and phosphorus in two of the streams. This finding is summarized in the success story entitled "*Implementing Best Management Practices Reduces Nitrogen in Two Corsica River Tributaries*". This monitoring was conducted by MDE's 319-funded Targeted Watershed Project. More recently, nontidal water quality monitoring at these same locations has continued but analysis including the newer data has not been reported.

Tidal

Information extracted from Maryland Dept. of Natural Resources' publication: "*Upper Eastern Shore Basin Water Quality and Habitat Assessment Overall Condition 2012-2014*"

"The Corsica River is a tributary of the Chester River. Water quality is poor because phosphorus and sediment levels are too high. Habitat quality for underwater grasses is poor because algal densities are high and water clarity is low. Summer bottom dissolved oxygen levels are good."

	Water Quality			Habitat Quality		
River	**Nitrogen**	**Phosphorus**	**Sediments**	**Algal Densities**	**Water Clarity**	**Summer Bottom DO**
Corsica	**Meet**	**Fail**	**Fail**	**Fail**	**Fail**	**Meet**

"Table 2. Summary of tidal water quality and habitat quality indicators.
Annual trends for 1999-2014 for nitrogen (total nitrogen), phosphorus (total phosphorus), sediment (total suspended solids), algal densities (chlorophyll *a*), and water clarity (Secchi depth).

Summer bottom dissolved oxygen (DO) trends are for June through September data only.

Trends are either 'Increasing' or 'Decreasing' if significant at $p \leq 0.01$; blanks indicate no significant trend. Improving trends are in green, degrading trends are in red. [Annual Report editor note: DNR's Table 2 indicates that no significant annual trends were identified in the tidal Corsica River for the 1999-2014 analysis period.]

Nitrogen (dissolved inorganic nitrogen) levels below the level for nitrogen limitation 'Meet' criteria, otherwise 'Fail' criteria for 2012-2014 data.

Phosphorus (dissolved inorganic phosphorus), sediment (total suspended solids), algal densities (chlorophyll *a*) and water clarity (Secchi depth) either 'Meet' or 'Fail' submerged aquatic vegetation (SAV) habitat requirements for 2012-2014 data.

Summer (June through September) bottom dissolved oxygen levels either 'Meet' or 'Fail' EPA open-water 30-day dissolved oxygen criteria."

Corsica River Watershed - 2005-2015 Completed 319(h) Grant NPS Implementation Projects

Project Summary			Project Expenditures					Overall Pollutant Load Reduction		
Area/Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Non Federal Match	Total	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal	State					
Centreville	Watershed Restoration	2006	319 FFY05 #2	$232,666.15		$155,110.77	$387,776.92	0	0	0
	Watershed Restoration	2009	319 FFY06 #3	$241,974.82		$161,316.55	$403,291.37	62	6	0
	Watershed Restoration	2012	319 FFY09 #1	$270,427.25		$180,284.83	$520,712.08	5.33	1.05	0.29
	Stormwater Retrofit near WWTP		General Funds		$60,000.00					
	Banjo Lane Coastal Plain Outfall		General Funds		$10,000.00					
MDA / Queen Anne's Soil Conservation District	Agricultural Technical Assistance	2006	319 FFY04 #18	$32,379.50		$21,586.33	$53,965.83	4,847	114	0
		2008	319 FFY05 #12	$145,554.24		$97,036.16	$242,590.40	767	79	463
		2008	319 FFY06 #9	$14,272.71		$9,515.14	$23,787.85	2,413	233	0
		2008	319 FFY07 #6	$22,187.16		$14,791.44	$36,978.60	286	10	755
		2009	319 FFY08 #7	$50,780.00		$33,853.33	$84,633.33	46	3	62
		2010	319 FFY09 #4	$58,539.00		$39,026.00	$97,565.00	19,740	6,664	33
		2011	319 FFY10 #10	$61,590.00		$41,060.00	$102,650.00	53,259	802	0
		2012	319 FFY11 #10	$66,700.59		$44,467.06	$111,167.65	45,703	642	492
		2013	319 FFY12 #9	$50,999.97		$33,999.98	$50,000.00	55,822	828	108.6
		2014	319 FFY13 #9	$47,810.49		$31,873.66	$79,684.15	32,831	4,394	38.28
Queen Anne's County	Corsica and Beyond	2008	319 FFY06 #13	$124,281.44		$82,854.29	$207,135.73	0	0.34	0
	Bioretention Swale	2011	319 FFY08 #19	$50,000.00		$33,333.33	$83,333.33	0.22	0.35	0.739
	Board of Education Bioretention	2013	319 FFY11 #11	$22,431.94		$14,954.63	$37,386.57	5.16	0.36	0.066
	Board of Ed. Phase 2: Kramer Center	2014	319 FFY12 #10	$66,624.98		$44,416.65	$111,041.63	60.7	7.6	3.03
TOTAL for completed projects				$1,559,220.24	$70,000.00	$1,039,480.16	$2,633,700.45	215,847.2	13,785.1	1,956.0

SFY 2015 319(h) Grant Project Activity - Corsica River Watershed

Project Summary			Project Funding					Projected Pollutant Load Reduction		
Area/Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Non Federal Match	Total	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal	State					
Centreville	Watershed Restoration	TBD	319 FFY11 #8	$298,998.00		$199,332.00	$498,330.00	5.16	0.36	0.066
	Watershed Restoration	TBD	319 FFY12 #7	$115,002		$76,668	$191,670	20.6	1.8	0.6

2005-2015 Completed NPS Implementation Projects -- Corsica River Watershed
State Revolving Fund (SRF)

Project Summary			Project Expenditures					Pollutant Load Reduction		
Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match $	Total $	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal $	State $					
Queen Anne's County	Bloomfield Park N. Bldg. Permeable Paving		SRF Grant		$200,000.00		$250,000.00	864	173	0
TOTAL reported for completed projects				0	200,000	0	250,000	864	173.0	0

SFY 2015 319(h) SRF Activity for NPS Implementation Projects - Corsica River Watershed

Project Summary			Project Funding					Projected Pollutant Load Reduction		
Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match	Total	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal	State					
	(no currently working SRF project)									

Corsica River Watershed
Chesapeake and Atlantic Coastal Bays Trust Fund
SFY 2015 NPS Implementation Project Status (1)

State FY	Partner	Project	Project_Type	County	Trust_Fund	Status	Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment ton/yr
FY11	Queen Annes County	Rain Barrel Giveaway Program (120 @ $49 each)	Stormwater Management	Queen Anne's	$5,880.00	Complete	0	0	0
FY11	Corsica River Conservancy	Corsica Watershed Rain Garden Initiative (73 @ $1973)	Stormwater Management	Queen Anne's	$144,027.03	Complete	0.015405	0.001351	0
FY11	Corsica River Conservancy	Residential Soil Test (32 @ $7.52)	Education & Outreach	Queen Anne's	$240.58	Complete	0	0	0
FY11	Corsica River Conservancy	Symphony Village Bioswale	Stormwater Management	Queen Anne's	$17,000.00	Complete	0.37	0.03	0
FY11	Queen Annes County	Providence Area Planting	Tree Planting Projects	Queen Anne's	$23,000.90	Complete	91.90	6.21	1.12
FY11	Queen Annes County	Mill Stream Park Buffer Plantings (Phase I)	Tree Planting Projects	Queen Anne's	$20,000.00	Complete	57.44	3.88	0.7
FY13	Centreville, Town of	Pennsylvania Ave Bioswale	Stormwater Management	Queen Anne's	$50,000.00	Complete	2	0	0
FY11	Queen Annes County	Mill Stream Park Buffer - Phase II	Tree Planting Projects	Queen Anne's	$52,470.80	Complete	209.66	14.16	2.56
FY11	Queen Annes County	QAC Office Building Stormwater Management	Stormwater Management	Queen Anne's	$200,000.00	Complete	12	2	0.000235
FY11	Queen Annes County	Banjo Lane Coastal Plain Outfall	Stormwater Management	Queen Anne's	$30,000.00	Complete	0	0	0
FY11	Queen Annes County	Centreville WWTP Outfall Design and Permitting	Stormwater Management	Queen Anne's	$30,000.00	Complete	0	0	0
FY13	Queen Annes County	Centreville Elementary School Bioretention	Stormwater Management	Queen Anne's	$50,000.00	Complete	0	0	0
FY11	Queen Annes County	Bloomfied Park Permable Paving	Stormwater Management	Queen Anne's	$50,000.00	Complete	4	0.66	8.00E-05
FY11	Queen Annes County	Conquest Beach Planting	Tree Planting Projects	Queen Anne's	$4,528.30	Complete	18.09	1.22	0.22
					$677,147.61	TOTAL COMPLETED	395.5	28.2	4.60
FY14	Queen Annes County	Kennard School Planting	Tree Planting Projects	Queen Anne's	$4,800.00	Construction	29.87	2	0.35
FY15	Delmarva RC & D Council	Centreville High School Stormwater Wetland	Stormwater Management	Queen Anne's	$44,467.50	Design/Planning	0	0	0
FY12	Centreville, Town of	Outfall Rehabilitation	Stream Restoration	Queen Anne's	$250,000.00	Permit	10	2	0.6375
FY13	Queen Annes County	Board of Education Bioretention	Stormwater Management	Queen Anne's	$62,132.00	Permit	0	0	0
	(1) Maryland DNR Trust Fund database 10/26/15.				$361,399.50	TOTAL WORKING	39.9	4.0	0.99

SFY2015 Agricultural BMP Implementation						**Corsica River Watershed Plan**			
Corsica River Watershed			Estimated Pollutant Load Reduction			**2011 Progress Report Table 1**			**SFY2015 Progress**
BMP Type	**Unit**	SFY15 Total	Nitrogen Total (lbs)	Phosphorus Total (lbs)	Sediment Total (tons)	**Management Measure**	**Goal**	**Units**	
Alternative Crops	acres	0							
Amendments for the Treatment of Ag Wast	AU	0							
Animal Mortality Facility	count	0							
Conservation Cover	acres	0							
Conservation Plans/SCWQP	acres	1,998	1,243.4	114.1	28.61				
Cover Crops	acres	6,375	23,873.0	71.1	20.28	2. Agricultural Cover Crops	5,500	acre/yr	6,375
Critical Area Planting	acres	0							
Dead Bird Composting Facility	count	0							
Fencing	feet	0							
Field Border	acres	0							
Filter Strip	acres	0							
Grassed Waterway	acres	0							
Horse Pasture Management	acres	0							
Loafing Lot Management System	acres	0							
Pasture & Hay Planting	acres	0							
Prescribed Grazing	acres	0							
P-sorbing Materials	acres	0							
Riparian Forest Buffer	acres	0				1. Agricultural Buffers	150	acres	0
Riparian Herbaceous Cover	acres	0							
Roof Runoff Structure	count	0							
Stream Restoration Ag	feet	0							
Tree/Shrub Establishment	acres	0							
Waste Storage Facility	count	0							
Wastewater Treatment Strip	acres	0							
Water Control Structure	count	1	51.6	0.0	0.00				
Watering Facility	count	0							
Wetland Creation	acres	0							
Wetland Restoration	acres	0				6. Wetland Creation (all types)	20	acres	0
Windbreak/Shelterbelt Establishment	feet	0							
						3. Nutrient Mgmt Horse Farms	5	projects	
						4. Agricultural BMPs (all types)	50	count	
						5. Catalog all BMPs on farms	125	parcels	
						10. Easements, Land Acquisition	200	acres	
Total Pollutant Load Reduction			25,168.0	185.2	48.89				
Total Annual Practices (2)			23,873.0	71.1	20.28				
Total Multi-year Practices			1,295.0	114.1	28.61				

(1) "SFY15 Total" column date is MDA 12/30/15. MDE used MAST to estimate pollution load reductions.

(2) The Maryland Departmant of Agriculture (MDA) defines annual practices as cover crops, nutrient mgmt, manure transport, conservation tillage & high residue tillage.

SFY2015 Urban BMP Implementation
Corsica River Watershed

Urban Management Practice	Unit	BMPs Reported	Estimated Pollutant Load Reduction		
			Nitrogen lb/yr	Phosphorus lb/yr	Sediment tons/yr
Bioretention (13)	acres	0			
Bioswale (13)	acres	0			
Cisterns & Rain Barrels	acres	0			
Disconnection of Rooftop Runoff (13)	acres	0			
Dry Detention Ponds & Hydro Structures (13)	acres	0			
Dry Extended Detention Ponds (13)	acres	0			
Dry Well (13)	acres	0			
Filtering Practices (13)	acres	0			
Forest Conservation	acres	0			
Forest Harvesting Practices	acres	0			
Infiltration Practices (13)	acres	0			
Permeable Pavement (13)	acres	0			
Rain Garden	acres	0			
Reduction of Impervious Surface (13)	acres	0			
Riparian Forest Buffers on Urban Lands (13)	acres	0			
Septics Connections to Sewers	count	0			
Septic Denitrification Critical Area	count	1	11.80		
Septic Denitrification outside of 1000 feet	count	1	3.80		
Septic Denitrification within 1000 feet	count	1	6.50		
Septic Tank Pumpout	count	0			
Stream Restoration Urban	feet	300	28.00	20.90	2.252
Street Sweeping	acres	0			
Tree Planting	acres	0			
Urban Forest Buffer (13)	acres	0			
Wet Extended Detention	acres	0			
Wet Ponds & Wetlands (13)	acres	0			
TOTAL Urban BMPs Pollutant Load Reduction			50.10	20.90	2.25

(1) "BMPs Reported" column data is MDE 12/9/2015. MDE uses MAST to estimate pollutant load reductions.

(2) Pollutant load reduction is estimated by MDE using MAST.

Corsica River Watershed Plan

2011 Progress Report Table 1			SFY2015 Progress
Urban Management Practice	Goal	Units	
9. LID Projects -- rain barrels	40	count	0
9. LID Projects -- rain gardens	100	count	0
7. Retrofit Septic Systems	14	count	3
15. Stream Restoration	0.5	miles	0.0568
Street Sweeping (no goal number)	50	tons/yr	
13. Stormwater Retrofits *	187.46	acres	0

Watershed Plan Goal #13 "Stormwater Retrofits" aggregates urban BMPs footnoted (13).

Units of measure shaded red differ from State reporting units.

SFY2014 Agricultural BMP Implementation **Corsica River Watershed**			Nitrogen Reduction		Phosphorus Reduction		Sediment Reduction	
BMP Type	**Unit**	SFY14 Total	lb/acre	Total (lbs)	lb/acre	Total (lbs)	lb/acre	Total (tons)
Alternative Crops	acres	0						
Amendments for the Treatment of Ag Wast	AU	0						
Animal Mortality Facility	count	0						
Conservation Cover	acres	1.2						
Conservation Plans/SCWQP	acres	1,773	1.6	2836.8	0.1	177.3	172.8	153.19
Cover Crops	acres	5,137	1.8	9246.6				
Critical Area Planting	acres	0						
Dead Bird Composting Facility	count	0						
Fencing	feet	0						
Field Border	acres	0						
Filter Strip	acres	0						
Grassed Waterway	acres	0.1	26.3	2.63	0.8	0.08	224.8	0.01
Horse Pasture Management	acres	0						
Loafing Lot Management System	acres	0						
Pasture & Hay Planting	acres	0						
Prescribed Grazing	acres	0						
P-sorbing Materials	acres	0						
Riparian Forest Buffer	acres	0						
Riparian Herbaceous Cover	acres	0.4	35.1	14.04	4	1.6	10093	2.02
Roof Runoff Structure	count	0						
Stream Restoration Ag	feet	0						
Tree/Shrub Establishment	acres	0						
Waste Storage Facility	count	0						
Wastewater Treatment Strip	acres	0						
Water Control Structure	count	0						
Watering Facility	count	0						
Wetland Creation	acres	0						
Wetland Restoration	acres	0						
Windbreak/Shelterbelt Establishment	feet	0						
Total SFY14 Pollutant Load Reduction				12,100		179		155.22
Total SFY14 Annual Practices (2)				9,247		0		0
Total SFY14 Multi-year Practices				2,853		179		155

(1) "SFY14 Total" column data is May 2015.

(2) The Maryland Department of Agriculture defines annual practices as cover crops, nutrient mgmt, manure transport, conservation tillage & high residue tillage.

Corsica River Watershed Plan **2011 Progress Report Table 1**			**SFY2014 Progress**
Management Measure	**Goal**	**Units**	
2. Agricultural Cover Crops	5,500	acre/yr	5,137
1. Agricultural Buffers	150	acres	0.4
6. Wetland Creation (all types)	20	acres	0
3. Nutrient Mgmt Horse Farms	5	projects	
4. Agricultural BMPs (all types)	50	count	
5. Catalog all BMPs on farms	125	parcels	
10. Easements, Land Acquisition	200	acres	

SFY2014 Urban BMP Implementation
Corsica River Watershed

Urban Management Practice	Unit	BMPs Reported	Estimated Pollutant Load Reduction		
			Nitrogen lb/yr	Phosphorus lb/yr	Sediment tons/yr
Bioretention (13)	acres	0			
Bioswale (13)	acres	0			
Cisterns & Rain Barrels	acres	0			
Disconnection of Rooftop Runoff (13)	acres	0			
Dry Detention Ponds & Hydro Structures (13)	acres	0			
Dry Extended Detention Ponds (13)	acres	0			
Dry Well (13)	acres	0			
Filtering Practices (13)	acres	0			
Forest Conservation	acres	0			
Forest Harvesting Practices	acres	0			
Infiltration Practices (13)	acres	0			
Permeable Pavement (13)	acres	0			
Rain Garden	acres	0			
Reduction of Impervious Surface (13)	acres	0			
Riparian Forest Buffers on Urban Lands (13)	acres	0			
Septics Connections to Sewers	count	0			
Septic Denitrification Critical Area	count	0			
Septic Denitrification outside of 1000 feet	count	0			
Septic Denitrification within 1000 feet	count	8	46.40		
Stream Restoration Urban	feet	0			
Street Sweeping	acres	0			
Tree Planting	acres	0			
Urban Forest Buffer (13)	acres	0			
Wet Ponds & Wetlands (13)	acres	0			
TOTAL Urban BMPs Pollutant Load Reduction			46.40	0.00	0.00

(1) "BMPs Reported" column data is May 2015.

Corsica River Watershed Plan

2011 Progress Report Table 1			SFY2014 Progress
Urban Management Practice	Goal	Units	
9. LID Projects -- rain barrels	40	count	0
9. LID Projects -- rain gardens	100	count	0
7. Retrofit Septic Systems	14	count	8
15. Stream Restoration	0.5	miles	0
Street Sweeping (no goal number)	50	tons/yr	
9. LID Projects	100	count	0
13. Stormwater Retrofits *	187.46	acres	0

Watershed Plan Goal #13 "Stormwater Retrofits" aggregates urban BMPs footnoted (13).

Units of measure shaded red differ from State reporting units.

Appendix
Watershed Eligible for 319(h) Grant Implementation Funding

Lower Jones Falls in Baltimore City and Baltimore County, Maryland

Contents

Introduction

The *Lower Jones Falls Small Watershed Action Plan* was completed by Baltimore County in October 2008 and was accepted by EPA in January 2009. The upstream portion of the watershed is in Baltimore County and the downstream portion of the watershed is in Baltimore City.

Pollutant reduction goals from the watershed plan in two locations: in the Executive Summary Table E-4 on page 9, which is essentially duplicated in Table 5.4 on page 85:

- Nitrogen: 6,498 pounds per year.
- Phosphorus: 679 pounds per year.
- Total Suspended Solids: 204.9 tons per year.
- Fecal Coliform Bacteria: 4,679,348 billion per year.

Watershed plan BMP implementation goals are in Chapter 5, in Tables 5.1 and 5-3. There are two different base years for tracking watershed plan implementation:

- 2008 for nitrogen, phosphorus and sediment. Pollutant load reductions reported that year and thereafter can be counted toward meeting watershed plan goals. The watershed plan Section 5.2 page 83 indicates that the reduction goals are based on anticipated results of the management strategy presented in the plan. Monitoring for these pollutants is not referenced as a basis for the plan and TMDLs for these pollutants were not available when the plan was written.
- 2005 for bacteria. Pollutant load reductions reported that year and thereafter can be counted toward meeting watershed plan goals. The watershed plan Section 5.2 page 83 indicates that the bacteria reduction goal is based on the TMDL. The Fecal Bacteria TMDL Section 2.2 pages 11-12 indicate that the TMDL is based on monitoring conducted 2003 and earlier.

Milestones

Maryland's 2015-2019 NPS Management Plan Objective 5 lists one milestone for this watershed: annually report progress in the 319 Annual Report.

Urban BMP tracking/reporting

Lower Jones Falls Watershed Plan Goal and Implementation Progress					
Management Practice	**SWAP Goal**	**Units**	**2008-SFY14 Progress**	**SFY15 Activity**	**2008-SFY15 Progress**
Convert Dry Ponds	NA	NA	0	0	0
Stormwater Retrofits	100	acres	1.3	0	1.3
Downspout Disconnection	250	rooftop acres	0.3	0.1	0.4
Reforestation	25	acres	3.9	0	3.9
Street Trees	1,000	trees	0	0	0
Stream Restoration	20,000	ft	0	0	0
Baltimore County data received by MDE 2/4/2016.					

The table above presents Baltimore County tracking of watershed plan implementation progress by the Department of Environmental Protection & Sustainability, Watershed Management and Monitoring Section. Additionally, the County also used their own methods for estimating pollutant load reduction that are reported elsewhere in the SFY2015 Annual Report.

Agricultural BMP tracking/reporting

For agricultural BMPs, the *Lower Jones Falls Small Watershed Action Plan* does not include implementation goals. This is in part because agriculture accounts for only about one percent of the land area in the watershed. During state fiscal years 2014 and 2015, there are no reports of agricultural BMPs implementation in the watershed.

Lower Jones Falls Watershed - 2006-2015 Completed 319(h) Grant and State Revolving Fund NPS Implementation Projects											
Project Summary			Project Expenditures					Pollutant Load Reduction			
Area/Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match	Total	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)	Bacteria (MPN)
				Federal	State						
Baltimore City	Stony Run Stream Restoration Northern Parkway to Wyndhurst Av	2006	319 FFY03 #17	$139,000.00	$0	$92,667	$231,666.67	0	299	360	0
Baltimore County	no 319 or SRF funded projects recorded										
			TOTAL for completed projects	$139,000.00	$0	$92,666.67	$231,666.67	0	299	360	0

For nitrogen, phosphorus and sediment pollutant loads, BMPs installed 2008 and later can be counted toward watershed plan implementation.
For bacteria pollutant loads, BMPs installed 2005 and later can be counted toward watershed plan implementation.

SFY2015 319(h) Grant and State Revolving Fund Project Activity - Lower Jones Falls Watershed											
Project Summary			Project Funding					Projected Pollutant Load Reduction			
Area/Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match	Total	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)	Bacteria (MPN)
				Federal	State						
Baltimore City	no 319 or SRF grant projects currently working										
Baltimore County	no 319 or SRF grant projects currently working										

Lower Jones Falls Watershed
Chesapeake and Atlantic Coastal Bays Trust Fund
SFY 2015 NPS Implementation Project Status (1)

State FY	Partner	Project	Project_Type	County	Trust_Fund	Status	Nitrogen Annual_lbs	Phosphorus Annual_l_1	Sediment Annual_Ton
FY14	Alliance for the Chesapeake Bay	Union Baptist Church	Tree Planting Projects	Baltimore City	$314.85	Complete	0.2355	0.0095	0.000775
FY14	Alliance for the Chesapeake Bay	Payne Memorial	Tree Planting Projects	Baltimore City	$4,156.02	Complete	0.6594	0.0266	0.0022
FY14	Alliance for the Chesapeake Bay	Saints Philip and James Parish	Tree Planting Projects	Baltimore City	$755.64	Complete	0.5652	0.0228	0.00186
FY15	Blue Water Baltimore	Guilford Elementary Middle School	Stormwater Management	Baltimore City	$53,243.70	Complete	1.01	0.07	0.01
FY14	Baltimore City Rec & Parks	Baltimore Polytechnic Institute	Tree Planting Projects	Baltimore City	$2,036.27	Complete	0.99	0.042	0.007
FY14	Baltimore City Rec & Parks	Northwestern HS	Tree Planting Projects	Baltimore City	$4,043.44	Complete	1.7	0.07	0.012
FY14	Alliance for the Chesapeake Bay	Baltimore Hebrew Congregation	Tree Planting Projects	Baltimore City	$503.76	Complete	0.942	0.038	0.0031
FY14	Alliance for the Chesapeake Bay	Chizuk Amuno	Tree Planting Projects	Baltimore	$1,574.25	Complete	1.1775	0.0475	0.003875
FY14	Alliance for the Chesapeake Bay	Benedictine Sisters of Baltimore Emmanuel Monastery	Tree Planting Projects	Baltimore	$818.61	Complete	0.74	0.05	0.008
FY14	Alliance for the Chesapeake Bay	Bennedictine Sisters of Baltimore	Tree Planting Projects	Baltimore	$364.00	Complete	1.425	0.1	0.0158
					$67,810.54	TOTAL COMPLETED	9.44	0.48	0.06
FY13	Parks & People Foundation	Howard Dog Park	Stormwater Management	Baltimore City	$61,000.00	Construction	0.99	0.16	0.061
FY13	Parks & People Foundation	Druid Hill Park Bio-Filter Installation (Remove Impervious 9)	Stormwater Management	Baltimore City	$113,000.00	Construction	29.58	2.41	0.98
FY14	Chesapeake Bay Trust	Mount Vernon-Belvedere Tree Pit Creation and Expansion Project	Tree Planting Projects	Baltimore City	$13,570.00	Design/Planning	188	0.08	12.4
FY14	Chesapeake Bay Trust	Improving Tree Health and Canopy in CREATES Neighborhoods	Tree Planting Projects	Baltimore City	$188,105.00	Design/Planning	28	1.9	0.3
FY14	Chesapeake Bay Trust	Improving Tree Health and Canopy in CREATES Neighborhoods	Tree Planting Projects	Baltimore City	$42,817.00	Design/Planning	0	0	0
FY14	Chesapeake Bay Trust	Reservoir Hill Tree Canopy Project	Tree Planting Projects	Baltimore City	$60,827.00	Design/Planning	74.699997	9.2	2.6
FY15	Parks and People Foundation	708 Whitelock Street	Stormwater Management	Baltimore City	$82,388.44	Design/Planning	0.43	0.08	0.02
FY15	Parks and People Foundation	3700 Cottage Ave	Stormwater Management	Baltimore City	$101,312.92	Design/Planning	0.47	0.49	0.12
FY15	Blue Water Baltimore	Chizuk Amuno Synagogue	Stormwater Management	Baltimore	$233,771.22	Design/Planning	1.69	0.14	0.03
FY13	Parks & People Foundation	Phase I: Samuel Coleridge-Taylor 507 Preston Street Green Space Creatio	Tree Planting Projects	Baltimore City	$50,000.00	Permit	0	0	0
FY14	Parks and People Foundation	507 W Preston St, Samuel Coleridge Taylor Elem	Stormwater Management	Baltimore City	$52,656.36	Permit	0.13	0.13	0.03
FY13	Trout Unlimited	Jones Falls Stream Restoration	Stream Restoration	Baltimore	$425,000.00	Permit	0	0	0
	(1) Maryland DNR Trust Fund database 10/27/15.				$1,424,447.94	TOTAL WORKING	323.99	14.59	16.54

Appendix
Watershed Eligible for 319(h) Grant Implementation Funding

Lower Monocacy River Watershed in Frederick County, Maryland

Contents

Introduction

The *Lower Monocacy River Watershed Restoration Action Strategy Supplement* was completed by Frederick County in July 2008 and EPA accepted the plan 7/30/2008. The part of the watershed encompassed by the watershed plan is the Frederick County portion of the watershed. (Small upstream portions of the watershed are in Carroll and Montgomery Counties, Maryland.)

Pollutant reduction goals are listed on watershed plan page 11:

- Table J: 25-year for agricultural BMP implementation
- Table K: 25-year goal for urban BMP implementation
- Overall pollutant load reduction goals are summarized in the sentence immediately following the tables.

BMP implementation goals:

- Agricultural BMPs: Table R on page 22.
- Urban BMPs: Table T on page 25.

Base Year for watershed plan implementation is 2003. Pollutant load reductions that year and thereafter can be counted toward meeting watershed plan goals. The TMDL for Lake Linganore phosphorus and sediment in Section 2.2 page 5 indicates that monitoring data used for the TMDL was collected in 2002. The 2008 Lower Monocacy watershed plan goals for nitrogen, phosphorus and sediment reduction are based on Tributary Strategy goals and County calculations. The 2008 plan does not address more recent TMDLs.

Milestones

Maryland's 2015-2019 NPS Management Plan Objective 5 includes two milestones for this watershed:

- Annually: Report progress in the 319 Annual Report, and
- In 2018 assess plan implementation progress and in 2019 update plan if needed.

Lower Monocacy River Watershed
1992-2015 Completed 319(h) Grant NPS Implementation Projects

Project Summary			Project Expenditures					Pollutant Load Reduction		
Area/Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Non Federal Match	Total	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal	State					
MDA with Frederick SCD	Monocacy Agri Enforcement		319 FFY1992 #4	$55,530	Grant budget amount is shown. Expenditure data is not available.			Completed projects shaded grey predate the baseline year for the watershed plan and are not counted toward implementation progress reporting. Blank spaces indicate that information was not available.		
	Moncacy Eng Tech / SCS		319 FFY1992 #5	$52,000						
	Monocacy Demo Monitor/Model		319 FFY1992 #9	$71,438						
	Engineering Support - Monocacy	1994	319 FFY1993 #6							
	Monocacy Watershed Initiative		319 FFY1994 #2							
	Monocacy Watershed	1996	319 FFY1995 #14	$83,190						
	Agricultural Implementation	2006	319 FFY04 #23	$74,767.61		$49,845.07	$124,612.68	1,296.3	171.6	4.7
	Agricultural Implementation	2008	319 FFY04 #39	$35,000.00		$23,333.33	$58,333.33	609.64	118.36	10
Frederick County	Watershed Restoration	2008	319 FFY05 #17	$216,237.00		$144,158.00	$360,395.00	615.9	43.9	8.2
	Urban Wetlands, Bennett Creek Pilot	2011	319 FFY07 #4	$196,732.92		$131,155.28	$327,888.20	101.3	18.5	1.6
		2012	319 FFY08 #4	$228,361.26		$152,240.84	$380,602.10	149.9	31.4	2.782
	Green Infrastructure	2013	319 FFY10 #9	$284,739.42		$189,826.28	$572,971.98	350.94	34.13	4.07
			TOTAL for completed projects	$1,297,996.21	$0.00	$690,558.81	$1,824,803.30	3,124.0	417.9	31.35

For nitrogen, phosphorus and sediment, BMPs installed 2003 and later can be counted toward watershed plan implementation.

SFY 2015 319(h) Grant NPS Implementation Project Activity - Lower Monocacy River Watershed

Project Summary			Project Funding					Projected Pollutant Load Reduction		
Area/Lead	Name/Dsescription	End Date	Grant Funding Source	Grant Funds		Non Federal Match	Total	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal	State					
Frederick County	Neighborhood Green Infrastructure	TBD	319 FFY13 #7	$97,000		$64,667	$161,667	29	2	TBD

Lower Monocacy River Watershed
2011-2015 Completed State Revolving Fund NPS Implementation Projects

Project Summary			Project Expenditures					Pollutant Load Reduction		
Area/Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match $	Total $	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)	Bacteria (MPN)
				Federal $	State $						
	no completed SRF-funded projects										
			TOTAL for completed projects	$0.00	$0	$0.00	$0.00	0	0	0	0

Summary of State Revolving Fund Projects Activity in 2015 - Lower Monocacy River Watershed

Project Summary			Project Funding					Projected Pollutant Load Reduction			
Area/Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match $	Total $	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)	Bacteria (MPN)
				Federal $	State $						
	no SRF projects currently working										

Lower Monocacy River Falls Watershed
Chesapeake and Atlantic Coastal Bays Trust Fund
SFY 2015 NPS Implementation Project Status (1)

State FY	Partner	Project	Project_Type	County	Trust_Fund	Status	Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment ton/yr
FY14	Frederick County Government	Mountain Village HOA (Riparian Buffers for Frederick Co. Streams - Student & Community Collaborative Service)	Tree Planting Projects	Frederick	$15,212.61	Complete	14.33	0.975	0.1575
FY14	Frederick County Government	Crestwood Middle School (Riparian Buffers for Frederick Co. Streams - Student & Community Collaborative Service)	Tree Planting Projects	Frederick	$7,727.04	Complete	11.46	0.78	0.126
FY14	City of Frederick	Carroll Creek/Baker Park (III) (The City of Frederick Stream Restoration and Educational Projects)	Tree Planting Projects	Frederick	$34,097.70	Complete	201	13.44	2.38
FY14	City of Frederick	Carroll Creek/Baker Park (II)	Tree Planting Projects	Frederick	$10,716.42	Complete	63.18	4.22	0.75
FY14	Alliance for the Chesapeake Bay	Centennial Memorial	Tree Planting Projects	Frederick	$364.00	Complete	0.942	0.038	0.0031
FY14	City of Frederick	Carroll Creek/Baker Park (I) (The City of Frederick Stream Restoration and Educational Projects)	Tree Planting Projects	Frederick	$12,664.86	Complete	74.699997	5	0.88
FY14	City of Frederick	Waterford Park (The City of Frederick Stream Restoration and Educational Projects)	Tree Planting Projects	Frederick	$52,607.88	Complete	310.179993	20.73	3.67
FY14	City of Frederick	Old Camp Park (The City of Frederick Stream Restoration and Educational Projects)	Tree Planting Projects	Frederick	$1,948.44	Complete	11.5	0.77	0.14
FY14	Land and Cultural Preservation Fund	Dearbought Park	Tree Planting Projects	Frederick	$2,721.65	Complete	9.74	0.4	0.07
FY14	City of Frederick	Rivermist, City Parkland (The City of Frederick Stream Restoration and Educational Projects)	Tree Planting Projects	Frederick	$2,435.55	Complete	14.4	0.96	0.17
FY14	City of Frederick	Career & Technology Center (The City of Frederick Stream Restoration and Educational Projects)	Education & Outreach	Frederick	$19,877.00	Complete	0	0	0
					$160,373.15	TOTAL COMPLETED	711.43	47.31	8.35
FY14	Center for Watershed Protection	Hood College, Whitaker Parking lot / Rosenstock Hall	Stormwater Management	Frederick	$36,923.00	Design/Planning	2.4	0.3	0.16
FY14	Center for Watershed Protection	Hood College, North of Coffman Chapel	Stormwater Management	Frederick	$56,550.00	Design/Planning	21.6	1.4	0.57
FY15	Delmarva RC & D Council	Cassis	Wetland Restoration	Frederick	$2,460.00	Design/Planning	2.222	0.196	0.01
FY15	MD Forestry Conservancy Dist. Boards	Stoneking Reforestation	Tree Planting Projects	Frederick	$7,000.00	On-going	0	1	0.28
FY15	MD Forestry Conservancy Dist. Boards	Friends Meeting School Reforestation	Tree Planting Projects	Frederick	$10,000.00	On-going	1	1	0.43
FY15	MD Forestry Conservancy Dist. Boards	Reid Reforestation	Tree Planting Projects	Frederick	$6,000.00	On-going	0	1	0.23
FY14	City of Frederick	Fredericktowne Village Park (The City of Frederick Stream Restoration and Educational Projects)	Tree Planting Projects	Frederick	$23,868.39	On-going	104.699997	9.41	1.67
FY14	City of Frederick	Walnut Ridge (The City of Frederick Stream Restoration and Educational Projects)	Tree Planting Projects	Frederick	$19,484.40	On-going	114.879997	7.68	1.36
	(1) Maryland DNR Trust Fund database 10/26/15.				$162,285.79	TOTAL WORKING	246.80	21.99	4.71

SFY2015 Agricultural BMP Implementation
Lower Monocacy River Watershed
In Frederick County, Maryland

Agricultural Best Management Practice	Unit	SFY15 Total	Estimated Pollutant Load Reduction: Nitrogen Total (lbs)	Phosphorus Total (lbs)	Sediment Total (tons)
Alternative Crops	acres	0			
Amendments for the Treatment of Ag Was	AU	0			
Animal Mortality Facility	count	0			
Conservation Cover	acres	7.1	0	0	0
Conservation Plans/SCWQP	acres	2,467	8,774.2	626.4	552.51
Cover Crops	acres	12,993	191,259.0	1,166.8	999.86
Critical Area Planting	acres	4.6	0	0	0
Dead Bird Composting Facility	count	0			
Fencing	feet	31,286	3,417.2	300.3	80.22
Field Border	acres	0			
Filter Strip	acres	0			
Grassed Waterway	acres	4.87	261.8	7.8	4.15
Horse Pasture Management	acres	0			
Loafing Lot Management System	acres	0.54	35.7	5.8	0.43
Pasture & Hay Planting	acres	9	0	0	0
Prescribed Grazing	acres	164.2	0.0	77.5	14.91
P-sorbing Materials	acres	0			
Riparian Forest Buffer	acres	13.8	1,065.4	21.8	11.80
Riparian Herbaceous Cover	acres	2	106.8	3.2	1.70
Roof Runoff Structure	count	1	66.5	10.8	0.81
Stream Restoration Ag	feet	0			
Tree/Shrub Establishment	acres	0			
Waste Storage Facility	count	4			
Wastewater Treatment Strip	acres	0			
Water Control Structure	count	0			
Watering Facility	count	10	0.0	15.7	3.03
Wetland Creation	acres				
Wetland Restoration	acres				
Windbreak/Shelterbelt Establishment	feet				
Total Pollutant Load Reduction			204,986.6	2,236.1	1,669.43
Total Annual Practices (2)			191,259.0	1,166.8	999.86
Total Multi-year Practices			13,727.6	1,069.3	669.57

"SFY15 Total" column is MDA data. MDE used MAST to estimate pollutant load reductions.

The Maryland Department of Agriculture defines annual practices as cover crops, nutrient mgmt, manure transport, conservation tillage & high residue tillage.

Lower Monocacy River Watershed Plan
Agricultural BMP Implementation Goals

Management Practice Plan Table R	Goal	Unit	SFY2015 Progress	SFY2014 thru SFY2015
Soil Conservation & Water Quality Plans	58,292	acres	2,467	4,515
Cover Crops	25,111	acres/yr	12,993	
Buffers Grass - Agriculture	789	acres	0	0
Buffers Forested - Agriculture	2,233	acres	13.8	13.8
Tree Planting - Agriculture	444	acres	0	0.3
Animal Waste Mgmt - Livestock	165	count	4	7
Animal Waste Mgmt - Poultry	3			
Wetland - Agriculture	376	acres	0	0
Conservation Tillage	24,032	acres/yr		
Nutrient Management	47,897	acres		
Retirement of Highly Erodible Land	2,185	acres		
Stream Protection with Fencing	1,471	acres		
Stream Protection without Fencing	207	acres		

SFY2015 Urban BMP Implementation
Lower Monocacy River Watershed In Frederick County, Maryland

Urban Management Practice	Unit	BMPs Reported	Estimated Pollutant Load Reduction		
			Nitrogen lb/yr	Phosphorus lb/yr	Sediment tons/yr
Bioretention (A)	acres	7.60	129.20	7.60	1.581
Bioswale (A)	acres	0			
Cisterns & Rain Barrels (A)	acres	0.78	6.32	1.56	0.436
Disconnection of Rooftop Runoff (A)	acres	0			
Dry Detention Ponds & Hydro Structures (A)	acres	0			
Dry Extended Detention Ponds (A)	acres	5.32	23.94	1.60	0.732
Dry Well (A)	acres	0			
Filtering Practices (A)	acres	0			
Forest Conservation	acres	0			
Forest Harvesting Practices	acres	0			
Infiltration Practices (A)	acres	4.74	86.27	4.74	1.013
Permeable Pavement (A)	acres	0.59	10.03	0.53	0.115
Rain Garden (A)	acres	0.23	3.91	0.23	0.048
Reduction of Impervious Surface (A)	acres	0			
Riparian Forest Buffers on Urban Lands (B)	acres	1.60	122.40	3.20	1.426
Septics Connections to Sewers	count	0			
Septic Denitrification Critical Area	count	0			
Septic Denitrification outside of 1000 feet	count	65	234.00		
Septic Denitrification within 1000 feet	count	10	60.00		
Septic Tank Pumpout	count	0			
Stream Restoration Urban	feet	0			
Street Sweeping (A)	acres	0			
Tree Planting	acres	0			
Urban Forest Buffer (B)	acres	1.00	5.60	0.60	0.115
Wet Extended Detention (A)	acres	0			
Wet Ponds and Wetlands (A)	acres	0			
Urban TOTAL Pollutant Load Reduction			681.67	20.06	5.466

"BMPs Reported" column is MDE data 12/9/15.
Pollution load reduction is estimated by MDE using MAST.

Lower Monocacy River Watershed Plan

Plan Page 25	Urban Management Practice	Goal	Unit	SFY2015 Progress	SFY2014 thru SFY2015
Table T	Septic Denitrification (upgrade & connection to sewer)	17,784	count	75	102
Table T	Stream Restoration, Urban	956	feet		
Table T	Tree Planting (urban)	20	acres		
Table T	Buffers Forested, Urban (B)	73	acres	2.60	54.66
Table T	Nutrient Management mixed	18,461	acres		
Table T	Nutrient Management urban	17,427	acres		
Table T	Sediment & Erosion Control	1,460	acres		
Table T	Stormwater Management (A)	6,780	acres	19.26	19.58

(A) Watershed plan goal "Stormwater Management" progress aggregates reporting for BMPs footnoted (A).

(B) Watershed plan goal "Buffers Forested, Urban" aggregates reporting for BMPs footnoted (B).

SFY2014 Agricultural BMP Implementation
Lower Monocacy River Watershed
In Frederick County, Maryland

Agricultural Best Management Practice	Unit	SFY14 Total	Nitrogen Reduction lb/acre	Nitrogen Reduction Total (lbs)	Phosphorus Reduction lb/acre	Phosphorus Reduction Total (lbs)	Sediment Reduction lb/acre	Sediment Reduction Total (tons)
Alternative Crops	acres	0						
Amendments for the Treatment of Ag Waste	AU	0						
Animal Mortality Facility	count	0						
Conservation Cover	acres	19.2						
Conservation Plans/SCWQP	acres	2,048	1.95913	4012.3	0.17422	356.8	253.211	259.29
Cover Crops	acres	13,548	6.77773	91824.7				
Critical Area Planting	acres	9.6						
Dead Bird Composting Facility	count	0						
Fencing	feet	1,147	196.043	6424.6	22.2175	728.1	6385.53	104.63
Field Border	acres	0						
Filter Strip	acres	0						
Grassed Waterway	acres	0.41	53.4146	21.9	1.70732	0.7	1626.1	0.33
Horse Pasture Management	acres	0						
Loafing Lot Management System	acres	0.56	116.607	65.3	19.8214	11.1	1611.43	0.45
Pasture & Hay Planting	acres	0						
Prescribed Grazing	acres	3.8	1.47368	5.6	0.5	1.9	181.763	0.35
P-sorbing Materials	acres	0						
Riparian Forest Buffer	acres	0						
Riparian Herbaceous Cover	acres	0						
Roof Runoff Structure	count	3	116.7	350.1	19.6667	59	1611.03	2.42
Stream Restoration Ag	feet	0						
Tree/Shrub Establishment	acres	0.3	2.66667	0.8	0.66667	0.2	286.333	0.04
Waste Storage Facility	count	3						
Wastewater Treatment Strip	acres	0						
Water Control Structure	count	1	20.47	204.7				
Watering Facility	count	3	0.69333	20.8	0.16333	4.9	60.59	0.91
Wetland Creation	acres	0						
Wetland Restoration	acres	0						
Windbreak/Shelterbelt Establishment	feet	0						
Total SFY14 Pollutant Load Reduction				102,931		1,163		368.42
Total SFY14 Annual Practices (2)				91,825		0		0
Total SFY14 Multi-year Practices				11,106		1,163		368.42

(1) "SFY14 Total" column data is May 2015.
(2) Annual Practices: cover crops, nutrient mgmt, manure transport, conservation tillage & high residue tillage.

Lower Monocacy River Watershed Plan

Agricultural BMP Implementation Goals

Management Practice Plan Table R	Goal	Unit	SFY2014 Progress
Soil Conservation & Water Quality Plans	58,292	acres	2,048
Cover Crops	25,111	acres/yr	13,548
Buffers Grass - Agriculture	789	acres	0
Buffers Forested - Agriculture	2,233	acres	0
Tree Planting - Agriculture	444	acres	0.3
Animal Waste Mgmt - Livestock	165	count	3
Animal Waste Mgmt - Poultry	3		
Wetland - Agriculture	376	acres	0
Conservation Tillage	24,032	acres/yr	0
Nutrient Management	47,897	acres	0
Retirement of Highly Erodible Land	2,185	acres	
Stream Protection with Fencing	1,471	acres	
Stream Protection without Fencing	207	acres	

SFY2014 Urban BMP Implementation
Lower Monocacy River Watershed In Frederick County, Maryland

Urban Management Practice	Unit	BMPs Reported	Estimated Pollutant Load Reduction		
			Nitrogen lb/yr	Phosphorus lb/yr	Sediment tons/yr
Bioretention (1)	acres	0.32	5.63	0.29	0.07
Bioswale (1)	acres	0			
Disconnection of Rooftop Runoff (1)	acres	0			
Dry Detention Ponds & Hydro Structures (1)	acres	0			
Dry Extended Detention Ponds (1)	acres	0			
Dry Well (1)	acres	0			
Filtering Practices (1)	acres	0			
Forest Conservation	acres	0			
Forest Harvesting Practices	acres	0			
Infiltration Practices (1)	acres	0			
Permeable Pavement (1)	acres	0			
Reduction of Impervious Surface (1)	acres	0			
Riparian Forest Buffers on Urban Lands (2)	acres	44.91	1661.67	89.82	32.18
Septics Connections to Sewers	count	0			
Septic Denitrification Critical Area	count	0			
Septic Denitrification outside of 1000 feet	count	11	39.60		
Septic Denitrification within 1000 feet	count	16	96.00		
Stream Restoration Urban	feet	0			
Street Sweeping (1)	acres	0			
Tree Planting	acres	0			
Urban Forest Buffer (2)	acres	7.15	39.33	4.29	0.84
Wet Ponds and Wetlands (1)	acres	0			
Urban TOTAL Pollutant Load Reduction			1,842.23	94.40	33.08

(1) "BMPs Reported column data is May 2015.

Lower Monocacy River Watershed Plan

Plan Page 25	Urban Management Practice	Goal	Unit	SFY2014 Progress
Table T	Septic Denitrification (upgrade & connection to sewer)	17,784	count	27
Table T	Stream Restoration, Urban	956	feet	
Table T	Tree Planting (urban)	20	acres	
Table T	Buffers Forested, Urban (2)	73	acres	52.06
Table T	Nutrient Management mixed	18,461	acres	
Table T	Nutrient Management urban	17,427	acres	
Table T	Sediment & Erosion Control	1,460	acres	
Table T	Stormwater Management (1)	6,780	acres	0.32

(1) Watershed plan goal "Stormwater Management" progress aggregates reporting for BMPs footnoted (1).

(2) Watershed plan goal "Buffers Forested, Urban" aggregates reporting for BMPs footnoted (2).

Appendix
Watershed Eligible for 319(h) Grant Implementation Funding

Middle Gwynns Falls in Baltimore City and Baltimore County, Maryland

Contents

Introduction

The *Middle Gywnns Falls Small Watershed Action Plan* was completed by Baltimore County in September 2013, an addendum was completed in April 2014, and the overall plan was accepted by EPA in April 2014. The part of the watershed encompassed by the watershed plan is the Baltimore County portion of the watershed. Land use in Baltimore County's Middle Gwynns Falls watershed is 60.9% residential (0.6% low density, 42.5% mid density and 15.2% high density). Various other developed land uses cover 21.1% of the watershed (8.3% commercial, 3.5% industrial, 6.4% institutional and 2.9 transportation). Open land uses account for the remaining 17.9% of the watershed area (5.2% open urban, 12.5% forest and 0.2% agriculture). Overall, impervious surfaces cover 28.9% of the watershed.

Pollutant reduction goals by 2025 (and location within the watershed plan):

- Nitrogen: 50,442 pounds per year (Table 3-3 on page 23).
- Phosphorus: 4,086 pounds per year (Table 3-3 on page 23).
- Sediment: 4,357,308 pounds per year, i.e. 2,179 tons per year (Addendum A Table A-5).
- Fecal Bacteria: varies by monitoring station (Addendum A Table A-12).
- Chloride: The plan has a general goal to reduce in-stream chloride levels.

BMP implementation goals:

- Nitrogen and phosphorus: Appendix A Table A-2.
- Sediment: Addendum A Table A-6.
- Bacteria: Addendum A Section A.3.2

There are three different base years for tracking watershed plan implementation:

- Nitrogen and phosphorus base year is 2011. Pollutant load reductions reported that year and thereafter can be counted toward meeting watershed plan goals. The watershed plan Section 2.2 pages 12-15 indicates that the goal is to help meet the "bay-wide Chesapeake Bay TMDL" completed in 2010. Watershed plan Section 3.4.1.1 page 22 indicates that the baseline NPS load estimates in the plan were derived from 2010 land use data.

- Sediment base year is 2008. Pollutant load reductions reported that year and thereafter can be counted toward meeting watershed plan goals. The watershed plan Addendum A.2.1 indicates that the sediment reduction goal is based land use data from 2007 aerial imagery. The Bay TMDL is based on Chesapeake Bay Program P5 model land uses (pages 5-7) and the edge-of-field target erosion rated (pages 8-12).
- Bacteria base year is 2004. Pollutant load reductions reported that year and thereafter can be counted toward meeting watershed plan goals. The watershed plan Addendum A Section A.3 indicates that the bacteria reduction goal is based on the Gwynns Falls Bacteria TMDL approved by EPA in 2007. The Bacteria TMDL Section 2.2 pages 10-12 indicate that the TMDL is based on monitoring conducted 2003 and earlier.

Milestones

Maryland's 2015-2019 NPS Management Plan Objective 5 lists one milestone for this watershed: annually report progress in the 319 Annual Report.

Urban BMP tracking/reporting

Middle Gwynns Falls Watershed Plan					
Goal and Implementation Progress					
Management Practice	**SWAP Goal**	**Units**	**2013-SFY14 Progress**	**SFY15 Activity**	**2008-SFY15 Progress**
6. Stormwater Retrofits	20	projects	0	0	0
8. Downspout Disconnection	89	rooftop acres	0.16	0.13	0.29
9. Wetland creation (urban)	1	project			
13. Riparian Buffer Trees	127	acres	0.01	0	0.01
14. Street and Shade Trees	28.8	acres			
15. Institutional Trees	46.7	acres	0.01	0	0.01
33. Stream Restoration	32,432	linear feet	0	0	0
Baltimore County data received by MDE 2/4/2016.					

The table above presents Baltimore County tracking of watershed plan implementation progress by the Department of Environmental Protection & Sustainability, Watershed Management and Monitoring Section. Additionally, the County also used their own methods for estimating pollutant load reduction that are reported elsewhere in the SFY2015 Annual Report.

Agricultural BMP tracking/reporting

For agricultural BMPs, the *Middle Gwynns Falls Small Watershed Action Plan* does not include implementation goals. This is in part because agriculture accounts for less than one percent of the land area in the watershed. However, during state fiscal years 2014 and 2015, there were reports of agricultural cover crop implementation in the watershed. See tables on the following pages.

Water Quality Monitoring Activity, Overall Condition, Trends

Baltimore County's 2015 NPDES Report Table 9-30 includes bacteria monitoring information that is the basis for the 15% reduction indicated in the SFY15 Annual Report. According to the report, the only sampling site in the SWAP area that reported bacteria loads in 2014 "GWY-2" showed a 2014 seasonal low geometric mean of 314 MPN/100 ml. MDE data for this site indicated a seasonal dry weather geometric mean of 373 MPN/100 ml (from Section 9.4.2.2, page 9-77, GWY-2 (GWN0115)). The 2014 concentration is 15% less than the MDE data. (Additional water quality information is in the 2014 Annual Report)

Middle Gwynns Falls (In Baltimore County only)
2011-2015 Completed 319(h) Grant NPS Implementation Projects

Project Summary			Project Expenditures				Pollutant Load Reduction			
Area/Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match $	Total $ (1)	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)	Bacteria (MPN)
				Federal $	State $						
Baltimore County	Scotts Level McDonogh Road Watershed Restoration Project	2014	319 FFY12 #5	$320,004		$213,336	$533,340	415.20	136.4	306.2	0
			TOTAL for completed projects	$320,004.00	$0	$213,336.00	$533,340.00	415	136	306	0

For nitrogen and phosphorus pollutant loads, BMPs installed 2011 and later can be counted toward watershed plan implementation.
For sediment pollutant loads, BMPs installed 2011 and later can be counted toward watershed plan implementation.

SFY 2015 319(h) Grant NPS Implementation Projects - Middle Gwynns Falls Watershed

Project Summary			Project Funding					Projected Pollutant Load Reduction			
Area/Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match $	Total $	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)	Bacteria (MPN)
				Federal $	State $						
	no 319(h) Grant projects currently working										

Middle Gwynns Falls Watershed
Chesapeake and Atlantic Coastal Bays Trust Fund
SFY 2015 NPS Implementation Project Status (1)

State FY	Partner	Project	Project_Type	County	Trust_Fund	Status	Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment ton/yr
FY13	Baltimore County	Scotts Level Branch at McDonough Retrofit, Stream Restoration, and Buffer	Stream Restoration	Baltimore	$680,000.00	Complete	418.700012	134	0.153
					$680,000.00	TOTAL COMPLETED	418.70	134	0.15
FY14	Baltimore County	Dead Run at Westview Park Stream Restoration	Stream Restoration	Baltimore	$1,225,312.00	Design/Planning	609.900024	280.899994	46.799999
FY14	Baltimore County	Powhatan ES	Tree Planting Projects	Baltimore	$4,640.13	Design/Planning	4.58	0.31	0.05
(1) Maryland DNR Trust Fund database 10/26/15.					$1,229,952.13	TOTAL WORKING	614.48	281.21	46.85

SFY2015 Agricultural BMP Implementation
Middle Gwynns Falls Watershed
In Baltimore County, Maryland

Agricultural BMP	Unit	SFY15 Total	Estimated Pollutant Load Reduction: Nitrogen Total (lbs)	Phosphorus Total (lbs)	Sediment Total (tons)	E. Coli MPN/ 100ml
Alternative Crops	acres	0				
Amendments for the Treatment of Ag Wast	AU	0				
Animal Mortality Facility	count	0				
Conservation Cover	acres	0				
Conservation Plans/SCWQP	acres	0				
Cover Crops	acres	12.1	78.2			
Critical Area Planting	acres	0				
Dead Bird Composting Facility	count	0				
Fencing	feet	0				
Field Border	acres	0				
Filter Strip	acres	0				
Grassed Waterway	acres	0				
Horse Pasture Management	acres	0				
Loafing Lot Management System	acres	0				
Pasture & Hay Planting	acres	0				
Prescribed Grazing	acres	0				
P-sorbing Materials	acres	0				
Riparian Forest Buffer	acres	0				
Riparian Herbaceous Cover	acres	0				
Roof Runoff Structure	count	0				
Stream Restoration Ag	feet	0				
Tree/Shrub Establishment	acres	0				
Waste Storage Facility	count	0				
Wastewater Treatment Strip	acres	0				
Water Control Structure	count	0				
Watering Facility	count	0				
Wetland Creation	acres	0				
Wetland Restoration	acres	0				
Windbreak/Shelterbelt Establishment	feet	0				
Total Pollutant Load Reduction (1)			78.2	0	0	0
Total Annual Practices (2)			78.2	0	0	0
Total Multi-year Practices			0	0	0	0

(1) "SFY15 Total" column is 12/30/15 MDA data.

(2) Annual Practices: cover crops, nutrient mgmt, manure transport, conservation tillage & high residue tillage.

Middle Gwynns Falls SWAP

Agricultural BMP Implemental Goals

Management Practice Appendix A Table A-2	Goal	Units	SFY2015 Progress
The Middle Gwynns Falls Small Watershed Action Plan has no goals for agricultural BMP implementation because only 0.2% of the watershed is categorized as agricultural land use.			

SFY2014 Agricultural BMP Implementation
Middle Gwynns Falls Watershed
In Baltimore County, Maryland

Agricultural BMP	Unit	SFY14 Total	Nitrogen Reduction lb/acre	Nitrogen Reduction Total (lbs)	Phosphorus Reduction lb/acre	Phosphorus Reduction Total (lbs)	Sediment Reduction lb/acre	Sediment Reduction Total (tons)	Bacteria Reduction lb/acre	Bacteria Reduction Total (tons)
Alternative Crops	acres	0								
Amendments for the Treatment of Ag Wast	AU	0								
Animal Mortality Facility	Count	0								
Conservation Cover	acres	0								
Conservation Plans/SCWQP	acres	0								
Cover Crops	acres	47.5	1.63579	77.7						
Critical Area Planting	acres	0								
Dead Bird Composting Facility	count	0								
Fencing	feet	0								
Field Border	acres	0								
Filter Strip	acres	0								
Grassed Waterway	acres	0								
Horse Pasture Management	acres	0								
Loafing Lot Management System	acres	0								
Pasture & Hay Planting	acres	0								
Prescribed Grazing	acres	0								
P-sorbing Materials	acres	0								
Riparian Forest Buffer	acres	0								
Riparian Herbaceous Cover	acres	0								
Roof Runoff Structure	count	0								
Stream Restoration Ag	feet	0								
Tree/Shrub Establishment	acres	0								
Waste Storage Facility	count	0								
Wastewater Treatment Strip	acres	0								
Water Control Structure	count	0								
Watering Facility	count	0								
Wetland Creation	acres	0								
Wetland Restoration	acres	0								
Windbreak/Shelterbelt Establishment	feet	0								
Total Pollutant Load Reduction				77.7		0		0		0
Total SFY14 Annual Practices (2)				77.7		0		0		0
Total SFY14 Multi-year Practices				0		0		0		0

(1) "SFY14 Total" column data is May 2015.

(2) Annual Practices: cover crops, nutrient mgmt, manure transport, conservation tillage & high residue tillage.

Middle Gwynns Falls SWAP

Agricultural BMP Implemental Goals

Management Practice Appendix A Table A-2	Goal	Units	SFY2014 Progress
The Middle Gwynns Falls Small Watershed Action Plan has no goals for agricultural BMP implementation because only 0.2% of the watershed is categorized as agricultural land use.			

Appendix
Watershed Eligible for 319(h) Grant Implementation Funding

Sassafras River Watershed in Frederick County, Maryland

Contents

Introduction

The *Sassafras Watershed Action Plan* was completed by the Sassafras River Association, a private nonprofit organization, in December 2009. EPA accepted the plan in January 2010. The watershed plan encompasses the portion of the watershed is in Cecil and Kent Counties, Maryland. The upstream portion of the watershed in Delaware is not included in the watershed plan.

Pollutant reduction goals are in watershed plan Executive Summary Table E.5 and are reiterated in Table 5.4 on page 108. The phosphorus load reduction goal equals the TMDL limit for NPS phosphorus. The implementation measures that the plan proposes to meet the phosphorus goal will also reduce nitrogen and sediment loads. The estimates of the load reductions for nitrogen and sediment associated with these implementation measures are the basis for the plans reduction goals for nitrogen and sediment. (see watershed plan section E6.0, paragraph 1, on page xxv.)

BMP implementation goals are in the watershed plan Executive Summary Table E.4 on pages xxv thru xxviii and are reiterated in Table 5.3 on pages 105 thru 108.

Base Year for watershed plan implementation is 1999. Pollutant load reductions that year and thereafter can be counted toward meeting watershed plan goals. The Sassafras River phosphorus TMDL Section 2.2 on page 6 indicates that monitoring data used to create the TMDL was collected in 1999.

Milestones

Maryland's 2015-2019 NPS Management Plan Objective 5 lists one milestone for this watershed: annually report progress in the 319 Annual Report.

Water Quality Monitoring Activity, Overall Condition, Trends

The information on this page was extracted from the Maryland Department of Natural Resources' publication: "*Upper Eastern Shore Basin Water Quality and Habitat Assessment Overall Condition 2012-2014*". This report did not have information on nontidal water quality. (Also see MDE's 2014 Annual Report.)

"Water quality in the [tidal] Sassafras River is fair due to high sediment levels. Habitat quality for underwater grasses is poor due to poor water clarity and high algal densities, and has gotten worse due to increasing algal densities. Harmful algal blooms of blue-green algae occur in most years and have led to human health impacts and beach closures at Betterton Beach. The area covered with underwater grass beds was 23% of the restoration goal during this period. Summer bottom dissolved oxygen levels are good."

"Table 2. Summary of tidal water quality and habitat quality indicators.

	Water Quality			Habitat Quality		
River	**Nitrogen**	**Phosphorus**	**Sediments**	**Algal Densities**	**Water Clarity**	**Summer Bottom DO**
Sassafras	**Meet**	**Meet**	**Fail**	**Increasing Fail**	**Fail**	**Meet**

Annual trends for 1999-2014 for nitrogen (total nitrogen), phosphorus (total phosphorus), sediment (total suspended solids), algal densities (chlorophyll *a*), and water clarity (Secchi depth). Summer bottom dissolved oxygen (DO) trends are for June through September data only.

Trends are either 'Increasing' or 'Decreasing' if significant at $p \leq 0.01$; blanks indicate no significant trend. Improving trends are in green, degrading trends are in red. [Annual Report editor note: DNR's Table 2 indicates that no significant annual trends were identified in the tidal Corsica River for the 1999-2014 analysis period.]

Nitrogen (dissolved inorganic nitrogen) levels below the level for nitrogen limitation 'Meet' criteria, otherwise 'Fail' criteria for 2012-2014 data.

Phosphorus (dissolved inorganic phosphorus), sediment (total suspended solids), algal densities (chlorophyll *a*) and water clarity (Secchi depth) either 'Meet' or 'Fail' submerged aquatic vegetation (SAV) habitat requirements for 2012-2014 data.

Summer (June through September) bottom dissolved oxygen levels either 'Meet' or 'Fail' EPA open-water 30-day dissolved oxygen criteria."

How do the Upper Eastern Shore Rivers compare to other Maryland rivers?

The Sassafras River is in the 'High Agriculture/Low Developed' land use category. Nitrogen and phosphorus levels are higher than most rivers and sediment levels are moderate. Algal levels are among the highest of all the rivers and water clarity is very low. Summer bottom dissolved oxygen levels are moderate.

Sassafras River Watershed									
2009-2015 Completed 319(h) Grant NPS Implementation Projects									
Project Summary			**Project Expenditures**				**Pollutant Load Reduction**		
Area/Lead	**Name/Description**	**End Date**	**Grant Funding Source**	**Grant Funds**		**Non Federal Match**	**Total**	**Nitrogen (lb/yr)**	**Phosphorus (lb/yr)**	**Sediment (ton/yr)**
				Federal	**State**					
SRA	Galena Elementary School stormwater	2013	319 FFY12 #8	$14,000.00		$9,333.33	$25,000.00	1.38	0.24	0.05
SRA	Phipps Treatment Wetlands & sediment trap	2015	319 FFY13 #8	$50,000		$33,333	$83,333	99.3	19.9	2.6
			TOTAL	$64,000.00	$0.00	$42,666.67	$108,333.33	100.7	20.2	2.65

For phosphorus pollutant load reduction, BMPs installed 1999 and later can be counted toward watershed plan implementation.

SFY 2015 319(h) Grant NPS Implementation Project Activity - Sassafras River Watershed										
Project Summary			**Project Expenditures**					**Pollutant Load Reduction**		
Area/Lead	**Name/Dsescription**	**End Date**	**Grant Funding Source**	**Grant Funds**		**Non Federal Match**	**Total**	**Nitrogen (lb/yr)**	**Phosphorus (lb/yr)**	**Sediment (ton/yr)**
				Federal	**State**					
	No 319(h) Grant projects now working									

Sassafras River Watershed
Chesapeake and Atlantic Coastal Bays Trust Fund
SFY 2015 NPS Implementation Project Status (1)

State FY	Partner	Project	Project_Type	County	Trust_Fund	Status	Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment tons/yr
FY12	Sassafras River Association	Phipps Dairy Farm Vertical Flow Treatment Wetland	Wetland Restoration	Kent	$224,350.00	Complete	75	7	0.00155
FY13	Kent County Public Schools	Sassafras Natural Resource Management Area Waterway and Drainage Buffer Restoration and Enhancement Project	Tree Planting Projects	Kent	$29,988.80	Complete	442.5	18.3	3.4
FY13	Sassafras River Association	Budds Landing	Stream Restoration	Cecil	$170,864.00	Complete	0	90	1.1
FY13	Sassafras River Association	Salfner Farm Stream Restoration	Stream Restoration	Cecil	$90,000.00	Complete	120	40.799999	93
FY13	Sassafras River Association	Crawford Treatment Wetland	Stormwater Management	Cecil	$165,100.50	Complete	2993	863	12
					$680,303.30	TOTAL COMPLETED	3630.5	1019.1	109.5
FY14	Kent County Public Schools	Sassafras Natural Resource Management Area Site II	Tree Planting Projects	Kent	$16,865.00	Construction	147.5	6.1	1.13
FY15	Sassafras River Association	Swantown Creek Stream Restoration	Stream Restoration	Kent	$1,198,922.00	Design/Planning	307.5	278.8	31
FY14	Sassafras River Association	Turners Creek Natural Resource Area Ravine Restoration	Stream Restoration	Kent	$121,643.80	Design/Planning	300	102	232.5
FY14	Chesapeake Bay Trust	Greener Wheeler Avenue Project, Phase 1	Stormwater Management	Kent	$92,615.00	Design/Planning	0.03	0	4.2
FY14	Chesapeake Bay Trust	Greener Wheeler Avenue Project, Phase 1	Stormwater Management	Kent	$4,817.00	Design/Planning	0	0	0
FY13	Sassafras River Association	Rt 301 Stormwater Conveyance	Stream Restoration	Cecil	$440,000.00	Permit	35	465	0.053
	(1) Maryland DNR Trust Fund database 10/27/15.				$1,874,862.80	TOTAL WORKING			

SFY2015 Agricultural BMP Implementation
Sassafras River Watershed
In Cecil County and Kent County, MD

Agricultural BMP	Unit	SFY2015 Total	Estimated Pollutant Load Reduction: Nitrogen Total (lbs)	Phosphorus Total (lbs)	Sediment Total (tons)
Alternative Crops	acres	0			
Amendments for Treatment of Ag Waste	AU	0			
Animal Mortality Facility	count	0			
Conservation Cover	acres	17.3			
Conservation Plans/SCWQP	acres	3,824	3,528.6	274.5	147.38
Cover Crops	acres	14,637	63,158.6	332.3	176.15
Critical Area Planting	acres	0			
Dead Bird Composting Facility	acres	0			
Fencing	feet	0			
Field Border	acres	0			
Filter Strip	acres	0			
Grassed Waterway	acres	0.24	6.9	0	0.05
Horse Pasture Management	acres	0			
Loafing Lot Management System	acres	0.1	24.1	4.2	0.02
Pasture & Hay Planting	acres	0			
Prescribed Grazing	acres	0			
P-sorbing Materials	acres	0			
Riparian Forest Buffer	acres	0			
Riparian Herbaceous Cover	acres	0			
Roof Runoff Structure	count	0			
Stream Restoration Ag	feet	720		49.5	5.67
Tree/Shrub Establishment	acres	0.25	0	0	0
Waste Storage Facility	count	0			
Wastewater Treatment Strip	acres	0			
Water Control Structure	count	4	23.7	0	0.00
Watering Facility	count	0			
Wetland Creation	acres	0.5	2.1	0.1	29.90
Wetland Restoration	acres	0			
Windbreak/Shelterbelt Establishment	feet	0			
Total Pollutant Load Reduction			66,744.0	661	359.17
Total Annual Practices (2)			63,158.6	332	176.15
Total Multi-year Practices			3,585.4	328	183.02

"SFY15 Total" column data is MDA 12/30/15. MDE used MAST to estimate pollutant load reduction.

The Maryland Department of Agriculture defines annual practices as cover crops, nutrient mgmt, manure transport, conservation tillage & high residue tillage.

Sassafras River Watershed Plan

Management Measures: Watershed Plan Table 5.1	Goal	Units	SFY2015 Progress
Cover Crops (#17, 19)	5000	acres/yr	14,637
#15 Stream Buffers	2	miles	
#21 Wetland Creation	5	count	
#3 Nutrient Management	100	acres	0
#14 Shoreline Buffers	1	mile	
#18 On Farm Source Control	5	farms	
#20 Innovative nutrient use	100	acres	
#22 Agricultural BMPs	500	acres	

Units of measure shaded red differ from State reporting units.

SFY2015 Urban BMPs Implemented
Sassafras River Watershed
In Cecil County and Kent County, Maryland

Urban Management Practices	Unit	BMPs Reported	Estimated Pollutant Load Reduction		
			Nitrogen lb/yr	Phosphorus lb/yr	Sediment lb/yr
Bioretention	acres	0			
Cisterns and Rain Barrels	acres	0			
Bioswale	acres	0			
Disconnection of Rooftop Runoff	acres	0			
Dry Detention Ponds & Hydro Structures	acres	0			
Dry Extended Detention Ponds	acres	0			
Dry Well	acres	0			
Filtering Practices	acres	0			
Forest Conservation	acres	0			
Forest Harvesting Practices	acres	0			
Infiltration Practices	acres	0			
Permeable Pavement	acres	0			
Rain Garden	acres	0			
Reduction of Impervious Surface	acres	0			
Riparian Forest Buffers on Urban Lands	acres	0			
Septics Connections to Sewers	count	0			
Septic Denitrification Critical Area	count	3	23.40		
Septic Denitrification outside of 1000 feet	count	1	3.10		
Septic Denitrification within 1000 feet	count	9	50.40		
Septic Tank Pumpout	count	0			
Stream Restoration Urban	feet	0			
Street Sweeping	acres	0			
Tree Planting	acres	0			
Urban Forest Buffer	acres	0			
Wet Extended Detention	acres	0			
Wet Ponds & Wetlands	acres	0			
Urban BMPs Total Pollutant Load Reduction			76.90	0	0

(1) "BMPs Reported" is MDe data 12/9/15. MDE used MAST to estimate polutant load reduction.

Sassafras River Watershed Plan

Urban Management Measures Watershed Plan Table 5.1	GOAL	Units	SFY2015 Progress
#5, #6, #10 Septic system upgrades	150	count	13
#1 Road retrofit & stream restore	3	count	
#12 Stabilize eroding ravines	1	miles	
#13 Stabilize eroding shoreline	0.5	miles	

Units of measure shaded red differ from State reporting units.

SFY2014 Agricultural BMP Implementation Sassafras River Watershed In Cecil County and Kent County, Maryland			Nitrogen Reduction		Phosphorus Reduction		Sediment Reduction	
Agricultural BMP	Unit	SFY2014 Total	lb/acre	Total (lbs)	lb/acre	Total (lbs)	lb/acre	Total (tons)
Alternative Crops	acres	0						
Amendments for Treatment of Ag Waste	AU	0						
Animal Mortality Facility	count	0						
Conservation Cover	acres	0		0		0		0
Conservation Plans/SCWQP	acres	3,512	1.22611	4306.1	0.07733	271.6	79.9303	140.358
Cover Crops	acres	12,839	0.54418	6986.7				
Critical Area Planting	acres	0.5						
Dead Bird Composting Facility	acres	0						
Fencing	feet	0						
Field Border	acres	0						
Filter Strip	acres	1.2	21.5833	25.9	0.66667	0.8	471.333	0.2828
Grassed Waterway	acres	5	21.54	107.7	0.68	3.4	472.12	1.1803
Horse Pasture Management	acres	0						
Loafing Lot Management System	acres	1	100.4	100.4	18.5	18.5	180.3	0.09015
Pasture & Hay Planting	acres	0						
Prescribed Grazing	acres	0						
P-sorbing Materials	acres	0						
Riparian Forest Buffer	acres	0						
Riparian Herbaceous Cover	acres	24.8	21.5565	534.6	0.64516	16	472.157	5.85475
Roof Runoff Structure	count	2	100.2	200.4	18.35	36.7	179.95	0.17995
Stream Restoration Ag	feet	0						
Tree/Shrub Establishment	acres	0						
Waste Storage Facility	count	2						
Wastewater Treatment Strip	acres	0						
Water Control Structure	count	2	74.7	149.4				
Watering Facility	count	0						
Wetland Creation	acres	0						
Wetland Restoration	acres	0						
Windbreak/Shelterbelt Establishment	feet	0						
Total SFY14 Pollutant Load Reduction				12,411		347		147.95
Total SFY14 Annual Practices (2)				6,987		0		0
Total SFY14 Multi-year Practices				5,424		347		148

(1) "SFY2014 Total" column data is May 2015.

(2) Annual Practices: cover crops, nutrient mgmt, manure transport, conservation tillage & high residue tillage.

Sassafras River Watershed Plan			
Management Measures			SFY2014 Progress
Watershed Plan Table 5.1	Goal	Units	
Cover Crops (#17, 19)	5000	acres/yr	12,839
#15 Stream Buffers	2	miles	
#21 Wetland Creation	5	count	
#3 Nutrient Management	100	acres	0
#14 Shoreline Buffers	1	mile	
#18 On Farm Source Control	5	farms	
#20 Innovative nutrient use	100	acres	
#22 Agricultural BMPs	500	acres	

Units of measure shaded red differ from State reporting units.

SFY2014 Urban BMPs Implemented
Sassafras River Watershed
In Cecil County and Kent County, Maryland

Urban Management Practices	Unit	BMPs Reported	Estimated Pollutant Load Reduction		
			Nitrogen lb/yr	lb/yr	Sediment lb/yr
Bioretention	acres	0			
Bioswale	acres	0			
Disconnection of Rooftop Runoff	acres	0			
Dry Detention Ponds & Hydro Structures	acres	0			
Dry Extended Detention Ponds	acres	0			
Dry Well	acres	0			
Filtering Practices	acres	0			
Forest Conservation	acres	0			
Forest Harvesting Practices	acres	0			
Infiltration Practices	acres	0			
Permeable Pavement	acres	0			
Reduction of Impervious Surface	acres	0			
Riparian Forest Buffers on Urban Lands	acres	0			
Septics Connections to Sewers	count	0			
Septic Denitrification Critical Area	count	0			
Septic Denitrification outside of 1000 feet	count	0			
Septic Denitrification within 1000 feet	count	0			
Stream Restoration Urban	feet	0			
Street Sweeping	acres	0			
Tree Planting	acres	0			
Urban Forest Buffer	acres	0			
Wet Ponds & Wetlands	acres	0			
Urban BMPs Total Pollutant Load Reduction			0.00	0.00	0.00

(1) During SFY2014, no urban BMP implementation was reported as of May 2015.

Sassafras River Watershed Plan

Urban Management Measures Watershed Plan Table 5.1	GOAL	Units	SFY2014 Progress
#5, #6, #10 Septic system upgrades	150	count	0
#1 Road retrofit & stream restore	3	count	
#12 Stabilize eroding ravines	1	miles	
#13 Stabilize eroding shoreline	0.5	miles	

Units of measure shaded red differ from State reporting units.

Appendix
Watershed Eligible for 319(h) Grant Implementation Funding

Upper Choptank River Watershed in Caroline County, Maryland

Contents

Introduction

The *Upper Choptank River Watershed Based Plan* was completed by Caroline County in November 2010 and EPA accepted the plan in December 2010. The part of the watershed encompassed by the watershed plan is in Caroline County, Maryland. Two parts of the Choptank River watershed are not included in the plan: 1) the upstream portion of the watershed in Delaware and a very small area of Queen Anne's County, and 2) the downstream portion of the watershed in the State 8-digit watershed designated 02130404 in Talbot County and further downstream.

Pollutant reduction goals are in watershed plan Table 3 on page 13.

BMP implementation goals are in three parts of the plan:
- Agricultural BMPs in Table 4 on page 15
- Urban BMPs in Table 5 on page 18
- Septic system upgrades or connection to treatment plants in Table 6 on page 20.

Base Year for watershed plan implementation is 2002. Pollutant load reductions that year and thereafter can be counted toward meeting watershed plan goals. The baseline year and plan goals are derived from the work of the Maryland Tributary Team for the Choptank River Basin. No TMDL for nutrients and/or sediment applied to the watershed at the time the watershed plan was written.

Milestones

Maryland's 2015-2019 NPS Management Plan Objective 5 includes two milestones for this watershed:
- Annually: Report progress in the 319 Annual Report, and
- 2015: Assess implementation progress and update the plan if needed.

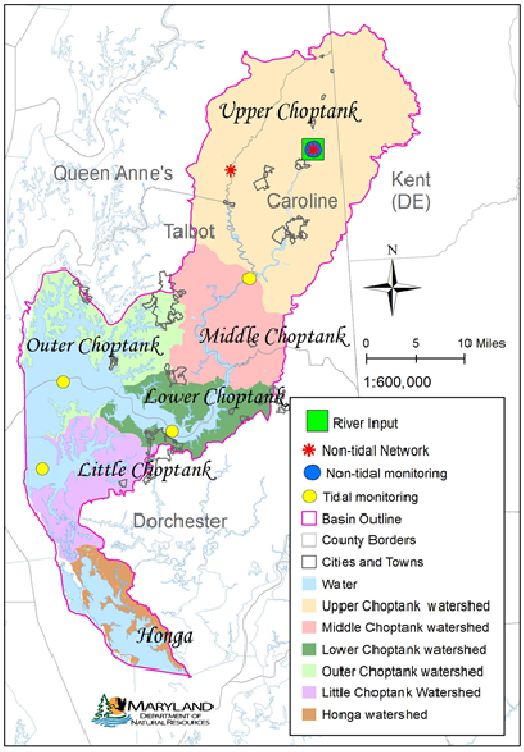
Pollution Load Reduction Progress

The Annual Report table Pollution Load Reduction Progress is repeated on the next page with additional details and notes added. In general, estimates of the pollution load reduction in the watershed for two primary sources:

1) State Fiscal Year reporting Chesapeake Bay WIP implementation progress for NPS BMP implementation used for EPA's Chesapeake Bay model. For this annual report, data was available for SFY14 and SFY15 only. Annual BMPs like cover crops are counted only for the current reporting year.
2) 319 projects reporting multi-year BMP load reductions 2013 or earlier are counted. Not included are 319 projects focused on implementing annual BMPs (cover crops). For SFY14 and SFY15, 319-funded NPS BMP implementation reported directly to MDE and WIP implementation reporting received by MDE are assessed to ensure that no double counting occurs.
3) NPS BMP implementation not funded by the 319(h) Grant that was reported by watershed plan implementers in the 2013 Annual Report.

Water Quality Monitoring Activity, Overall Condition, Trends

Information extracted from Maryland Dept. of Natural Resources' publication: *Choptank and Little Choptank Water Quality and Habitat Assessment Overall Condition 2012-2014*



This map taken from DNR's publication shows the watershed area encompassed by their watershed assessment and DNR's sampling stations (nontidal and tidal) and the nontidal Network stations in the basin where trends were determined for 2014.

In the map, note that the nontidal network stations receive runoff from Delaware. Also, note that the nontidal network station on the western tributary (red dot in map) is on Tuckahoe Creek, which is not in the 319 priority watershed for the Upper Choptank River. In that context, according to DNR's report:

"Maryland DNR also participates in the Non-tidal Network, a partnership with the United States Geologic Survey (USGS), the Chesapeake Bay Program, and the other states in the basin, to measure non-tidal water quality using the same sampling and analysis methods. Maryland's long-term non-tidal station on the Choptank is also part of the Non-tidal Network (Figure 1, Table 1); a second station on Tuckahoe Creek is part of the Non-tidal Network. USGS completes the trends analysis for all Non-tidal Network stations. USGS combines river flow data and the nutrient and sediment data for the most recent 10-year period. The USGS method accounts for changes in river flow so that

underlying changes in nutrient and sediment levels can be determined. Trends results from the Non-tidal Network stations from the other states are included below because of the consistency in monitoring and analysis methods."

"USGS and MDDNR also measure the nutrient and sediment loadings at the fall-line station (River Input station on Figure 1) to determine trends in loadings at this station."

"Choptank River: Non-tidal areas: Nitrogen, phosphorus and sediment loads from the watershed to the non-tidal waters of the Choptank have increased.[4] Nitrogen and phosphorus levels in the water have increased when the effect of flow is accounted for (Table 1). There were no trends at the Non-tidal Network station on Tuckahoe Creek."

"Tidal areas: Water quality in the tidal upper Choptank is poor. Nitrogen, phosphorus and sediment levels are too high (Table 2). Habitat quality for underwater grasses is poor because algal densities are too high and water clarity is poor. No underwater grass beds were found in the upper Choptank.[5] Bottom dwelling animal populations are healthy in this portion of the river."

				MDDNR 1999-2014 (without flow)			USGS 2005*-2014 (with flow)		
Watershed	**USGS Gage #**	**MD DNR Station**	**River/Creek**	**N**	**P**	**Sed**	**N**	**P**	**Sed**
Upper Chopank	01491000	ET5.0	**Choptank**				**Inc**	**Inc**	
	01491500	TUK0181	Tuckahoe Creek						

"Table 1. Summary of non-tidal water quality trends.
Trends for nitrogen (N), phosphorus (P) and sediment (Sed). Trends at MD DNR long-term non-tidal monitoring stations (columns labeled 'MDDNR') are determined for 1999-2014; analysis does not include use of flow data. Trends at Non-tidal Network stations (columns labeled 'USGS') are determined by USGS for 2005-2014 (at some stations there is no 2005 data); analysis includes use of flow data. Non-tidal Network stations include the corresponding USGS gage number. Stations in bold typeface are MD DNR long-term non-tidal monitoring stations that are also part of the Non-tidal Network.

The River Input Station (fall-line station) is highlighted in yellow. Decreasing trends ('Dec') are improving trends and shown with green typeface. Increasing trends ('Inc') are degrading trends and shown with red typeface. Blanks indicate no significant trend. Grey shading indicates that the station does not have data for that parameter."

Continued next page

		Water Quality			Habitat Quality		
River	**River portion**	**Nitrogen**	**Phosporus**	**Sediments**	**Algal Densities**	**Water Clarity**	**Summer Bottom DO**
Choptank	Upper	Fail	Fail	Fail	Fail	Fail	Meet
	Lower	Fail	Meet	Meet	Meet	Fail	Meet
	Outer	Fail	Meet	Meet	Increasing Meet	Meet	Meet
Little Choptank		Meet	Meet	Meet	Increasing Meet	Meet	Fail

"Table 2. Summary of tidal water quality and habitat quality indicators.
Annual trends for 1999-2014 for nitrogen (total nitrogen), phosphorus (total phosphorus), sediment (total suspended solids), algal densities (chlorophyll *a*), and water clarity (Secchi depth).

Summer bottom dissolved oxygen (DO) trends are for June through September data only. Trends are either 'Increasing' or 'Decreasing' if significant at $p \leq 0.01$; blanks indicate no significant trend. Improving trends are in green, degrading trends are in red.

Nitrogen (dissolved inorganic nitrogen) levels below the level for nitrogen limitation 'Meet' criteria, otherwise 'Fail' criteria for 2012-2014 data.

Phosphorus (dissolved inorganic phosphorus), sediment (total suspended solids), algal densities (chlorophyll *a*) and water clarity (Secchi depth) either 'Meet' or 'Fail' submerged aquatic vegetation (SAV) habitat requirements for 2012-2014 data. Summer (June through September) bottom dissolved oxygen levels either 'Meet' or 'Fail' EPA open-water 30-day dissolved oxygen criteria."

Upper Choptank River Watershed
2004-2015 Completed 319(h) Grant NPS Implementation Grant Projects

Project Summary			Project Expenditures					Pollutant Load Reduction		
Area/Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Match	Total	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal	State					
MDA / Caroline Soil Conservation District (SCD)	Upper Choptank Cover Crop Demo	2004	319 FFY03 #12	$48,161.00		$32,107.33	$80,268.33	0	0	461.8
	Upper Choptank Cover Crop Demo	2005	319 FFY03 #21	$114,000.00		$76,000.00	$190,000.00	23,097	642	0
	Agricultural Technical Assistance	2005	319 FFY04 #13	$49,949.00		$33,299.33	$83,248.33	0	0	393.1
	Upper Choptank Cover Crop Demo	2006	319 FFY04 #20	$150,000.00		$100,000.00	$250,000.00	19,465	458	0
	Agricultural Technical Assistance	2007	319 FFY04 #32	$55,990.64		$37,327.09	$93,317.73	20,646.14	1,979.37	99.89
	Agricultural Technical Assistance	2006	319 FFY05 #9	$39,167.70		$26,111.80	$65,279.50	9,139.8	1,461.3	23.84
	Upper Choptank Cover Crop Demo	2007	319 FFY05 #18	$121,600.00		$81,066.67	$202,666.67	33,192	0	0
Caroline SCD	Agricultural Technical Assistance	2010	319 FFY07 #21	$56,256.00		$37,504.00	$93,760.00	33,169.01	5,832.24	107.97
	Agricultural Technical Assistance	2009	319 FFY08 #2	$48,314.98		$32,209.99	$80,524.97	82,140.24	2,707.31	41.2
Caroline Co.	DPW Stormwater Retrofits	2012	319 FFY10 #7	$46,213.30		$30,808.87	$77,022.17	11.39	7.89	0.91
	U. Choptank Watershed Restoration	2014	319 FFY12 #6	$130,781.17		$87,187.45	$217,968.62	8.01	0.85	0
	U. Choptank Watershed Restoration	2014	319 FFY13 #6	$138,378.63		$92,252.42	$230,631.05	16.06	2.69	0.23
			TOTAL for completed projects	$998,812.42	$0.00	$665,874.95	$1,664,687.37	220,884.7	13,091.7	1,128.94

SFY 2015 319(h) Grant NPS Implementation Project Activity - Upper Choptank River Watershed

Project Summary			Project Funding					Future Pollutant Load Reduction		
Lead	Name/Description	End Date	Grant Funding Source	Grant Funds		Non Federal Match	Total	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
				Federal	State					
Caroline County	Dept. Emergency Services Porous Parking	TBD	319 FFY14 #6	$133,770.00	$0	$119,798.00	TBD	TBD	TBD	TBD
	Volunteer Fire Company SWM upgrades	TBD	319 FFY12 #14	$37,834.00	$0	$25,223.00	TBD	TBD	TBD	TBD

Upper Choptank River Watershed
Chesapeake and Atlantic Coastal Bays Trust Fund
SFY 2015 NPS Implementation Project Status (1)

State FY	Partner	Project	Project_Type	County	Trust_Fund	Status	Nitrogen lbs/yr	Phosphorus lbs/yr	Sediment ton/yr
FY14	Delmarva RC&D	Choptank Restoration Wetlands: Firth	Wetland Restoration	Talbot	$2,334.00	Complete	129.240005	8.73	1.58
FY15	Delmarva RC & D Council	Laznovsky	Wetland Restoration	Talbot	$1,981.80	Complete	15.55	1.372	0.097
FY15	Delmarva RC & D Council	Trax	Wetland Restoration	Talbot	$1,045.50	Complete	3.333	0.294	0.02
FY14	Caroline County	Ganey's Wharf Public Landing (west of Harmony)	Tree Planting Projects	Caroline	$2,285.76	Complete	2.87	0.2	0.03
FY14	Talbot County	Wootenaux Creek (Talbot County Stream Forest Enhancement)	Tree Planting Projects	Talbot	$30,252.00	Complete	66.059998	4.42	0.78
FY15	Midshore Riverkeeper Conservancy	Hutchison-1	Agricultural Practices	Talbot	$17,788.00	Complete	1681	0	0
FY14	Caroline County	Caroline County Dept. of Emergency Services Facility	Tree Planting Projects	Caroline	$11,946.00	Complete	17.19	1.17	0.189
FY14	Caroline County	Town of Denton (Sharp Road)	Tree Planting Projects	Caroline	$10,592.00	Complete	8.6	0.59	0.09
FY15	Midshore Riverkeeper Conservancy	Voorhees	Agricultural Practices	Caroline	$17,638.00	Complete	1609	0	0
FY14	Town of Greensboro	Greensboro Stream Restoration Project	Stream Restoration	Caroline	$99,696.00	Complete	0	0	0
FY14	Caroline County	Ober Community Park (Greensboro)	Tree Planting Projects	Caroline	$3,689.00	Complete	5.89	0.25	0.04
FY14	Caroline County	Marydel Community Park (Marydel)	Tree Planting Projects	Caroline	$14,072.00	Complete	148.190002	6.45	1.29
					$213,320.06	TOTAL COMPLETE	3,686.92	23.48	4.12
FY15	Delmarva RC & D Council	Knox	Wetland Restoration	Talbot	$4,137.00	Design/Planning	37.774	3.332	0.236
FY15	Delmarva RC & D Council	Ewing	Wetland Restoration	Talbot	$3,127.60	Design/Planning	12.2	1.078	0.076
FY15	Delmarva RC & D Council	Brennan 1	Wetland Restoration	Talbot	$3,411.80	Design/Planning	44.44	3.92	0.278
FY15	Delmarva RC & D Council	Brennan 2	Wetland Restoration	Talbot	$1,627.50	Design/Planning	4.44	0.392	0.02
FY15	Midshore Riverkeeper Conservancy	Levengood	Wetland Restoration	Caroline	$6,433.00	Design/Planning	23	2	0
	(1) Maryland DNR Trust Fund database 10/27/15.				$18,736.90	TOTAL WORKING	121.85	10.72	0.61

SFY2015 Agricultural BMP Implementation
Upper Choptank River Watershed
In Caroline County, Maryland

Agricultural Best Management Practice	Unit	SFY2015 Total	Estimated Pollutant Load Reduction: Total Nitrogen (lbs)	Total Phosphorus (lbs)	Total Sediment (tons)
Alternative Crops	acres	0			
Amendments for Treatment of Ag Waste	AU	0			
Animal Mortality Facility	count	0			
Conservation Cover	acres	0			
Conservation Plans/SCWQP	acres	8,792	7718.8	996.1	77.34
Cover Crops	acres	36,845	174363.3	1002.8	83.64
Critical Area Planting	acres	3.95	0.0	0.0	0.00
Dead Bird Composting Facility	count	2			
Fencing	feet	0			
Field Border	acres	1.61	35.0	1.9	0.11
Filter Strip	acres	0			
Grassed Waterway	acres	0			
Horse Pasture Management	acres	0			
Loafing Lot Management System	acres	1.56	1215.5	205.5	0.01
Pasture & Hay Planting	acres	0			
Prescribed Grazing	acres	0			
P-sorbing Materials	acres	0			
Riparian Forest Buffer	acres	0			
Riparian Herbaceous Cover	acres	9.06	196.9	10.8	0.60
Roof Runoff Structure	count	0			
Stream Restoration Ag	feet	995	0.0	31.5	6.71
Tree/Shrub Establishment	acres	0			
Waste Storage Facility	count	3			
Wastewater Treatment Strip	acres	0			
Water Control Structure	count	5	325.3	0.0	0.00
Watering Facility	count	0			
Wetland Creation	acres	0			
Wetland Restoration	acres	1.9	8.2	1.3	0.02
Windbreak/Shelterbelt Establishment	feet	2206			
Total Pollutant Load Reduction			183,863.0	2,249.9	168.43
Total Annual Practices (2)			174,363.3	1,002.8	83.64
Total Multi-year Practices			9,499.7	1,247.1	84.79

(1) "SFY15 Total" column is Maryland Dept. of Agriculture 12/30/15 data.

(2) Annual Practices: cover crops, nutrient mgmt, manure transport, conservation tillage & high residue tillage.

Upper Choptank River Watershed Plan
Agricultural BMP Implementation Goals

Management Practice Watershed Plan Table 4	Goal	Units	SFY2015 Progress
Soil Conservation WQ Plans	66,000	acres	8,792
Cover Crops	50,000	acres/yr	36,845
Commodity Cover Crops	15,000	acres/yr	
Stream protection with fencing	130	acres	0
Buffers Forested - Agriculture	1,000	acres	0
Buffers Grassed - Agriculture	5,500	acres	9.06
Runoff Control	8	count	0
Tree Planting - Agriculture	100	acres	0
Animal Waste Mgmt - Livestock	2	count	3
Animal Waste Mgmt - Poultry	4		
Drainage Control Structures	65	count	5
Wetland - Agriculture	1,200	acres	1.9
Conservation Tillage	20,000	acres/yr	0
Nutrient Management	48,000	acres	0
Precision Agriculture	25,000	acres	0
Retirement of Highly Erodible Land	500	acres	
Stream protection with no fencing	32	acres	

SFY2015 Urban BMP Implementation
Upper Choptank River Watershed
In Caroline County, Maryland

Management Practice	Unit	BMPs Reported	Estimated Pollutant Load Reduction		
			Nitrogen lb/yr	Phosphorus lb/yr	Sediment tons/yr
Bioretention (1)	acres	0			
Cisterns and Rain Barrels (1)	acres	0			
Bioswale (1)	acres	0			
Disconnection of Rooftop Runoff (1)	acres	0			
Dry Detention Ponds & Hydro Structures (1)	acres	0			
Dry Extended Detention Ponds (1)	acres	0			
Dry Well (1)	acres	0			
Filtering Practices (1)	acres	0			
Forest Conservation	acres	0			
Forest Harvesting Practices	acres	0			
Infiltration Practices (1)	acres	0			
Permeable Pavement (1)	acres	0.5	6.32	0.68	
Rain Garden (1)	acres	0			
Reduction of Impervious Surface (1)	acres	0			
Riparian Forest Buffers on Urban Lands (2)	acres	0			
Septics Connections to Sewers	count	0			
Septic Denitrification critical area	count	7	68.60		
Septic Denitrification outside of 1000 feet	count	14	77.00		
Septic Denitrification within 1000 feet	count	5	17.00		
Septic Tank Pumpout	count	0			
Stream Restoration Urban	feet	0			
Street Sweeping (1)	acres	0			
Tree Planting	acres	0			
Urban Forest Buffer (2)	acres	0			
Wet Extended Detention (1)	acres	0			
Wet Ponds & Wetlands (1)	acres	0			
Urban BMPs TOTAL			168.92	0.68	0

(3) "BMPs Reported" column is draft data 12/9/2015 and Caroline County input 1/6/16.

Upper Choptank River Watershed Plan
Urban BMP Implementation Goals

	Management Practice	Goal	Units	SFY2015 Progress
Table 6	Septic Connections to WWTP	750	count	0.00
Table 6	Enhanced Septic Denitrification	5,051	count	26
Table 5	Buffers Forested, Urban (2)	60	acres	0.00
Table 5	Erosion and Sediment Control	895	acres/yr	
Table 5	Nutrient Management, Urban	12,000	acres	
Table 5	Stormwater Management (1)	8,400	acres	0.50

(1) Watershed plan goal "stormwater management" aggregates reporting for BMPs footnoted (1).

(2) Watershed plan goal "buffers forested, urban" aggregates reporting for BMPs footnoted (2).

Units of measure shaded red differ from State reporting units.

SFY2014 Agricultural BMP Implementation
Upper Choptank River Watershed
In Caroline County, Maryland

Agricultural Best Management Practice	Unit	SFY2014 Total	Total Nitrogen lb/acre	Total Nitrogen Total (lbs)	Total Phosphorus lb/acre	Total Phosphorus Total (lbs)	Total Sediment lb/acre	Total Sediment Total (tons)
Alternative Crops	acres	0						
Amendments for Treatment of Ag Waste	AU	180	-2.27	-409.10				
Animal Mortality Facility	count	0						
Conservation Cover	acres	0						
Conservation Plans/SCWQP	acres	8,401	0.80	6,726.20	0.10	880.20	16.44	69.08
Cover Crops	acres	31,673	2.17	68,883.90				
Critical Area Planting	acres	0.3						
Dead Bird Composting Facility	count	5						
Fencing	feet	0						
Field Border	acres	0.5	21.40	10.70	1.20	0.60	133.20	0.03
Filter Strip	acres	0						
Grassed Waterway	acres	1.2	21.58	25.90	1.08	1.30	133.92	0.08
Horse Pasture Management	acres	0						
Loafing Lot Management System	acres	1.6	1,003.13	1,605.00	169.56	271.30	12.31	0.01
Pasture & Hay Planting	acres	0						
Prescribed Grazing	acres	0						
P-sorbing Materials	acres	0						
Riparian Forest Buffer	acres	0						
Riparian Herbaceous Cover	acres	14.1	21.70	306.00	1.18	16.60	133.79	0.94
Roof Runoff Structure	count	1	1,001.90	1,001.90	169.40	169.40	12.20	0.01
Stream Restoration Ag	feet	0						
Tree/Shrub Establishment	acres	0						
Waste Storage Facility	count	4						
Wastewater Treatment Strip	acres	0						
Water Control Structure	count	1	6.52	65.20				
Watering Facility	count	0						
Wetland Creation	acres	1.5	4.13	6.20	0.60	0.90	16.80	0.01
Wetland Restoration	acres	0						
Windbreak/Shelterbelt Establishment	feet	0						
Total SFY14 Pollutant Load Reduction				78,222		1,340		70.16
Total SFY14 Annual Practices (2)				68,884		0		0
Total SFY14 Multi-year Practices				9,338		1,340		70

(1) "SFY2014 Total" column data is May 2015.

(2) Annual Practices: cover crops, nutrient mgmt, manure transport, conservation tillage & high residue tillage.

Upper Choptank River Watershed Plan

Agricultural BMP Implementation Goals

Management Practice Watershed Plan Table 4	Goal	Units	SFY2014 Progress
Soil Conservation WQ Plans	66,000	acres	8,401
Cover Crops	50,000	acres/yr	31,673
Commodity Cover Crops	15,000	acres/yr	
Stream protection with fencing	130	acres	0
Buffers Forested - Agriculture	1,000	acres	0
Buffers Grassed - Agriculture	5,500	acres	21.70
Runoff Control	8	count	1
Tree Planting - Agriculture	100	acres	0
Animal Waste Mgmt - Livestock	2	count	4
Animal Waste Mgmt - Poultry	4		
Drainage Control Structures	65	count	1
Wetland - Agriculture	1,200	acres	1.5
Conservation Tillage	20,000	acres/yr	0
Nutrient Management	48,000	acres	0
Precision Agriculture	25,000	acres	0
Retirement of Highly Erodible Land	500	acres	
Stream protection with no fencing	32	acres	

SFY2014 Urban BMP Implementation
Upper Choptank River Watershed
In Caroline County, Maryland

Management Practice	Unit	BMPs Reported	Estimated Pollutant Load Reduction		
			Nitrogen lb/yr	Phosphorus lb/yr	Sediment tons/yr
Bioretention (1)	acres	0			
Bioswale (1)	acres	0			
Disconnection of Rooftop Runoff (1)	acres	0			
Dry Detention Ponds & Hydro Structures (1)	acres	0			
Dry Extended Detention Ponds (1)	acres	0			
Dry Well (1)	acres	0			
Filtering Practices (1)	acres	0			
Forest Conservation	acres	0			
Forest Harvesting Practices	acres	0			
Infiltration Practices (1)	acres	0			
Permeable Pavement (1)	acres	0			
Reduction of Impervious Surface (1)	acres	0			
Riparian Forest Buffers on Urban Lands (2)	acres	0			
Septics Connections to Sewers	count	0			
Septic Denitrification critical area	count	15	142.50		
Septic Denitrification outside of 1000 feet	count	8	28.00		
Septic Denitrification within 1000 feet	count	21	123.90		
Stream Restoration Urban	feet	0			
Street Sweeping (1)	acres	0			
Tree Planting	acres	0			
Urban Forest Buffer (2)	acres	0			
Wet Ponds & Wetlands (1)	acres	0			
Urban BMPs TOTAL			294.40	0	0

(3) "BMPs Reported" column data is May 2015.

Upper Choptank River Watershed Plan
Urban BMP Implementation Goals

	Management Practice	Goal	Units	SFY2014 Progress
Table 6	Septic Connections to WWTP	750	count	0.00
Table 6	Enhanced Septic Denitrification	5,051	count	44
Table 5	Buffers Forested, Urban (2)	60	acres	0.00
Table 5	Erosion and Sediment Control	895	acres/yr	
Table 5	Nutrient Management, Urban	12,000	acres	
Table 5	Stormwater Management (1)	8,400	acres	0.00

(1) Watershed plan goal "stormwater management" aggregates reporting for BMPs footnoted (1).

(2) Watershed plan goal "buffers forested, urban" aggregates reporting for BMPs footnoted (2).

Units of measure shaded red differ from State reporting units.