# Annual Report
# Maryland 319 Nonpoint Source Program
# State Fiscal Year 2017

Maryland
Department of
the Environment

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## Preface

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

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

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

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

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

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

## I. Mission and Goals of the NPS Program

*Maryland's 2015-2019 Nonpoint Source Management Plan* (State NPS Plan), generated by the Maryland Department of the Environment (MDE) and partner agencies, was approved by the US Environmental Protection Agency (EPA) in January 2015. The document's vision, mission, goals are shown on the right. The completed document, including posted updates is available on the Internet at http://mde.maryland.gov/programs/Water/319NonPointSource/Pages/index.aspx

**Maryland's 2015-2019 NPS Management Plan**

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

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

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

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

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

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

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

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

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

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

## II. Executive Summary

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

During the past 28 years, Maryland received about $59.14 million through the 319(h) Grant to support the Maryland's NPS management program including on-the-ground implementation of best management practices (BMPs).

In 319 priority watersheds, overall reported SFY17 reductions of nitrogen, phosphorus, and sediment are significantly greater than goals in *Maryland's 2015-2019 Nonpoint Source Management Plan* (State Plan). In these watersheds, the majority of this success arises from the State's integrated reporting of BMP implementation for the EPA Chesapeake Bay Program. In the numbers below, cover crops account for the difference between "all reported BMPs" and multi-year BMPs:

Nitrogen SFY17 Reduction (lb/yr):
Goal: 150,000. All reported BMPs: 578,656. Multi-Year BMPs only: 38,585.
Phosphorus SFY17 Reduction (lb/yr):
Goal: 3,000. All reported BMPs: 6,148. Multi-Year BMPs only: 3,822.
Sediment SFY17 Reduction (tons/yr):
Goal: 600. All reported BMPs: 3,119. Multi-Year BMPs only: 1,274.

Overall reported funding of NPS implementation in priority watersheds reached $10.16M from the Federal 319(h) Grant and $15M from State funding thru the end of SFY17. (excluding match for the 319 Grant)

Two 319-funded projects were completed during SFY17 that reported implementing best management practices. These projects' estimated pollutant load reductions totaled: nitrogen 181.5 lbs/yr, phosphorus 61.7 lbs/year and sediment 797.76 tons/year.

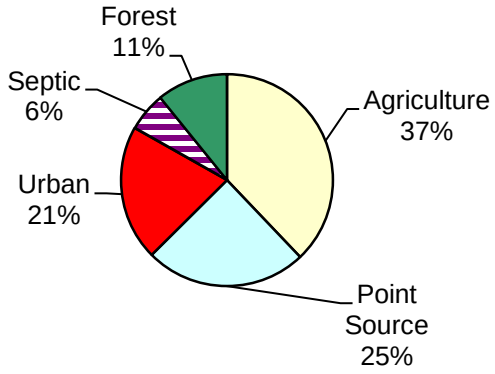
Three Maryland State agencies reported expending over $62.97 million for nonpoint source programs and implementation during SFY17. (Departments of Agriculture, Environment and Natural Resources only)

## III. Overview

Maryland surface waters flow into three major drainage areas:

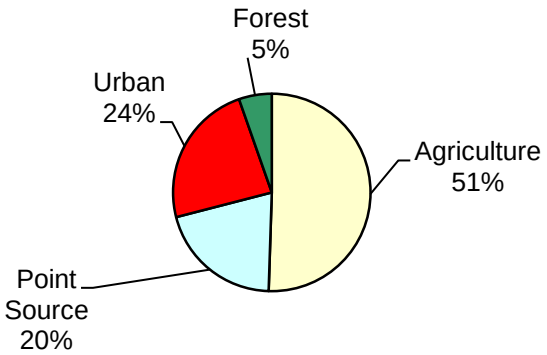
- The Chesapeake Bay watershed receives runoff from of Maryland's mid section and encompasses more than 90% of the State. Most 319-funded implementation projects are in this watershed. These projects are mostly designed to reduce nitrogen, phosphorus and sediment pollutant loads.
- Maryland's Coastal Bays receives runoff from Maryland's eastern-most coastal plain in Worcester County. During SFY17, 319-funded implementation was active.
- Maryland's Appalachian area runoff drains thru the Youghiogheny River and Casselman River watersheds toward the Ohio and Mississippi Rivers. In the Casselman River watershed, the 319(h) Grant continues to help fund acid mine drainage remediation.

**Figure 1. Total Nitrogen Sources in Maryland SFY 2017**




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

**Figure 2. Total Phosphorus Sources in Maryland SFY 2017**




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

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

Maryland's NPS management program has responsibilities set forth in the Federal Clean Water Act Section 319. To help meet these responsibilities, the State program has received Federal grant support each year since 1990 and is required to maintain at least a minimum annual level of nonfederal expenditure. A summary that covers the period 1990 thru SFY17 for Maryland is in **Appendix – Financial Information**.

Chapter IV of the Annual Report provides brief summaries of grant-funded NPS Program activities during SFY17 in 319 priority watersheds. More detailed information supporting Chapter IV is in **Appendix – Watersheds**.

Demonstrating improvements in water quality resulting from nonpoint source program implementation and successes in achieving nonpoint source management goals and objectives are important for the program. Each year, at least one success story is submitted to EPA. Maryland's SFY17 success story is based on MDE analysis of monitoring data from Spiker Run in Garrett County. The in-stream data documented that pH levels have significantly improved following implementation of acid mine drainage remediation projects that were partially funded by the 319(h) Grant. (see **Appendix – Success Story**).

Figure 3. Baltimore County Dept. of Environmental Protection and Sustainability hosted staff from EPA Region 3 and MDE at their Herring Run stream restoration project at the County's Overlook Park in September 2017. The photo shows a section of Herring Run that is being stabilized prior to final vegetative stabilization. This area, including the stream bed, banks and floodplain, has been reshaped to create a more-natural, stable system. The project is funded in part by 319(h) Grant FFY2014 funds. (photo by MDE)

## IV. Major Accomplishments, Successes and Progress

### A. Statewide NPS Management Program Progress

1. Introduction and Overview

This annual report is based in part on the milestones from *Maryland's 2015-2019 Nonpoint Source Management Plan* that was approved by EPA in January 2015. It also provides a summary of implementation progress reporting in 319 priority watersheds (see Figure 3). In addition to local input in 319 priority watershed progress, MDE also uses data reported by Maryland for use in the Chesapeake Bay Model. To gauge progress toward meeting state and local goals, Maryland tracks implementation progress for selected categories of BMPs that have been recognized by the EPA Chesapeake Bay Program and the Chesapeake Bay States.

*Maryland's 2015-2019 Nonpoint Source Management Plan* includes specific categories of objectives designed to focus effort on reducing and preventing NPS pollution: 1- Regional Coverage, 2- Multiple Scales, 3- Pollutants and Stressors, 4- Pollutant Sources, 5- Types of Waterbodies, 6- Protection and Restoration, 7- Priority Setting, and 8- Program Management and Evaluation. Under these categories are specific objectives with milestones to gage progress. The table below summarizes SFY17 progress for selected milestones.

**Table 1. Milestones Progress Statewide**

| Obj. # | Objective Name (abbreviated) | Goal SFY17 | Report SFY17 |
|---|---|---|---|
| 3 | Annual nitrogen NPS Loads to Bay | Report Progress | 36,763,530 |
| | Nitrogen: overall reduction in 319 priority watersheds (lb/yr) | 150,000 | 551,056 |
| | Annual phosphorus NPS Loads to Bay | Report Progress | 2,675,178 |
| | Phosphorus: overall reduction in 319 priority watersheds (lb/yr) | 3,000 | 9,359 |
| | Sediment: 319-funded projects annual reductions (tons/yr) | 15 | 1,031.2 |
| | Sediment: overall reduction in 319 priority watersheds (tons/yr) | 600 | 4,453.7 |
| 4 | Cover crop acreage | 417,000 | 543,584 |
| | Nutrient Management Plan acreage (report includes all 3 Tiers | 682,247 | 763,777 |
| | Soil Conservation and Water Quality Plan acreage | 1,026,000 | 898,847 |
| | Septic system upgrades to remove nitrogren (count) | 1,200 | 1,543 |
| | Stormwater retrofits (nitrogen reduction lb/yr) (1) | 20,000 | 14,638 |
| | Local stormwater WLA implementation plans reviewed | | |
| 5 | 319 priority watersheds: implement watershed plans | Report Progress | See section IV.B |
| (1) Underestimate of actual due to complexity of calculating estimate. | | | |
| See Appendix Milestones for a complete listing of milestones and progress for this state fiscal year. | | | |

Additionally, Maryland also tracks statewide progress by other metrics:

- Many forms of best management practices (BMPs) as listed in the table on next page.
- 319(h) Grant investment in Maryland is summarized in Appendix A, including
    - Total annual 319(h) Grant awards to Maryland
    - State of Maryland expenditures for NPS programs (maintenance of effort)
    - Distribution of 319(h) Grant implementation funding by County
    - Distribution of 319(h) Grant funds for monitoring (water quality, biological)

| **Table 2 – BMP Implementation Statewide Progress In Maryland State Fiscal Year 2017** | | | |
|---|---|---|---|
| **Type of Practice** | **Statewide Total** | **Nitrogen Reduction (lb/yr)** | **Phosphorus Reduction (lb/yr)** |
| Animal Composters on Ag Lands | 35 | 318 | 8 |
| Animal Waste Management Systems-Livestock | 902 | 1,085,856 | 122,952 |
| Animal Waste Management Systems-Poultry | 730 | 164,016 | 18,572 |
| Cover Crops | 543,359 | 980,366 | 44,802 |
| Dry Detention Ponds and Hydro Structures | 52,810 | 19,283 | 2,387 |
| Dry Extended Detention Ponds | 30,280 | 44,226 | 2,737 |
| Filtering Practices | 6,203 | 18,120 | 1,682 |
| Forest Conservation | 118,809 | 1,627 | 21 |
| Forest Harvesting Practices | 17,103 | 11,707 | 183 |
| Grassed Buffers | 52,997 | 407,324 | 46,657 |
| Infiltration Practices | 15,638 | 91,360 | 6,007 |
| Nutrient Management Plan Implementation | 792,464 | 1,443,296 | 211,843 |
| Retirement Of Highly Erodible Lands | 28,928 | 136,759 | 1,436 |
| Riparian Forest Buffers on Ag Lands | 23,290 | 256,149 | 20,504 |
| Riparian Forest Buffers on Urban Lands | 944 | 1,114 | 322 |
| Runoff Control | 1,464 | 2,138 | 132 |
| Septic Connections to Sewers | 2,352 | 17,176 | 0 |
| Septic Denirification | 12,101 | 55,665 | 0 |
| Soil Conservation Water Quality Plans | 898,717 | 1,023,007 | 180,185 |
| Stream Protection w/Fencing | 737 | 10,067 | 985 |
| Stream Protection w/o Fencing | 64,021 | 72,875 | 11,409 |
| Stream Restoration | 336,460 | 5,745 | 510 |
| Tree Planting on Agricultural Lands | 28,928 | 335,872 | 41,243 |
| Water Control Structures | 3,155 | 23,703 | 0 |
| Wet Ponds | 65,044 | 95,000 | 13,228 |
| Wetland Restoration on Ag Lands | 14,083 | 53,703 | 10,096 |

Table footnotes:
1. Data for each BMP represents cumulative totals through June 2016 using CBP Model Phase 5.3.2.
2. Nutrient load reductions are estimates for each type of practice representing 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 tables' values do not include all BMPs implemented. Some BMP reductions are not easily calculated.
4. 2016 Progress incorporated changes in BMP implementation which included decreases in some BMPs from past years.

2. Priority Watersheds for 319(h) Grant Implementation Funding

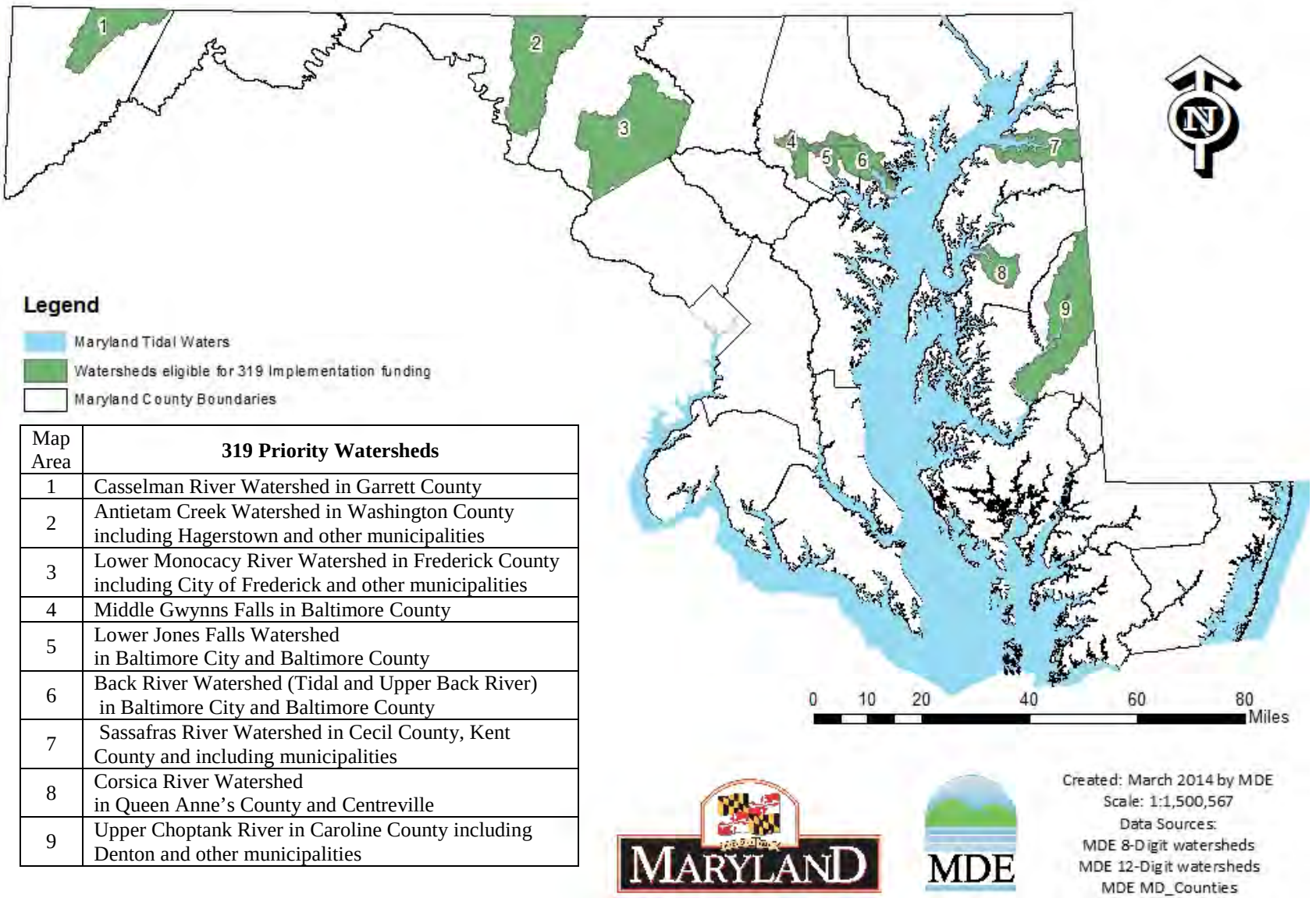
During SFY17, ten priority watersheds in Maryland are eligible for 319(h) Grant implementation funding. Additionally one watershed plan completed implementation and two watershed plans are being drafted in an effort to seek eligibility. The table below summarizes watershed planning status in each area. The locations of the priority watersheds are mapped on the next page.

**Table 3. Priority Watersheds for 319(h) Grant Implementation Funding**

| Watershed | | Plan Name | Plan Date, Status | Plan Lead |
|---|---|---|---|---|
| Chesapeake Bay | Back River | *Tidal Back River Small Watershed Action Plan* | 2010 Implementing | Baltimore County Department of Environmental Protection and Sustainability |
| | | *Upper Back River Small Watershed Action Plan* | 2008 Implementing | |
| | Middle Gwynns Falls | *Middle Gwynns Falls Small Watershed Action Plan* | 2014 Implementing | |
| | Lower Jones Falls | *Lower Jones Falls Watershed Small Watershed Action Plan* | 2008 Implementing | |
| | Spring Branch | *Spring Branch Subwatershed – Small Watershed Action Plan* | 2008 Completed | |
| | Antietam Creek | *Antietam Creek Watershed Restoration Plan* | 2012 Implementing | Washington County Soil Conservation District |
| | Corsica River | *Corsica River Watershed Restoration Action Strategy, Corsica River Targeted Initiative Progress Report: 2005-2011* | 2004, 2012 Implementing | Town of Centreville, Queen Anne's County |
| | Jennings Run | *TBD* | 2017 Drafting Plan | MDE Land & Materials Admin., Abandoned Mine Land Div. |
| | Lower Monocacy River | *Lower Monocacy River Watershed Restoration Action Strategy (WRAS) Supplement*: *EPA A-I Requirements, Frederick County Maryland* | 2008 Implementing | Frederick County Dept. Of Public Works, Community Development Division |
| | Sassafras River | *Sassafras Watershed Action Plan* | 2009 Implementing | ShoreRivers (formerly Sassafras River Association) |
| | Upper Choptank River | *Upper Choptank River Watershed Based Plan* | 2010 Implementing | Caroline County Dept. of Planning & Codes |
| Casselman River (Ohio River Basin) | | *Casselman River Watershed Plan for pH Remediation* | 2011 Implementing | MDE Land & Materials Admin., Abandoned Mine Land Div. |
| Coastal Bays (Atlantic Ocean) | | TBD | 2017 Drafting Plan | Worcester County |

Table footnotes: Copies of the watershed plans are available on MDE's web page: http://mde.maryland.gov/programs/Water/319NonPointSource/Pages/factsheet.aspx

**Figure 4**
**319 Priority Watersheds in Maryland**
**Currently Eligible for 319(h) Grant Implementation Funding**




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

Table 2 on the previous page lists the ten 319 priority watersheds that are currently eligible to seek funding to implement a watershed plan that EPA has reviewed and accepted. In all ten watersheds, Total Maximum Daily Load (TMDL) load allocations that limit NPS loads are reiterated in the watershed plan explicit goals. For each of these watersheds, plan implementation progress tracking includes BMP implementation and load reduction estimates. Progress is reported by MDE to EPA every year in the *Maryland 319 Nonpoint Source Program Annual Report*.

To date, implementation of the 319 priority watershed plans has not generated information that might suggest that revision of a TMDL should be considered. However, in the Casselman River watershed which has pH TMDLs, watershed plan implementation has resulted in meeting several TMDLs at the stream segment scale and State water quality pH standards are being met in these stream segments following acid mine drainage remediation (implementation and ongoing operation and maintenance of BMPs).

In all ten watersheds, funding for NPS implementation from three grant sources is summarized in Table 3:

- Federal 319(h) Grant funds
- State Revolving Fund
- State Chesapeake and Atlantic Coastal Bays Trust Fund

In one case, Antietam Creek watershed, the 319(h) Grant funding was initially used beginning in 1994 to help implement previous watershed priorities/plans that pre-dated the current the 319 Priority Watershed Plans. (See Appendix-Watersheds for details.)

**Table 4. 1994-SFY2017 NPS Implementation Funding in 319 Priority Watershed Plans**

| 319 Priority Watershed | Projects Completed (count) | Federal 319(h) Grant ($) (1) | State Revolving Fund ($) | State Trust Fund ($) (2) | Other State NPS ($) | State Funds Total ($) (2, 3) | Total Funds Reported ($) |
|---|---|---|---|---|---|---|---|
| Antietam Creek | 34 | 3,176,276.14 | 424,600 | 696,771.99 | 0 | 1,121,371.99 | 4,297,648.13 |
| Back River (Tidal) | 39 | 556,443.00 | 3,102,100 | 3,936,619.74 | 0 | 7,267,618.74 | 8,468,445.55 |
| Back River (Upper) | 0 | 644,383.81 | 0 | | 228,899 | | |
| Casselman River | 1 | 782,734.00 | 0 | 6,440.19 | 0 | 6,440.19 | 789,174.19 |
| Corsica River | 43 | 1,919,132.11 | 200,000 | 1,178,127.60 | 270,000 | 1,648,127.60 | 3,567,259.71 |
| Lower Jones Falls | 29 | 139,000.00 | 0 | 2,229,588.50 | 0 | 2,229,588.50 | 2,368,588.50 |
| Lower Monocacy River | 35 | 1,387,102.99 | 0 | 350,040.97 | 0 | 350,040.97 | 1,737,143.96 |
| Middle Gwynns Falls | 6 | 320,004.00 | 0 | 706,745.56 | 0 | 706,745.56 | 1,026,749.56 |
| Sassafras River | 15 | 64,000.00 | 0 | 1,404,829.65 | 0 | 1,404,829.65 | 1,468,829.65 |
| Upper Choptank River | 32 | 1,174,095.43 | 0 | 303,472.78 | 0 | 303,472.78 | 1,477,568.21 |
| TOTAL | 234 | 10,163,171.48 | 3,726,700 | 10,812,636.98 | 498,899 | 15,038,235.98 | 25,201,407.46 |

1) Federal includes all 319(h) Grant NPS implementation projects only. (Planning and water quality monitoring costs excluded.)

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

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

During SFY17 in the 319 priority watersheds, two 319(h) Grant-funded projects were completed and three 319(h) Grant-funded implementation projects actively working as shown in Table 4. Additional information on all of these projects is provided in this report and in Appendix - Watersheds.

**Table 5. SFY2017 319(h) Grant-Funded Implementation Projects Status**

| 319 Priority Watershed | Status | | | Environmental Results (4) | | |
|---|---|---|---|---|---|---|
| | Completed (1) | Working (2) | Proposed (3) | Nitrogen lbs/yr | Phosphorus lbs/yr | Sediment ton/yr |
| Antietam Creek | 2 | 1 | 0 | 181.5 | 61.7 | 797.76 |
| Back River - Tidal | 0 | 0 | 0 | 0 | 0 | 0 |
| Back River - Upper | 0 | 1 | 0 | 0 | 0 | 0 |
| Casselman River | 0 | 1 | 0 | 0 | 0 | 0 |
| Corsica River | 0 | 0 | 0 | 0 | 0 | 0 |
| Lower Jones Falls | 0 | 0 | 0 | 0 | 0 | 0 |
| Lower Monocacy River | 0 | 0 | 1 | 0 | 0 | 0 |
| Middle Gwynns Falls | 0 | 0 | 0 | 0 | 0 | 0 |
| Sassafras River | 0 | 0 | 2 | 0 | 0 | 0 |
| Upper Choptank River | 0 | 0 | 2 | 0 | 0 | 0 |
| TOTAL | 2 | 3 | 5 | 181.5 | 61.7 | 797.76 |

(1) Project ended during SFY2017 (7/1/16 thru 6/30/17). (2) Project continued during/beyond SFY2017.
(3) In MDE's application for the FFY2017 319(h) Grant (awarded 9/19/17). (4) Completed projects only.

Also, in 319 priority watersheds, implementation progress was accomplished using funding from sources other than the 319(h) Grant. Table 5 (next page) summarizes the aggregate pollutant load reduction by all NPS projects reported in this document regardless of funding source including annual practices like cover crops.

Additional information for each 319 priority watershed is presented in the following sections of this chapter and in Appendix - Watershed.

| Table 6. SFY17 Pollutant Load Reductions in Priority Watersheds | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **319 Priority Watershed** | **Sub Watershed** | **Agriculture Multi-Year BMPs** | | | **Urban BMPs (Multi-Year)** | | | **All Multi-Year BMPs** | |
| | | **Nitrogen lbs/yr** | **Phosphorus lbs/yr** | **Sediment ton/yr** | **Nitrogen lbs/yr** | **Phosphorus lbs/yr** | **Sediment ton/yr** | **Nitrogen lbs/yr** | **Phosphorus lbs/yr** | **Sediment ton/yr** |
| Antietam Creek | All in Maryland | 11,568.6 | 1,113.3 | 545.00 | 659.0 | 23.80 | 25.41 | 12,227.6 | 1,137.1 | 570.41 |
| Back River | Tidal (entire County subwatershed) | 0 | 0 | 0 | 497.4 | 175.1 | 26.24 | 497.4 | 175.1 | 26.24 |
| | Upper (Baltimore City and County) | 0 | 0 | 0 | 664 | 253.2 | 38.11 | 663.7 | 253.2 | 38.11 |
| Corsica River | All | 1,368.2 | 145.6 | 21.00 | 129.8 | 0 | 0 | 1,498.0 | 145.6 | 21.00 |
| Lower Jones Falls | All (Baltimore City and County) | 0 | 0 | 0 | 90.6 | 25.2 | 3.87 | 90.6 | 25.2 | 3.87 |
| Lower Monocacy River | All incl. Lake Linganore, Frederick Co. | 8,968.4 | 876.1 | 372.71 | 276.0 | 0 | 0 | 9,244.4 | 876.1 | 372.71 |
| Middle Gwynns Falls | All in Baltimore County only | 0 | 0 | 0 | 459.1 | 155.1 | 23.53 | 459.1 | 155.1 | 23.53 |
| Sassafras River | All in Maryland only | 2,304.9 | 165.3 | 163.50 | 46.0 | 0 | 0 | 2,350.9 | 165.3 | 163.50 |
| Upper Choptank River | All in Caroline County only | 11,451.8 | 889.3 | 54.70 | 101.7 | 0 | 0 | 11,553.5 | 889.3 | 54.70 |
| | | | | | | | | | | |
| TOTAL | | 35,661.9 | 3,189.6 | 1,156.91 | 2,923.2 | 632.4 | 117.15 | 38,585.1 | 3,822.0 | 1,274.06 |
| MDE used MAST to estimate pollutant load reductions for BMPs that were reported by MDE to the EPA Bay Program. Urban Baltimore County watersheds are shaded. | | | | | | | | | | |

| **319 Priority Watershed** | **Sub Watershed** | **Cover Crops SFY17** | | | **TOTAL All BMPs SFY17** | | |
|---|---|---|---|---|---|---|---|
| | | **Nitrogen lbs/yr** | **Phosphorus lbs/yr** | **Sediment ton/yr** | **Nitrogen lbs/yr** | **Phosphorus lbs/yr** | **Sediment ton/yr** |
| Antietam Creek | All in Maryland | 85,617.9 | 621.0 | 488.30 | 97,845.5 | 1,758.1 | 1,058.71 |
| Back River | Tidal (entire County subwatershed) | 0 | 0 | 0 | 497.4 | 175.1 | 26.24 |
| | Upper (Baltimore City and County) | 0 | 0 | 0 | 663.7 | 253.2 | 38.11 |
| Corsica River | All | 30,943.3 | 92.2 | 26.28 | 32,441.3 | 237.8 | 47.28 |
| Lower Jones Falls | All (Baltimore City and County) | 0 | 0 | 0 | 90.6 | 25.2 | 3.87 |
| Lower Monocacy River | All incl. Lake Linganore, Frederick Co. | 202,826.5 | 1,237.4 | 1,060.32 | 212,070.9 | 2,113.5 | 1,433.03 |
| Middle Gwynns Falls | All in Baltimore County only | 0 | 0 | 0 | 459.1 | 155.1 | 23.53 |
| Sassafras River | All in Maryland only | 71,357.1 | 375.4 | 199.02 | 73,708.0 | 540.7 | 362.52 |
| Upper Choptank River | All in Caroline County only | 149,326.1 | 0.1 | 71.60 | 160,879.6 | 889.4 | 126.30 |
| | | | | | | | |
| TOTAL | | 540,070.9 | 2,326.1 | 1,845.52 | 578,656.0 | 6,148.1 | 3,119.58 |

3. Success Stories

During SFY17, MDE reported a success story on improvements in Spiker Run, which is a tributary to the Casselman River in Garrett County, Maryland. MDE planned and implemented the work necessary to eliminate the low pH impairment to the stream caused by acid mine drainage. MDE also conducted the before and after water quality monitoring and analysis that was necessary to document the in-stream improvements. See Appendix – Success Story.

4. National Water Quality Initiative

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

In 2012, Maryland was among the first States to create a cooperative monitoring agreement to support the NWQI effort. Since that time, MDE has collaborated with the United States Department of Agriculture/National Resources Conservation Services (USDA/NRCS) to conduct in-stream monitoring in the Catoctin Creek watershed. During SFY17 this included a combination of nutrient synoptic surveys and surface water bi-weekly monitoring.

During SFY17, the following NWQI activities were conducted in the Catoctin Creek watershed:

1) MDE continued monitoring under the 2016 3-year interagency agreement with Maryland NRCS to fund water quality sampling and sample analysis.
2) Sampling during this period was conducted at the same small-watershed sites originally designated for this project.
3) During SFY16, MDE in cooperation with the Frederick Soil Conservation District identified a farmer who was willing to allow water quality monitoring by MDE to determine if an in-stream watershed quality change can be detected. Downstream of this farmer's land, MDE already have an existing monitoring station. In SFY17 during BMP installation, MDE begin water quality sampling within and above the farm. MDE sampling is anticipated to continue for another year.

Over the period from 2013 thru 2015, Maryland DNR reported that Catoctin Creek nitrogen levels decreased when changes in river low are accounted for. One station in Catoctin Creek showed a significant decrease in sediment levels. [1] Analysis has not been conducted to determine if these changes can be linked to NWQI implementation.

[1]Maryland Department of Natural Resources. *Water Quality Summary 2013-2015*. Preliminary report received via personal communication 11/6/17 from Renee Karrh.

## B. Antietam Creek Watershed

### Location

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

### Goals, Milestones and Progress

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

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

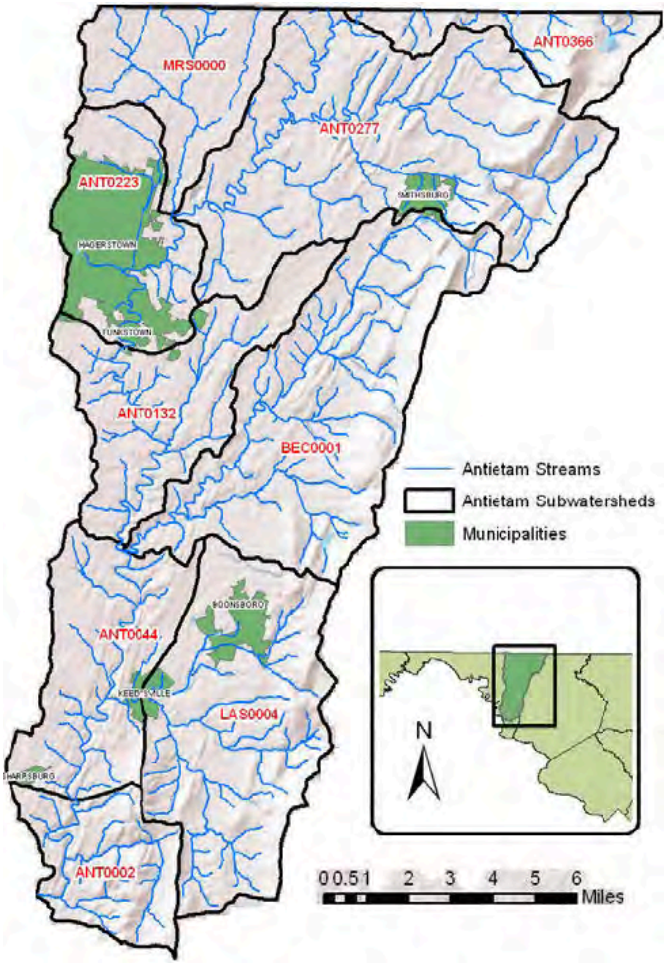



Figure 5. Antietam Creek Watershed.

Figure 6. In November 2014 during EPA's annual review of Maryland's NPS program, EPA staff joined the Washington County Soil Conservation District Manager and MDE staff in an on-site review of the proposed stream restoration on part of Little Antietam Creek. The steep eroding creek banks in the photo were typical along this part of the creek. The proposed stream restoration site assessment and design was partially funded by the 319(h) Grant in FFY2011 project #13. (MDE photo) The same vicinity after the restoration in 2107 is depicted on the next page.

## Implementation Status -- Antietam Creek Watershed Plan

Between 2012 and June 2017, over $2.49 million has been invested by State and Federal grants/loans in completed projects to help implement the Antietam Creek Watershed Plan as summarized in the table below. This investment, along with the leveraged nonfederal funds, has yielded significant pollutant load reduction. Also, this annual report includes the first reported bacteria reductions associated with a 319(h) Grant project.

**Table 7: Grant Expenditures Summary 2012 to June 2017**
**Antietam Creek Watershed Plan Implementation**

| | Grant Project Expenditures | | | | Pollutant Load Reduction | | | |
|---|---|---|---|---|---|---|---|---|
| **Grant Name** | **Federal Grants $** | **State Grants $** | **Non Federal Match $** | **Total $ Expenditures** | **Nitrogen lb/yr** | **Phosphorus lb/yr** | **Sediment tons/yr** | **E. Coli billion/yr** |
| 319(h) Grant | 1,407,509.60 | | 938,340.07 | 2,345,849.67 | 642.8 | 216.5 | 1,136.41 | 166 |
| State Revolving Fund | | 424,600.00 | | 424,600.00 | 202.0 | 10.7 | 0.0 | 0.0 |
| Chesapeake & Atlantic Coastal Bays Trust Fund | | 696,771.99 | | 696,771.99 | 426.9 | 51.3 | 15.08 | 0 |
| **TOTAL** | 1,407,509.60 | 1,121,371.99 | 938,340.07 | 3,467,221.66 | 1,271.6 | 278.5 | 1,151.49 | 166 |

**Table 8: Pollution Load Reduction Progress Reported**

| **Antietam Creek Watershed** | **Nitrogen lb/yr** | **Phosphorus lb/yr** | **Sediment tons/yr** | **E. Coli billion/yr** |
|---|---|---|---|---|
| 2012 thru SFY16 | 34,347.6 | 1,979.0 | 1,800.34 | |
| SFY17 Cover Crops | 85,617.9 | 621.0 | 488.3 | |
| SFY17 Multi-Year BMPs | 12,227.6 | 1,137.1 | 570.4 | 0 |
| All Trust Fund thru SFY17 | 426.9 | 51.3 | 15.08 | 0 |
| Total | 132,620.0 | 3,788.4 | 2,874.1 | 0 |
| Watershed Plan Goals (1) | | | 12,923.00 | 5,411,472 |
| Percent of Goal Achieved | | | 22.2% | 0% |

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

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

Figure 7. Stream restoration construction long Little Antietam Creek took place in 2016 (below left). Construction was completed late in 2016 (belowright). The restoration was funded in part by two the 319(h) Grant in FFY2015 project #7). (photos by Washington County SCD).

## C. Back River Watersheds

### Location

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

### Implementation

Projects that are implementing watershed plans goals, funded thru three Federal and State grant/loan sources, are summarized on the next page. (See page 4 for project photo.) The pollutant removal goals in both the Tidal Back River and the Upper Back River watershed plans are drawn from the same nutrient TMDL. Both plans have urban BMP implementation goals. Agriculture is nearly absent in both areas. No agricultural BMP implementation was reported during SFY14-17 in either area.


Figure 8. Back River Watersheds.

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

**Table 9. Tidal Back River Watershed Plan BMP Goals and Implementation Progress**

| Management Practice | SWAP Goal | Units | 2010-FY16 Progress | FY17 Activity | 2010-FY16 Progress |
|---|---|---|---|---|---|
| 6. Convert Dry Ponds | 2 | projects | 2 | 0 | 2 |
| 10. Stormwater Retrofits | 16 | projects | 8 | 0 | 8 |
| 11. Impervious Cover Removal | 0.5 | acres | 1.0 | 0 | 1.0 |
| 12. Downspout Disconnection | 12.0 | rooftop acres | 0.8 | 0 | 0.7 |
| 16. Riparian Buffer Trees | 156 | acres | 0.4 | 0 | 0 |
| 17. Shoreline Buffer Trees | 181 | acres | 0 | 0 | 0 |
| 18. & 19. Upland Trees | 36.75 | acres | 21.45 | 1.58 | 23.03 |
| 20. Institutional Trees* | 2.1 | acres | 5.5 | 0.1 | 5.6 |
| 33. Shoreline Management | 2 | projects | 1 | 0 | 1 |
| 36. Stream Restoration | 3,442 | ft | 1,523 | 0 | 1,523 |

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

| Table 10. Upper Back River SWAP (Baltimore County Portion) Goal * | | | | | |
|---|---|---|---|---|---|
| **Management Practice** | **SWAP Goal** | **Units** | **2008-FY16 Progress** | **FY17 Activity** | **Total Progress** |
| Convert Dry Ponds | 17 | projects | 12 | 0 | 12 |
| Stormwater Retrofits | 50 | projects | 1 | 0 | 1 |
| Downspout Disconnection | 180 | rooftop acres | 4.5 | 0 | 4.5 |
| Riparian Buffer Trees | 200 | acres | 3.6 | 0.04 | 3.64 |
| Reforestation | 50 | acres | 21.3 | 1.9 | 23.2 |
| Street Trees | 4,000 | trees | 475 | 0 | 475 |
| Stream Restoration | 66,000 | ft | 2,000 | 0 | 2,000 |

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

## Table 11. Pollution Load Reduction Progress Tidal and Upper Back River SWAPs

| Pollution Reduction Progress | | | |
|---|---|---|---|
| **Tidal Back River Watershed** | Nitrogen lbs/yr | Phosphorus lbs/yr | Sediment lbs/yr |
| **Completed Measures Prior To SWAP** | | | |
| Unkown, it is unclear in the SWAP | | | |
| **SWAP Implementation** | | | |
| 2010-FY14 | 1,163.4 | 563.3 | 1,671,946.1 |
| FY15 | 32.8 | 2.3 | 565.4 |
| FY16 | 168.9 | 9.2 | 3,107.9 |
| FY17 | 61.1 | 0.6 | 126.4 |
| 2011 Fertilizer Act | 1,081.7 | 239.4 | 0.0 |
| FY17 Street Sweeping | 419.6 | 167.8 | 50,350.7 |
| FY17 Inlet Cleaning | 16.7 | 6.7 | 2,000.8 |
| Total Estimated Pollutant Reductions 2010-FY17 | 2,944.2 | 989.3 | 1,728,097.3 |
| Watershed Plan Goals | 6,498 | 679 | |
| Percent of Goal Achieved | 45.3% | 145.7% | |

| Pollution Reduction Progress (Baltimore County Portion) | | | |
|---|---|---|---|
| **Upper Back River Watershed** | Nitrogen lbs/yr | Phosphorus lbs/yr | Sediment lbs/yr |
| **Completed Measures Prior To SWAP** | | | |
| | 9,661.0 | 1,340.6 | unknown |
| **SWAP Implementation** | | | |
| 2008-FY14 | 538.1 | 147.4 | 94,184.4 |
| FY15 | 59.1 | 9.7 | 1,192.3 |
| FY16 | 158.6 | 16.4 | 5,532.8 |
| FY17 | 37.3 | 2.6 | 1,049.6 |
| 2011 Fertilizer Act | 6,472.5 | 1,432.4 | 0.0 |
| FY17 Street Sweeping | 561.8 | 224.7 | 67,410.5 |
| FY17 Inlet Cleaning | 64.6 | 25.9 | 7,756.2 |
| Total Estimated Pollutant Reductions 2010-FY17 | 7,892.0 | 1,859.1 | 177,125.8 |
| Grand Total Pollutant Reductions | 17,553.0 | 3,199.7 | 177,125.8 |
| Watershed Plan Goals* | 48,189.6 | 6,055.8 | |
| Percent of Goal Achieved | 36.4% | 52.8% | |

## D. Casselman River Watershed

### Location

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

### Goal

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

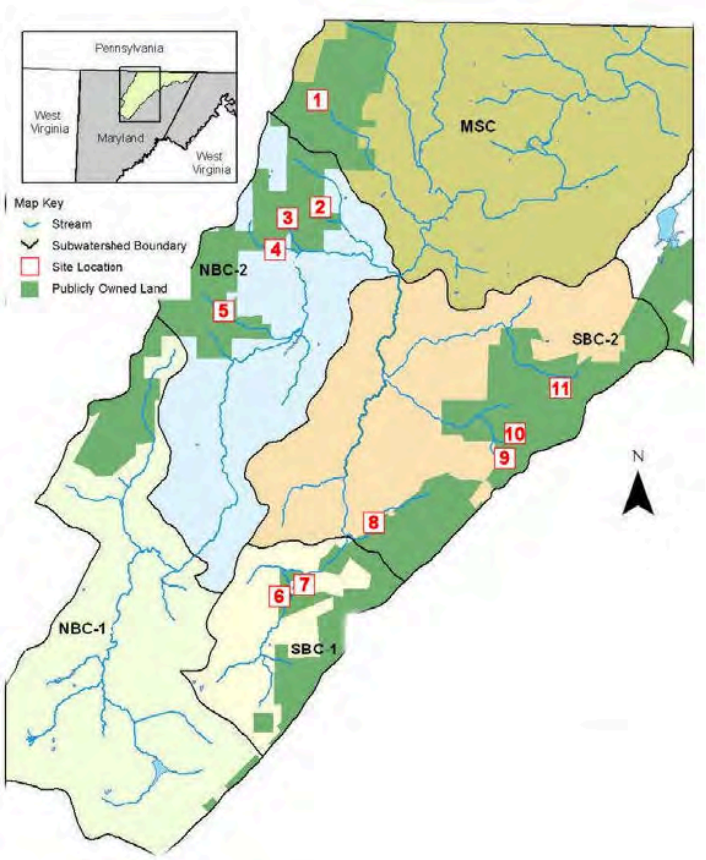



Figure 9. Casselman River watershed and Phase 1 sites.

### Implementation

All construction is by MDE using 319(h) FFY11 Grant funds. Phase 1 is on public land and Phase 2 is on private land, which continued thru SFY17 to install BMPs to mitigate acid mine drainage. (see Appendix D)

Figure 10. The photo shows a FFY13 319(h) Grant-funded site on private land where delivery trucks deposited limestone crushed to sand-sized grains (grey in photo center right). The limestone particles at this site will be gradually wash downstream and distribute along the stream bed. The limestone neutralizes excess acidity and provides pH buffering capacity. (photo by MDE Land Management Administration, Abandoned Mine Land Division.)

## E. Corsica River Watershed

### Location

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

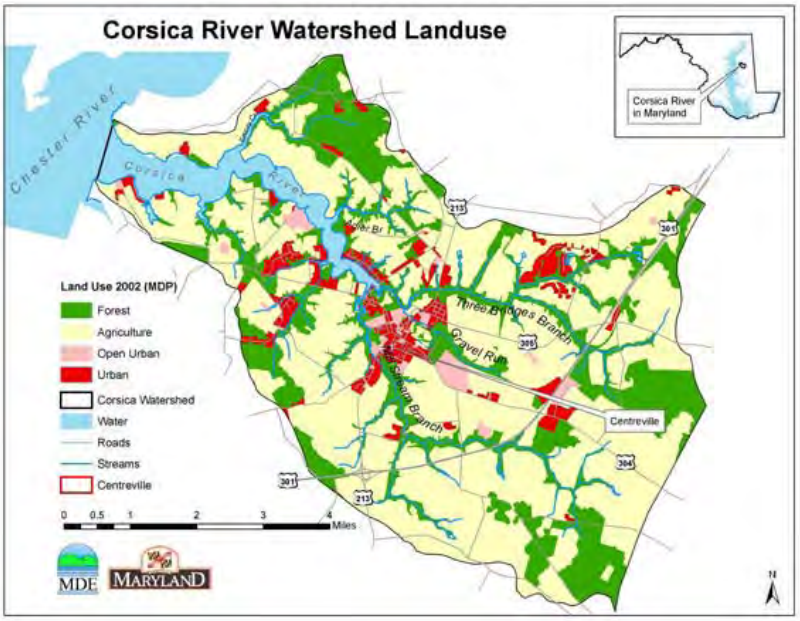



Figure 11. Corsica River Watershed

### Goals

| Table 12: Pollution Load Reduction Progress | | | |
|---|---|---|---|
| **Corsica River Watershed** | **Nitrogen lb/yr** | **Phosphorus lb/yr** | **Sediment tons/yr** |
| 2005 thru SFY16 | 49,535.0 | 6,106.7 | 1,075.35 |
| SFY17 Cover Crops | 30,943.3 | 92.2 | 26.28 |
| SFY17 Multi-Year BMPs | 1,498.0 | 145.6 | 21.05 |
| All Trust Fund thru SFY17 | 1,217.7 | 115.8 | 18.8 |
| Total 2005 thru SFY17 | 83,193.9 | 6,460.3 | 1,141.45 |
| Watershed Plan Goals (1) | NA | NA | NA |
| Percent of Goal Achieved | NA | NA | NA |
| All funding sources. Annual BMPs in SFY17 only. See Appendix D. | | | |

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

| Table 13: Grant Expenditures Summary - Corsica River Watershed Plan Implementation | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Grant Project Expenditures** | | | | **Pollutant Load Reduction** | | |
| **Grant Name** | **Federal Grants $** | **State Grants $** | **Non Federal Match $** | **Total $ Expenditures** | **Nitrogen lb/yr** | **Phosphorus lb/yr** | **Sediment tons/yr** |
| 319(h) Grant | 1,919,132.11 | 270,000.00 | 1,279,421.41 | 3,233,553.56 | 215,912.4 | 13,790.9 | 1,957.18 |
| State Revolving Fund | 0 | 200,000.00 | 0 | 250,000.00 | 864.0 | 173.0 | 0.00 |
| Chesapeake & Atlantic Coastal Bays Trust Fund | | 1,178,127.60 | | 1,178,127.60 | 1,217.7 | 115.8 | 18.78 |
| **TOTAL** | 1,919,132.11 | 1,648,127.60 | 1,279,421.41 | 4,661,681.17 | 217,994.0 | 14,079.7 | 1,975.95 |

## F. Lower Jones Falls Watershed

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

### Implementation Status

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

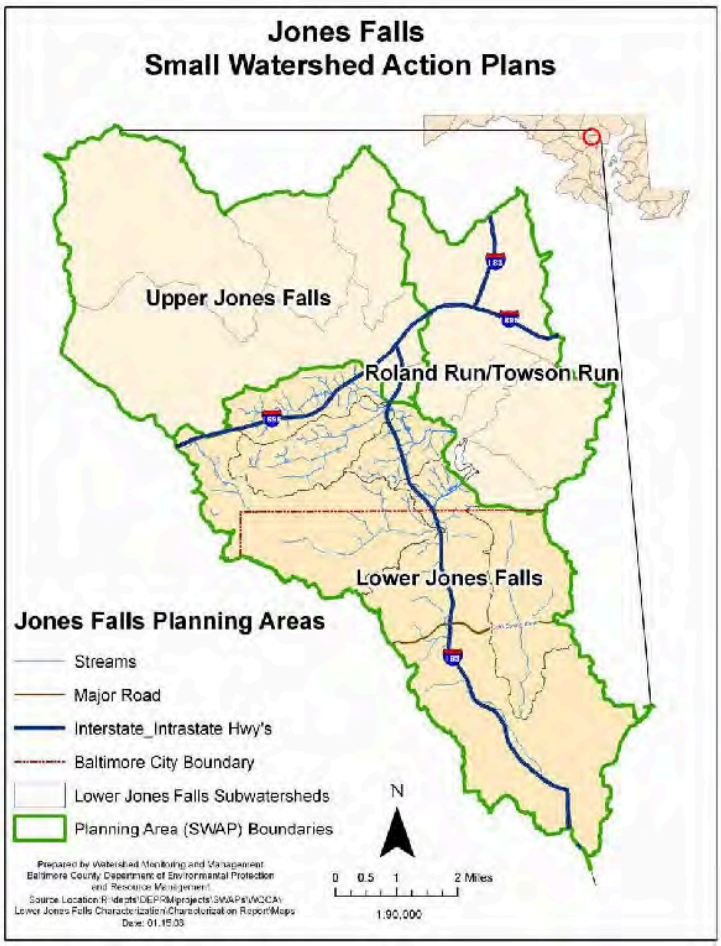



Figure 12. Jones Falls Watershed

| Table 14. Lower Jones Falls SWAP Pollution Reduction Progress * (Baltimore County Portion) | | | |
|---|---|---|---|
| **Lower Jones Falls Watershed** | Nitrogen lbs/yr | Phosphorus lbs/yr | Sediment lbs/yr |
| **Completed Measures Prior To SWAP** | | | |
| | 7,751 | 1,166 | 418,556 |
| **SWAP Implementation** | | | |
| FY09-FY14 | 149.5 | 1.6 | 698.6 |
| FY15 | 0.6 | 0.0 | 25.6 |
| FY16 | 44.1 | 1.1 | 537.8 |
| FY17 | 29.8 | 0.9 | 439.8 |
| 2011 Fertilizer Act | 7,016.7 | 920.5 | 0.0 |
| FY17 Street Sweeping | 52.0 | 20.8 | 6,236.0 |
| FY17 Inlet Cleaning | 8.8 | 3.5 | 1,058.1 |
| Total Estimated Pollutant Reductions FY09-FY17 | 7,301.5 | 948.4 | 8,995.9 |
| Grand Total Pollutant Reductions | 15,052.5 | 2,114.4 | 427,551.9 |
| Watershed Plan Goals* | 23,146 | 3,887 | 409,800 |
| Percent of Goal Achieved* | 65.0% | 54.4% | 104.3% |

* Baltimore County and Baltimore City are responsible for meeting these goals collectively. Also see Appendix F.

## G. Lower Monocacy River Watershed

### Location

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

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


Figure 13. Monocacy River Watershed.

### Goals and Implementation

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

**Table 15: Pollution Reduction Progress Reported**

| Lower Monocacy River Watershed | Nitrogen lb/yr | Phosphorus lb/yr | Sediment tons/yr |
|---|---|---|---|
| Prior Years | 37,312.1 | 3,239.8 | 1,568.87 |
| SFY17 Cover Crops | 202,826.5 | 1,237.4 | 1,060.3 |
| SFY17 Multi-Year BMPs | 8,968.4 | 876.1 | 372.7 |
| All Trust Fund thru SFY17 | 1,558.9 | 93.3 | 21.0 |
| Total Estimated Pollutant Reduction 2008 thru 2014 | 250,665.9 | 5,446.5 | 3,022.9 |
| Watershed Plan Goals (1) | 649,998 | 68,952 | 10,345 |
| Percent of Goal Achieved | 38.6% | 7.9% | 29.2% |

Prior Years data is from 2013 and Maryland Chesapeake Bay WIP reporting SFY14-SFY16. See Appendix G for more detail.

The adjacent table shows that significant estimated pollutant load reduction was achieved during state fiscal year. However, much of the estimated pollution reduction is associated with annual cover crops. Therefore, a continuation of annual cover crop planting is necessary in the future.

## Implementation Status – Lower Monocacy River Watershed Plan

| Table 16: Grant Expenditures Summary<br>Lower Monocacy River Watershed Plan Implementation | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Grant Expenditures Summary** | | | | | **Pollutant Load Reduction** | | |
| **Grant Name** | **Federal Grants $** | **State Grants $** | **Non Federal Match $** | **Total $ Expenditures** | **Nitrogen lb/yr** | **Phosphorus lb/yr** | **Sediment tons/yr** |
| 319(h) Grant | 1,387,102.99 | | 749,963.33 | 1,973,314.60 | 3,154.3 | 418.3 | 32.28 |
| State Revolving Fund | | 0 | | 0 | 0 | 0 | 0 |
| Chesapeake & Atlantic Coastal Bays Trust Fund | | 350,040.97 | | 350,040.97 | 1,558.9 | 93.3 | 20.99 |
| **TOTAL** | 1,387,102.99 | 350,040.97 | 749,963.33 | 2,323,355.57 | 4,713.2 | 511.6 | 53.27 |

The summary table above indicates that significant estimated pollutant load reductions have been reported as a result of over $1.38M in Federal 319(h) Grant funds that leveraged about three quarters of a million dollars in local match in the Lower Monocacy River watershed. (see Appendix G)

## H. Middle Gwynns Falls Watershed

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

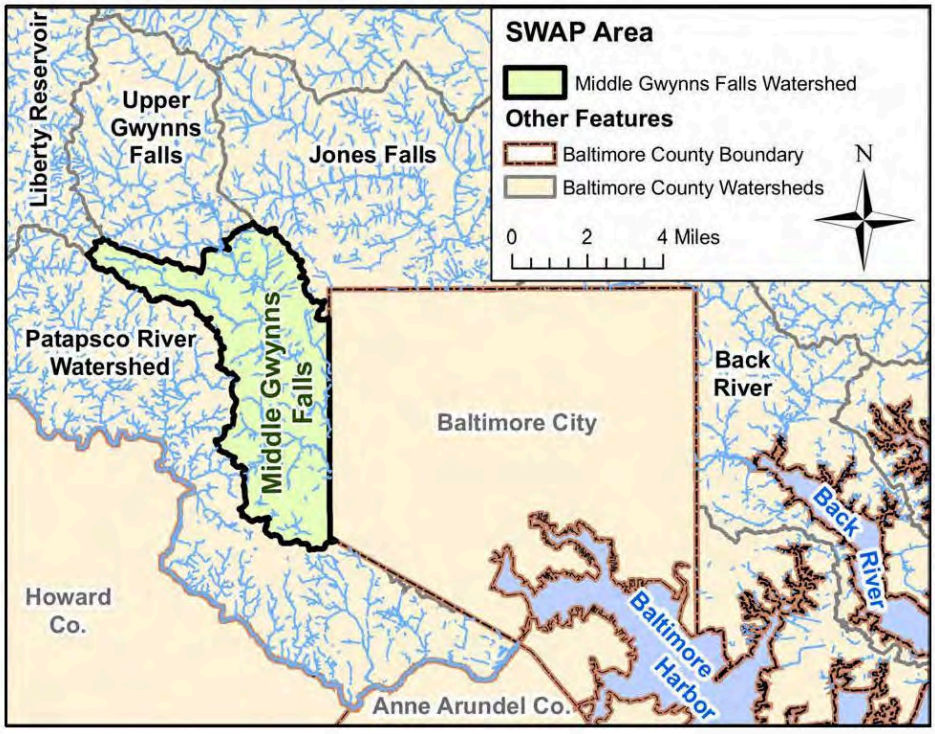



Figure 14. Gwynns Falls watershed in Baltimore County

### Implementation Status

**Table 17. Middle Gwynns Falls SWAP Pollution Reduction Progress**

| Middle Gwynns Falls Watershed | Nitrogen lbs/yr | Phosphorus lbs/yr | Sediment lbs/yr | Bacteria |
|---|---|---|---|---|
| **Completed Measures Prior To SWAP** | | | | |
| Through August 2013 | 6,128.8 | 572.2 | 808,461.0 | |
| **SWAP Implementation** | | | | |
| September 2013-FY14 | 163.6 | 135.5 | 90,350.2 | |
| FY15 | 137.7 | 8.5 | 12,551.3 | 15% reduction |
| FY16 | 281.1 | 20.9 | 18,440.8 | 49% reduction |
| FY17 | 71.0 | 1.5 | 970.6 | 28% reduction |
| 2011 Fertilizer Act | 4,928.0 | 640.0 | 0.0 | |
| FY17 Street Sweeping | 346.1 | 138.4 | 41,531.1 | |
| FY17 Inlet Cleaning | 37.97 | 15.19 | 4,555.86 | |
| FY17 Septic Pumpouts | 4.0 | na | na | |
| Total Estimated Pollutant Reductions Post-SWAP | 5,969.5 | 960.0 | 168,399.9 | |
| Grand Total | 12,098.3 | 1,532.2 | 976,860.9 | |
| Watershed Plan Goals | 50,442* | 4,086* | 4,095,076.1** | 99.99% |
| Percent of Goal Achieved | 24.0% | 37.5% | 23.9% | 49% |

* Chesapeake Bay TMDL. ** Local Sediment TMDL issued by the State: 36.4% reduction.

For more information see Appendix H.

| Table 18: Grant Expenditures Summary - Middle Gwynns Falls 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** | **Bacteria MPN/yr** |
| 319(h) Grant | 320,004.00 | | 213,336.00 | 533,340.00 | 415.2 | 136.4 | 306.2 | 0 |
| State Revolving Fund | | 0 | | 0 | 0 | 0 | 0 | 0 |
| Chesapeake & Atlantic Coastal Bays Trust Fund | | 706,745.56 | | 706,745.56 | 438.5 | 137.9 | 307.0 | 0 |
| **TOTAL** | 320,004.00 | 706,745.56 | 213,336.00 | 1,240,085.56 | 853.7 | 274.3 | 613.2 | 0 |

Figure 14. The two photos show existing conditions in the Scotts Level Branch drainage area in the vicinity of Marriottsville Road within the Middle Gwynns Falls watershed. A FFY2016 319(h) Grant for over $0.6M is scheduled to begin construction sometime next year to eliminate the eroding vertical stream banks and to restore the stream area. Total project cost is projected to be well over $1.0M. Project completion is projected before June 2019. (photo by Baltimore County Dept. of Environmental Protection and Sustainability, Capital Program and Operations Section).

## I. Sassafras River Watershed Plan

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

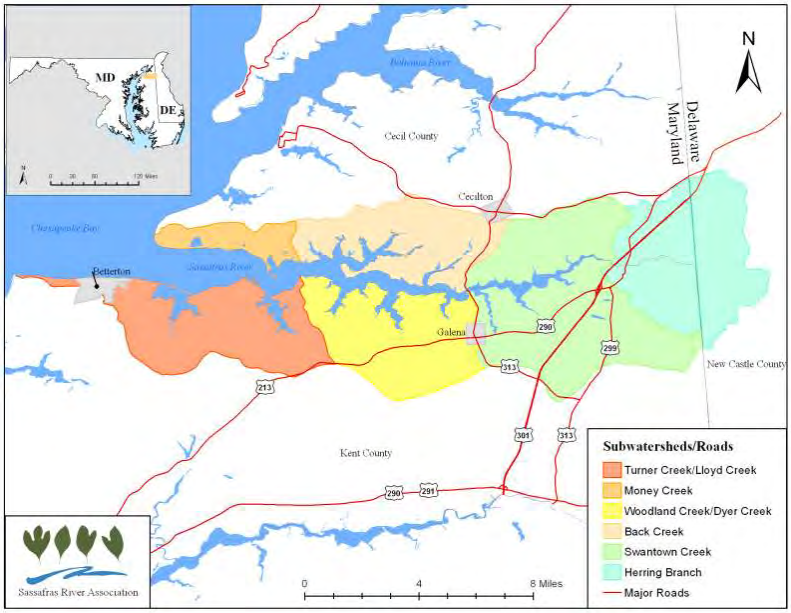



Figure 15. Sassafras River watershed map

### Plan Implementation Progress

The 2009 Sassafras River Watershed Action Plan (SWAP) was developed by the Sassafras River Association (SRA). On November 15, 2017 the SRA, which is the lead Sassafras plan implementer announced that it is merging with two other NGOs. The new NGO, called ShoreRivers, is anticipated to continue as the lead implementer of the Sassafras Plan. Implementation tracking progress is summarized on the next page.

Figure 16. The photo above shows a newly constructed BMP on a Kent County farm as seen 9/26/17 when EPA and MDE representatives visited. The farm's steep slope and large drainage area required that grade stabilization be provided by rock. In between the rock, several bioretention/treatment wetland areas are ready for planting. Representatives in photo: Kent Soil Conservation District Board member, Sassafras River Association agricultural project leader. (photo by MDE, Integrated Water Planning Program)

## Implementation Status – Sassafras River Watershed Plan

| Table 19: Grant Expenditures Summary - Sassafras River Watershed Plan Implementation | | | | | | | |
|---|---|---|---|---|---|---|---|
| Grant Project Expenditures | | | | | Pollutant Load Reduction | | |
| Grant Name | Federal Grants $ | State Grants $ | Non Federal Match $ | Total $ Expenditures | Nitrogen lb/yr | Phosphorus lb/yr | Sediment tons/yr |
| 319(h) Grant | 64,000.00 | | 42,666.67 | 108,333.33 | 100.7 | 20.2 | 2.6 |
| State Revolving Fund | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chesapeake & Atlantic Coastal Bays Trust Fund | | 1,404,829.65 | | 1,404,829.65 | 12,121.4 | 8,663.4 | 133.5 |
| **TOTAL** | 64,000.00 | 1,404,829.65 | 42,666.67 | 1,513,162.98 | 12,222.1 | 8,683.6 | 136.1 |

The table above shows that, among three State administered funding sources, Maryland's Chesapeake and Atlantic Coastal Bays has had the most significant impact in the Sassafras River watershed. During SFY2017, there were no projects working or completed using 319(h) Grant or the State Revolving Fund. However, two projects were proposed on three farms for future 319(h) Grant funding:

- Harbor View and Colchester Farms Project involves constructing a mixture of cascading wetland system, bioretention and enhanced treatment infiltration, and
- Starkey Project involves constructing multi-celled treatment wetlands, wetland creation/restoration and stabilization of an eroded gully.

| Table 20: Pollution Reduction Progress | | | |
|---|---|---|---|
| Sassafras River Watershed | Nitrogen lb/yr | Phosphorus lb/yr | Sediment tons/yr |
| Previous Years | 11,000.5 | 917.6 | 430.75 |
| SFY17 Cover Crops | 71,357.1 | 375.4 | 199.0 |
| SFY17 Multi-Year BMPs | 2,353.5 | 165.3 | 163.51 |
| All Trust Fund thru SFY17 | 12,121.4 | 8,663.4 | 133.5 |
| Total Pollutant Reduction | 96,832.5 | 10,121.8 | 926.7 |
| Watershed Plan Goals (1) | 46,475 | 6,458 | 721.9 |
| Percent of Goal Achieved | 208.4% | 156.7% | 128.4% |
| All funding sources. Annual BMPs in SFY17 only. See Appendix I. | | | |

The table shows that pollutant reductions reported during SFY2017 made significant progress to watershed plan goals.

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

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

## J. Upper Choptank River

### Location

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

### Goal

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

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

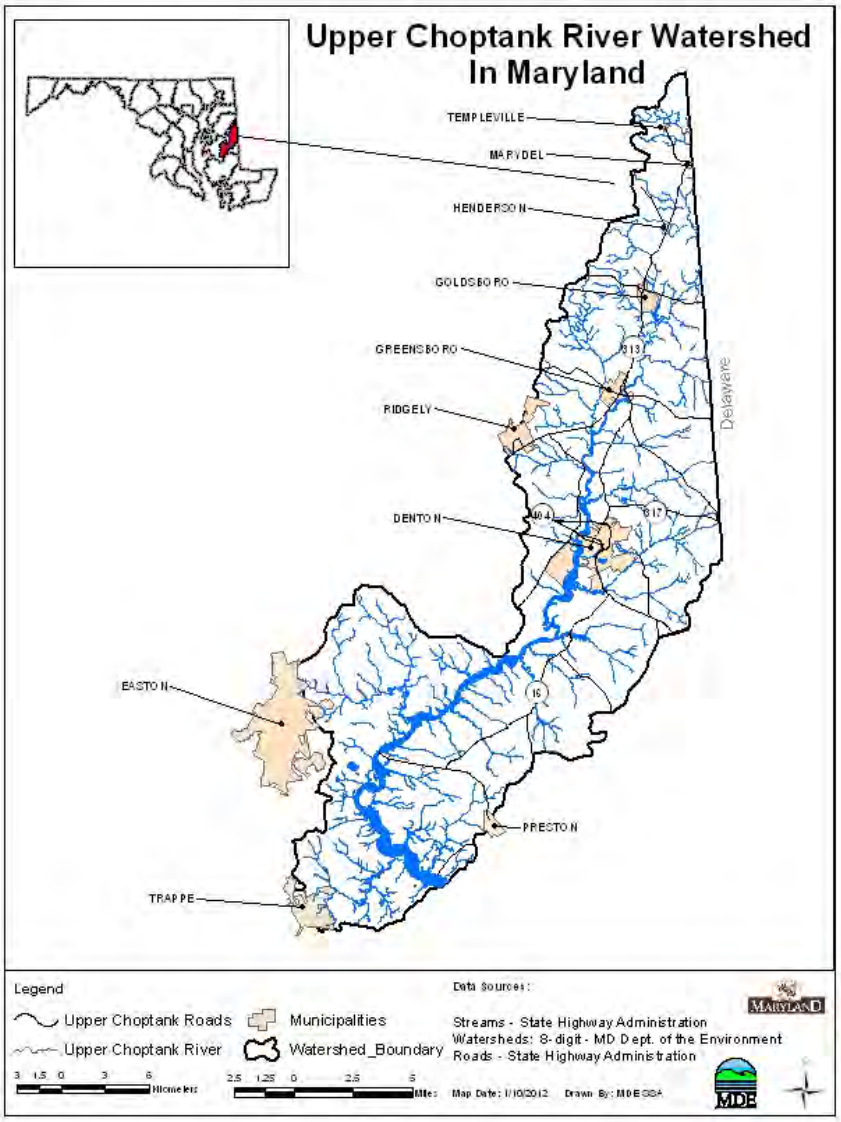



Figure 17. (above) Upper Choptank River Watershed.

**Table 21: Grant Expenditures Summary**
**Upper Choptank River Watershed Plan Implementation**

| | Grant Project Expenditures | | | | Pollutant Load Reduction | | |
|---|---|---|---|---|---|---|---|
| **Grant Name** | **Federal Grants $** | **State Grants $** | **Non Federal Match $** | **Total $ Expenditures** | **Nitrogen lb/yr** | **Phosphorus lb/yr** | **Sediment tons/yr** |
| 319(h) Grant | 1,174,095.43 | | 782,730.29 | 1,956,825.72 | 145,137.3 | 11,988.1 | 666.91 |
| State Revolving Fund | | 0 | | 0 | 0 | 0 | 0 |
| Chesapeake & Atlantic Coastal Bays Trust Fund | | 303,472.78 | | 303,472.78 | 3,888.6 | 157.6 | 853.5 |
| **TOTAL** | 1,174,095.43 | 303,472.78 | 782,730.29 | 2,260,298.50 | 149,025.9 | 12,145.7 | 1,520.42 |

## Implementation Status – Upper Choptank River Water Plan

| Table 22: Pollution Load Reduction Progress | | | |
|---|---|---|---|
| **Upper Choptank River Watershed** | **Nitrogen lb/yr** | **Phosphorus lb/yr** | **Sediment tons/yr** |
| 2002 thru SFY16 | 196,996.8 | 18,057.5 | 1,015.36 |
| SFY2017 Cover Crops | 149,326.1 | 0.1 | 71.6 |
| SFY17 Multi-Year BMPs | 11,553.5 | 889.3 | 54.7 |
| All Trust Fund thru SFY17 | 3,888.6 | 157.6 | 853.5 |
| Total Estimated Pollutant Reduction | 357,876.4 | 18,946.9 | 1,141.67 |
| Watershed Plan Goals (1) | 704,000 | 34,500 | |
| Percent of Goal Achieved | 50.8% | 54.9% | |
| All funding sources. Annual BMPs (cover crops) are shown in SFY17 only. See Appendix J. | | | |

The pollutant load reduction progress table above summarizes overall watershed plan implementation progress based on available reporting. Annual cover crops for SFY2017 comprise 40% of the total estimated nitrogen pollutant load reduction for implementing the watershed plan. This suggests that cover crop planting will continue to be an important annual practice for future years of watershed plan implementation.

## V. Areas of Concern/Recommendations/Future Actions

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

### A. Timeframe

The SFY17 Annual Report continues to use the timeline initiated in the SFY15 Annual Report to synchronize progress reporting for CWA Section 319(h) NPS Program and the EPA Chesapeake Bay Program (CBP) to the degree that these two programs allow. However, this synchronization is cannot be fully realized because of differing deadline requirements. Therefore, MDE anticipates the following schedule for finalizing this annual report:

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

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

Significant effort has been invested by State agencies to improve the completeness and accuracy of BMP implementation data. Some of this work has been funded by an EPA grant under the Chesapeake Bay Regulatory and Accountability Program (CBRAP). The first grant "CBRAP1" ran from 7/1/10 thru 6/30/17. The second grant "CBRAP2" started 7/1/16 and continued thru SFY17. These grants have been used by Maryland to help address issues involving both point sources and nonpoint sources. Several of the work areas called Objectives that address nonpoint source issues are:

- Agriculture NPS
    - Technical assistance for farmers drafting and updating nutrient management plans to meet State requirements. (funded from 7/1/10 thru 6/30/18 under Objective 10 CBRAP1 and CBRAP2)
    - Agricultural Watershed Implementation Plan coordination to meet the Chesapeake Bay TMDL. (funded from 7/1/10 thru 6/30/18 under Objective 11 CBRAP1 and CBRAP2)
    - Poultry manure management assessments and compliance (funded from 7/1/10 thru 6/30/13 under Objective 12 CBRAP1 only)
    - Nutrient management review and compliance (funded 7/1/14 thru 6/30/17 under Objective 23 CBRAP1 only)

  - Best management practice verification (funded 3/15/15 thru 6/30/17 under Objective 29 CBRAP1 and CBRAP2)
- Urban NPS
  - Accountability framework development and implementation at the State and local levels such as establishing watershed implementation plans, monitoring progress of NPS implementation by setting two-milestones and tracking efforts to meet plan goals and milestones (funded 7/1/2012 thru 6/30/18 under Objective 16 CBRAP1 and CBRAP2)
  - Coordination of among State programs and with local agencies to expedite NPS implementation (funded 7/1/10 thru 6/30/18 under Obj. 9 CBRAP1 and CBRAP2, funded 7/1/11 thru 6/30/13 under Obj. 13 CBRAP1 only and funded 7/1/12 thru 6/30/18 under Obj. 15 CBRAP1 and CBRAP2).
  - Development, deployment, updating and training for a tool for tracking and envisioning NPS implementation scenarios. The Maryland Automated Scenario Tool (MAST). (Funded 7/1/10 thru 11/21/11 under Obj. 3 CBRAP1 only, funded 3/1/12 thru 12/31/12 under Obj. 18 CBRAP1 only and funded 7/1/16 thru 6/30/17 under Obj. 36 CBRAP2 only).
- Data Management
  - Enhancing statewide data management integration and efficiency. (funded 1/1/15 thru 6/30/17 under Obj. 26 CBRAP1 only).
  - Development and deployment of the new data management system using FFY16 and FFY17 319(h) Grant funds.

**C. Differences in 319 Priority Watershed Plan Implementation and Tracking**

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

There are significant differences in participation among local jurisdictions. Some participate fully, several participate only indirectly (public newsletters) or not at all. Among these, Baltimore County is fully engaged but is dissatisfied with the tracking methods used for statewide reporting and prefers to supply their own estimates of progress that were used in the watershed-specific reporting in this report. For all 319 priority watersheds except for Baltimore County, MDE used the Maryland Assessment and Scenario Tool (MAST) to estimate BMP pollutant load reductions for nitrogen, phosphorus and sediment for SFY14 thru SFY17. In the Annual Report executive summary and for Milestones Objective 3, MDE used only MAST estimates for all 319 watersheds in aggregate instead of attempting to mesh these two very divergent tracking/reporting methods.

Beginning in 2018 when the Chesapeake Bay Model Phase 6 is available, MAST will no longer be used by Maryland. It is anticipated that the SFY18 Annual Report will use the Chesapeake Bay Assessment and Scenario Tool (CAST). This transition may cause pollutant load reduction tracking for the SFY18 Annual Report to be incompatible with prior year's Annual Reports.

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

As first reported in the 2014 Annual Report, local interest in funding NPS implement use the 319(h) Grant has tended to very limited. Therefore, for 2014 thru SFY17 few 319-funded BMPs have been completed and total pollutant load reduction reported is small compared to other reported funding sources.

Beginning in SFY17, consistent with EPA guidance began reporting 319(h) Grant matching funds AND pollutant load reductions associated with the matching funds.

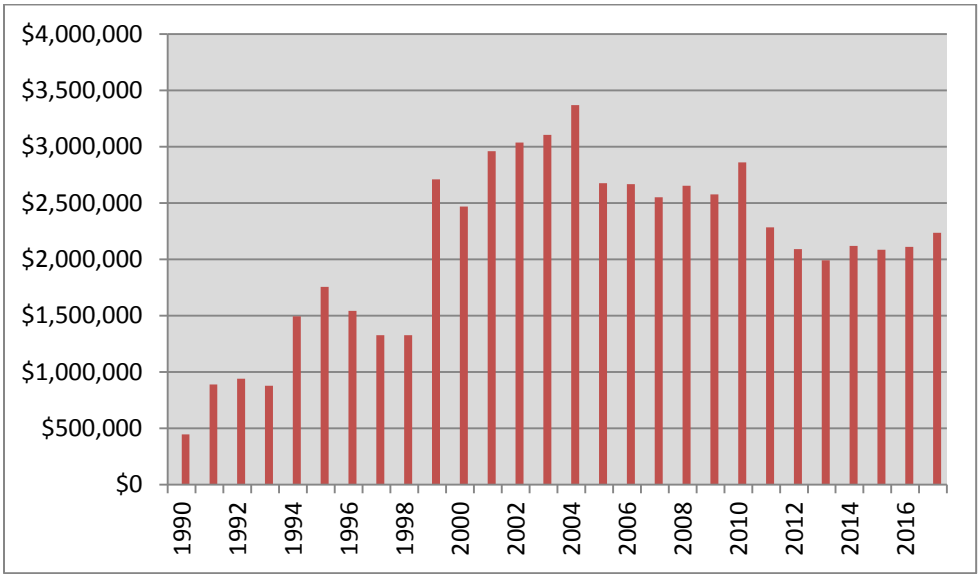
# *Appendix A Financial Information*



Contents



**Federal 319(h) Grant Funds Awarded To Maryland**
**By Federal Fiscal Year Appropriated 1990 thru SFY 2017**




Grant funding from the Federal Clean Water Act Section 319(h) was first awarded to the State of Maryland in 1990. The graph above shows the Federal funds in each grant award. As the graph shows, grant awards received by Maryland from FFY2014 thru FFY2017 have been similar funding levels. 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.

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.

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

Since 1990, about $59 million in Federal 319(h) Grant funds have been awarded to Maryland as shown in the table below.

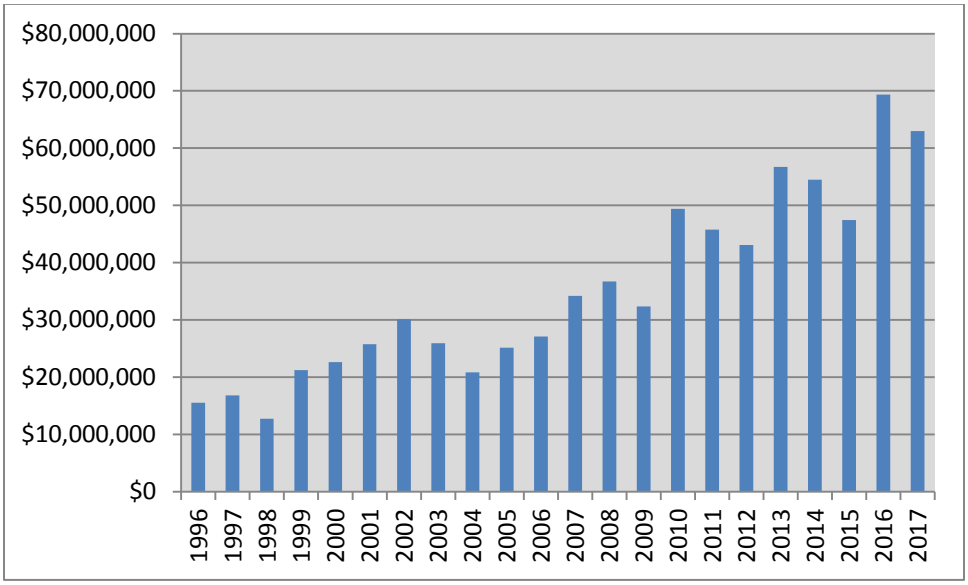
**Federal 319(h) Grant Funds Awarded To Maryland By Federal Fiscal Year Appropriated**

| 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 | $1,990,999 | $1,327,333 | $3,318,332 |
| 2014 | $159.3 | $2,119,118 | $1,412,745 | $3,531,863 |
| 2015 | $159 | $2,084,277 | $1,389,518 | $3,473,795 |
| 2016 | $164.92 | $2,109,728 | $1,406,485 | $3,516,213 |
| 2017 | | $2,236,500 | $1,491,000 | $3,727,500 |
| | | | | |
| Total | $4,219.7 | $59,144,876 | $39,429,917 | $98,574,793 |

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

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

**Summary State Fiscal Year 1996 thru 2017**




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 graph above shows that Maryland consistently surpasses its MOE. Beginning in 2013, NPS expenditures by DNR's Chesapeake and Atlantic Coastal Bays Trust Fund were included in the MOE. 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.

**319(h) Grant Implementation Funding Distribution 2002 thru SFY2017**

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 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 areas where implementation is complete and no longer eligible.
    - Watersheds that 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 additional 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.

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 State Fiscal Year 2017** | | | |
|---|---|---|---|
| **Watershed Plan Responsible Entity** | **# of Plans** | **Significant Contributor** | **Status June 2016** |
| 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 | MDE | eligible |
| | 1 | MDE | drafting |
| 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 |

The table on the next page, total Federal 319(f) grant funds expended in each of these watersheds is summarized. The expenditures shown includes all 319 funding both before and after EPA accepted the watershed plan. For example, the expenditures listed for the Lower Jones Falls watershed were invested years prior to the completion of the watershed plan.

# 319(h) Grant Implementation Budget Funding Distribution 2002 thru SFY2017

**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 | 1,659,831 | 15% | Back River - Tidal | 556,443 | | | | |
| | | | | Back River - Upper | 644,384 | | | | |
| | | | | Gwynns Falls - Middle | 320,004 | | | | |
| | | | | Jone Falls - Lower | 139,000 | | | | |
| Calvert | 0 | 0 | | | | | | | |
| Caroline | 1 | 1,174,095 | 11% | Choptank River - Upper | 1,174,095 | | | | |
| Carroll | 0 | 0 | | | | | | | |
| Cecil | 1 | 0 | | Sassafras River | 0 | | | | |
| Charles | 0 | 0 | | | | | | | |
| Dorcester | 0 | 0 | | | | | | | |
| Frederick | 1 | 1,387,103 | 12% | Monocacy River - Lower | 1,387,103 | | | | |
| Garrett | 1 | 1,635,115 | 15% | 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 | 1,919,132 | 17% | Corsica River | 1,919,132 | | | | |
| Somerset | 0 | 0 | | | | | | | |
| St Mary's | 0 | 0 | | | | | | | |
| Talbot | 0 | 0 | | | | | | | |
| Washington | 1 | 3,176,276 | 28% | Antietam Creek | 3,176,276 | | | | |
| Wicomico | 0 | 0 | | | | | | | |
| Worcester | 0 | 0 | | | | Coastal Bays | 0 | | |
| | Overall TOTAL | 11,154,552 | 100% | Drainage Area Total $ | 10,455,437 | | 0 | | 699,115 |
| | | | | Percent of Total $ | 94% | | 0% | | 6% |

| Region | Count | Total $ | % |
|---|---|---|---|
| Central Md | 4 | 1,798,831 | 16% |
| Eastern Shore | 3 | 3,157,227 | 28% |
| Southern Md | 0 | 0 | 0% |
| Western Md | 3 | 6,198,494 | 56% |
| Maryland TOTAL | 10 | 11,154,552 | 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.)

| Summary of 319 Priority Watershed Monitoring (Water Quality and Biological) Funded by the 319(h) Grant | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Watershed** | **Sub Watershed** | **Anti-Degradation** | **Before / After** | **Benthic** | **Long Term** | **OSDS** | **Success Story** | **Synoptic Survey** |
| Antietam Creek | | 2015: 2 sites | | MDE BA 2013-2015 | | | | MDE TW 2009 2011-2015 |
| Back River | | | | | | | | |
| Casselman River | | | MDE TW 2010-2016 | MDE BA 2011-2016 | | | 2015 Big Laurel Run 2016 Little Laurel Run 2017 Spiker Run | |
| Catoctin Creek | | | | | | | | MDE TW 2012-2016 |
| Corsica River | | 2016: 1 site 2014: 2 sites | MDE TW 2007-2012 | MDE TW 2005-2007 | MDE TW 2005-2017 | MDE TW 2007-2015 | | MDE TW 2008-2013 2015-2016 |
| Lower Jones Falls | | | | | | | | |
| Lower Monocacy River | Bens Branch, Linganore Cr | | MDE TW 2005-2015 | MDE TW 2005-2007 | | | 2008 Bens Branch | MDE TW 2005-2007 |
| Middle Gwynns F. | | | | | | | | |
| Sassafras River (1) | | | | | | | | MDE TW 2006-2007 |
| Upper Choptank River | | 2016: 2 sites 2015: 1 site 2014: 1 site | | | | | | |

Anti-Degradation = MDE BA sampling benthic macroinvertebrates and/or fish communities usually on a single day in Spring.
Before/After = Sampling before and after implementing NPS BMPs to gauge in-stream water quality affects.
Bens Branch = 2008 success story, site is also called Hunting Lotte Farm.
Benthic = MDE BA sampling benthic macroinvertebrates and/or fish communities before and after NPS BMP implementation.
Long Term = Weekly grab (whole & filtered) and flow weighted composite samples for total and dissolved nutrients
MDE BA = MDE Biological Assessment for Water Quality Protection and TMDL Implementation
MDE TW = MDE Targeted Watershed Monitoring of NPS Implementation Progress
OSDS = Monitoring pre and post land use change re OSDS implementation: TDN, NH4, NO23, NO2, PO4, CL.
NSS = Nutrient Synoptic Survey: whole & filtered samples for total & dissolved nutrients. Sometimes: chlorides, sulfates, bacteria, other.
Success Story = Year that MDE submitted and EPA accepted the success story. Success stories listed were supported by the before/after monitoring and/or the benthic monitoring listed for the table.

(1) Final Report for 319(h) Grant FFY2006 project #8.

# Appendix B
# Antietam Creek in Washington County, Maryland
# Watershed Eligible for 319(h) Grant Implementation Funding

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.)

## Water Quality Monitoring Activity, Overall Condition, Trends

### Index of Biological Integrity [1]

Beginning in 2014, MDE's 319(h) Grant-funded biological monitoring project has been sampling benthic macroinvertebrates and fish in selected streams within the Antietam Creek watershed. These two measures are used to gauge existing stream health on a scale of 1 to 5:

good (4.0-5.0), fair (3.0-3.9), poor (2.0-2.9), very poor (1.0-1.9)
BIBI = benthic index of biological integrity
FIBI = fish index of biological integrity

The following biological information was extracted from the May 2017 progress report, Project #1 Implementation of the Antietam Creek Watershed Restoration Plan. [2]

Project 1's objective involves collecting benthic data for a fifth year from selected stream sites in the Antietam watershed, which is currently listed on the 303(d) list of impaired waters, and has an approved TMDL for nutrients and sediments. Within areas where localized implementation projects have been approved, six benthic macroinvertebrate stations were established for long-term monitoring of sediment control projects Table 1. This effort is designed to demonstrate long-term improvement in the BIBI if sediment control projects are successful.

In 2017, six stations were sampled for benthics, Table 2. Currently all six stations are pending results for 2017. Four years of completed data (2013, 2014, 2015 and 2016) are not sufficient to interpret trends at this time.

**Table 1 Station Locations Antietam Creek Watershed [1]**

| Station | Stream Name | Location | Latitude | Longitude |
|---|---|---|---|---|
| LAC-001-T-2015 | Little Antietam Creek | Anderson Property/Soccer Field | 39.68165 | 77.60550 |
| LAC-002-T-2015 | Little Antietam Creek | Shank Property/farm | 39.68527 | 77.60973 |
| BEAV-001-T-2015 | Beaver Run | Cavetown Church Property | 39.64585 | 77.58418 |
| BEAV-002-T-2015 | Beaver Run | Albert Powell Hatchery | 39.58767 | 77.64026 |
| LGC-001-T-2015 | Little Grove Creek | Smithburg Sewage Treatment Plant | 39.66398 | 77.58364 |
| LGC-002-T-2015 | Little Grove Creek | mouth | 39.68196 | 77.60606 |

**Table 2 Benthic Macroinvertebrate (BIBI) Pre-Implementation Results [2] Antietam Creek Watershed**

| Station | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| LAC-001-T-2015 | 2.500 | 3.250 | 2.500 | 2.500 | pending |
| LAC-002-T-2015 | 3.000 | 3.000 | 2.000 | 2.000 | pending |
| BEAV-001-T-2015 | 3.750 | 2.000 | 2.500 | 2.750 | pending |
| BEAV-002-T-2015 | 2.500 | 2.250 | 1.750 | 2.250 | pending |
| LGC-001-T-2015 | 1.250 | 1.000 | 1.500 | 1.250 | pending |
| LGC-002-T-2015 | not sampled | 2.750 | 1.750 | 1.750 | pending |

[1] Maryland Department of the Environment. MDE Biological Assessment for Water Quality Protection and TMDL Implementation. 319(h) Grant FFY2016 Project 5 Objective 2.
[2] Maryland Department of the Environment. *Q3Report MDE Biological Assessment FFY-16 GRTS#5 thru 3-30-2017*. Charles Poukish. May 8, 2017. 47 pages.

## Water Quality Monitoring Before/After Plan Implementation [3]

MDE conducted nontidal water quality monitoring in the Antietam Creek watershed from mid 2011 thru late 2014 to gather three years of in-stream water quality data at 58 synoptic survey monitoring stations before significant watershed plan implementation occurred. The SFY16 Annual Report provides some summary information on this program.

From 2015 thru SFY17, no additional monitoring was conducted at the 58 synoptic survey monitoring stations. During this time period, it seemed unlikely that watershed plan implementation had progressed to a level that changes in water quality might be detected.

## 319(h) Grant: synopsis of multi-phase projects fully completed during SFY17

Beaver Creek (Antietam Creek tributary, Use III trout stream) stream restoration project (325 linear feet) on private farmland (Barr property) by Washington County Soil Conservation District.

- Total 319(h) Grant expenditure for overall project: $255,494.63
- Phase 1: 319 FFY13 #10 $148,930.00 expended for site survey, design and permitting, partial construction of stream restoration design.
    - Subgrant agreement executed 12/17/2013
    - Project completed 12/31/15
- Phase 2: 319 FFY15 #6 $106,564.63 expended to complete construction the stream restoration per Phase 1 designs.
    - Subgrant agreement executed 11/2/15
    - Project completed 12/31/16

Little Antietam Creek stream restoration (2500 linear feet) and Little Grove Creek (600 linear feet) project on private farmland (Shank property and Anderson property)by Washington County Soil Conservation District.

- Total 319(h) Grant expenditure for overall project: $512,618.43
- Phase 1: not 319-funded, completed 2011: stream fencing and buffer establishment
- Phase 2: 319 FFY11 #13 $64,253.43: cattle water supply, septic upgrade to remove nitrogen, survey and design for stream restoration.
    - Subgrant agreement executed 1/28/14
    - Project completed 9/30/15
- Phase 3: 319 FFY15 #7 $448,365.00 construct the stream restoration per Phase 2 designs.
    - Subgrant agreement executed 11/2/15
    - Project completed 12/31/16

319(h) Grant: projects tracking table (next page)

[3] Maryland Department of the Environment. MDE Targeted Watershed Project. 319(h) Grant FFY2016 Project 4 Objective 2.

## Antietam Creek Watershed
## 1994-SFY17 Completed NPS Implementation Projects - 319(h) Grant

| Project Summary | | | Project Expenditures | | | | | Reported 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 (billion/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 |
| | Barr Property Stream Restoration Ph1 | SFY16 | 319 FFY13 #10 | 148,930.00 | | 99,287.00 | 248,217.00 | 23.75 | 4.95 | 2.76 | 0 |
| | Barr Property Stream Restoration Ph2 | SFY17 | 319 FFY15 #6 | $106,564.63 | | $71,043.09 | $177,607.72 | | | | |
| | Kiwanis Park Stream Stabilization Ph1 | SFY15 | 319 FFY2014 #7 | 124,340.97 | | 82,893.98 | 207,234.95 | 34.2 | 10.3 | 16.75 | 0 |
| | Kiwanis Park Stream Stabilization Ph2 | SFY16 | 319 FFY12 #13 | 39,147.90 | | 26,098.60 | 65,246.50 | 17.1 | 5.15 | 4.15 | 0 |
| | Shank/Anderson Project Phase 2 of 3 | SFY16 | 319 FFY11 #13 | 64,253.43 | | 42,835.62 | 107,089.05 | 157.7 | 56.7 | 795.0 | 0 |
| | Shank/Anderson Project Phase 3 of 3 | SFY17 | 319 FFY15 #7 | 448,365.00 | | 298,910.00 | 747,275.00 | | | | |
| Washington County | Greensburg Rd Little Antietam Creek Restoration | 2014 | 319 FFY2012 #11 | 229,555.73 | | 153,037.15 | 382,592.88 | 110 | 37.4 | 85.25 | 0 |
| | Devils Backbone Park Stream Restoration | SFY16 | 319 FFY11 #15 | 95,051.72 | | 63,367.81 | 361,812.58 | 300.0 | 102.0 | 232.50 | 0 |
| | | SFY16 | 319 FFY14 #8 | 122,035.83 | | 81,357.22 | | | | | |
| | | | | | | | | | | | |
| | | | TOTAL overall | 3,176,276.14 | 0.00 | 1,472,386.43 | 3,680,965.57 | 284,097.8 | 23,104.5 | 1,217.61 | 0 |
| | | | TOTALS for projects counted toward watershed plan implementation. | 1,407,509.60 | 0.00 | 938,340.07 | 2,345,849.67 | 642.8 | 216.5 | 1,136.41 | 166 |
| For sediment and bacteria pollutant loads, BMPs installed 2012 and later can be counted toward watershed plan implemetation. | | | | | | | | 498.6 | 168.8 | 1,034.41 | 0.0 |

## SFY17 NPS Implementation Projects In Progress - 319(h) Grant - Antietam Creek Watershed

| Project Summary | | | Project Funding | | | | | Future 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 $ | | | | | | |
| Hagerstown | no projects working during SFY17 | | | | | | | | | | |
| Washington County | no projects working during SFY17 | | | | | | | | | | |
| Washington County SCD | Winder Property Phase 2 of 3 | TBD | 319 FFY16 #8 | 39,480 | | 26,320 | 65,800 | 126.4 | 17.15 | 1,662.5 | 271.4 billion |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | TOTALS | 39,480 | 0 | 26,320 | 65,800 | 126.4 | 17.2 | 1,662.5 | 271.4 billion |

## Antietam Creek Watershed
## 2011-SFY17 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 SFY16 - 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 2017 NPS Implementation Project Status (1)**

| Year Funded | PartnerCD | ProjectTitle | ProjectType | County | Trust Fund Dollars | Status | BMP Units | BMPs Reported | Annual LbsN | Annual LbsP | Annual TonsTSS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SFY13 | Chesapeake Bay Foundation | Maryland Watershed Restoration Project: Hidden Hollow Farm | Tree Planting Projects | Washington | 1,485.00 | Complete | acres | 3 | 111.8 | 10.7 | 4.65 |
| SFY13 | Town of Boonsboro | Boonsboro Community Tree Planting In The Park Project | Tree Planting Projects | Washington | 15,000.00 | Complete | acres | 3.6 | 80.4 | 5.4 | 0.95 |
| SFY14 | Chesapeake Bay Trust | Hagertown's Tree Planting and Memorial Blvd Greening | Tree Planting Projects | Washington | 65,850.00 | Complete | | | | | |
| SFY14 | Chesapeake Bay Trust | Hagertown's Tree Planting and Memorial Blvd Greening | Tree Planting Projects | Washington | 104,150.00 | Complete | | | 11.8 | 0.5 | 0.04 |
| SFY14 | City of Hagerstown | Bioretention Facility near Clean Water Circle (site A) | Stormwater Management | Washington | 455,000.00 | Complete | | | 100.5 | 20.9 | 5.80 |
| SFY14 | City of Hagerstown | Wet Swales near Hagerstown Light Dept. (Site B) | Stormwater Management | Washington | 45,000.00 | Complete | | | 36.9 | 9.3 | 2.70 |
| SFY14 | Washington County | Fountaindale Elementary (Washington County Board of Education Riparian Buffers) | Tree Planting Projects | Washington | 625.50 | Complete | acres | 0.2 | 5.9 | 0.2 | 0.05 |
| SFY14 | Washington County | Northern Middle School (Washington County Board of Education Riparian Buffers) | Tree Planting Projects | Washington | 780.62 | Complete | acres | 1.2 | 35.4 | 1.5 | 0.27 |
| SFY14 | Washington County | Smithsburg Middle/High School Complex (Washington County Board of Education Riparian Buffers) | Tree Planting Projects | Washington | 2,341.87 | Complete | acres | 1.5 | 44.3 | 1.8 | 0.34 |
| SFY15 | Md Forestry Board Foundation | Klein Reforestation | Tree Planting Projects | Washington | 6,539.00 | Complete | acres | 2 | 0.0 | 1.0 | 0.29 |
| | (1) Maryland DNR provided this data 11/30/17 and indicated it is the full extent available. | | | TOTALS | 696,771.99 | | | | 426.88 | 51.31 | 15.08 |
| SFY18 | Md Forestry Board Foundation | Klein Reforestation | Tree Planting Projects | Washington | 4,711.83 | Design/Planning | | | 7.4 | 0.52 | 0.25 |
| | (1) Maryland DNR provided this data 11/30/17 and indicated it is the full extent available. | | | TOTALS | 4,711.83 | | | | 7.40 | 0.52 | 0.25 |

## Antietam Creek Watershed
## In Washington County, Maryland
## SFY17 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 |
|---|---|---|---|---|---|---|
| **Annual Practices** | | | | | | |
| Cover Crops | acres | 7,547 | 85,617.93 | 620.99 | 488.29 | |
| **Multi-Year Practices** | | | | | | |
| 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 | 3,997 | 6,146.7 | 580 | 460.14 | |
| Critical Area Planting | acres | 0 | | | | |
| Dead Bird Composting Facility | count | 0 | | | | |
| Fencing | feet | 18 | 1,980.9 | 232.1 | 55.15 | |
| Field Border | acres | 0 | | | | |
| Filter Strip | acres | 0 | | | | |
| Grassed Waterway | acres | 0.69 | 20.48 | 0.6 | 0.43 | |
| Horse Pasture Management | acres | 0 | | | | |
| Loafing Lot Management System | acres | 0.31 | 37.72 | 9.1 | 0.45 | |
| Pasture & Hay Planting | acres | 0 | | | | |
| Prescribed Grazing | acres | 14.5 | 19.4 | 5.8 | 1.87 | |
| P-sorbing Materials | acres | 0 | | | | |
| Riparian Forest Buffer | acres | 19.8 | 892.0 | 15.3 | 8.68 | |
| Riparian Herbaceous Cover | acres | 2.3 | 72.12 | 0.6 | 0.42 | |
| Roof Runoff Structure | count | 9 | 1,115.3 | 224 | 10.80 | |
| Stream Restoration Ag | feet | 7,301 | 1,271.5 | 39.1 | 6.32 | |
| Tree/Shrub Establishment | acres | 0 | | | | |
| Waste Storage Facility | count | 0 | | | | |
| Wastewater Treatment Strip | acres | 0 | | | | |
| Water Control Structure | count | 0 | | | | |
| Watering Facility | count | 17 | 12.48 | 6.7 | 0.73 | |
| Wetland Creation | acres | 0 | | | | |
| Wetland Restoration | acres | 0 | | | | |
| Windbreak/Shelterbelt Establishment | feet | 0 | | | | |
| Total Annual Practices (2) | | | 85,617.9 | 621.0 | 488.3 | 0.0 |
| Total Multi-year Practices | | | 11,568.6 | 1,113.3 | 545.0 | 0.0 |
| Total Pollutant Load Reduction | | | 97,186.5 | 1,734.3 | 1,033.3 | 0.0 |

(1) "SFY17 Total" column is 1/22/18 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 | Progress: SFY17 | Progress: 2012 thru SFY17 |
|---|---|---|---|---|---|
| Cover Crops | 4,000 | | acres/yr | 7,547 | |
| Soil Conservation WQ Plans | 3,050 | 15,460 | acres | 3,997 | 17,297 |
| Stream Protection Fenced | 780 ac | 780 ac | feet | 18 | 36,774 |
| Grass Buffers | 295 | 35 | acres | 0 | 3 |
| | | | acres | 0 | 0.8 |
| | | | acres | 1 | 2.32 |
| Riparian Forest Buffers | | 260 | acres | 20 | 90.3 |
| | | | acres | 2 | 10.2 |
| Runoff Control Systems | | 12 | count | 9 | 31 |
| Stream Restoration | | | feet | 7,301 | 7,626 |
| Animal Waste Mgmt Systems | | 26 | count | 0 | 17 |
| | | | count | 17 | 35 |
| Conservation Tillage | 6,200 | | acres | | |
| Erodible Land Retirement | 130 | | acres | | 0 |
| Livestock Stream Crossing | | 17 | count | | 0 |
| No-Till | 4,800 | | acres | | 0 |
| Stream protection no fence | 1,300 | 1,300 | acres | | 40 |

## Prior Years Progress Toward Watershed Plan Goals

| Data reported by locals: 2013 Annual Report | Extracted from State Data reported by MDE to EPA Bay Program: SFY14 | SFY15 | SFY16 | | Units |
|---|---|---|---|---|---|
| | | | | | |
| 3,956.9 | 2,887.0 | 3,015.0 | 3,441.0 | | acres |
| | 8,905.0 | 6,160.0 | 21,691.0 | | feet |
| 2.5 | 0 | 0 | 0.0 | | acres |
| 0 | 0.1 | 0.0 | 0.7 | | acres |
| 0 | 1.0 | 0.0 | 0.6 | | acres |
| 56.8 | 2.5 | 0.0 | 11.2 | | acres |
| 0 | 7.3 | 0.0 | 0.59 | | acres |
| 4 | 2 | 3 | 13.0 | | count |
| 0 | 0 | 0 | 325.0 | | feet |
| 2 | 4 | 4 | 7 | | count |
| 0 | 5 | 8 | 5 | | count |
| 0 | 0 | 0 | 0 | | acres |
| 0 | 0 | 0 | 0 | | count |
| 0 | 0 | 0 | 0 | | acres |
| 40.0 | 0 | 0 | 0 | | acres |

## Antietam Creek Watershed
## In Washington County, Maryland
### SFY2017 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 | 0 | | | | |
| Bioswale | acres | 0 | | | | |
| Disconnection of Rofftop 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 | 19.69 | 423.34 | 21.66 | 6.24 | |
| Permeable Pavement | acres | 0 | | | | |
| Rain Garden | acres | 0 | | | | |
| Reduction of Impervious Surface | acres | | | | | |
| Riparian Forest Buffers on Urban Lands | acres | | | | | |
| Septics Connections to Sewers | count | | | | | |
| Septics Denitrification Critical Area | count | | | | | |
| Septic Denitrification outside of 1000 ft | count | 15 | 49.5 | | | |
| Septic Denitrification within 1000 ft | count | 0 | | | | |
| Stream Restoration Urban | feet | | | | | |
| Street Sweeping | acres | | | | | |
| Tree Planting | acres | 18.8 | 186.12 | 2.14 | 19.17 | |
| Urban Forest Buffer | acres | 0 | | | | |
| Wet Extended Detention | acres | 0 | | | | |
| Wet Ponds & Wetlands | acres | 0 | | | | |
| | | | | | | |
| | | | | | | |
| TOTAL Pollutant Load Reduction | | | 658.96 | 23.80 | 25.41 | 0.00 |

(1) "BMPs Reported" column is 1/25/18 MDE data. Bacteria load reduction was not reported.
(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 | Progress | | Prior Years Progress Toward Watershed Plan Goals | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | SFY17 | 2012-SFY17 | Data reported by locals | Extracted from State Data reported by MDE to EPA Bay Program | | | | |
| | | | | | | 2012-2013 | SFY14 | SFY15 | SFY16 | | Units |
| Forest Harvest Practices | 250 | | acres | 0.00 | 798.0 | 722.0 | 0.0 | 76.0 | 0.0 | | acres |
| Septic System Upgrades | | 645 | count | 15 | 137 | 26 | 10 | 30 | 14 | | count |
| | | | | | | | 17 | 4 | 21 | | |

# Appendix C
# Tidal Back River in Baltimore County, Maryland And Upper Back River in Baltimore County and Baltimore City, Maryland Watersheds Eligible for 319(h) Grant Implementation Funding

Contents



## C.1. Back River Small Area Watershed Plans Summary

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

## C.2. Tidal Back River SWAP Overview

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

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.)

Tidal Back River SWAP pollutant reduction goals (Table 3-2 on page 23) are:

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

Tidal Back River SWAP implementation goals (Appendix A, Table A-1) are for urban BMPs. Of these, the measurable goals are numbered: 6, 10, 12, 16, 17, 18, 19, 20, and 36. Some goals have milestone dates for reporting or progress achievement, which were reiterated in *Maryland's 2015-2019 NPS Management Plan* under Objective 5:

. Annually: Report progress in the 319 Annual Report

A. Assess progress for several action items
    - 2016: #37 hot spots
    - 2018: #10 stormwater retrofits
    - 2019: #31 wetland plantings.

## C.3. Upper Back River SWAP Overview

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:

B. Nitrogen reduction goal is 48,190 pounds per year.
C. Phosphorus reduction goal is 6,056 pounds per year.
D. Fecal bacteria reduction is a general goal in the watershed plan but there are no quantitative measures or milestones in the plan for water quality or BMP implementation. The plan notes that s consent decree is governing improvements to the sewerage system that will lead to reduced bacteria in surface waters in plan Section 1.4.1 (page 1-4), Section 2.3 (page 2-2), Section 2.9 (page 2-4), Section 3.2.7 (page 3-4) and Appendix A Table A-2 in several places.

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

E. Table 3-4 and Table 3-5 on pages 3-11 and 3-12.
F. 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.)

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

G. Annually: Report progress in the 319 Annual Report,
H. 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.

## C.4. BMP tracking/reporting

Urban BMPs tracking and progress reporting 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 method is presented 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

Agricultural BMP tracking and progress reporting for the State of Maryland is conducted by the Maryland Department of Agriculture. No agricultural BMP implementation was reported during the period state fiscal year 2014 thru 2017.

## C.5. Grant-Funded Implementation Projects

The following three pages present tables summarizing the status of grant-funded NPS BMP implementation from the follow grant sources:

- Tidal Back River watershed: 319(h) Grant and State Revolving Fund
- Upper Back River watershed: 319(h) Grant and State Revolving Fund
- Back River watershed overall: Chesapeake and Atlantic Coastal Bays Trust Fund

**2012-SFY17 Completed NPS Implementation Projects -- Back River Tidal Watershed**
**319(h) Grant and State Revolving Loan 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 (1) | 2012 | SRF Grant | $0 | $2,717,100 | $0 | $4,285,123 | 1,010 | 53.5 | 0 |
| | Bread & Cheese Creek stream restoration & stormwater control | 2013 | 319 FFY2010 #11 | 556,443 | 0 | 370,962 | 1,000,000 | 280.07 | 94.19 | 214 |
| | Tidal Back River Greening (2) | | SRF Grant | 0 | 385,000 | 0 | 1,500,000 | 441 | 113 | 24 |
| | | | | | | | | | | |
| TOTAL reported for completed projects | | | | 556,443 | 3,102,100 | 370,962 | 6,785,123 | 1,731 | 260.7 | 238 |

**SFY 2017 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 or SRF projects were working during SFY17 | | | | | | | | | |

Footnotes:

(1) SRF records indicate this project is “a shoreline erosion control project utilizing dredged material; included maintenance dredging of the 5,000 ft long channel adjacent to the island to create the beach and to stabilize 3,100 linear feet of shoreline using a combination of stone structures and beach fill with wetland vegetation.”

(2) The project involved 7 schools, 1 park & ride, 1 community center. SRF records also indicate "consists of stormwater improvements, including impervious surface removal, bioretention BMPs, reforestation, and shoreline enhancement w/wetland buffer". Total overall project cost was recalculated during design according to SRF records.

## 2012-SFY17 Completed NPS Implementation Projects -- Back River Upper Watershed
## 319(h) Grant and State Revolving Loan Fund (SRF)

| 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 |
| | No completed SRF projects are iedentified | | | | | | | | | |
| 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.

## SFY17 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 FFY2014 #9 | $358,032 | | $238,688 | TBD | 200.5 | 29.6 | 6.75 |
| Baltimore City | No SRF projects were working during SFY17 | | | | | | | | | |

**Back River Watershed (Tidal and Upper combined)**
**Chesapeake and Atlantic Coastal Bays Trust Fund**
**SFY 2017 NPS Implementation Project Status (1)**

| Year Funded | PartnerCD | ProjectTitle | ProjectType | County | Trust Fund Dollars | Status | BMP Units | BMPs Reported | Annual LbsN | Annual LbsP | Annual TonsTSS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FY10 | Baltimore County DEPS | Red House Run Stream Restoration | Stream Restoration | Baltimore | 186,121.00 | Complete | | | 606 | 32 | 0.0025 |
| FY12 | Baltimore County | Herring Run at Overlook Park Stream Restoration and | Stream Restoration | Baltimore | 385,735.55 | Complete | | | 65 | 11 | 3.92 |
| | | Bread and Cheese Creek Water Quality Enhancement | Stream Restoration | | 193,557.00 | Complete | | | 200 | 30 | 6.7515 |
| | | Monitoring Water Quality Improvements at Bread and | Monitoring | | 5,400.00 | Complete | | | 0 | 0 | 0 |
| | | Upland Tree Plantings - BWB | Tree Planting Projects | | 35,000.00 | Complete | | | 11.9 | 2.3 | 0.1485 |
| | | Tree Planting - BRRC | Tree Planting Projects | | 10,000.00 | Complete | | | 5.8 | 1.1 | 0.072 |
| FY13 | Alliance for the Chesapeake Bay | Trees and Environmental Education: Chinquapin Run | Tree Planting Projects | Baltimore City | 8,065.31 | Complete | | | 8.6 | 0.59 | 0.09 |
| | | Trees and Environmental Education: Northwood & Ke | Tree Planting Projects | | 8,065.32 | Complete | | | 8 | 0.55 | 0.9 |
| | Parks and People Foundation | Students Restoring Urban Stream: Herring Run Park | Tree Planting Projects | | 16,305.00 | Complete | | | 6.6 | 0.44 | 0.07 |
| | | Green Space Creation at Moravia Park Elementary (Re | Stormwater Management | | 370,000.00 | Complete | | | 8.87 | 1.09 | 0.435 |
| | Baltimore County | Bread & Cheese Creek Stream Restoration | Stream Restoration | Baltimore | 802,801.00 | Complete | | | 346.2 | 115.7 | 263.5 |
| | | Upper Back River Stormwater pond implementation | Stormwater Management | | 95,883.81 | Complete | | | 371.5 | 56.4 | 10.61 |
| | | Tidal Back River Greening Project | Stormwater Management | | 787,388.00 | Complete | | | 441 | 133.2 | 24.13 |
| FY14 | Chesapeake Bay Trust | Greening Watershed Neighborhoods | Tree Planting Projects | Baltimore | 114,342.00 | Complete | | | 42.39 | 1.71 | 0.14 |
| | Baltimore City Recreation and Parks | Chinquapin Run Park @ Kitmore | | Baltimore City | 6,739.07 | Complete | | | 3.438 | 0.234 | 0.0378 |
| | | Armistead Gardens ES/MS | | Baltimore City | 2,994.02 | Complete | | | 1.1775 | 0.05 | 0.0085 |
| | | Baltimore IT Academy | | Baltimore City | 2,994.02 | Complete | | | 1.1304 | 0.048 | 0.0082 |
| | | Moravia Park ES | | Baltimore City | 16,847.67 | Complete | | | 7.065 | 0.3 | 0.051 |
| | | NACA Freedom and Democracy Academy | | Baltimore City | 8,423.84 | Complete | | | 4.239 | 0.18 | 0.0306 |
| | | Patterson HS | | Baltimore City | 1,682.77 | Complete | | | 0.77 | 0.03 | 0.005 |
| | | Vanguard Collegiate/Maritime Academy | | Baltimore City | 5,615.89 | Complete | | | 2.355 | 0.1 | 0.017 |
| | | Hazelwood EMS | | Baltimore City | 8,985.42 | Complete | | | 3.77 | 0.16 | 0.027 |
| | | Herring Run Park @ Armistead Gardens | | Baltimore City | 7,300.66 | Complete | | | 3.72 | 0.25 | 0.041 |
| | | Herring Run Park @ Shannon & Lyndale | | Baltimore City | 8,199.20 | Complete | | | 4.18 | 0.28 | 0.046 |
| | Alliance for the Chesapeake Bay | Gallery Church Baltimore | | Baltimore | 1,890.58 | Complete | | | 1.3188 | 0.0532 | 0.0043 |
| | | St. Matthew's Catholic | | Baltimore City | 2,014.63 | Complete | | | 0.8949 | 0.0361 | 0.0029 |
| | | Faith Presbyterian, Baltimore | | Baltimore City | 2,975.52 | Complete | | | 1.41 | 0.06 | 0.0046 |
| | Baltimore County | Victory Villa ES | | Baltimore | 4,482.11 | Complete | | | 4.58 | 0.31 | 0.05 |
| | | Villa Cresta ES | | Baltimore | 2,465.16 | Complete | | | 2.52 | 0.17 | 0.03 |
| FY15 | Blue Water Baltimore | Baltimore International Academy | Stormwater Management | Baltimore City | 290,000.00 | Complete | | | 5.95 | 1.43 | 0.426 |
| | | Natural History Society of Maryland | | Baltimore | 270,000.00 | Complete | | | 1.53 | 0.38 | 0.112 |
| | | St. Anthony of Padua | | Baltimore City | 143,160.90 | Complete | | | 2.15 | 0.42 | 0.124 |
| | | St. Pius X | | Baltimore | 131,184.29 | Complete | | | 3.56 | 0.54 | 0.16 |
| | | | | | | | | | | | |
| | (1) Maryland DNR provided this data 11/30/17 and indicated it is the full extent available. | | | TOTALS | 3,936,619.74 | | | | 2,177.6 | 391.1 | 311.96 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FY14 | Baltimore County | Herring Run at Overlook Park Stream Restoration and Buffer Planting Phase II | Stream Restoration | Baltimore | 2,471,368.00 | Construction | | | 786.6 | 267.44 | 106.68 |
| | (1) Maryland DNR provided this data 11/30/17 and indicated it is the full extent available. | | | TOTALS | 2,471,368.00 | | | | 786.6 | 267.4 | 106.68 |

## C.6. Monitoring

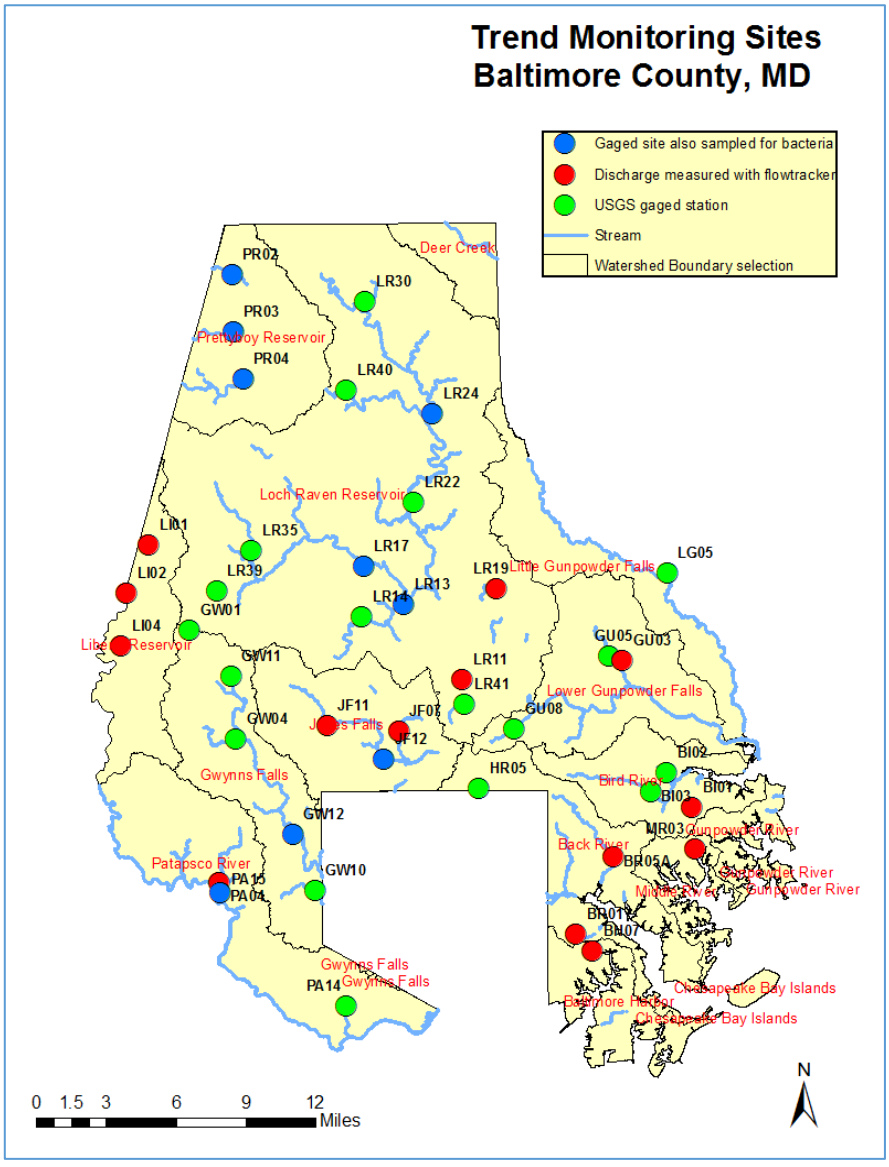
### C.6.a. Nontidal Water Quality – State Agencies

MDE nontidal monitoring projects funded by the 319(h) Grant have operated anywhere in the Back River watershed. [1, 2] Maryland Department of Natural Resources is not known to be monitoring Back River nontidal streams.

### C.6.b. Nontidal – Water Quality Baltimore Countywide

Each year Baltimore County reports to meet their MS4 permit requirements. [3]
In their report, findings from monitoring are summarized. The distribution of countywide water quality monitoring stations in Baltimore County is shown in the adjacent map.

According to the County, their Back River water quality monitoring stations are showing the following trends for pollutant concentrations (County report Figure 9-19 page 9-53):
-- Nitrogen improving trendline slope = -6.0776
-- Phosphorus improving trendline slope = -0.0883
-- Sediment improving trendline slope = -10.189

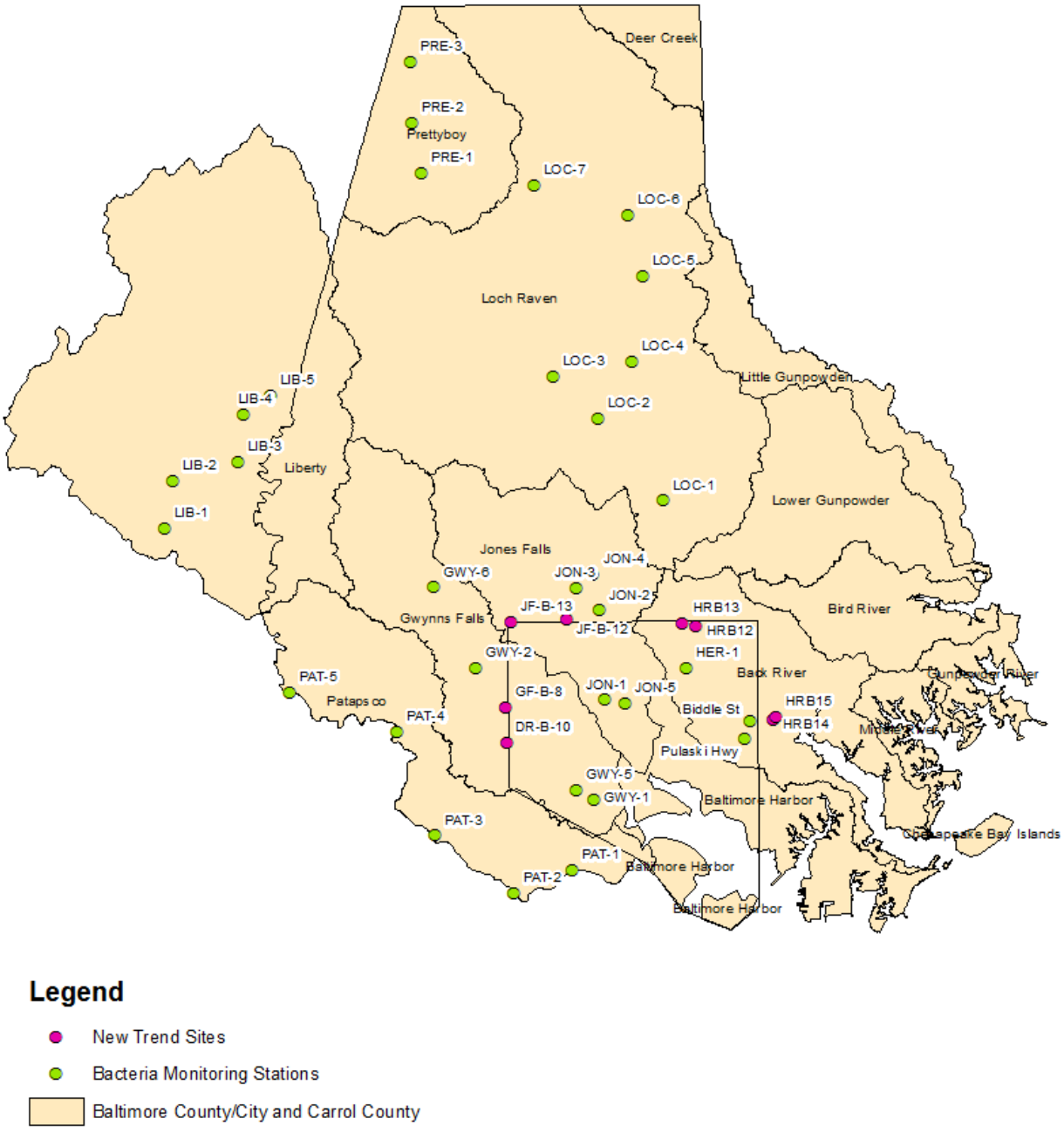



Baltimore County trend monitoring sites. (County report Figure 9-21 page 9-46)

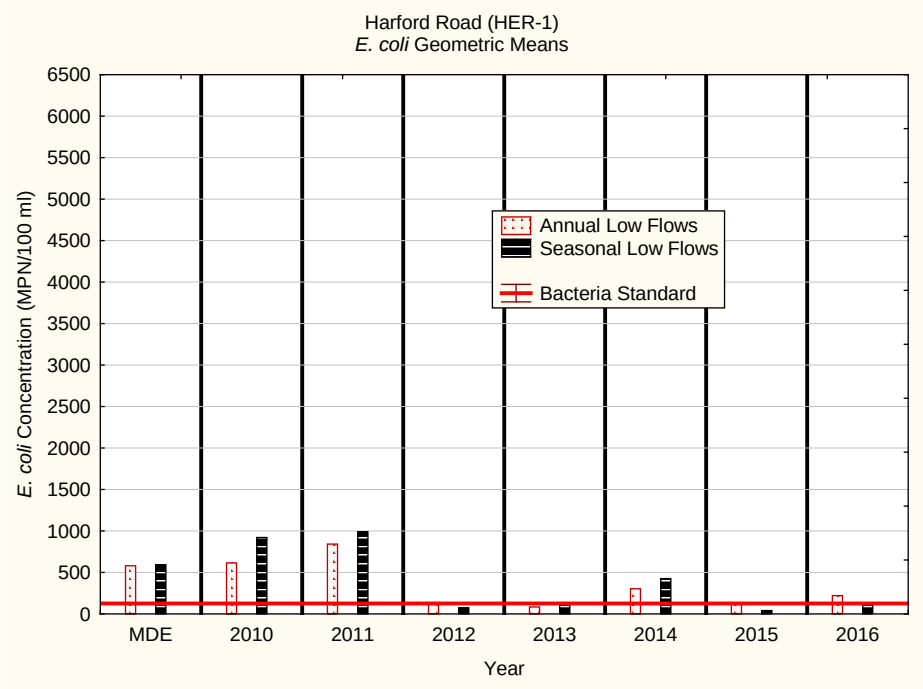
[1] Maryland Department of the Environment. MDE Targeted Watershed Project. 319(h) Grant FFY2016 Project 4.
[2] Maryland Department of the Environment. MDE Biological Assessment for Water Quality Protection and TMDL Implementation. 319(h) Grant FFY2016 Project 5.

[3] Baltimore County. NPDES Municipal Stormwater Discharge Permit 2017 Annual Report. December 22, 2017.

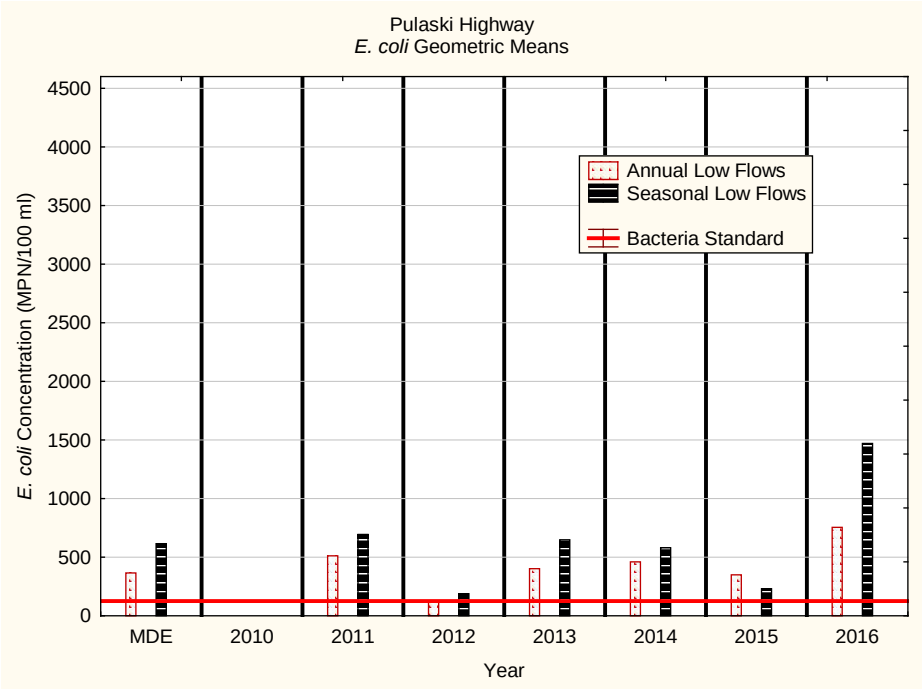
Baltimore County also conducts bacteria monitoring at the stations shown in the map below. For the stations in the Herring Run tributary to Back River, the County graphed E. coli geometric mean concentrations for both annual and seasonal flow periods stratified by flow condition as shown on the following pages (County report Figures 9-61 thru 9-67, pages 9-99 thru 9-102). The County noted that samples taken in 2016 were almost completely during low flows.

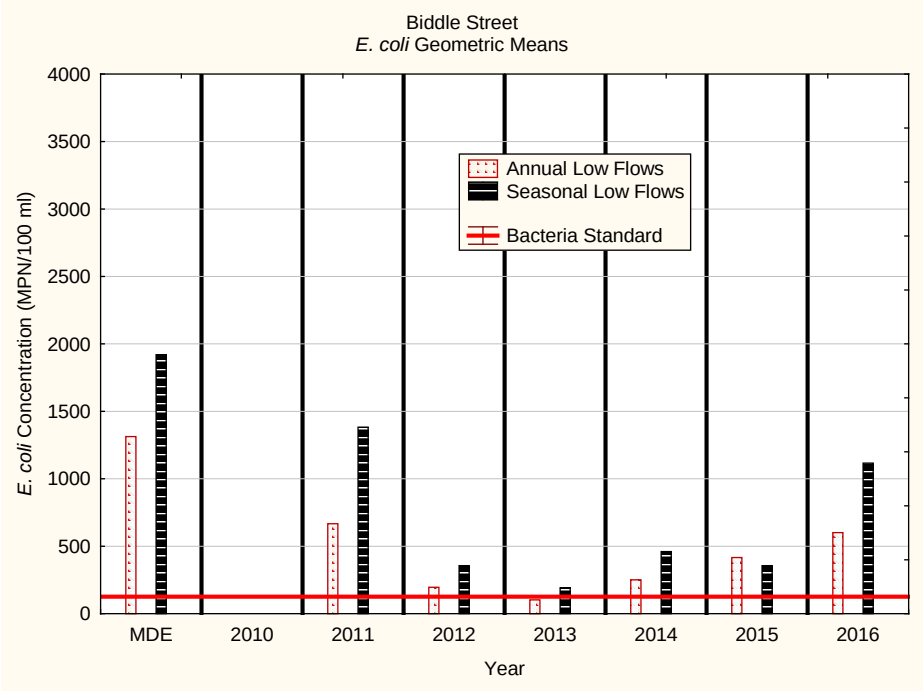


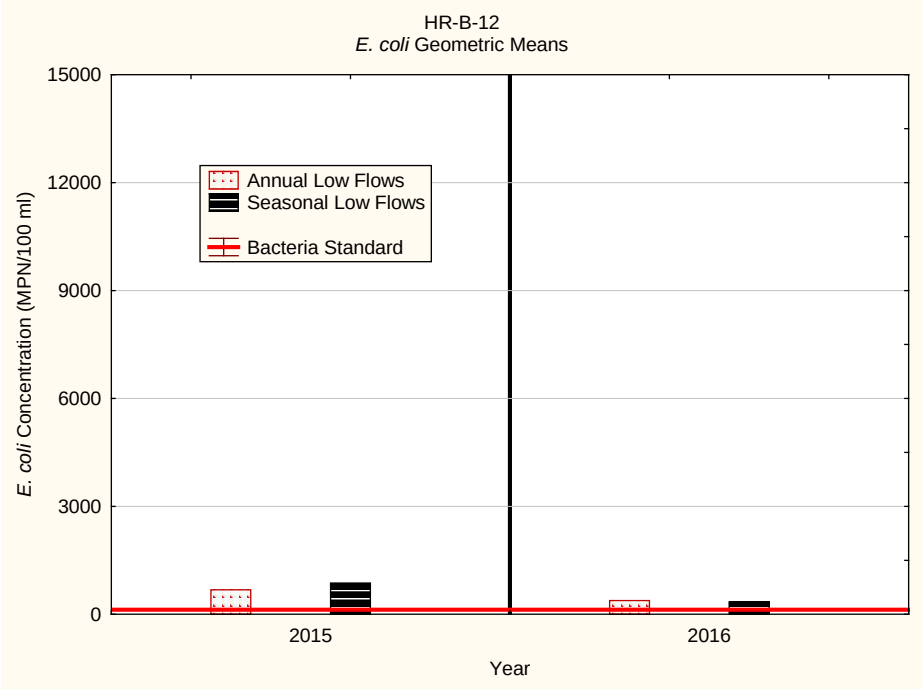

Baltimore County bacteria monitoring sites. (County report Figure 9-27 page 9-56)

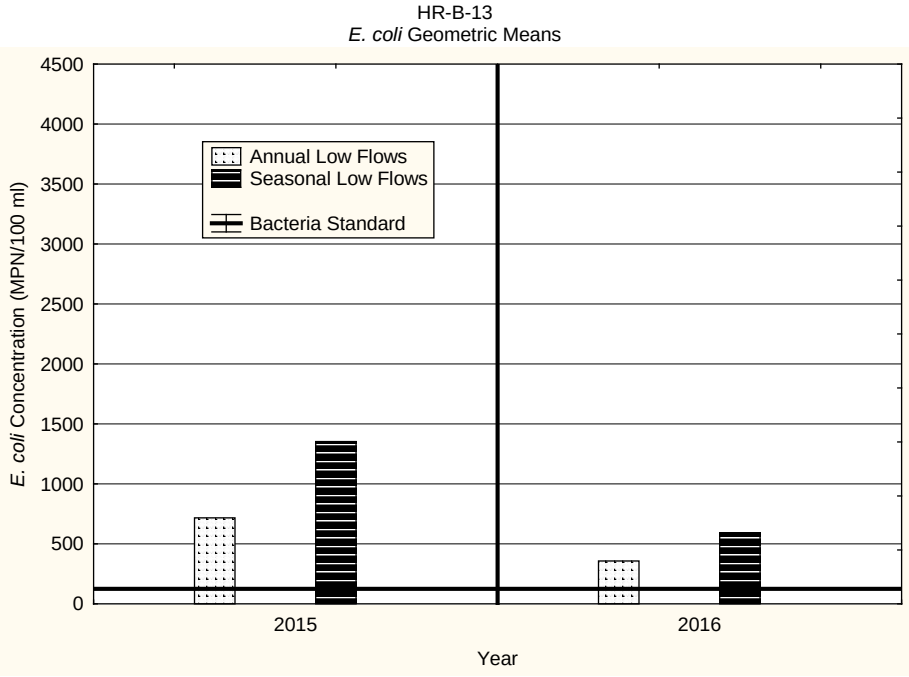


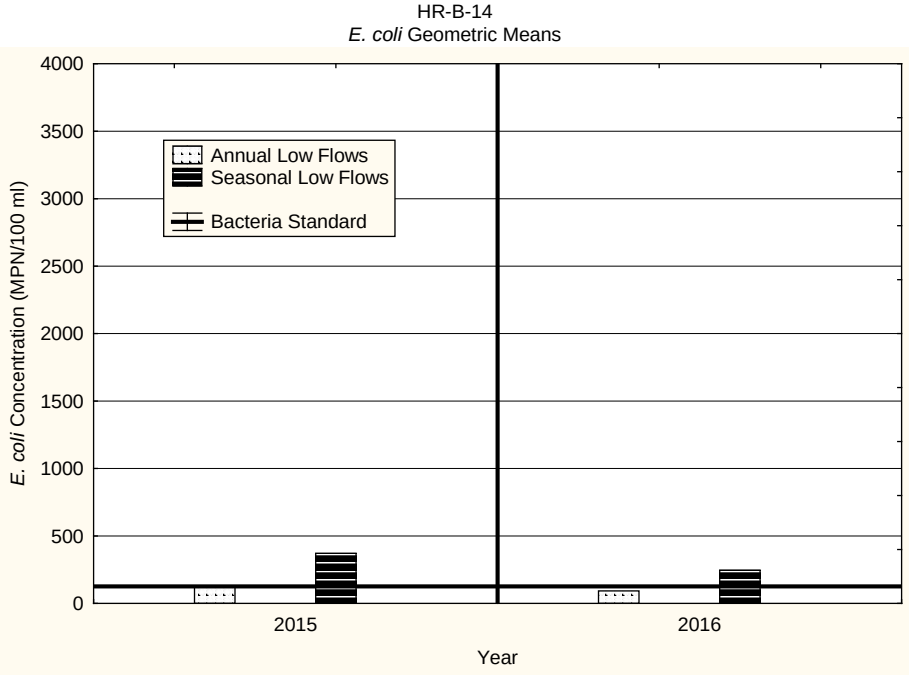

The County report said that "For the second year in a row, site HER-1 met the bacterial standard for seasonal low flows, and all seasonal sampling occurred during low flow periods, thus it met the standard for all seasonal flows as well."



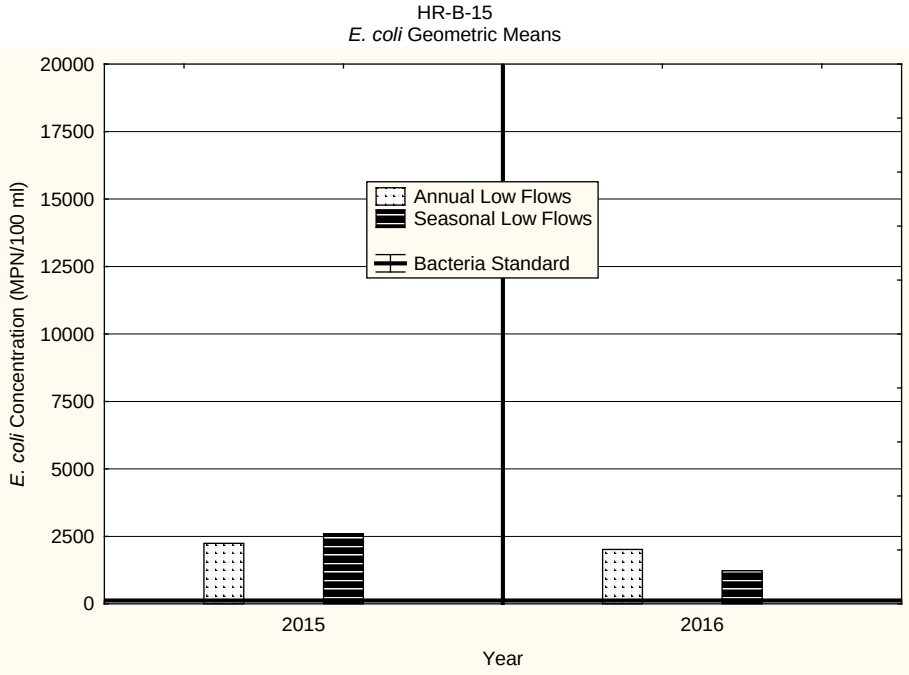

Biddle Street
*E. coli* Geometric Means
*E. coli* Concentration (MPN/100 ml)
4000
3500
3000
2500
2000
1500
1000
500
0
Annual Low Flows
Seasonal Low Flows
Bacteria Standard
MDE
2010
2011
2012
2013
2014
2015
2016
Year


HR-B-12
*E. coli* Geometric Means
*E. coli* Concentration (MPN/100 ml)
15000
12000
9000
6000
3000
0
Annual Low Flows
Seasonal Low Flows
Bacteria Standard
2015
2016
Year




According to the County report “Site HR-B-14 also met the standard for annual low flows for the second year in a row.”


HR-B-15
*E. coli* Geometric Means
20000
17500
15000
12500
10000
7500
5000
2500
0
*E. coli* Concentration (MPN/100 ml)
Annual Low Flows
Seasonal Low Flows
Bacteria Standard
2015
2016
Year

The table below from the County report shows results of their analysis for the Herring Run watershed by station, by year and by flow regime (County report Table 9-41 page 9-103). The green shading high-lights instances that the standard was exceeded zero percent of the time.

| Site | Year | N | | Percent Single Sample Exceedance (MPN) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flow Type | | 576 | | 410 | | 298 | | 235 | |
| | | High | Low | High | Low | High | Low | High | Low | High | Low |
| HER-1 | 2012 | 0 | 4 | | 0% | | 0% | | 0% | | 0% |
| | 2013 | 1 | 3 | 100% | 0% | 100% | 0% | 100% | 0% | 100% | 33% |
| | 2014 | 1 | 3 | 100% | 33% | 100% | 67% | 100% | 67% | 100% | 67% |
| | 2015 | 1 | 3 | 100% | 33% | 100% | 33% | 100% | 33% | 100% | 33% |
| | 2016 | 0 | 4 | | 0% | | 0% | | 0% | | 0% |
| Biddle | 2012 | 1 | 4 | 0% | 50% | 0% | 50% | 0% | 75% | 75% | 0% |
| | 2013 | 1 | 3 | 0% | 33% | 0% | 33% | 0% | 33% | 0% | 67% |
| | 2014 | 1 | 2 | 100% | 50% | 100% | 50% | 100% | 50% | 100% | 100% |
| | 2015 | 1 | 3 | 100% | 33% | 100% | 67% | 100% | 67% | 100% | 67% |
| | 2016 | 0 | 4 | | 75% | | 75% | | 100% | | 100% |
| Pulaski | 2012 | 1 | 4 | 0% | 0% | 0% | 25% | 0% | 50% | 0% | 50% |
| | 2013 | 1 | 3 | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 25% |
| | 2014 | 1 | 3 | 100% | 33% | 100% | 67% | 100% | 100% | 100% | 100% |
| | 2015 | 1 | 3 | 100% | 33% | 100% | 33% | 100% | 67% | 100% | 67% |
| | 2016 | 0 | 4 | | 50% | | 50% | | 50% | | 75% |
| HR-B-12 | 2012 | | | | | | | | | | |
| | 2013 | | | | | | | | | | |
| | 2014 | | | | | | | | | | |
| | 2015 | 3 | 7 | 100% | 57% | 100% | 86% | 100% | 86% | 100% | 86% |
| | 2016 | 0 | 10 | | 30% | | 30% | | 30% | | 40% |
| HR-B-13 | 2012 | | | | | | | | | | |
| | 2013 | | | | | | | | | | |
| | 2014 | | | | | | | | | | |
| | 2015 | 3 | 7 | 100% | 86% | 100% | 86% | 100% | 86% | 100% | 100% |
| | 2016 | 0 | 10 | | 50% | | 60% | | 80% | | 90% |
| HR-B-14 | 2012 | | | | | | | | | | |
| | 2013 | | | | | | | | | | |
| | 2014 | | | | | | | | | | |
| | 2015 | 3 | 7 | 100% | 43% | 100% | 43% | 100% | 43% | 100% | 57% |
| | 2016 | 0 | 10 | | 20% | | 30% | | 40% | | 40% |
| HR-B-15 | 2012 | | | | | | | | | | |
| | 2013 | | | | | | | | | | |
| | 2014 | | | | | | | | | | |
| | 2015 | 3 | 7 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| | 2016 | 0 | 10 | | 80% | | 80% | | 90% | | 100% |

The County's report indicated "These data also indicate a generally improving trend over time in the bacteria concentrations, particularly during low flow (dry weather) conditions, but since 2014 has become more variable. Site HER-1 has generally decreased, but the other sites have been more variable. The high flows also indicate improving trends, but given the limited number of samples, it is not possible to ascertain the accuracy of this trend. The trend sites added in 2015 have also shown a general decreasing trend, but this may be due to only two years of monitoring data being available for these sites."

## C.6.c. Tidal Water Quality – State Agencies

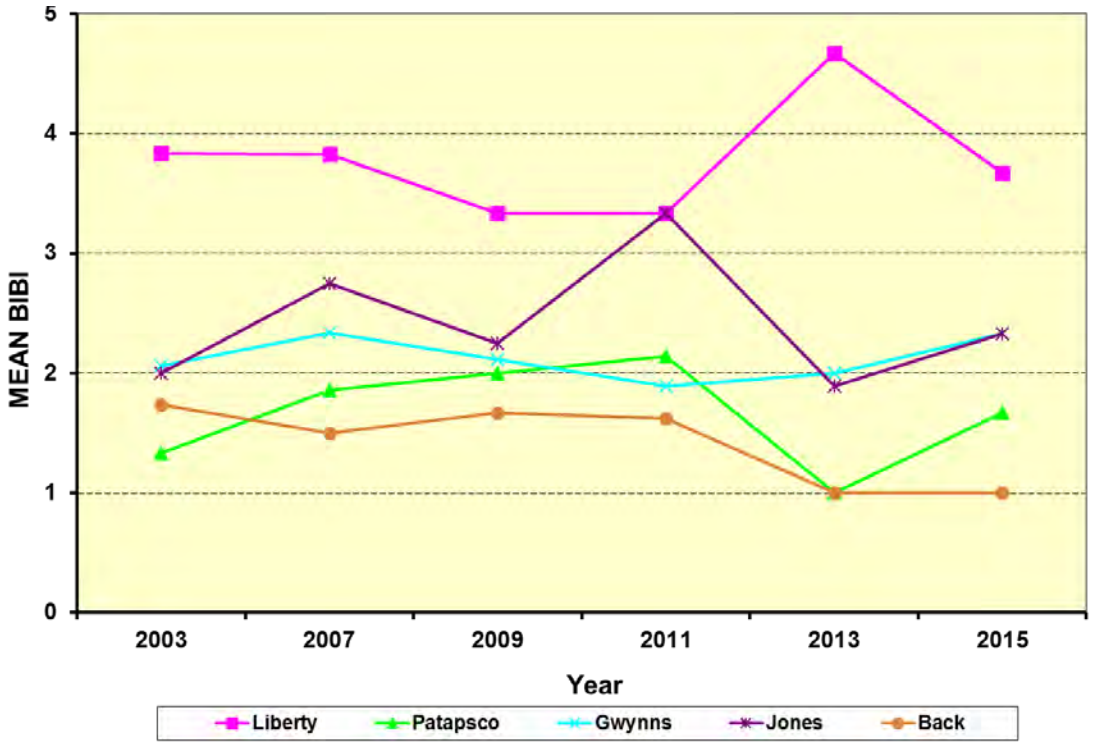
The most recent assessment available from the Maryland Department of Natural Resources is presented below: [4]

"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…

In many ways, Back River water and habitat quality is the worst of all Maryland rivers. Percent developed land use in the Back River watershed is the highest (and percent agriculture is the lowest) of all Maryland rivers. Nitrogen and phosphorus levels in the water and algal densities are also the highest, and water clarity is among the worst. Sediment levels are also among the highest of the high developed watershed rivers. Even though summer bottom dissolved oxygen levels are the highest of all Maryland rivers, this is an indication of poor habitat quality due to high nutrient levels and algal densities."

## C.6.d. Nontidal Biology – Baltimore County

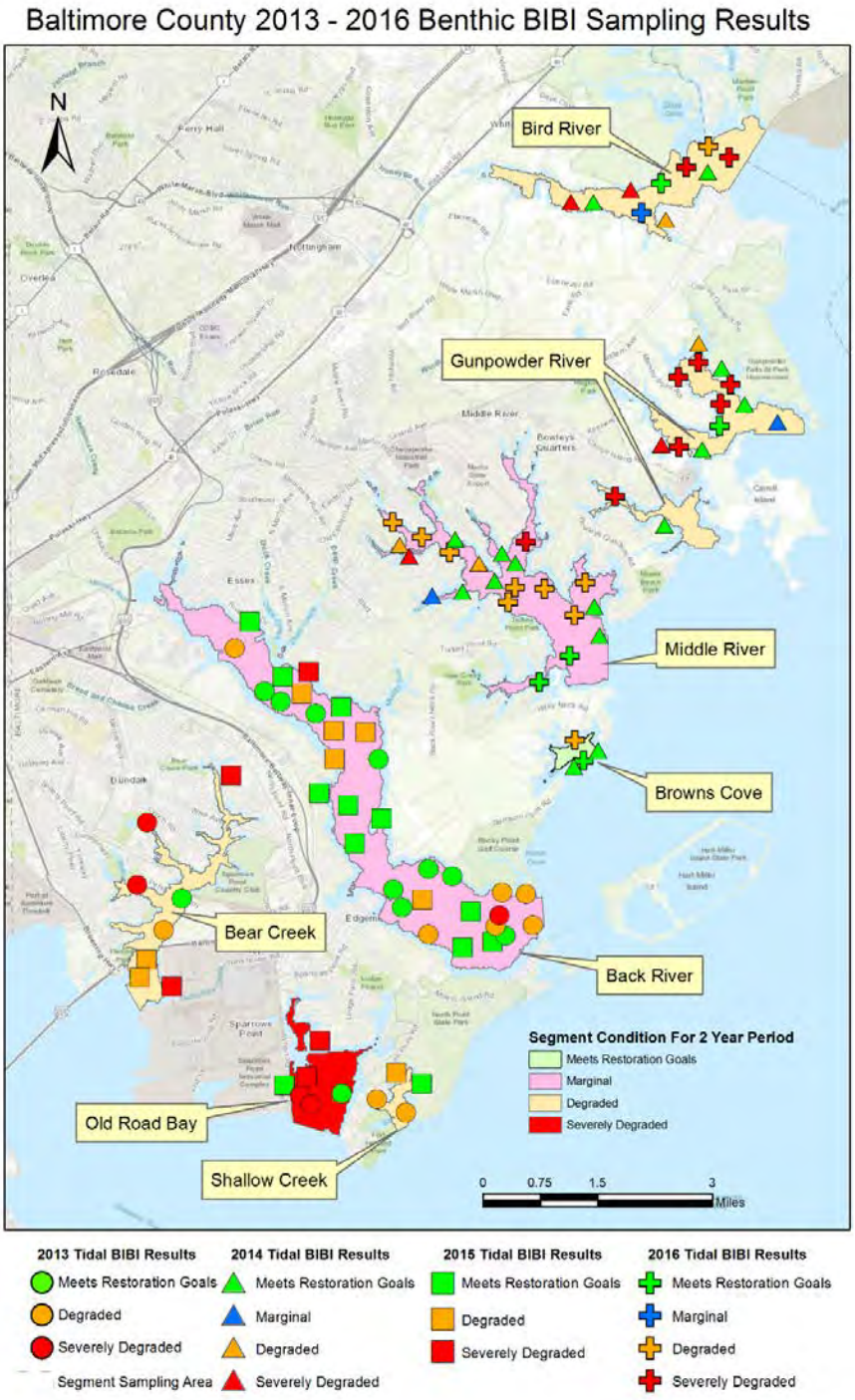
The graph shows mean benthic index of biological integrity (BIBI) scores. (County 2017 MS4 Report Figure 9-79 page 9-135).




[4] DNR. *Water Quality Summary 2013-2015*. Preliminary report received via personal communication from Renee Karrh 11/6/17.

## C.6.e. Tidal Biology – Baltimore County

Baltimore County began biennially Tidal Benthic Random Sampling in 2013. Results are summarized below. (County 2017 MS4 Report, Figure 9-89 page 9-148)



# Appendix D
# 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:

- Pollution reduction goals for pH are in watershed plan Chapter 3 Section 3.2 on page 11.
- BMP implementation goals for pH are in watershed plan Chapter 5 Table 9 on page 35.
- The plan does not address nutrients or sediment. Also, The downstream portion of the Casselman River watershed in Pennsylvania is not addressed in the MDE plan.

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.)

Responsibility to implement the plan rests with MDE's Abandoned Mine Land Division (AMLD). To help meet this responsibility, they have worked with the Maryland Department of Natural Resources, the Garrett Soil Conservation District and private property owners.

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.
    - Status SFY17
        - Delistings: One is in the draft 2016 Integrated Report. Two are proposed.
- Report 303(d) stream segments that achieve pH criteria via Maryland's Integrated Report.

**Implementation, Operations and Maintenance**

During SFY17 July 2016 thru June 30, 2017:

- MDE's Abandoned Mine Land Division (AMLD) completed bidding, and construction of four additional Phase II limestone sand application sites in the fall of 2016. The last constructed four sites became operational with the addition of limestone sands in February 2017. With construction of the four new sites, this brings the total of completed projects (Phase I and II) to eighteen that are adding alkalinity to the mainstem and several tributaries of the Casselman.
- Limestone sand was applied at all 14 sites that were operational in November 2016 and again in February 2017 (a total of 81 tons @$42.00/ton, not funded by the 319(h) Grant). It is anticipated that additional limestone sand will be applied to 18 operational sites in March 2017. (Note: The amount of sand and even the time between dumping of sand varies for each site based on the amount of precipitation, i.e., sand left from last dump, size and flow of the stream, etc.)

**Monitoring**

Index of Biological Integrity [1]

Beginning in 2014, MDE's 319(h) Grant-funded biological monitoring project has been sampling benthic macroinvertebrates in selected streams within the Casselman River watershed. This measure are used to gauge existing stream health on a scale of 1 to 5:

good (4.0-5.0), fair (3.0-3.9), poor (2.0-2.9), very poor (1.0-1.9)
BIBI = benthic index of biological integrity

The following biological information was extracted from the May 2017 progress report, Project #2 Implementation of the *Casselman River Watershed Based Plan for pH Remediation*. [2]

==========

Project 2's objective is to collect benthic data within the Casselman River watershed prior to and after installation of acid mine drainage AMD treatment systems in order to determine treatment efficiency and document improvement. All benthic samples are analyzed in the MDE Field Services benthic laboratory.

This effort assessed four Phase I implementation stations from 2011 thru 2016 (Table 1). Three out of four Phase 1 sites demonstrate significant improvements in the benthic community coinciding with improvements in pH (Table 2). The fourth station CASS 008 T did not improve for unknown reasons. Two of the four sites now meet or surpass the healthy BIBI threshold of 3.0.

[1] Maryland Department of the Environment. MDE Biological Assessment for Water Quality Protection and TMDL Implementation. 319(h) Grant FFY2016 Project 5 Objective 2.
[2] Maryland Department of the Environment. *Q3Report MDE Biological Assessment FFY-16 GRTS#5 thru 3-30-2017*. Charles Poukish. May 8, 2017. 47 pages. [includes edits by Dennis Rasmussen received 1/8/18]

| Table 1 BIBI Sampling Stations in Casselman River Watershed | | | | | |
|---|---|---|---|---|---|
| **Watershed Plan Phase** | **Stream Name** | **Location** | **Station Code** | **Latitude** | **Longitude** |
| Phase 1 Implementation on public land | Big Laurel Run near West Shale Road | West Shale Road, 0.8 miles South of Germany Road | CASS 017A T | 39.64881 | 79.13779 |
| | Spiker Run | Amish Road-Bittinger Property | CASS 001 T | 39.69692 | 79.18695 |
| | Kameris Creek | off Amish Road | CASS 006 T | 39.67326 | 79.20672 |
| | Unnamed tributary 2 to NB Casselman R | State Land- Amish Road | CASS 008 T | 39.65878 | 79.22273 |
| Phase 2 Implementation on private land | Little Shade Run | Posey Row Road | LSR0013 | 39.70851 | 79.17987 |
| | Unnamed tributary to Little Laurel Run | Off West Shale Road | LLR0021 | 39.63430 | 79.15047 |
| | Unnamed tributary to North Branch Casselman River | Leger Road at Foxtown Road | UNA0018 | 39.63229 | 79.24320 |

Beginning in 2016, sampling at five Phase II stations was initiated to assess conditions before AMD treatment begins. Two of those sites (UTSCA43A and SCA0067) were dropped in 2017 because the results indicated they were biologically healthy (BIBI 4.0 and 3.75 respectively). Table 1 lists the three sampling sites that continue into 2017.

| Table 2 Phase 1 BIBI Findings Before and After Installation of pH Mitigation Casselman River Watershed | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Station** | **BIBI Before** | | **Average Before** | | | **BIBI After** | | | **Average After** | |
| | **2011** | **2012** | **BIBI** | **pH** | **2013 pH mitigation installed** | **2014** | **2015** | **2016** | **BIBI** | **pH** |
| CASS 017B T | 1.750 | 2.750 | 2.250 | 5.0 | | 3.250 | 2.750 | 3.000 | 3.000 | 6.9 |
| CASS 001 T | 2.500 | 3.250 | 2.875 | 6.6 | | 4.250 | 4.250 | 4.750 | 4.417 | 7.0 |
| CASS 006 T | 2.250 | 2.250 | 2.250 | 5.6 | | 3.000 | 3.000 | 3.500 | 3.167 | 7.1 |
| CASS 008 T | 2.500 | 2.500 | 2.500 | 4.6 | | 2.750 | 2.250 | 2.500 | 2.500 | 6.9 |

Monitoring results for Phase I sites and continuing monitoring at Phase II sites are designed to help demonstrate localized/sustained water quality improvements that are in compliance with state pH standards, and either meet or surpass the biological 303 (d) listing threshold for healthy benthic communities (IBI of 3 or greater). This monitoring plan accomplishes the "demonstrate improvement" requirement in the a-i criteria and should successfully fulfill all the requirements of a true TMDL implementation project. The design focuses on the actual stream segments impaired by acid mine discharge, which in turn, supports delisting of the 303 (d) stream segments impaired by AMD.

| Table 2 Phase 2 BIBI Findings Before and After Installation of pH Mitigation Casselman River Watershed | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Station** | **BIBI Before** | | **Average Before** | | | **BIBI After** | | | **Average After** | |
| | **2016** | | **BIBI** | | **2016 pH mitigation installed** | **2017** | | | **BIBI** | |
| LSR0013 | 2.000 | | 2.000 | | | 2.750 | | | 2.750 | |
| LLR0021 | 2.250 | | 2.250 | | | 2.250 | | | 2.250 | |
| UNA0018 | 2.000 | | 2.000 | | | 2.000 | | | 2.000 | |
| UTSCA43A | 4.000 | | 4.000 | | | N/A | | | N/A | |
| SCA0067 | 3.750 | | 3.750 | | | N/A | | | N/A | |

Water Quality Monitoring [3]

MDE has been conducting nontidal water quality monitoring in the Casselman River watershed from 2010 thru the date of this report. All available information for SFY2017 is presented in the table below. Monitoring at completed Phase 2 implementation sites is continuing.

| Nontidal Water Quality Monitoring in the Casselman River Watershed [4] | | | | |
|---|---|---|---|---|
| **Activity** | **2016 Jul-Sept** | **2016 Oct-Dec** | **2017 Jan-Mar** | **2017 Apr-June** |
| Phase I Site Samples | 27 | 51 | Sampling ended 2016 | |
| Phase II Site Samples | 49 | 30 | No winter samples | 42 |

According to the most recent final report for MDE's Targeted Watershed project:

> Figure 1 shows Phase I of the AMD BMP implementation to address pH impairments (sand dump platforms and leach beds) was originally scheduled to be installed in the summer of 2012. Therefore, pre-implementation monitoring was conducted in the fall of 2011 but not the summer of 2012. Due to contract and scheduling delays, the implementation was subsequently rescheduled to be installed and completed by the spring of 2013. Implementation was finally installed in July of 2013. Post Implementation Monitoring has continued since that time. From July 2015 through December of 2015, 17 sites were collected. That number decreased when sampling resumed in May 2016 through June 2016 to 9 sites. The decrease was due to the incorporation of Phase II and in the fact that we had sufficient post implementation data.
>
> Figure 3 shows Phase II of the AMD BMP implementation was originally scheduled to be installed at all sites in the spring of 2016. Some were, but most were not. Therefore, Pre implementation monitoring began in July 2015. From July 2015 through December 2015, 10 Phase II sites were monitored monthly for the same parameters associated with Phase I. In May 2016 through June 2016 those site numbers increased from 10 to 18 to include sites further slated for remediation.
>
> The total number of Casselman monitoring sites, both Phase I and Phase II, have remained constant at 27. The locations have changed somewhat over time as the study has evolved. Monitoring stations (CASS005, CASS006, CASS008, CASS012, CASS017, and CASS017B) had observed pH below the water quality standard of 6.5 consistently throughout the project pre-implementation monitoring period.

[3] Maryland Department of the Environment. MDE Targeted Watershed Project. 319(h) Grant FFY2016 Project 4 Objective 2.
[4] Maryland Department of the Environment. Targeted Watershed project quarterly status reports. [includes edits by Dennis Rasmussen received 1/8/18]

Figure 1. Map of Monitoring Stations for Phase I Implementation.

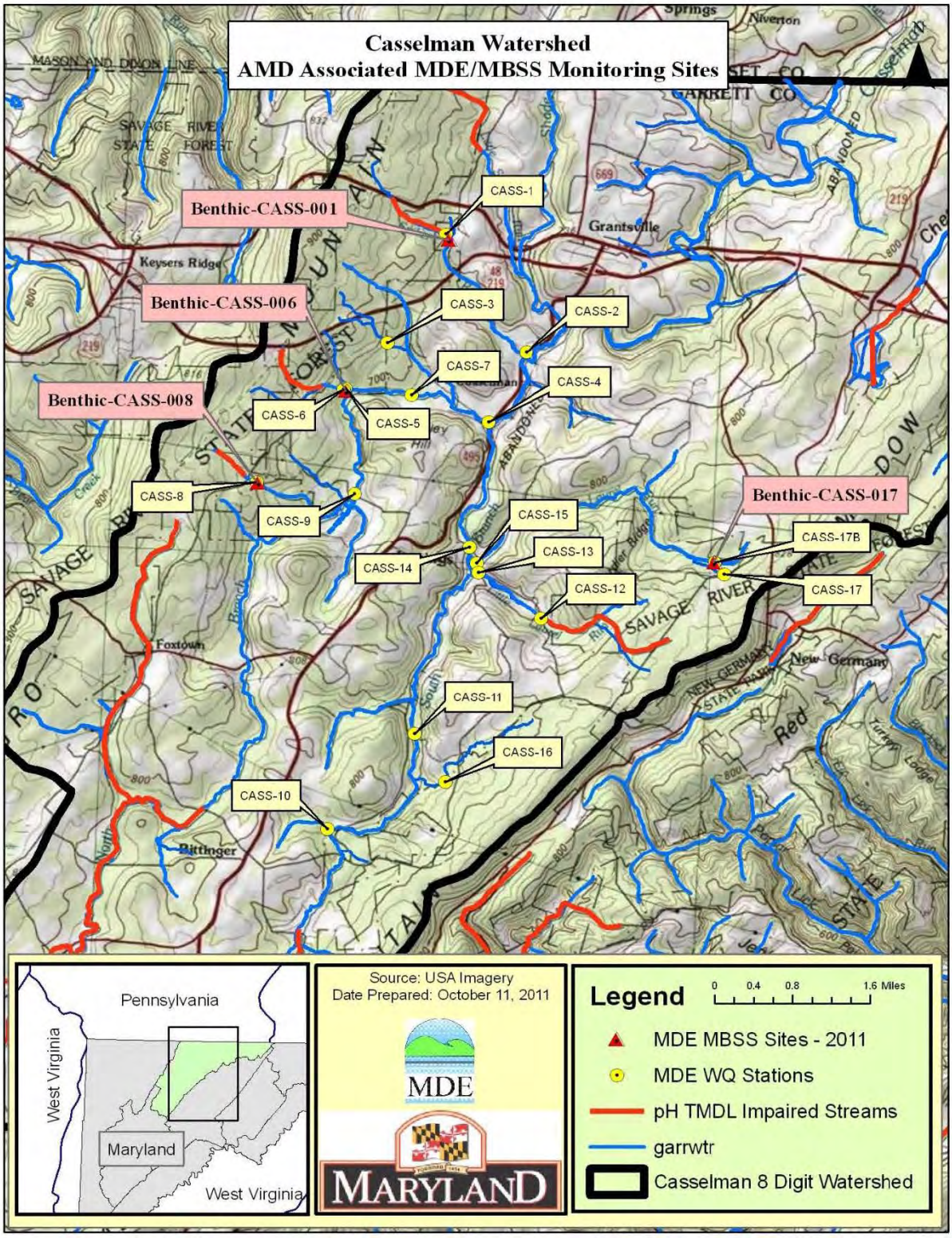
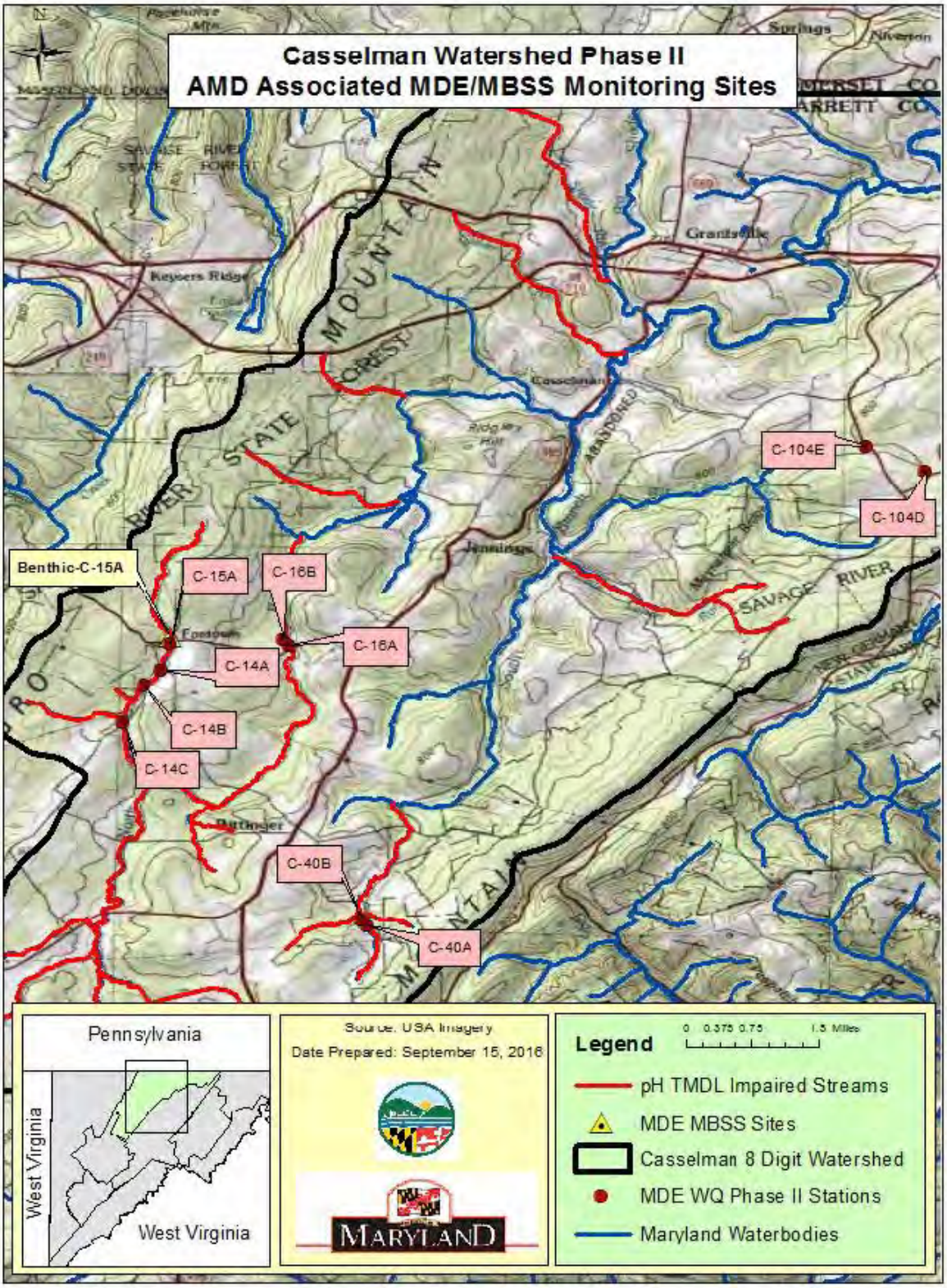


Figure 2. Map of Monitoring Stations for Phase II Implementation.



## Grant-Funded Implementation Projects

319(h) Grant

Funding for Phase 1 implementation is completed and Phase 2 continued thru SFY16 as summarized below based on quarterly project progress reports. The status of 319 grants in this watershed and the status of implementation site construction is summarized below:

- Phase 2 implementation of the Casselman River watershed plan focused on implementing limestone sand application sites on private property. Phase 2 implementation is completed. In early SFY17 (Autumn 2016), four additional limestone sand application areas were constructed. During 2016, an additional 387 tons of limestone sand doses were added to Phase 1 and 2 sites at a cost of $18,461.
- By the end of 2015, fourteen completed/operational treatment sites (Phase 1 and 2 sites) received 1090 tons of limestone sands at a cost of $47,498. The amount of limestone sand and time between limestone sand dumping varied for each site and the amount of previous precipitation, i.e., sand left from last dump, size and flow of the stream, etc.

Maryland's Chesapeake and Atlantic Coastal Bays Trust Fund Grant: This grant had very little activity in this watershed that did not contribute to implementation the Casselman River plan.

State Revolving Fund: There is no record of any project in the Casselman River watershed.

**Casselman River Watershed**
**2006-SFY17 Completed 319(h) Grant NPS Implementation Projects**

| Project Summary | | | Project Expenditures | | | | |
|---|---|---|---|---|---|---|---|
| Area/Lead | Name/Description | End Date | Grant Funding Source | Grant Funds | | Non Federal Match | Total |
| | | | | 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 |
| | AMD pH Remediation GIS Tool | SFY16 | 319 FFY11#14 | $83,619 | | $55,746 | $139,365 |
| | | | | | | | |
| | | | TOTALS | $782,734.00 | $0.00 | $521,822.67 | $1,304,556.67 |

**SFY17 319(h) Grant NPS Implementation Project Activity - Casselman River Watershed**

| Project Summary | | | Project Funding | | | | |
|---|---|---|---|---|---|---|---|
| Area/Lead | Name/Description | End Date | Grant Funding Source | Grant Funds | | Non Federal Match | Total |
| | | | | Federal | State | | |
| MDE | AMD pH Remediation Phase 2 | TBD | 319 FFY13 #5 | $401,307 | | $267,538 | $668,845 |

## Current Casselman pH Impairment List and Mitigation Status

| Plan | Maryland Integrated Report | | | Status | MDE Implementation Monitoring | | | BMP Status SFY17 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shed (2) | Name | 8-Digit Segment | Impairmt | | | Location | Success Story | Project # | Site Name | Type | Phase | Comlpete | BMP cost |
| NBC-1 | North Branch Casselman River | MD-050202040030 | 4a - pH | In Operation | | Trib 11 to NB Casselman | | C14 | Bowser Foxtown Road | Limestone sand | 2 | 2014 | $11,810 |
| | | | | | | Trib 11 to NB Casselman | | C15 | Bowser Dung Hill Road | Limestone sand | 2 | 2016 | $11,256 |
| | | | | | | | | | Jones | Not going forward with project at this time | | | |
| | | | | | | | | | Redmond | Not going forward with project at this time | | | |
| NBC-2 | North Branch Casselman River | MD-050202040032 | 4a - pH | In Operation | CASS-3 | Trib to NB Casselman | not TMDL stream | C28 | Amish Rd North | Leach bed and Sand | 1 | 2013 | $69,119 |
| | | | | | CASS-5 | Trib to NB Casselman | 5 or 6 ready re TMDL | C27 | Amish Rd South | Limestone sand | 1 | 2013 | $18,460 |
| | | | | | | NBC Casselman Mainstem | | C16a | Synder - Dung Hill Rd | Limestone sand | 2 | 2014 | $12,630 |
| | Alexander Run | MD-050202040032 | 4a - pH | In | CASS-8 | Alexander Run | ready re TMDL | C22 | Amish Rd - Alexander Run | Limestone sand | 1 | 2013 | $9,605 |
| | Tarkiln Run | MD-050202040032 | 4a - pH | In Operation | CASS-6 | Tarkiln Run | 5 or 6 ready re TMDL | C25 | Tarkiln Run | Limestone sand | 1 | 2013 | $8,868 |
| MSC | Spiker Run | MD-050202040034 | 4a - pH | In | CASS-1 | Spiker Run | ready re TMDL | C30 | Spiker Run | Leach bed & sand | 1 | 2013 | $71,850 |
| | Little Shade Run | MD-050202040034 | 4a - pH | In Operation | none | Little Shade Run | | C32 | Yoder Posey Row Road | Limestone Sand | 2 | 2016 | $11,071 |
| SBC-1 | South Branch Casselman River | MD-050202040031 | 4a - pH | In Operation | CASS-10 | Trib 12 to SB Casselman | not TMDL stream | C53 | Bear Hill Road | Leach bed | 1 | 2013 | $78,274 |
| | | | | | CASS-10 | Trib 12 to SB Casselman | | C52 | Maynardier Ridge Rd W of Bear Hill | Limestone sand | 1 | 2013 | $8,506 |
| | | | | | CASS-11 | SBC mainstem | | C40 | Koch - Frank Brenneman Rd | Limestone sand | 2 | 2014 | $8,800 |
| | | | | | | UT to SBC mainstem | | C43 | Windy Ridge | Limestone sand | 2 | 2016 | $10,400 |
| SBC-2 | Little Laurel Run | MD-050202040033 | 4a - pH | In Operation | CASS-16 | Trib 8A & 10 to SB Casselman | not TMDL stream | C56 | Maynardier Ridge Rd | Limestone sand | 1 | 2013 | $9,765 |
| | | | | | CASS-12 | UN Trib 6 (to Little Laurel Run) | submitted to EPA | C65 | West Shale Rd South | Limestone sand | 1 | 2013 | $8,526 |
| | | | | | CASS-12 | UN Trib 5 (to Little Laurel Run) | | C64 | West Shale Rd North | Limestone sand | 1 | 2013 | $10,294 |
| | | | | | CASS-12 | UN Trib 4 (to Little Laurel Run) | | C64a | Savage State Forest -West Shale Rd | Limestone sand | 2 | 2016 | $11,410 |
| | | | | | | | | | Beeman (Planning but not likely to build) | Leach bed | 2 | | |
| | Big Laurel Run | MD-050202040033 | not listed | In Operation | CASS-17B | UN Trib (to Big Laurel Run) | EPA approved | C72A | Big Laurel Run West Shale Road (add) | Limestone sand | 1 | 2013 | $11,124 |
| | | | | | CASS-17B | UN Trib (to Big Laurel Run) | | C72 | Big Laurel Run West Shale Road Siphon | Leach bed and sand | 1 | 2013 | $111,019 |
| CEP | Meadow Run | MD-050202040035 | 4a - pH | planning | none | Meadow Run @ Rt 40 | | | | | | | |

(1) Draft 2016 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

# Appendix E
# Corsica River Watershed in Centreville and Queen Anne's County, Maryland
# Watershed Eligible for 319(h) Grant Implementation Funding

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 including the Town of Centreville in Queen Anne's County.

The watershed plan's pollutant reduction goals (pages 23-24) refer to the TMDL for nitrogen and phosphorus 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, the Corsica nutrient TMDL approved in 2000 was based on 1997 water

quality data. (See TMDL Section 2.2 pages 5-9, and 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. As of the end of SFY2017, the Corsica River watershed plan implementers elected to retain the existing watershed plan, as revised in 2011, with no additional updates or revisions.

**Monitoring**

Nontidal – Water Quality Monitoring Before/After Implementation [1]

MDE has been conducting nontidal water quality monitoring in the Corsica River watershed from 2005 thru the date of this report. All available information for SFY2017 is presented in the table below.

| Nontidal Water Quality Monitoring in the Corsica River Watershed [2] | | | | |
|---|---|---|---|---|
| **Activity** | **2016 Jul-Sept** | **2016 Oct-Dec** | **2017 Jan-Mar** | **2017 Apr-June** |
| Composite Samples | 38 | 34 | 39 | 33 |
| Weekly Grab Samples | 51 | 36 | 52 | 48 |
| Synoptic Survey | 0 | 32 | 0 | 35 |

Nontidal – Index of Biological Integrity [3]

MDE's 319(h) Grant-funded biological monitoring project samples benthic macroinvertebrates and fish in healthy nontidal streams as part of Maryland's Tier II Antidegradation Program. These two measures serve as a gauge of existing stream health using a scale of 1 to 5:

good (4.0-5.0), fair (3.0-3.9), poor (2.0-2.9), very poor (1.0-1.9)
BIBI = benthic index of biological integrity
FIBI = fish index of biological integrity

In previously identified healthy waters within the Corsica River watershed several sites have been sampled to determine if healthy conditions are continuing. A score of 4.000 or above means Tier II healthy water criteria are continuing to be met. A lower score indicates that conditions have degraded below Maryland's Tier II healthy water criteria: [4]

- Gravel Run 1, CORS-109-A-2017 (results not yet available)

[1] Maryland Department of the Environment. MDE Targeted Watershed Project. 319(h) Grant FFY2016 Project 4 Objective 2.
[2] Maryland Department of the Environment. Targeted Watershed project quarterly status reports.
[3] Maryland Department of the Environment. MDE Biological Assessment for Water Quality Protection and TMDL Implementation. 319(h) Grant FFY2016 Project 5 Objective 2.
[4] Maryland Department of the Environment. *Q3Report MDE Biological Assessment FFY-16 GRTS#5 thru 3-30-2017*. Charles Poukish. May 8, 2017. 47 pages.

- Gravel Run 124, CORS-214-A-2014
  - BIBI 4.143 on 3/13/14
  - FIBI 4.33 in 2014
- Gravel Run 125, CORS-214-A-2015 (no longer meets Tier II criteria)
  - BIBI 1.86 on 3/21/14
  - FIBI 3.67 in 2014
- Mill Stream Branch, CORS-216-A-2016
  - BIBI (results not yet available)
  - FIBI 4.667 on 6/30/16

All fish data analysis results for SFY2017 are presented in the table below. [5]

**Fish Monitoring for Index of Biological Integrity Assessment in the Corsica River Watershed**

Mill Stream Branch, Station MDE-CORS-216-A-2016
FIBI = 4.667 June 30, 2016

| Common Name | Tolerance | Native or Introduced | Trophic Status | Lithophilic Spawner | Composition | # sampled @ Station |
|---|---|---|---|---|---|---|
| Least Brook Lamprey | NOTYPE | N | FF | N | B | 54 |
| American eel | NOTYPE | N | GE | N | | 62 |
| Fallfish | I | N | GE | Y | | 92 |
| Rosyside dace | NOTYPE | N | IV | Y | | 43 |
| Creek chubsucker | NOTYPE | N | IV | N | R | 4 |
| White sucker | T | N | OM | Y | | 12 |
| Margined madtom | I | IY | IV | N | B | 9 |
| Chain pickerel | NOTYPE | IY | TP | N | | 3 |
| Redfin pickerel | T | IY | TP | N | | 12 |
| Pirate perch | T | N | IV | N | | 4 |
| Bluegill | T | IC | IV | N | | 6 |
| Green sunfish | T | IC | GE | N | | 32 |
| Redbreast sunfish | NOTYPE | IY | GE | N | | 25 |
| Tessellated darter | T | N | IV | N | B | 97 |

Tidal

The Maryland Department of Natural Resources (DNR) conducted tidal water quality monitoring in the Corsica River from 2005 thru 2016. In 2017, a monitoring hiatus was initiated. According to a recent water quality summary by Maryland DNR, Corsica 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." [6]

[5] Maryland Department of the Environment. *Q3Report MDE Biological Assessment FFY-16 GRTS#5 thru 3-30-2017*. Charles Poukish. May 8, 2017. 47 pages.
[6] DNR. *Water Quality Summary 2013-2015*. Preliminary report received via personal communication from Renee Karrh 11/6/17.

## Corsica River Watershed
## 2005-SFY17 Completed 319(h) and State Revolving Fund Grant NPS Implementation Projects

| Project Summary | | | Project Expenditures | | | | | Overall Pollutant Load Reduction | | | Pollutant Load Reduction Prior to 2014 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Cover Crops | | | Multi-Year BMPs | | |
| Area/Lead | Name/Description | End Date | Grant Funding Source | Grant Funds | | Non Federal Match | Total | Nitrogen (lb/yr) | Phosphorus (lb/yr) | Sediment (ton/yr) | Nitrogen (lb/yr) | Phosphorus (lb/yr) | Sediment (ton/yr) | 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 | | | | 0 | 0 | 0 |
| | Watershed Restoration | 2009 | 319 FFY06 #3 | $241,974.82 | | $161,316.55 | $403,291.37 | 62 | 6 | 0 | | | | 62 | 6 | 0 |
| | Watershed Restoration | 2012 | 319 FFY09 #1 | $270,427.25 | | $180,284.83 | $520,712.08 | 5.33 | 1.05 | 0.29 | | | | 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 | | | | | | | | | | | |
| | Watershed Restoration | SFY16 | 319 FFY11 #8 | 278,237.30 | | 185,491.53 | 463,728.83 | 57.93 | 5.29 | 1.11 | | | | 57.93 | 5.29 | 1.11 |
| | Watershed Restoration | SFY16 | 319 FFY12 #7 | 81,674.57 | | 54,449.71 | 136,124.28 | 7.2 | 0.5 | 0.09 | | | | 7.2 | 0.5 | 0.1 |
| 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 | 4,847.0 | 114.0 | 0 | 0.0 | 0.0 | 0 |
| | | 2008 | 319 FFY05 #12 | $145,554.24 | | $97,036.16 | $242,590.40 | 767 | 79 | 463 | 0.0 | 0.0 | 0 | 767.0 | 79.0 | 0 |
| | | 2008 | 319 FFY06 #9 | $14,272.71 | | $9,515.14 | $23,787.85 | 2,413 | 233 | 0 | 0.0 | 0.0 | 0 | 2,413.0 | 233.0 | 0 |
| | | 2008 | 319 FFY07 #6 | $22,187.16 | | $14,791.44 | $36,978.60 | 286 | 10 | 755 | 0.0 | 0.0 | 0 | 286.0 | 10.0 | 0 |
| | | 2009 | 319 FFY08 #7 | $50,780.00 | | $33,853.33 | $84,633.33 | 46 | 3 | 62 | 0.0 | 0.0 | 0 | 46.0 | 3.0 | 0 |
| | | 2010 | 319 FFY09 #4 | $58,539.00 | | $39,026.00 | $97,565.00 | 19,740 | 6,664 | 33 | 19,591.4 | 6,654.5 | 0 | 148.6 | 9.5 | 0 |
| | | 2011 | 319 FFY10 #10 | $61,590.00 | | $41,060.00 | $102,650.00 | 53,259 | 802 | 0 | 52,372.3 | 718.2 | 0 | 886.7 | 83.8 | 0 |
| | | 2012 | 319 FFY11 #10 | $66,700.59 | | $44,467.06 | $111,167.65 | 45,703 | 642 | 492 | 45,576.0 | 625.0 | 0 | 127.0 | 17.0 | 0 |
| | | 2013 | 319 FFY12 #9 | $50,999.97 | | $33,999.98 | $50,000.00 | 55,822 | 828 | 108.6 | 55,821.8 | 748.3 | 0 | 0.0 | 80.1 | 0 |
| | | 2014 | 319 FFY13 #9 | $47,810.49 | | $31,873.66 | $79,684.15 | 32,831 | 4,394 | 38.28 | 32,830.9 | 4,392.8 | 0 | 0.1 | 1.2 | 0 |
| Queen Anne's County | Corsica and Beyond | 2008 | 319 FFY06 #13 | $124,281.44 | | $82,854.29 | $207,135.73 | 0 | 0.34 | 0 | | | | 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 | | | | 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 | | | | 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 | | | | 60.7 | 7.6 | 3.03 |
| | Bloomfield Park N. Bldg. Permeable Paving | 2012 | State Revolving Fund | | $200,000.00 | | $250,000.00 | 864 | 173 | 0 | | | | 864 | 173 | 0 |
| 319 Projects Total Completed | | | | $1,919,132.11 | | $1,279,421.41 | $3,233,553.56 | 215,912.4 | 13,790.9 | 1,957.18 | | | | | | |
| SRF Projects Total Completed | | | | | $200,000.00 | | $250,000.00 | 864 | 173 | 0 | | | | | | |
| TOTAL 319 & SRF Projects Completed | | | | $1,919,132.11 | $270,000.00 | $1,279,421.41 | $3,483,553.56 | 216,776.4 | 13,963.9 | 1,957.18 | 211,039.4 | 13,252.8 | 0 | 5,736.98 | 711.11 | 5.33 |

## SFY17 NPS Implementation Projects In Progress - 319(h) Grant and State Revolving Fund - 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 | | | | | |
| All Local Government | No 319 project working during SFY17 | | | | | | | | | |
| | No SRF project working during SFY17 | | | | | | | | | |

**Corsica River Watershed**
**Chesapeake and Atlantic Coastal Bays Trust Fund**
**SFY17 NPS Implementation Project Status (1)**

| Year Funded | PartnerCD | ProjectTitle | ProjectType | County | TrustFund Dollars | Status | BMP Units | BMPs Reported | Annual LbsN | Annual LbsP | Annual TonsTSS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FY11 | Corsica River Conservancy | Education & Outreach | Education & Outreach | Queen Anne's | 15,709.62 | Complete | | | 0.0 | 0.0 | 0 |
| | | Symphony Village Bioswale | Stormwater Management | Queen Anne's | 17,000.00 | Complete | | | 0.4 | 0.0 | 0 |
| | | Residential Soil Tests: 64 sites | Education & Outreach | Queen Anne's | 481.16 | Complete | | | 0.0 | 0.0 | 0 |
| | | Volunteer Water-Quality Program | Education & Outreach | Queen Anne's | 1,213.29 | Complete | | | 0.0 | 0.0 | 0 |
| | | Corsica Watershed Rain Garden Initiative: 73 sites | Stormwater Management | Queen Anne's | 144,027.03 | Complete | | | 0.0 | 0.0 | 0 |
| | Queen Annes County | Bloomfied Park Permable Paving | Stormwater Management | Queen Anne's | 50,000.00 | Complete | | | 4.0 | 0.7 | 8E-05 |
| | | QAC Office Building Stormwater Management | Stormwater Management | Queen Anne's | 200,000.00 | Complete | | | 12.0 | 2.0 | 0.000235 |
| | | Centreville WWTP Outfall Design and Permitting | Stormwater Management | Queen Anne's | 30,000.00 | Complete | | | 0.0 | 0.0 | 0 |
| | | Banjo Lane Coastal Plain Outfall | Stormwater Management | Queen Anne's | 30,000.00 | Complete | | | 0.0 | 0.0 | 0 |
| | | Rain Barrel Giveaway Program: 118 barrels | Stormwater Management | Queen Anne's | 5,782.00 | Complete | | | 0.0 | 0.0 | 0 |
| | | Mill Stream Park Buffer - Phase II | Tree Planting Projects | Queen Anne's | 52,470.80 | Complete | acres | 7.3 | 209.7 | 14.2 | 2.56 |
| | | Providence Area Planting | Tree Planting Projects | Queen Anne's | 23,000.90 | Complete | acres | 3.2 | 91.9 | 6.2 | 1.12 |
| | | Conquest Beach Planting | Tree Planting Projects | Queen Anne's | 4,528.30 | Complete | acres | 0.63 | 18.1 | 1.2 | 0.22 |
| | | Mill Stream Park Buffer Plantings (Phase I) | Tree Planting Projects | Queen Anne's | 20,000.00 | Complete | acres | 0.7 | 57.4 | 3.9 | 0.69999999 |
| FY12 | Corsica River Conservancy | Corsica River Rain Gardens | Stormwater Management | Queen Anne's | 10,000.00 | Complete | | | 215.4 | 14.6 | 2.60 |
| | Town of Centreville | Outfall Rehabilitation | Stream Restoration | Queen Anne's | 250,000.00 | Complete | | | 10.0 | 2.0 | 0.64 |
| FY13 | Queen Annes County | Centreville Elementary School Bioretention | Stormwater Management | Queen Anne's | 50,000.00 | Complete | | | 0.0 | 0.0 | 0 |
| | | Board of Education Bioretention | Stormwater Management | Queen Anne's | 62,132.00 | Complete | | | 0.0 | 0.0 | 0 |
| | Town of Centreville | Pennsylvania Ave Bioswale | Stormwater Management | Queen Anne's | 50,000.00 | Complete | | | 12.4 | 1.0 | 0 |
| FY14 | Queen Annes County | Kennard School Planting | Tree Planting Projects | Queen Anne's | 4,800.00 | Complete | acres | 5 | 29.9 | 2.0 | 0.34999999 |
| FY15 | Delmarva RC & D Council | Centreville High School Stormwater Wetland | Stormwater Management | Queen Anne's | 44,467.50 | Complete | | | 501.0 | 35.4 | 9.53 |
| FY16 | Delmarva RC & D Council | Conquest Wetland Restoration | Wetland Restoration | Queen Anne's | 112,515.00 | Complete | | | 55.5 | 32.7 | 1.058 |
| | (1) Maryland DNR provided this data 2/21/17 and indicated it is the full extent available. | | | TOTALS | 1,178,127.60 | | | | 1,217.7 | 115.8 | 18.78 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FY17 | Delmarva RC & D Council | Conquest and Middle School Wetlands | Wetland Restoration | Queen Anne's | 27,219.50 | Design/Planning | | | 137.35 | 14.8 | 1.45 |
| | (1) Maryland DNR provided this data 2/21/17 and indicated it is the full extent available. | | | TOTALS | 27,219.50 | | | | 0 | 0 | 0 |

Green shading = new for SFY17

| **SFY2017 Agricultural BMP Implementation Corsica River Watershed** | | | Estimated Pollutant Load Reduction | | |
|---|---|---|---|---|---|
| **BMP Type** | **Unit** | SFY17 Total | Nitrogen Total (lbs) | Phosphorus Total (lbs) | Sediment Total (tons) |
| **Annual Practices** | | | | | |
| Cover Crops | acres | 8,263 | 30,943.3 | 92.2 | 26.28 |
| **Multi-Year Practices** | | | | | |
| Alternative Crops | acres | 0 | | | |
| Amendments for the Treatment of Ag Was | AU | 0 | | | |
| Animal Mortality Facility | count | 1 | 6.3 | 1.1 | 0 |
| Conservation Cover | acres | 4.5 | 56.2 | 0.4 | 0.46 |
| Conservation Plans/SCWQP | acres | 1,532 | 858.3 | 81.0 | 20.06 |
| 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 | 1.3 | 59.8 | 12.5 | 0.00 |
| Horse Pasture Management | acres | 0 | | | |
| Loafing Lot Management System | acres | 0 | | | |
| Pasture & Hay Planting | acres | 0 | | | |
| Prescribed Grazing | acres | 4.67 | 1.2 | 0.6 | 0.01 |
| P-sorbing Materials | acres | 0 | | | |
| Riparian Forest Buffer | acres | 4.39 | 160.9 | 2.8 | 0.51 |
| Riparian Herbaceous Cover | acres | 4.9 | 225.4 | 47.1 | 0.00 |
| 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 Annual Practices (2) | | | 30,943.3 | 92.2 | 26.28 |
| Total Multi-year Practices | | | 1,368.2 | 145.6 | 21.0 |
| Total Pollutant Load Reduction | | | 32,311.4 | 237.9 | 47.3 |

(1) "SFY17 Total" column is MDA data dated 1/22/18. MDE used MAST to estimate pollution load reduction

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

| **Corsica River Watershed Plan** | | | | |
|---|---|---|---|---|
| **2011 Progress Report Table 1** | | | **Progress** | |
| **Management Measure** | **Goal** | **Units** | **SFY14-SFY17** | **Units** |
| 2. Agricultural Cover Crops | 5500 acre/yr | acres | | |
| | | | 0 | acres |
| | | | 0 | AU |
| | | | 1 | count |
| | | | 5.7 | acres |
| | | | 6,725 | acres |
| | | | 0 | acres |
| | | | 0 | count |
| | | | 0 | feet |
| | | | 0 | acres |
| | | | 0 | acres |
| | | | 1.4 | acres |
| | | | 0 | acres |
| | | | 0 | acres |
| | | | 0 | acres |
| | | | 4.67 | acres |
| | | | 0 | acres |
| 1. Agricultural Buffers | 150 | acres | 8.78 | acres |
| | | | 5.3 | acres |
| | | | 0 | count |
| | | | 0 | feet |
| | | | 0 | acres |
| | | | 0 | count |
| | | | 0 | acres |
| | | | 1 | count |
| | | | 0 | count |
| | | | 0 | acres |
| 6. Wetland Creation (all types) | 20 | acres | 0 | acres |
| | | | 0 | feet |
| 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 | | |

| **Prior Years Progress Toward Watershed Plan Goals** | | | | | |
|---|---|---|---|---|---|
| 2005-2013 2013 Annual Report | Extracted from State Data reported by MDE to EPA Bay Program | | | | |
| | SFY14 | SFY15 | SFY16 | | **Units** |
| | | | | | |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | AU |
| | 0 | 0 | 0 | | count |
| | 1.2 | 0 | 0 | | acres |
| | 1,773 | 1,998 | 1422 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | count |
| | 0 | 0 | 0 | | feet |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0.1 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| 94.3 | 0 | 0 | 4.39 | | acres |
| | 0.4 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | count |
| | 0 | 0 | 0 | | feet |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | count |
| | 0 | 0 | 0 | | acres |
| | 0 | 1 | 0 | | count |
| | 0 | 0 | 0 | | count |
| | 0 | 0 | 0 | | acres |
| 88.3 | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | feet |
| | | | | | |
| 11 | | | | | count |
| | | | | | |
| | | | | | |

| SFY2017 Urban BMP Implementation Corsica River Watershed | | | | | | Corsica River Watershed Plan | | | | | | Prior Years Progress Toward Watershed Plan Goals (Progress Report 2005-2011) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Estimated Pollutant Load Reduction | | | 2011 Progress Report Table 1 | | | Progress | | | Data Reported by Locals | | Extracted from State Data reported by MDE to the EPA Bay Program | | | | |
| Urban Management Practice | Unit | BMPs Reported | Nitrogen lb/yr | Phosphorus lb/yr | Sediment tons/yr | Urban Management Practice | Goal | Units | | SFY14-SFY17 | Units | 2012 (count) | 2013 (count) | SFY14 | SFY15 | SFY16 | | Units |
| Bioretention (13) | acres | 0 | 0.00 | 0.00 | 0.00 | | | | | 3.8 | acres | 4 | 0 | 0 | 0 | 3.8 | | acres |
| Bioswale (13) | acres | 0 | | | | | | | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| Cisterns & Rain Barrels | acres | 0 | | | | 9. LID Projects -- rain barrels | 40 | count | | 0.0 | acres | 65 | 0 | 0 | 0 | 0 | | acres |
| Disconnection of Rooftop Runoff (13) | acres | 0 | | | | | | | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| Dry Detention Ponds & Hydro Structures (13) | acres | 0 | | | | | | | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| Dry Extended Detention Ponds (13) | acres | 0 | | | | | | | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| Dry Swale (13) | acres | 0 | 0.00 | 0.00 | 0.00 | | | | | 1.4 | acres | | | 0 | 0 | 1.35 | | acres |
| Filtering Practices (13) | acres | 0 | | | | | | | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| Forest Conservation | acres | 0 | | | | | | | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| Forest Harvesting Practices | acres | 0 | | | | | | | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| Infiltration Practices (13) | acres | 0 | | | | | | | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| Permeable Pavement (13) | acres | 0 | | | | | | | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| Rain Garden | acres | 0 | | | | 9. LID Projects -- rain gardens | 100 | count | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| Reduction of Impervious Surface (13) | acres | 0 | | | | | | | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| Riparian Forest Buffers on Urban Lands (13) | acres | 0 | | | | | | | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| Septics Connections to Sewers | count | 0 | | | | | | | | 0.0 | count | | | 0 | 0 | 0 | | count |
| Septic Denitrification Critical Area | count | 11 | 129.80 | | | | | | | 13.0 | count | | | 0 | 1 | 1 | | count |
| Septic Denitrification outside of 1000 feet | count | 0 | | | | 7. Retrofit Septic Systems | 14 | count | | 1.0 | count | | | 0 | 1 | 0 | | count |
| Septic Denitrification within 1000 feet | count | 0 | 0.00 | | | | | | | 11.0 | count | | | 8 | 1 | 2 | | count |
| Septic Tank Pumpout | count | 0 | | | | | | | | 0.0 | count | | | 0 | 0 | 0 | | count |
| Stream Restoration Urban | feet | 0 | | | | 15. Stream Restoration | 0.5 | miles | | 300.0 | feet | | | 0 | 300 | 0 | | feet |
| Street Sweeping | acres | 0 | | | | Street Sweeping (no goal number) | 50 | acres | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| Tree Planting | acres | 0 | | | | | | | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| Urban Forest Buffer (13) | acres | 0 | | | | | | | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| Wet Extended Detention | acres | 0 | | | | | | | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| Wet Ponds & Wetlands (13) | acres | 0 | | | | | | | | 0.0 | acres | | | 0 | 0 | 0 | | acres |
| | | | | | | 13. Stormwater Retrofits * | 187.46 | acres | 0.0 | 0.0 | acres | | | | | | | |
| TOTAL Urban BMPs Pollutant Load Reduction | | | 129.80 | 0.00 | 0.00 | Watershed Plan Goal #13 "Stormwater Retrofits" aggregates urban BMPs footnoted (13). | | | | | | | | | | | | |
| (1) "BMPs Reported" column data is MDE dated 1/25/18. MDE uses MAST to estimate pollutant load reduc | | | | | | Units of measure shaded red differ from State reporting units. | | | | | | | | | | | | |
| (2) Pollutant load reduction is estimated by MDE using MAST. | | | | | | | | | | | | | | | | | | |

# Appendix F
# Lower Jones Falls in Baltimore City and Baltimore County, Maryland
# Watershed Eligible for 319(h) Grant Implementation Funding

Contents



## F.1. Lower Jones Falls SWAP Overview

Baltimore County completed the *Lower Jones Falls Small Watershed Action Plan* (SWAP) was in October 2008 and EPA accepted it 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.

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

## F.2. BMP tracking and reporting

The table below presents urban BMP implementation progress by the Baltimore County 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 SFY2017 Annual Report.

| Lower Jones Falls SWAP Area | | | | | |
|---|---|---|---|---|---|
| **Urban Management Practice** | **SWAP Goal** | **Units** | **FY09-FY16 Progress** | **FY17 Activity** | **Total Progress** |
| Convert Dry Ponds | NA | NA | 0 | 0 | 0 |
| Stormwater Retrofits | 100 | Impervious acres | 1.3 | 0 | 1.3 |
| Downspout Disconnection | 250 | acres | 0.4 | 0 | 0.4 |
| Street Trees | 1,000 | trees | 0 | | 0 |
| Reforestation | 25 | acres | 5.0 | 0.8 | 5.8 |
| Stream Restoration | 20,000 | feet | 0 | 0 | 0 |
| Redevelopment | 100 | acres | 0 | 0 | 0 |

Agricultural land uses account for less than one percent of the Lower Jones Falls watershed. The *Lower Jones Falls Small Watershed Action Plan* does not include agricultural BMP implementation goals. According to the Maryland Department of Agriculture that tracks agricultural BMP implementation statewide, no implementation of agricultural BMPs was reported in the Lower Jones Falls watershed for the period state fiscal year 2014 thru 2017.

## F.3. Grant-Funded Implementation Projects

The following two pages present tables summarizing the status of grant-funded NPS BMP implementation from the follow grant sources:

- 319(h) Grant and State Revolving Fund
- Chesapeake and Atlantic Coastal Bays Trust Fund

**Lower Jones Falls Watershed**
**2006-SFY17 Completed NPS Implementation Projects - 319(h) Grant and State Revolving Fund**

| 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.

**SFY2017 NPS Implementation Projects In Progress - 319(h) Grant and State Revolving Fund - 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 projects working during SFY17 | | | | | | | | | | |
| Baltimore County | No 319 or SRF projects working during SFY17 | | | | | | | | | | |

**Lower Jones Falls Watershed**
**Chesapeake and Atlantic Coastal Bays Trust Fund**
**SFY 2017 NPS Implementation Project Status (1)**

| Year Funded | PartnerCD | ProjectTitle | ProjectType | County | TrustFund Dollars | Status | BMP Units | BMPs Reported | Annual LbsN | Annual LbsP | Annual TonsTSS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FY13 | Md Forestry Board Foundation | Irvine Nature Center Tree Planting | Tree Planting Projects | Baltimore | 31,000.00 | Complete | | | 177 | 9 | 1.44 |
| | Parks and People Foundation | Druid Hill Park Bio-Filter Installation (Ren | Stormwater Management | Baltimore City | 113,000.00 | Complete | | | 29.58 | 2.41 | 0.98 |
| | | Phase I: Samuel Coleridge-Taylor 507 Pres | Tree Planting Projects | Baltimore City | 50,000.00 | Complete | | | 0 | 0 | 0 |
| | | Howard Dog Park | Stormwater Management | Baltimore City | 51,000.00 | Complete | | | 0.99 | 0.16 | 0.061 |
| FY14 | Chesapeake Bay Trust | Mount Vernon-Belvedere Tree Pit Creation | Tree Planting Projects | Baltimore City | 10,000.00 | Complete | | | 188 | 0.08 | 12.4 |
| | | Improving Tree Health and Canopy in CRE | Tree Planting Projects | Baltimore City | 184,535.00 | Complete | | | 28 | 1.9 | 0.3 |
| | | Reservoir Hill Tree Canopy Project | Tree Planting Projects | Baltimore City | 58,010.00 | Complete | | | 74.7 | 9.2 | 2.6 |
| | | Improving Tree Health and Canopy in CRE | Tree Planting Projects | Baltimore City | 40,000.00 | Complete | | | 0 | 0 | 0 |
| | Parks and People Foundation | Phase II: 507 W Preston St, Samuel Coleric | Stormwater Management | Baltimore City | 431,300.56 | Complete | | | 1.83 | 0.13 | 0.145 |
| | Baltimore City Recreation and Parks | Baltimore Polytechnic Institute | Tree Planting Projects | Baltimore City | 2,036.27 | Complete | | | 0.99 | 0.042 | 0.007 |
| | | Northwestern HS | Tree Planting Projects | Baltimore City | 4,043.44 | Complete | | | 1.7 | 0.07 | 0.012 |
| | Alliance for the Chesapeake Bay | Saints Philip and James Parish | Tree Planting Projects | Baltimore City | 810.25 | Complete | | | 0.57 | 0.03 | 0.001 |
| | | Union Baptist Church | Tree Planting Projects | Baltimore City | 337.60 | Complete | | | 0.23 | 0.01 | 0.0007 |
| | | Baltimore Hebrew Congregation | Tree Planting Projects | Baltimore City | 540.17 | Complete | | | 0.376 | 0.015 | 0.001 |
| | | Chizuk Amuno | Tree Planting Projects | Baltimore | 1,688.02 | Complete | | | 1.1775 | 0.0475 | 0.0039 |
| | | Woodbrook Baptist Church | Tree Planting Projects | Baltimore | 877.77 | Complete | | | 0.6123 | 0.0247 | 0.002 |
| | | Benedictine Sisters of Baltimore Emmanue | Tree Planting Projects | Baltimore | 1,688.02 | Complete | | | 1.42 | 0.1 | 0.016 |
| | | Bnos Yisroel | Tree Planting Projects | Baltimore City | 4,051.24 | Complete | | | 2.826 | 0.114 | 0.0093 |
| | | Grace United Methodist Church | Tree Planting Projects | Baltimore City | 2,975.52 | Complete | | | 0.75 | 0.038 | 0.0031 |
| FY15 | Parks and People Foundation | Newington Avenue Park | Stormwater Management | Baltimore City | 58,459.94 | Complete | | | 0.49 | 0.05 | 0.058 |
| | | Sarah's Hope Phase II | Stormwater Management | Baltimore City | 8,004.57 | Complete | | | 0.27 | 0.28 | 0.05 |
| | Blue Water Baltimore | Guilford Elementary Middle School | Stormwater Management | Baltimore City | 65,000.00 | Complete | | | 0.24 | 0.06 | 0.12 |
| | | Chizuk Amuno Synagogue | Stormwater Management | Baltimore | 280,000.00 | Complete | | | 6.85 | 0.76 | 1.42 |
| | | Jones Falls Stream Restoration (Supplemer | Stream Restoration | Baltimore | 24,891.50 | Complete | | | 0 | 0 | 0 |
| | | Baltimore Hebrew Congregation | Stormwater Management | Baltimore City | 159,039.73 | Complete | | | 1.11 | 0.13 | 0.24 |
| | | Shrine of the Sacred Heart | Stormwater Management | Baltimore City | 46,298.90 | Complete | | | 0.36 | 0.03 | 0.058 |
| FY16 | Blue Water Baltimore | Jones Falls Stream Restoration at Falls Roa | Stream Restoration | Baltimore | 600,000.00 | Complete | | | 124.54 | 38.96 | 15.33 |
| | | | | | | | | | | | |
| | (1) Maryland DNR provided this data 11/30/17 and indicated it is the full extent available. | | | TOTALS | 2,229,588.50 | | | | 644.6 | 63.6 | 35.26 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FY13 | Baltimore County | Towson Run at Cloisters Stream Restoratio | Stream Restoration | Baltimore | 997,014.29 | Construction | | | 819.2 | 268 | 608.37 |
| FY15 | Md Assoc. of Soil Conservation Distr | Irvine Nature Center Site | Stream Restoration | Baltimore | 1,951,000.00 | Construction | | | 3363 | 2625 | 850 |
| | | | | | | | | | | | |
| | (1) Maryland DNR provided this data 11/30/17 and indicated it is the full extent available. | | | TOTALS | 2,948,014.29 | | | | 4,182.2 | 2,893.0 | 1,458.37 |

## F.4. Monitoring

### F.4.a. Water Quality – State Agencies

The Maryland Department of Natural Resources (DNR) monitoring is focused entirely on the Jones Falls' receiving waters in the Patapsco River / Inner Harbor as summarized below. The most recent information for Pataspco River tidal waters was summarized for the 2013-2015 time period by DNR. However the following summary information is excerpted from a preliminary report prior to its public availability:

- Water quality in the tidal waters of the Patapsco River is fair because nitrogen levels are too high. Phosphorus and sediment levels have improved. Habitat quality for underwater grasses is poor due to high algal densities and poor water clarity. Severe algal blooms are common in the Patapsco in the summer. Habitat quality for bottom dwelling animals is poor and has gotten worse… Patapsco River nitrogen, phosphorus and sediment levels and algal densities are low to moderate compared to other rivers, and water clarity is better than in other high developed rivers basins. However, summer bottom dissolved oxygen levels in the Patapsco River are the lowest of all rivers in Maryland and greatly degraded. [1]

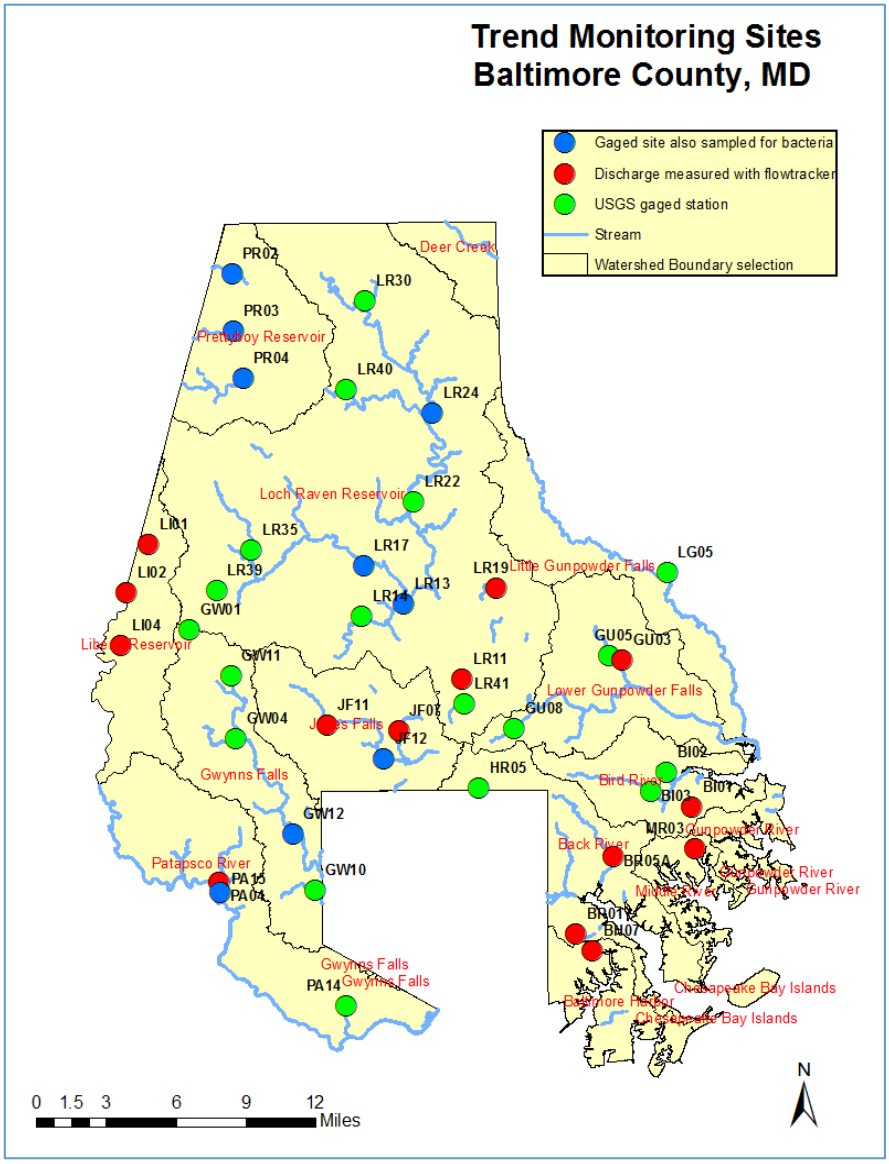
Neither DNR nor MDE are conducting nontidal monitoring water quality monitoring in the Jones Falls watershed. The monitoring projects funded by the 319(h) Grant are not active in this watershed. [2, 3]

[1] DNR. *Water Quality Summary 2013-2015*. Preliminary report received via personal communication 11/6/17.
[2] Maryland Department of the Environment. MDE Targeted Watershed Project. 319(h) Grant FFY2016 Project 4.
[3] Maryland Department of the Environment. MDE Biological Assessment for Water Quality Protection and TMDL Implementation. 319(h) Grant FFY2016 Project 5.

## F.4.b. Nontidal – Water Quality Baltimore County

Each year Baltimore 2017 County MS4 reports to meet their MS4 permit requirements. [4]
In their report, findings from monitoring are summarized. The distribution of countywide water quality monitoring stations in Baltimore County is shown in the adjacent map.

According to the County, their Jones Falls water quality monitoring stations are showing the following trends for pollutant concentrations (2017 County MS4 report Figure 9-19 page 9-53):
-- Nitrogen slope = -1.9163
-- Phosphorus slope = -0.1146
-- Sediment slope = -7.4032
(A negative slope indicates reduced pollutant load and improving water quality)




Baltimore County trend monitoring sites. (2017 County MS4 report Figure 9-21 page 9-46)

| Jones Falls Pollutant Load Analysis, Standardized by Drainage Area Acreage, 2016 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Site | Drainage Area (ac) | TSS | Nitrate / Nitrite | Total Nitrogen | Total Phosphorus | Chloride | Sodium |
| JF07 | 3,111.86 | 3.3 | 1.57 | 1.91 | 0.13 | 110.78 | 48.16 |
| JF11 | 7,986.54 | 3.9 | 1.64 | 1.94 | 0.13 | 45.26 | 16.21 |
| JF12 | 16,181.91 | 36.3 | 5.47 | 6.52 | 0.43 | 271.95 | 118.44 |

As shown in the table above, the County also estimated pollutant loads at their three Jones Falls stations. (2017 County MS4 report, Table 9-18 page).

[4] Baltimore County. NPDES Municipal Stormwater Discharge Permit 2017 Annual Report. December 22, 2017.

## F.4.c. Nontidal Bacteria -- Baltimore County

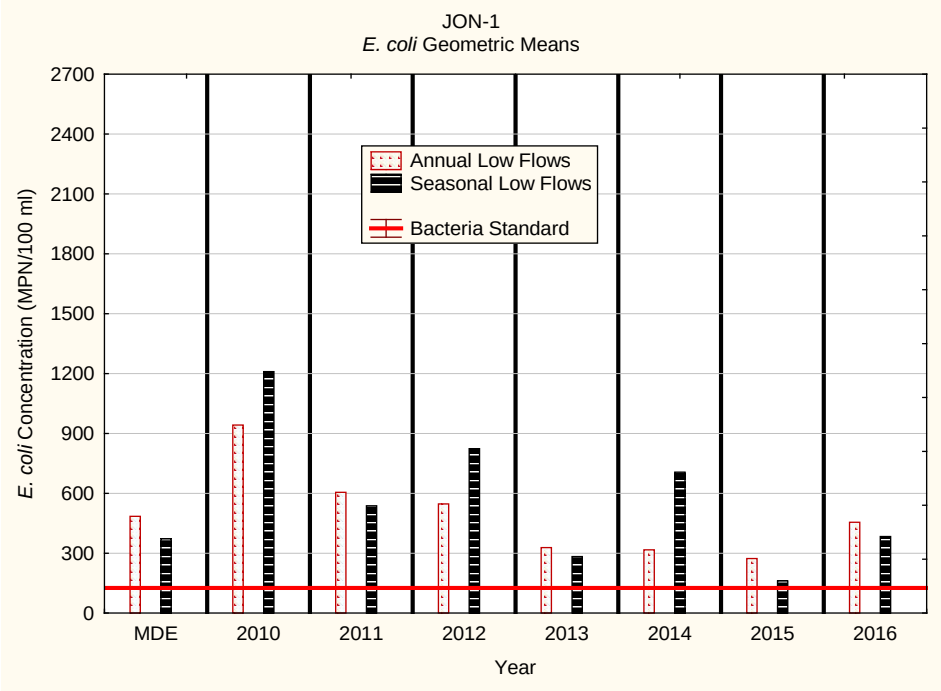
Baltimore County also conducts bacteria monitoring at the stations shown in the map below. There are five bacteria trend monitoring sites in the Jones Falls. Three of the monitoring sites are in the city and three are in the county. The table on the next presents the number of samples and the geometric mean for high (wet) flow and low (dry) flow by year. It also presents the geometric mean of all samples by year regardless of condition. The table is stratified by annual data (includes all data collected for the year) and seasonal data (includes only those samples collected between May 1st and September 30th each year). Geometric means below the water quality standard (126 MPN) are highlighted in green. These results are displayed graphically


The County graphed E. coli geometric mean concentrations for both annual and seasonal flow periods stratified by flow condition as shown on the following pages (2017 County MS4 report Figures 9-54 thru 9-60, pages 9-90 thru 9-93). The County noted that samples taken in 2016 were almost completely during low flows.

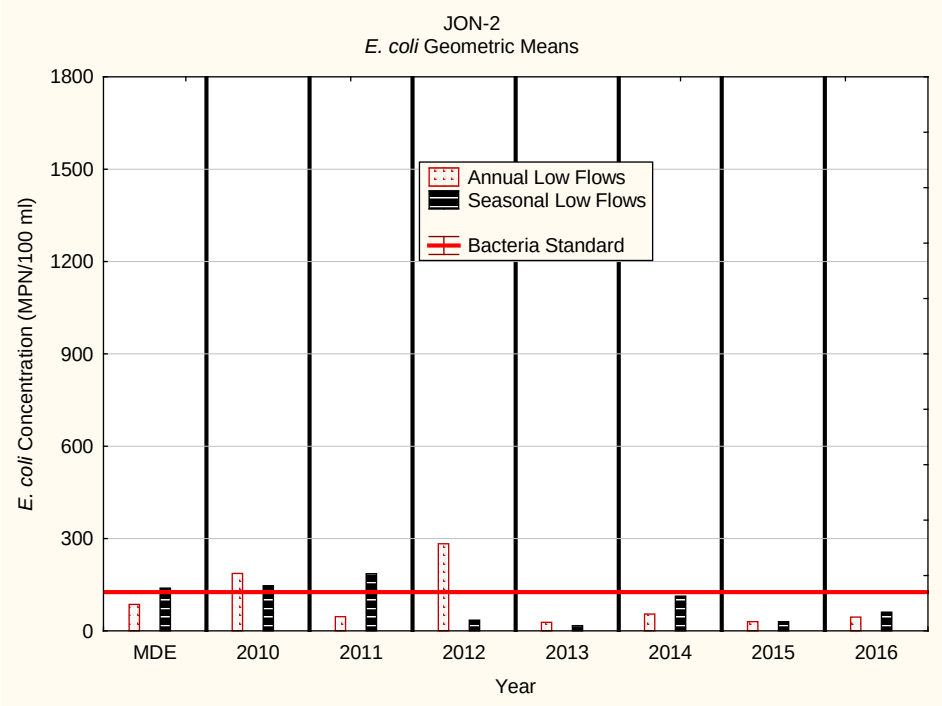
Map: Baltimore County bacteria monitoring sites. (2017 County MS4 report Figure 9-27 page 9-56)

Jones Falls E. coli Results on an Annual and Seasonal Basis (County 2017 MS4 Report Table 9-37 page 9-89)

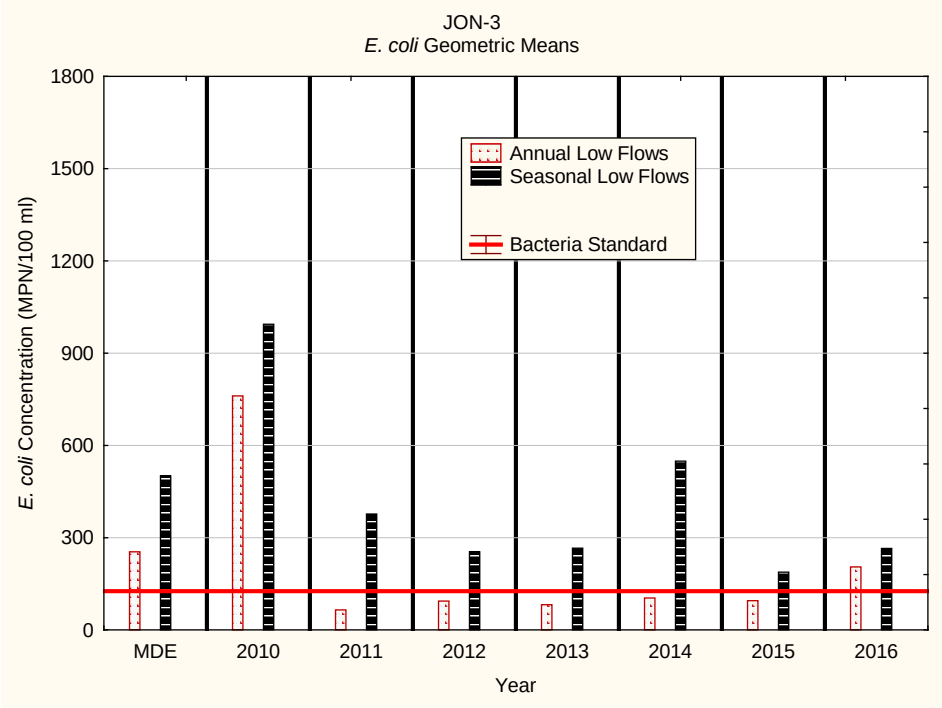
| **Annual (MPN/100 ml)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Site** | **Flow Type** | **2011** | | **2012** | | **2013** | | **2014** | | **2015** | | **2016** | |
| | | **N** | **MPN** | **N** | **MPN** | **N** | **MPN** | **N** | **MPN** | **N** | **MPN** | **N** | **MPN** |
| **JON-1 City** | High | 4 | 632 | 3 | ***98*** | 2 | 2,420 | 3 | 1684 | 3 | 930 | 1 | 2420 |
| | Low | 8 | 605 | 8 | 547 | 8 | 328 | 8 | 317 | 8 | 273 | 7 | 455 |
| | All | 12 | 614 | 11 | 342 | 10 | 489 | 11 | 500 | 11 | 341 | 8 | 561 |
| **JON-2** | High | 4 | 173 | 3 | ***32*** | 2 | ***24*** | 4 | 442 | 3 | 840 | 1 | 980 |
| | Low | 8 | ***46*** | 9 | 283 | 10 | ***28*** | 7 | ***55*** | 8 | ***30*** | 7 | ***45*** |
| | All | 12 | ***71*** | 12 | ***55*** | 12 | ***27*** | 11 | ***117*** | 11 | ***80*** | 8 | ***66*** |
| **JON-3** | High | 4 | 460 | 3 | 240 | 2 | 748 | 4 | 751 | 3 | 300 | 1 | 517 |
| | Low | 8 | ***65*** | 9 | ***94*** | 10 | ***82*** | 8 | ***104*** | 8 | ***95*** | 8 | 205 |
| | All | 12 | ***124*** | 12 | ***119*** | 12 | ***118*** | 12 | 201 | 11 | 145 | 9 | 230 |
| **JON-4** | High | 4 | 716 | 3 | 449 | 2 | 2,420 | 4 | 688 | 3 | 508 | 1 | 727 |
| | Low | 8 | ***111*** | 9 | ***64*** | 10 | ***60*** | 8 | 186 | 8 | ***125*** | 8 | 249 |
| | All | 12 | 207 | 12 | ***105*** | 12 | ***110*** | 12 | 288 | 11 | 191 | 9 | 285 |
| **JON-5 City** | High | 4 | 973 | 3 | 200 | 2 | 2,420 | 4 | 1151 | 3 | 721 | 2 | 1414 |
| | Low | 8 | 360 | 9 | 182 | 9 | 200 | 8 | 230 | 8 | 167 | 7 | 155 |
| | All | 12 | 502 | 12 | 186 | 11 | 315 | 12 | 394 | 11 | 249 | 9 | 204 |
| **JF-B-12** | High | | | | | | | | | 4 | 528 | 2 | 2192 |
| | Low | | | | | | | | | 13 | 284 | 14 | 275 |
| | All | | | | | | | | | 17 | 329 | 16 | 357 |
| **JF-B-13** | High | | | | | | | | | 4 | 697 | 2 | 1043 |
| | Low | | | | | | | | | 12 | 237 | 14 | 480 |
| | All | | | | | | | | | 16 | 310 | 16 | 529 |
| **Seasonal (May 1st to September 30th) (MPN/100 ml)** | | | | | | | | | | | | | |
| **Site** | **Flow Type** | **2011** | | **2012** | | **2013** | | **2014** | | **2015** | | **2016** | |
| | | **N** | **MPN** | **N** | **MPN** | **N** | **MPN** | **N** | **MPN** | **N** | **MPN** | **N** | **MPN** |
| **JON-1 City** | High | 2 | 751 | 1 | ** | 1 | 2,420 | 2 | 2420 | 1 | 1046 | 0 | |
| | Low | 3 | 538 | 4 | 824 | 4 | 283 | 3 | 706 | 3 | 161 | 4 | 384 |
| | All | 5 | 615 | 5 | 215 | 5 | 434 | 5 | 1155 | 4 | 257 | 4 | 384 |
| **JON-2** | High | 2 | 228 | 1 | ***75*** | 1 | ***63*** | 2 | 1087 | 1 | 1553 | 0 | |
| | Low | 3 | 186 | 4 | ***35*** | 4 | ***17*** | 2 | ***113*** | 3 | ***30*** | 4 | ***61*** |
| | All | 5 | 202 | 5 | ***40*** | 5 | ***49*** | 4 | 351 | 4 | ***81*** | 4 | ***61*** |
| **JON-3** | High | 2 | 551 | 1 | 387 | 1 | 770 | 2 | 1053 | 1 | 866 | 0 | |
| | Low | 3 | 377 | 4 | 254 | 4 | 266 | 3 | 549 | 3 | 188 | 4 | 265 |
| | All | 5 | 439 | 5 | 277 | 5 | 329 | 5 | 712 | 4 | 276 | 4 | 265 |
| **JON-4** | High | 2 | 2,178 | 1 | 210 | 1 | 2,420 | 2 | 1365 | 1 | 2420 | 0 | |
| | Low | 3 | 869 | 4 | 251 | 4 | 152 | 3 | 305 | 3 | 295 | 4 | 354 |
| | All | 5 | 1,255 | 5 | 242 | 5 | 684 | 5 | 555 | 4 | 500 | 4 | 354 |
| **JON-5 City** | High | 2 | 773 | 1 | 166 | 1 | 2,420 | 2 | 1773 | 1 | 1414 | 0 | |
| | Low | 3 | 275 | 4 | ***93*** | 4 | 479 | 3 | 372 | 3 | 376 | 4 | 205 |
| | All | 5 | 416 | 5 | ***105*** | 5 | 662 | 5 | 695 | 4 | 524 | 4 | 205 |
| **JF-B-12** | High | | | | | | | | | 2 | 1000 | 0 | |
| | Low | | | | | | | | | 8 | 337 | 10 | 359 |
| | All | | | | | | | | | 10 | 419 | 10 | 359 |
| **JF-B-13** | High | | | | | | | | | 2 | 687 | 0 | |
| | Low | | | | | | | | | 8 | 295 | 10 | 532 |
| | All | | | | | | | | | 10 | 350 | 10 | 532 |



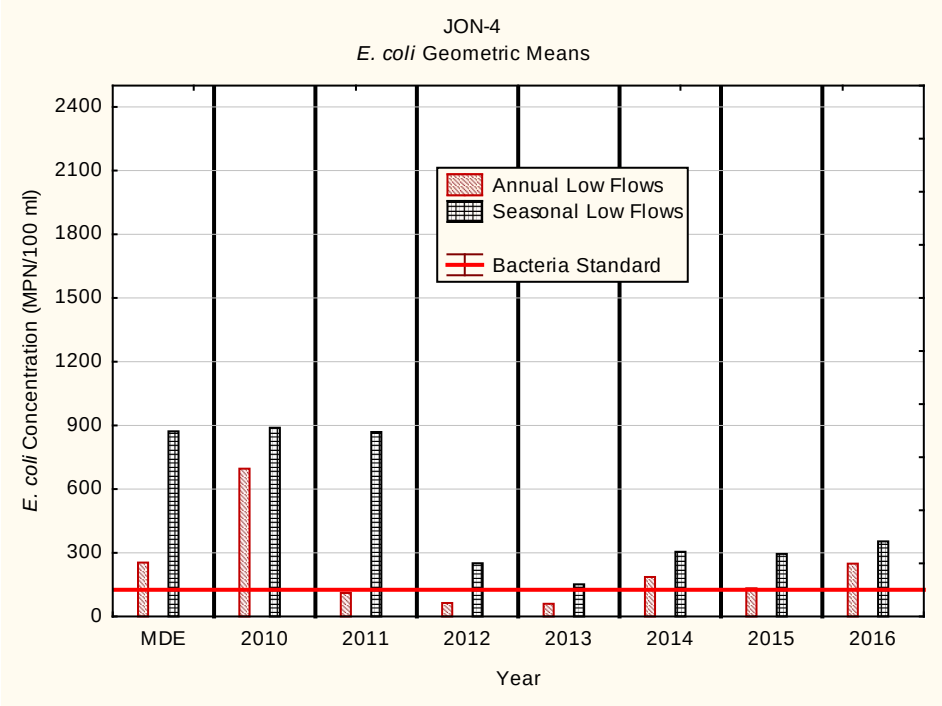

JON-1: County analysis indicates conditions are worsening at this station based on comparing MDE sampling in 2002-2003 and later county sampling.



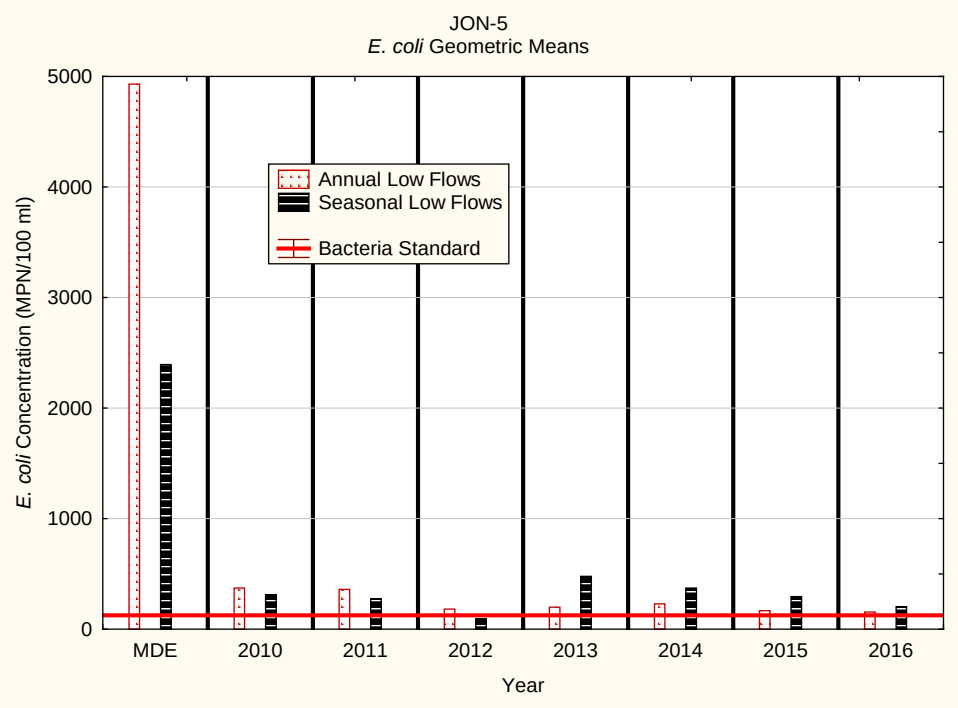

JON-2: County analysis indicates an improvement at this station based on comparing MDE sampling in 2002-2003 and later county sampling.



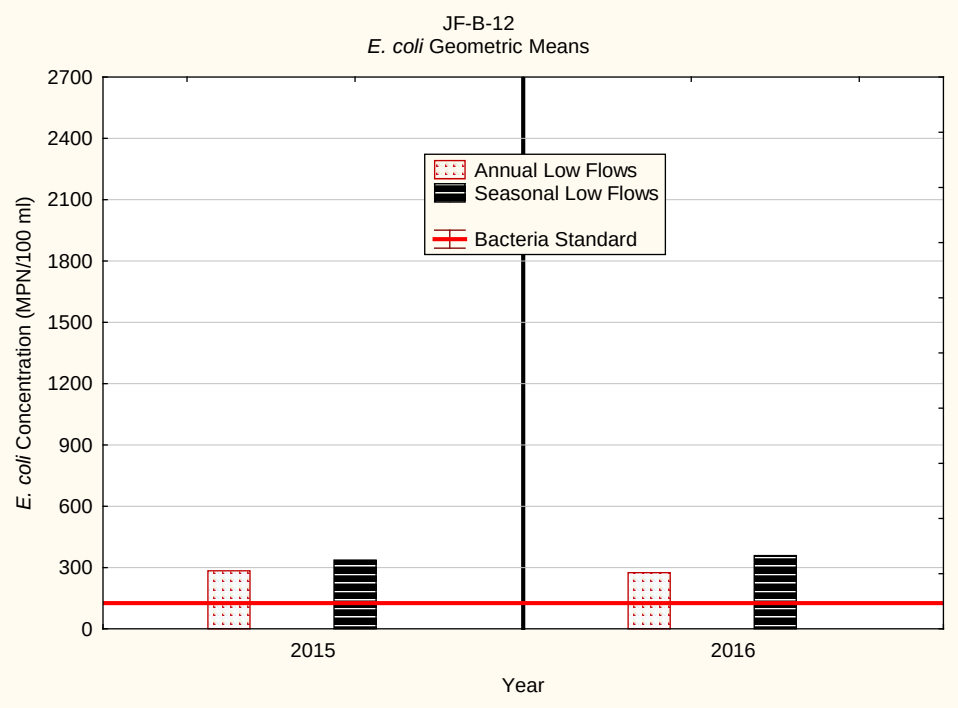

JON-3: County analysis indicates an improvement at this station based on comparing MDE sampling in 2002-2003 and later county sampling.



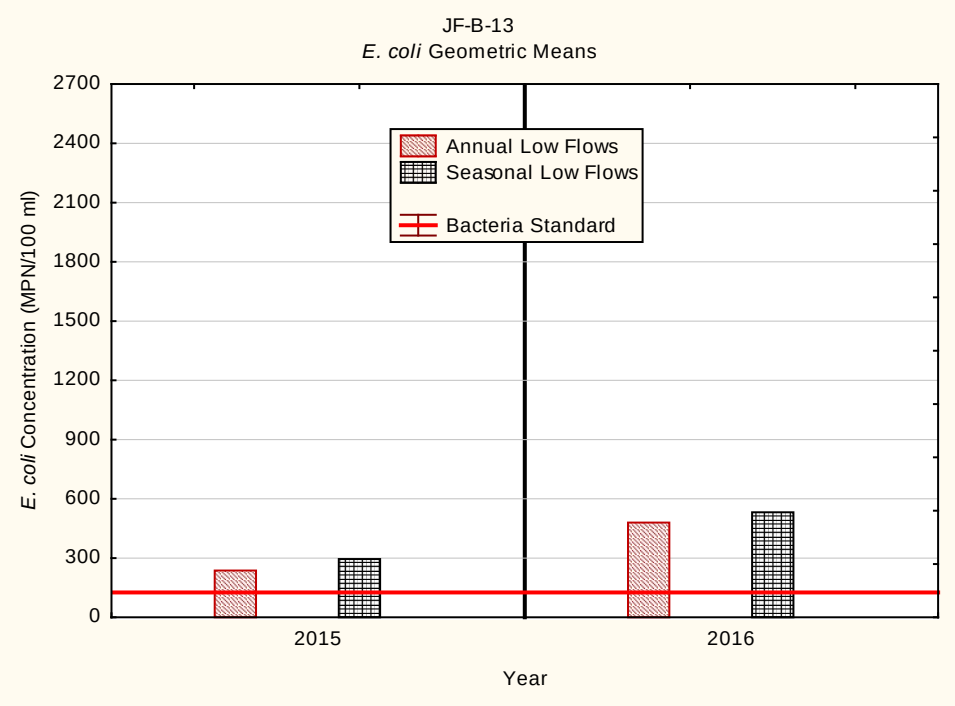

JON-4: County analysis indicates an improvement at this station based on comparing MDE sampling in 2002-2003 and later county sampling.




JON-4: County analysis indicates significant improvement at this station based on comparing MDE sampling in 2002-2003 and later county sampling.



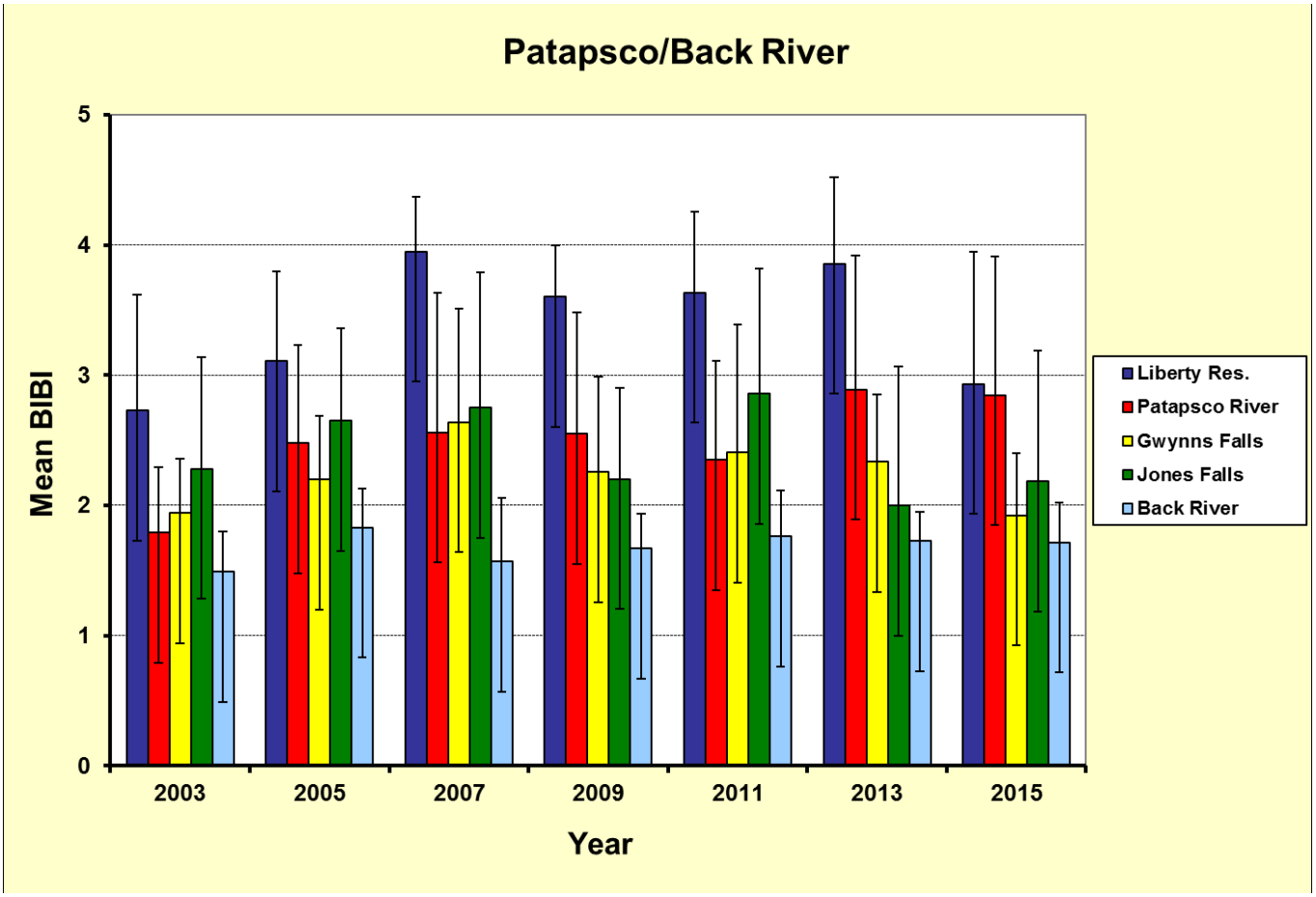

JF-B-12: County analysis over the two years of sampling indicates that the geometric means for most flow regimes have stayed approximately the same.



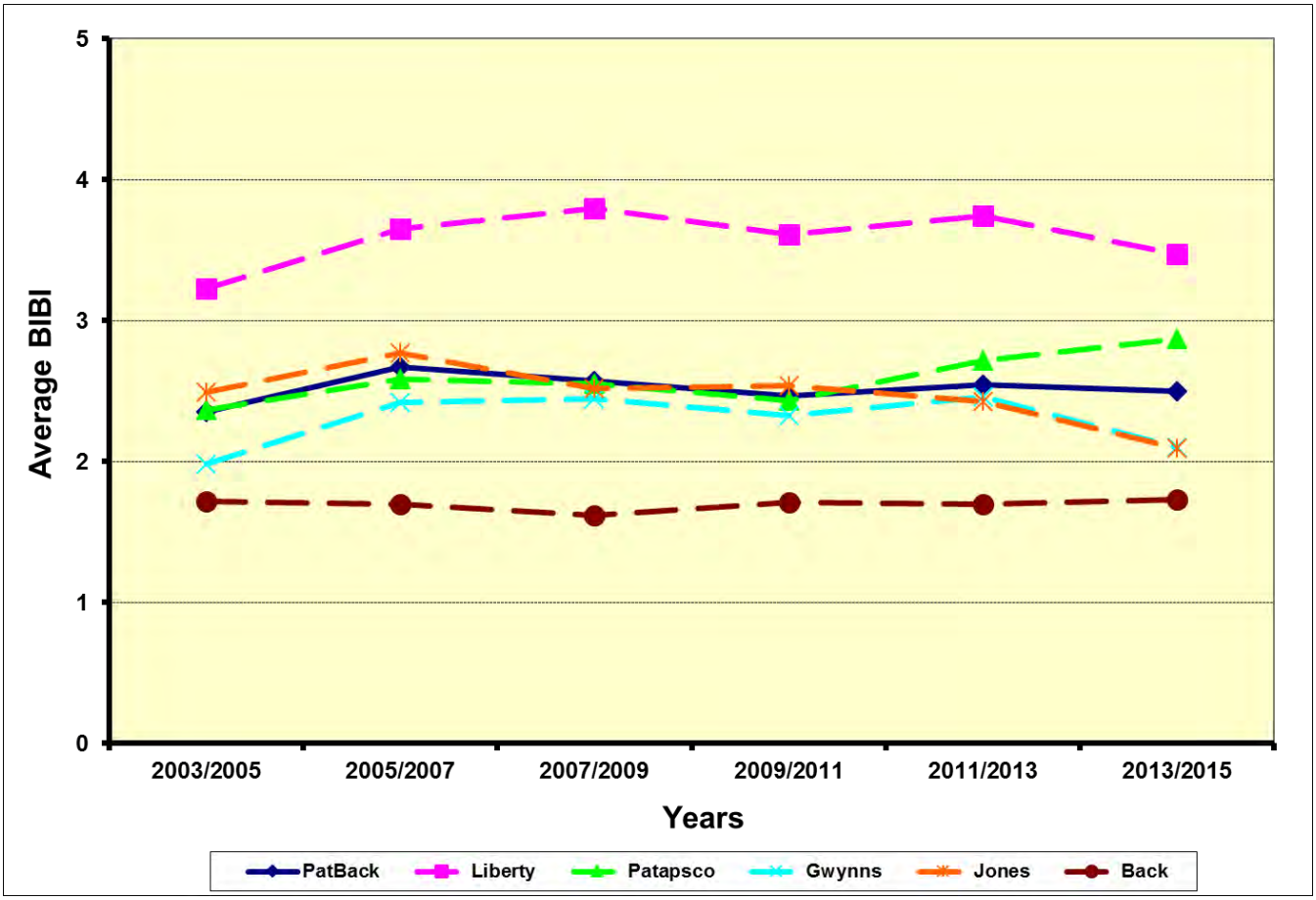

JF-B-13: County analysis over the two years of sampling indicates that the geometric means for most flow regimes have increased.

## F.4.d. Nontidal Biology – Baltimore County

One the five biological monitoring programs conducted by Baltimore County is to assess ecological health of stream using a probabilistic monitoring approach in freshwater and tidal waters using the Maryland Biological Stream Survey protocol. County-wide fifty randomly selected sites are monitored annually. Baltimore County visits its 319 priority watersheds every other year. The MBSS system is used to rank the conditions observed as summarized in the two graphs below (Very Poor = 1.00 thru 1.99, Poor = 2.00 thru 2.99, Fair = 3.00 thru 3.99, Good = 4.00 thru 4.99):




Means and one standard deviation of BIBI scores between 2003 and 2015
(2017 County MS4 report page 9-129)




BIBI rolling averages for probabilistic monitoring sites between 2003 and 2015.
(2017 County MS4 report page 9-133)

**F.4.e. Tidal Biology – Baltimore County**

Since 2013 Baltimore County has conducted random tidal benthic sampling using the Chesapeake Bay Benthic Index of Biological Integrity. County reporting did not indicate that the tidal receiving waters of the Jones Falls was part of this program (2017 County MS4 report page 9-148).

# Appendix G
# Lower Monocacy River Watershed in Frederick County, Maryland
# Watershed Eligible for 319(h) Grant Implementation Funding

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.)

Total pollutant reduction goals over 25 years are on watershed plan page 11:

- Nitrogen 649,998 pounds,
- Phosphorus 68,952 pounds,
- Sediment/total suspended solids 10,345 U.S. short tons.

Additional specific goals are:

- Pollutant load reduction for agricultural BMPs (Table J) and urban BMPs (Table K)
- Agricultural BMP implementation goals: Table R on page 22.
- Urban BMP implementation goals: 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 Obj. 5 has 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.

## Water Quality

State Agency Information

According to Maryland DNR[1], measured nitrogen levels decreased in the Monocacy River and Seneca Creek. Catoctin Creek nitrogen levels decreased when changes in river flow are accounted for. Measured phosphorus levels decreased at most of the stations in the Middle Potomac, but the trends were not significant when the effect of changes in river flow is accounted for. Only one station in Catoctin Creek has a significant decrease in sediment levels.

MDE nontidal monitoring projects funded by the 319(h) Grant have not been active in the Lower Monocacy River watershed. [2, 3]

Frederick County MS4 Permit Reporting

To meet requirements of its municipal separate sewer system (MS4) permit, Frederick County is monitoring Peter Pan Run, which is tributary to Bush Creek and the Lower Monocacy River. According to the most recent report [4]:

- Monitoring in Peter Pan Run is designed to build a long-term database of water quality and biological conditions and to assess the cumulative effects of restoration projects in the watershed. The program was initiated in 1999 to monitor and assess the effects of stormwater runoff from development in the watershed.
- May 1999 monitoring established the baseline pre-construction conditions within the Peter Pan Run watershed. That year construction began on a planned unit development (PUD), which is now a 3,500 residential unit, mixed-use development that also includes substantial commercial and office space. Construction on the PUD is continuing to add 200 to 300 residential units annually.
- The long term monitoring program involves monitoring flow volumes and water quality from both in-stream and SWM pond outfall stations. It includes monitoring physical and biological conditions at four permanent stations.
- Frederick County's SWM database for this watershed lists:
    - 21 extended detention dry ponds and 10 extended detention wet ponds
    - 5 combination sand filter and extended detention ponds
    - 3 sand filters, 2 infiltration trenches and 1 wet pond
    - 2 constructed swallow marshes and 1 reforestation of urban land on 0.25 acres

The following pages show water quality trend information extracted from the Versar report. Variation over time shown is affected by precipitation patterns:

- Very wet years: WYs 2001, 2002, 2009, 2015, 2016, 2017.
- Very dry years: WYs 2003, 2010, 2011, 2013, 2014.

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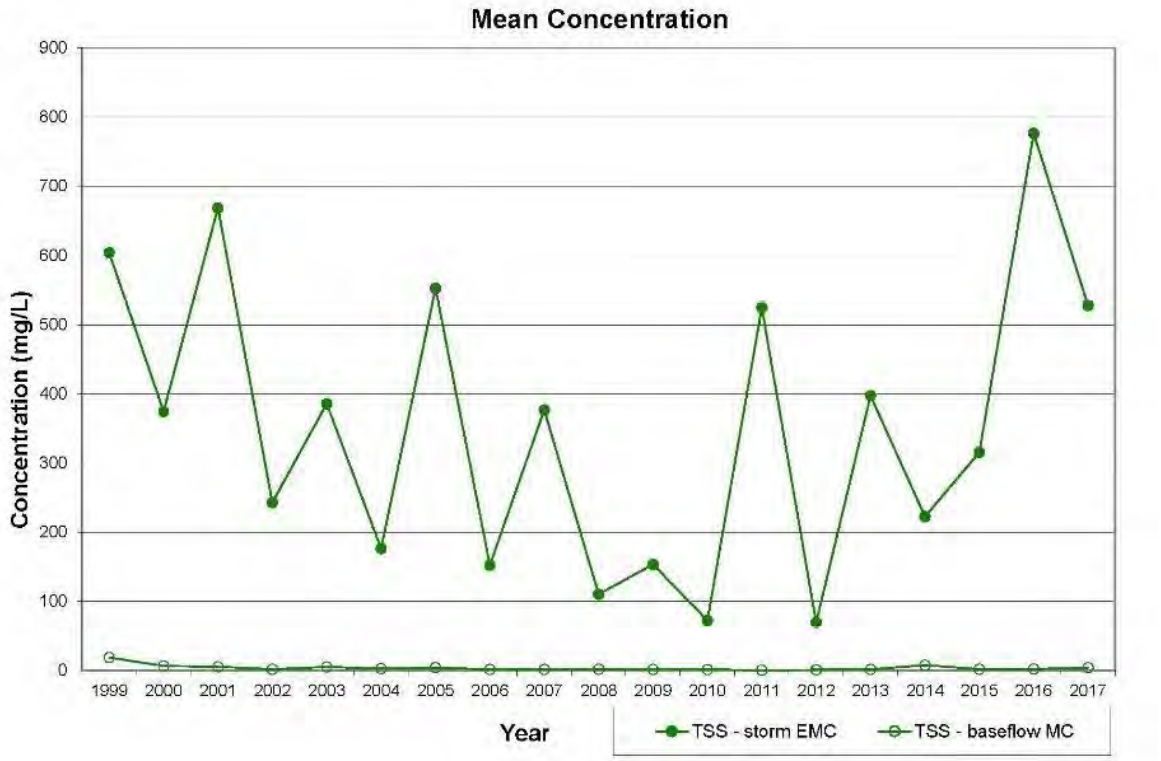
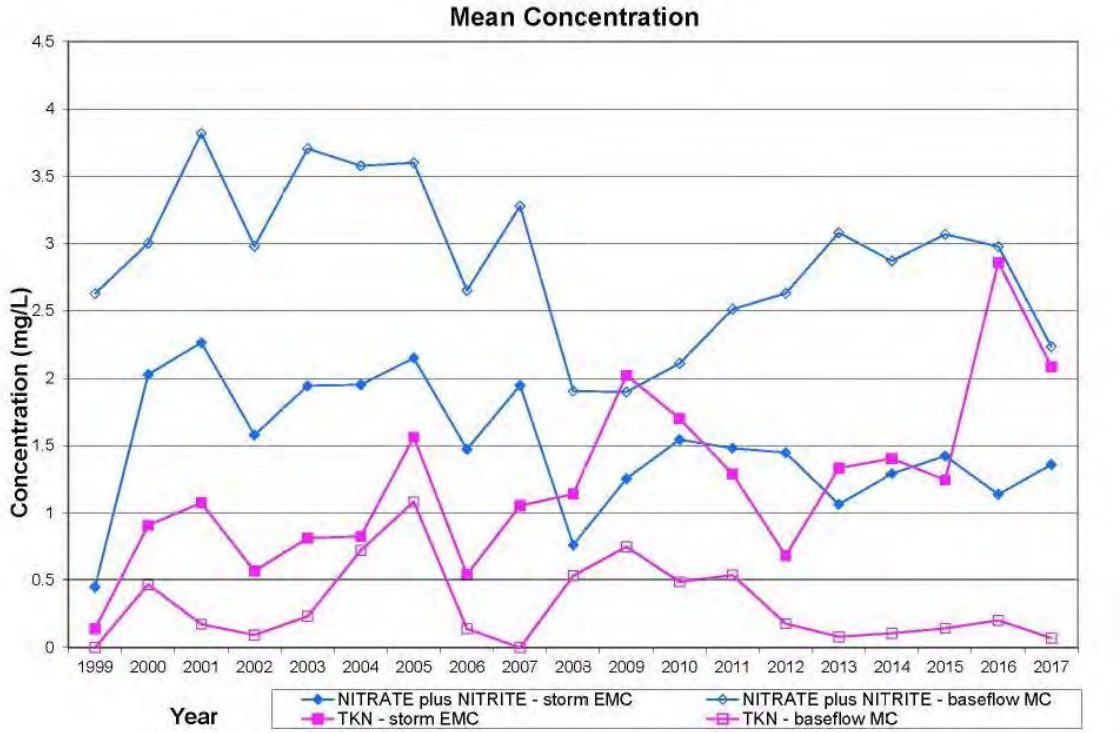
[1] DNR. *Water Quality Summary 2013-2015*. Preliminary report received via personal communication 11/6/17.
[2] Maryland Department of the Environment. MDE Targeted Watershed Project. 319(h) Grant FFY2016 Project 4.
[3] Maryland Department of the Environment. MDE Biological Assessment for Water Quality Protection and TMDL Implementation. 319(h) Grant FFY2016 Project 5.
[4] Versar, Inc. Frederick County Assessment of Controls: Peter Pan Run Monitoring July 2016 – June 2017. Prepared for the Frederick County Office of Sustainability and Environmental Resources. December 5, 2017

According to the report, a statistical analysis was performed on the individual storm EMC data from WY 1999 to the present to the in-stream station (Kendall's Tau-b correlation):

- TKN: statistically significant trend upward ($T_b$ = 0.503, p = 0.0035)
- Nitrate and nitrite: statistically significant trend downward ($T_b$ = -0477., p = 0.0057)
- Phosphorus: Except for a spike in concentration level in WY2009, baseflow phosphorus has shown a declining trend with minor fluctuations since 2004. (report page 2-17).
- TSS: A plot of TSS estimated mean concentrations (EMCs) by storm event did not show a discernible trend. A time series of average annual EMCs showed a general, gradual decline from 1999 to about 2009 and subsequent plateau until FY2016, in which a large increase was noted. The average annual EMC in FY2017 returned to similar levels noted from 2009 to 2015. (Versar report page 2-39)

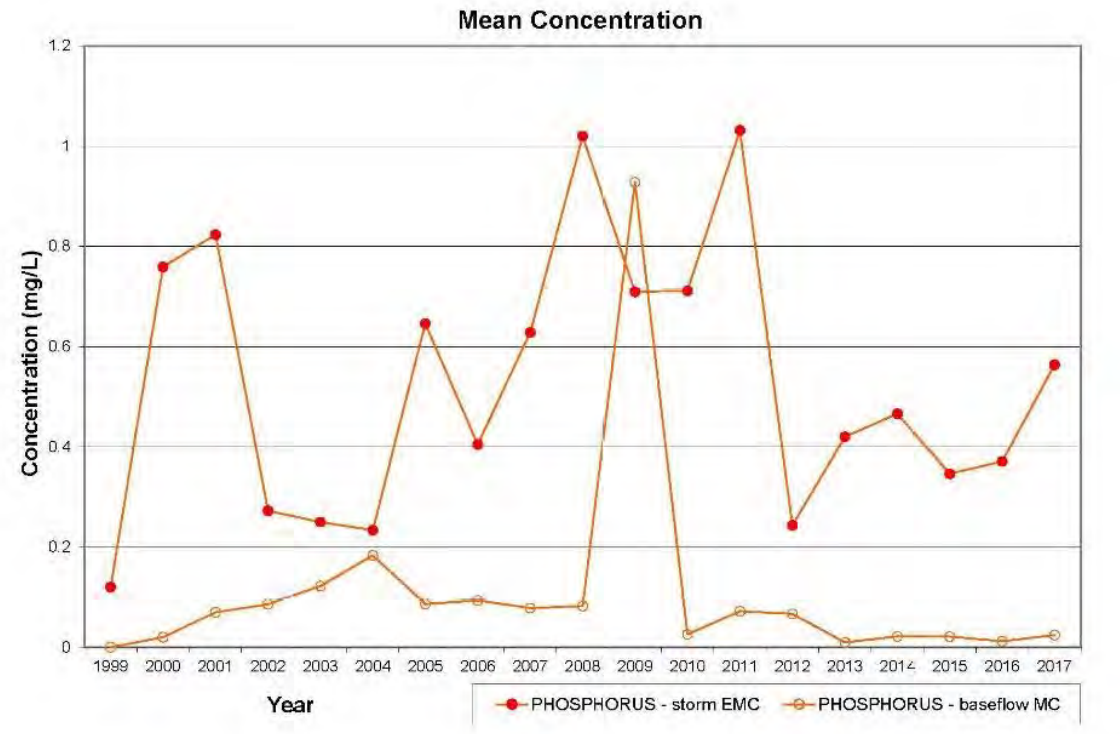



Above: Total suspended solids, Peter Pan Run in-stream station average of baseflow mean concentrations and storm event mean concentrations. (Versar report Figure 2-12 page 2-18)




Peter Pan Run in-stream station average of mean concentrations for baseflow and storm events (Versar report Figure 2-10 page 2-16 and Figure 2-11 page 2-17):

- Above: TKN, nitrate and nitrite annual flow-weighted.
- Below: Phosphorus



## Lower Monocacy River Watershed
## 1992-SFY17 Completed NPS Implementation Projects - 319(h) Grant and State Revolving Fund

| 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 |
| | Neighborhood Green Infrastructure | SFY16 | 319 FFY13 #7 | $89,106.78 | | $59,404.52 | $148,511.30 | 30.3 | 0.43 | 0.93 |
| | | | | | | | | | | |
| | | | TOTAL for completed projects | $1,387,102.99 | $0.00 | $749,963.33 | $1,973,314.60 | 3,154.3 | 418.3 | 32.28 |

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

## Lower Monocacy River Watershed
## SFY 2017 NPS Implementation Project In Progress - 319(h) Grant and State Revolving Fund

| 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 | | | | | |
| NGO (1) | Villages of Lake Linganore Stormwater Project | TBD | SRF loan and other sources | | $6,346,142 | $7,800,000 | $14,146,142 | TBD | TBD | TBD |
| City of Frederick | Rock Creek Stream Restoration (SFY17 pending execution of subaward agreement) | TBD | 319 FFY17 #9 | $270,000 | | $180,000 | $450,000 | 94 | 85 | 28 |
| Frederick County | No 319 projects working during SFY17 | | | | | | | | | |

**Lower Monocacy River Falls Watershed**
**Chesapeake and Atlantic Coastal Bays Trust Fund**
**SFY 2017 NPS Implementation Project Status (1)**

| Year Funded | PartnerCD | ProjectTitle | ProjectType | County | TrustFund Dollars | Status | BMP Units | BMPs Reported | Annual LbsN | Annual LbsP | Annual TonsTSS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SFY14 | Center for Watershed Protection | Hood College, Whitaker Parking lot / Rosenstock Hall | Stormwater Management | Frederick | 36,923.00 | Complete | | | 3.5 | 0.4 | 0.2545 |
| | | Hood College, North of Coffman Chapel | Stormwater Management | Frederick | 56,550.00 | Complete | | | 26.4 | 1.9 | 0.8665 |
| | City of Frederick | Walnut Ridge (City Stream Restoration and Educational Projects) | Tree Planting Projects | Frederick | 19,484.40 | Complete | acres | 4 | 114.9 | 7.7 | 1.36 |
| | | Waterford Park (City Stream Restoration and Educational Projects) | Tree Planting Projects | Frederick | 52,607.88 | Complete | acres | 10.8 | 310.2 | 20.7 | 3.67 |
| | | Carroll Creek/Baker Park (I) (City Stream Restoration and Educational Projects) | Tree Planting Projects | Frederick | 12,664.86 | Complete | acres | 2.6 | 74.7 | 5.0 | 0.88 |
| | | Carroll Creek/Baker Park (II) | Tree Planting Projects | Frederick | 10,716.42 | Complete | acres | 2.2 | 63.2 | 4.2 | 0.75 |
| | | Carroll Creek/Baker Park (III) (City Stream Restoration and Educational Projects) | Tree Planting Projects | Frederick | 34,097.70 | Complete | acres | 7 | 201.0 | 13.4 | 2.38 |
| | | Old Camp Park (City Stream Restoration and Educational Projects) | Tree Planting Projects | Frederick | 1,948.44 | Complete | acres | 0.4 | 11.5 | 0.8 | 0.14 |
| | | Rivermist, City Parkland (City Stream Restoration and Educational Projects) | Tree Planting Projects | Frederick | 2,435.55 | Complete | acres | 0.5 | 14.4 | 1.0 | 0.17 |
| | | Career & Technology Center (City Stream Restoration and Educational Projects) | Education & Outreach | Frederick | 19,877.00 | Complete | acres | 0.9 | 0.0 | 0.0 | 0 |
| | | Fredericktowne Village Park (City Stream Restoration and Educational Projects) | Tree Planting Projects | Frederick | 23,868.39 | Complete | acres | 4.9 | 104.7 | 9.4 | 1.67 |
| | Frederick County | Crestwood Middle School (County Riparian Buffers Streams - Student & Community Collaborative Service) | Tree Planting Projects | Frederick | 6,168.65 | Complete | acres | 2 | 11.5 | 0.8 | 0.126 |
| | Frederick County | Mountain Village HOA (County Riparian Buffers Streams - Student & Community Collaborative Service) | Tree Planting Projects | Frederick | 9,107.80 | Complete | acres | 2.5 | 14.3 | 1.0 | 0.1575 |
| | Land and Cultural Preservation Fund | Dearbought Park | Tree Planting Projects | Frederick | 2,721.65 | Complete | acres | 0.33 | 9.7 | 0.4 | 0.07 |
| | Potomac Conservancy | Schipper - Buffer | Agricultural Practices | Frederick | 11,215.00 | Complete | | | 289.0 | 12.0 | 2.22 |
| | | Glick - fencing & grassed waterway | Agricultural Practices | Frederick | 11,298.23 | Complete | | | 11.7 | 0.0 | 3.04 |
| | | Wetzel | Agricultural Practices | Frederick | 2,018.00 | Complete | | | 118.0 | 4.2 | 0.92 |
| | | Trimmer | Agricultural Practices | Frederick | 12,300.00 | Complete | | | 177.0 | 7.3 | 1.359 |
| SFY15 | Delmarva RC & D Council | Cassis | Wetland Restoration | Frederick | 2,460.00 | Complete | | | 2.2 | 0.2 | 0.01 |
| | Maryland Forestry Board Foundation | Reid Reforestation | Tree Planting Projects | Frederick | 5,231.00 | On-going | acres | 1.6 | 0.0 | 1.0 | 0.23 |
| | | Friends Meeting School Reforestation | Tree Planting Projects | Frederick | 9,808.00 | On-going | acres | 3 | 1.0 | 1.0 | 0.43 |
| | | Stoneking Reforestation | Tree Planting Projects | Frederick | 6,539.00 | On-going | acres | 2 | 0.0 | 1.0 | 0.28 |
| | | | | | | | | | | | |
| | (1) Maryland DNR provided this data 2/21/17 and indicated it is the full extent available. | | | TOTALS | 350,040.97 | | | | 1,558.9 | 93.3 | 20.99 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FY15 | Maryland Forestry Board Foundation | Danny White | Tree Planting Projects | Frederick | 3,000.00 | On-going | | | 7.7 | 0.2 | 0.05 |
| FY18 | | McKnight | Tree Planting Projects | Frederick | 4,711.83 | Design/Planning | | | 5.7 | 0.92 | 0.17 |
| | | Lake Linganore HOA | Tree Planting Projects | Frederick | 23,559.15 | Design/Planning | | | 28.5 | 4.5 | 0.85 |
| | | Day | Tree Planting Projects | Frederick | 28,270.98 | Design/Planning | | | 34.2 | 5.4 | 1 |
| | | | | | | | | | | | |
| | (1) Maryland DNR provided this data 2/21/17 and indicated it is the full extent available. | | | TOTALS | 59,541.96 | | | | 76.1 | 11.0 | 2.07 |

**SFY2017 Agricultural BMP Implementation**
**Lower Monocacy River Watershed**
**In Frederick County, Maryland**

| Agricultural Best Management Practice | Unit | SFY17 Total | Estimated Pollutant Load Reduction: Nitrogen Total (lbs) | Phosphorus Total (lbs) | Sediment Total (tons) |
|---|---|---|---|---|---|
| Annual Practices | | | | | |
| Cover Crops | acres | 15,759 | 202,826.5 | 1,237.4 | 1,060.32 |
| Multi-Year Practices | | | | | |
| Alternative Crops | acres | 0 | | | |
| Amendments re: Treatment of Ag Waste | AU | 0 | | | |
| Animal Mortality Facility | count | 0 | | | |
| Conservation Cover | acres | 0 | | | |
| Conservation Plans/SCWQP | acres | 2,356 | 4,179.5 | 379.8 | 283.91 |
| Critical Area Planting | acres | 0.1 | 0.02 | 0.03 | 0.01 |
| Dead Bird Composting Facility | count | 0 | | | |
| Fencing | feet | 19 | 2,292.7 | 201.5 | 53.84 |
| Field Border | acres | 0 | | | |
| Filter Strip | acres | 0 | | | |
| Grassed Waterway | acres | 3.6 | 168.9 | 5.1 | 2.68 |
| Horse Pasture Management | acres | 0 | | | |
| Loafing Lot Management System | acres | 1.43 | 85.8 | 12.9 | 1.06 |
| Pasture & Hay Planting | acres | 0 | | | |
| Prescribed Grazing | acres | 0 | | | |
| P-sorbing Materials | acres | 0 | | | |
| Riparian Forest Buffer | acres | 24.04 | 14.4 | 71.6 | 13.84 |
| Riparian Herbaceous Cover | acres | 0 | | | |
| Roof Runoff Structure | count | 11 | 670.8 | 110.0 | 8.13 |
| Stream Restoration Ag | feet | 0 | | | |
| Tree/Shrub Establishment | acres | 14 | 23.9 | 27.7 | 0 |
| Waste Storage Facility | count | 12 | 1,532.4 | 19.6 | 0 |
| | | | | | |
| Wastewater Treatment Strip | acres | 0 | | | |
| Water Control Structure | count | 0 | | | |
| Watering Facility | count | 34 | 0 | 47.9 | 9.24 |
| Wetland Creation | acres | 0 | | | |
| Wetland Restoration | acres | 0 | | | |
| Windbreak/Shelterbelt Establishment | feet | 0 | | | |

| | | | |
|---|---|---|---|
| Total Annual Practices | 202,826.5 | 1,237.4 | 1,060.32 |
| Total Multi-year Practices | 8,968.4 | 876.1 | 372.71 |
| Total Pollutant Load Reduction | 211,794.9 | 2,113.4 | 1,433.03 |

"SFY17 Total" column is MDA data dated 1/22/18. MDE estimated reductions w/ MAST.

The Maryland Department of Agriculture (MDA) 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 | Progress: SFY17 Progress | Progress: SFY14 thru SFY17 |
|---|---|---|---|---|
| Cover Crops | 25,111 | acres/yr | 15,759 | |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| | | | | 26.3 |
| Soil Conservation & Water Quality Plans | 58,292 | acres | 2,356 | 10,589 |
| | | | | 14.3 |
| | | | | 0 |
| | | | | 35043 |
| Buffers Grass - Agriculture | 789 | acres | 0 | 0 |
| | | | | 0 |
| | | | | 10.98 |
| | | | | 0 |
| | | | | 2.63 |
| | | | | 46.1 |
| | | | | 213.8 |
| | | | | 0 |
| Buffers Forested - Agriculture | 2,233 | acres | 24.04 | 37.84 |
| | | | | 2 |
| | | | | 20 |
| | | | | 0 |
| Tree Planting - Agriculture | 444 | acres | 14 | 14.3 |
| Animal Waste Mgmt - Livestock | 165 | count | 12 | 21 |
| Animal Waste Mgmt - Poultry | 3 | | | |
| | | | | 0 |
| | | | | 1 |
| | | | | 58 |
| Wetland - Agriculture | 376 | acres | 0 | 0 |
| | | | | 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 | | |

**Prior Years Progress Toward Watershed Plan Goals**

Extracted from State Data reported by MDE to EPA Bay Program

| | SFY14 | SFY15 | SFY16 | Units |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | AU |
| | 0 | 0 | 0 | count |
| | 19 | 7.1 | 0 | acres |
| | 2,048 | 2467 | 3718 | acres |
| | 9.6 | 4.6 | 0 | acres |
| | 0 | 0 | 0 | count |
| | 1147 | 31286 | 2591 | feet |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0.41 | 4.87 | 2.1 | acres |
| | 0 | 0 | 0 | acres |
| | 0.56 | 0.54 | 0.1 | acres |
| | 0 | 9 | 37.1 | acres |
| | 3.8 | 164.2 | 45.8 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 13.8 | 0 | acres |
| | 0 | 2 | 0 | acres |
| | 3 | 1 | 5 | count |
| | 0 | 0 | 0 | feet |
| | 0.3 | 0 | 0 | acres |
| | 3 | 4 | 2 | count |
| | | | | |
| | 0 | 0 | 0 | acres |
| | 1 | 0 | 0 | count |
| | 3 | 10 | 11 | count |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | feet |

## SFY2017 Urban BMP Implementation
## Lower Monocacy River Watershed In Frederick County, Maryland

| Urban Management Practice | Unit | BMPs Reported | Estimated Pollutant Load Reductio | | |
|---|---|---|---|---|---|
| | | | Nitrogen lb/yr | Phosphorus lb/yr | Sediment tons/yr |
| Bioretention (A) | acres | 0 | | | |
| Bioswale (A) | acres | 0 | | | |
| Cisterns & Rain Barrels (A) | acres | 0 | | | |
| Disconnection of Rooftop Runoff (A) | acres | 0 | | | |
| Dry Detention Ponds & Hydro Structures (A) | acres | 0 | | | |
| Dry Extended Detention Ponds (A) | acres | 0 | | | |
| Dry Well (A) | acres | 0 | | | |
| Filtering Practices (A) | acres | 0 | | | |
| Forest Conservation | acres | 0 | | | |
| Forest Harvesting Practices | acres | 0 | | | |
| Infiltration Practices (A) | acres | 0 | | | |
| Permeable Pavement (A) | acres | 0 | | | |
| Rain Garden (A) | acres | 0 | | | |
| Reduction of Impervious Surface (A) | acres | 0 | | | |
| Riparian Forest Buffers on Urban Lands (B) | acres | 0 | | | |
| Septics Connections to Sewers | count | 0 | | | |
| Septic Denitrification Critical Area | count | 0 | | | |
| Septic Denitrification outside of 1000 feet | count | 25 | 150.0 | | |
| Septic Denitrification within 1000 feet | count | 35 | 126.0 | | |
| Septic Tank Pumpout | count | 0 | | | |
| Stream Restoration Urban | feet | 0 | | | |
| Street Sweeping (A) | acres | 0 | | | |
| Tree Planting | acres | 0 | | | |
| Urban Forest Buffer (B) | acres | 0 | | | |
| Wet Extended Detention (A) | acres | 0 | | | |
| Wet Ponds and Wetlands (A) | acres | 0 | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Urban TOTAL Pollutant Load Reduction | | | 276.0 | 0.0 | 0.00 |

"BMPs Reported" column is MDE data 1/25/17. MDE used MAST to estimated pollution reduction.
Pollution load reduction is estimated by MDE using MAST.

## Lower Monocacy River Watershed Plan
## Urban BMP Implementation Goals

| Plan Page 25 | Urban Management Practice | Goal | Unit | Progress | |
|---|---|---|---|---|---|
| | | | | SFY17 | SFY14-SFY17 |
| | | | | | 7.92 |
| | | | | | 0 |
| | | | | | 0.78 |
| | | | | | 0 |
| | | | | | 0 |
| | | | | | 5.32 |
| | | | | | 0 |
| | | | | | 0 |
| | | | | | 0 |
| | | | | | 0 |
| | | | | | 4.74 |
| | | | | | 0.59 |
| | | | | | 0.23 |
| | | | | | 0 |
| | | | | | 46.51 |
| Table T | Septic Denitrification (upgrade & connection to sewer) | 17,784 | count | 60 | 240 |
| | | | | | 0 |
| Table T | Stream Restoration, Urban | 956 | feet | 0 | 0 |
| | | | | | 0 |
| Table T | Tree Planting (urban) | 20 | acres | 0 | 0 |
| | | | | | 8.15 |
| | | | | | 0 |
| | | | | | 0 |
| Table T | Nutrient Management mixed | 18,461 | acres | | 0 |
| Table T | Nutrient Management urban | 17,427 | acres | | 0 |
| Table T | Sediment & Erosion Control | 1,460 | acres | | 0 |
| Table T | Buffers Forested, Urban (B) | 73 | acres | 0 | 54.66 |
| Table T | Stormwater Management (A) | 6,780 | acres | 0 | 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).

## Prior Years Progress Toward Watershed Plan Goals

| Prior to SFY14 | Extracted from State Data reported by MDE to the EPA Bay Program | | | |
|---|---|---|---|---|
| | SFY14 | SFY15 | SFY16 | Units |
| Data by locals in annual reports is not compatible with this reporting methodology. | 0.32 | 7.60 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0.78 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 5.32 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 4.74 | 0 | acres |
| | 0 | 0.59 | 0 | acres |
| | 0 | 0.23 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 44.91 | 1.60 | 0 | acres |
| | 0 | 0 | 0 | count |
| | 0 | 0 | 0 | count |
| | 11 | 65 | 43 | count |
| | 16 | 10 | 35 | count |
| | 0 | 0 | 0 | count |
| | 0 | 0 | 0 | feet |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 7.15 | 1.00 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

# Appendix H
# Middle Gwynns Falls in Baltimore City and Baltimore County, Maryland
# Watershed Eligible for 319(h) Grant Implementation Funding

Contents



## H.1. Middle Gwynns Falls SWAP Overview

The *Middle Gywnns Falls Small Watershed Action Plan* (SWAP) 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. Downstream Baltimore City watershed areas are not addressed in this watershed plan. 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.

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

## H.2. Urban BMP tracking/reporting

The table below 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 here and elsewhere in the SFY2017 Annual Report.

| **Middle Gwynns Falls SWAP** | | | | | |
|---|---|---|---|---|---|
| **BMP Implementation Goals and Progress** | | | | | |
| **Management Practices Listed by SWAP Action Number** | **SWAP Goal** | **Units** | **2013-FY16 Progress** | **FY17 Activity** | **Total Progress** |
| 2. Street Sweeping (1) | 76 | miles | ? | ? | ? |
| 3. Storm Water Conversions | 10 | ponds | 6 | 0 | 6 |
| 6. Stormwater Retrofits | 20 | projects | 4 | 0 | 4 |
| 7. Impervious Area Removal | 2.8 | acres | 0.48 | 0.06 | 0.54 |
| 8. Downspout Disconnection | 89 | rooftop acres | 0.36 | 0 | 0.36 |
| 9. Wetland creation (urban) (2) | 1 | project | 1 | 0 | 0 |
| 13. Riparian Buffer Trees (3) | 127 | acres | 3.19 | 0.0 | 3.19 |
| 14. Street and Shade Trees | 28.8 | Acres | 3.1 | 1.58 | 4.68 |
| 15. Institutional Trees (3) | 46.7 | acres | 1.47 | 6.82 | 8.29 |
| 33. Stream Restoration | 32,432 | Linear feet | 1,973 | 0 | 1,973 |
| Redevelopment | 897 | acres | 2.0 | 0 | 2.0 |

(1) Street sweeping is not tracked by miles, so progress for this SWAP goal cannot be reported.
(2) The report for FY15 is for the Scotts Level Stream Restoration project, which constructed four artificial wetlands within the project. Another three artificial wetlands where constructed as part of stormwater retrofit projects, which are accounted for under management practice #6.
(3) Riparian buffer trees planted on institutional property are counted as buffer and not institutional to avoid double counting.

## H.3. Agricultural BMP tracking/reporting

The Middle Gwynns Falls watershed has less than one percent area with agricultural activity. The SWAP does not have agricultural BMP implementation goals. The Maryland Department of Agriculture tracks agricultural BMP implementation statewide. They report for SFY17 identified 11 acres of cover crops and no other agricultural BMPs. In SFY14 and SFY15 small acreages of cover crops were also reported but none in SFY16.

## H.4. Grant-Funded Implementation Projects

The following three pages present tables summarizing the status of grant-funded NPS BMP implementation from the follow grant sources:

- 319(h) Grant and State Revolving Fund
- Chesapeake and Atlantic Coastal Bays Trust Fund

## H.5. Monitoring Gwynns Falls Watershed

### H.5.a. Water Quality – State Agencies Monitoring

The Maryland Department of Natural Resource provided the following information [1]

- Gwynns Falls nontidal area (Middle Gwynns Falls is a subwatershed herein)
    - Measured phosphorus levels in the water have decreased at all of the non-tidal monitoring locations in the Patapsco River watershed, and sediment levels have decreased at two monitoring locations. Phosphorus levels at the Gwynns Falls station had still decreased when changes in river flow are accounted for.
- Patapsco River tidal (receives flows from Gwynns Falls, Jones Falls, etc.)
    - Water quality in the tidal waters of the Patapsco River is fair in part because nitrogen levels are too high. Phosphorus and sediment levels have improved. Habitat quality for underwater grasses is poor due to high algal densities and poor water clarity. Severe algal blooms are common in the Patapsco in the summer. Habitat quality for bottom dwelling animals is poor and has gotten worse.

MDE nontidal monitoring projects funded by the 319(h) Grant have not been active anywhere in the Gwynns Falls watershed. [2, 3]

[1] DNR. *Water Quality Summary 2013-2015*. Preliminary report received via personal communication 11/6/17.
[2] Maryland Department of the Environment. MDE Targeted Watershed Project. 319(h) Grant FFY2016 Project 4.
[3] Maryland Department of the Environment. MDE Biological Assessment for Water Quality Protection and TMDL Implementation. 319(h) Grant FFY2016 Project 5.

## Middle Gwynns Falls (In Baltimore County only)
## 2011-SFY17 Completed NPS Implementation Projects - 319(h) Grant and State Revolving Fund

| 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 |
| | no SRF funded projects | | | | | | | | | | |
| | | | | | | | | | | | |
| | 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.

## SFY17 NPS Implementation Projects In Progress - 319(h) Grant and State Revolving Fund - 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 $ | | | | | | |
| Baltimore County | Scotts Level at Marriottsville Road Stream Restoration | TBD | 319 FFY16 #10 | $613,940 | | $409,293 | $1,023,233 | 1,580 | 728 | 693 | 0 |
| | No SRF projects working during SFY17 | | | | | | | | | | |

**Middle Gwynns Falls Watershed**
**Chesapeake and Atlantic Coastal Bays Trust Fund**
**SFY 2017 NPS Implementation Project Status (1)**

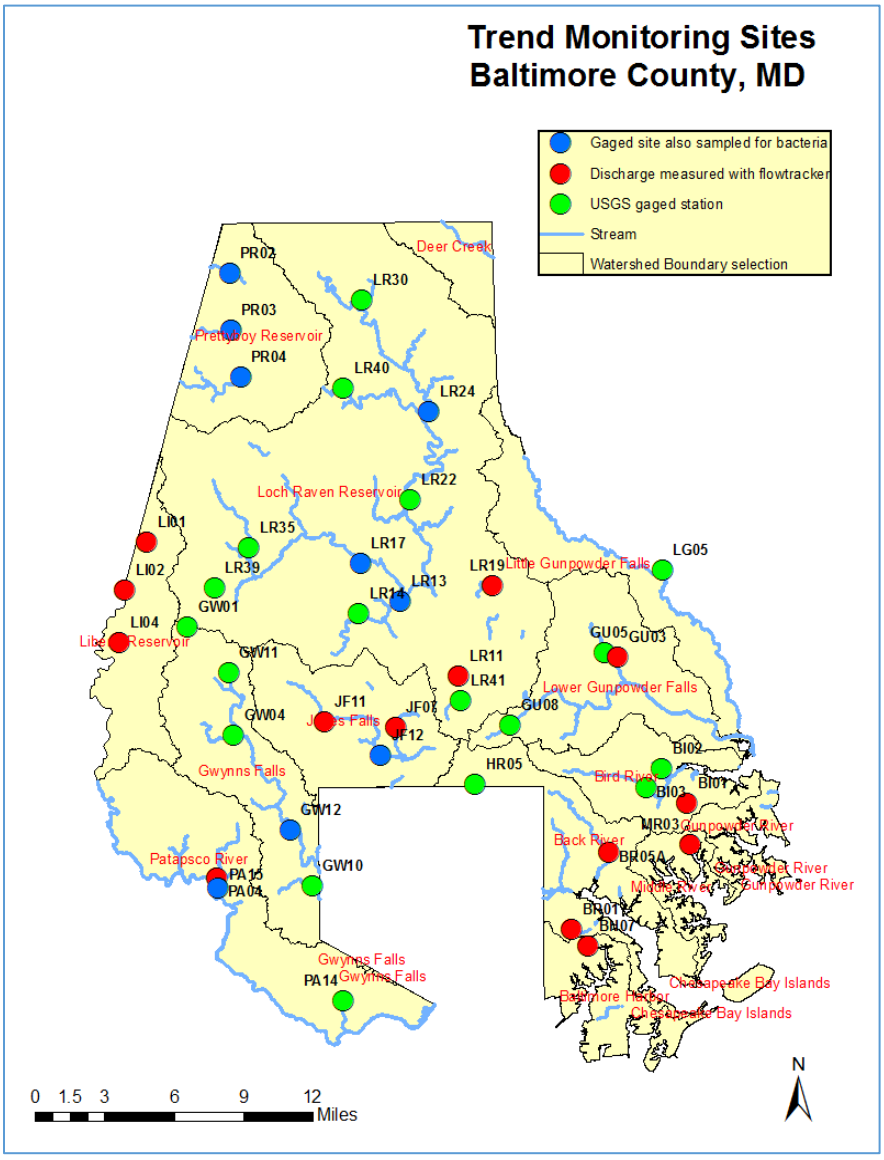
| Year Funded | Partner | ProjectTitle | ProjectType | County | TrustFund Dollars | Status | BMP Units | BMPs Reported | Annual LbsN | Annual LbsP | Annual TonsTSS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FY13 | Baltimore County | Scotts Level Branch at McDonough Retrofit, Stream Restoration, and Buffer | Stream Restoration | Baltimore | 680,000.00 | Complete | | | 415.2 | 136.4 | 306.2 |
| FY14 | Alliance for the Chesapeake Bay | Temple Emanuel of Baltimore | Tree Planting Projects | Baltimore | 4,861.50 | Complete | acres | 0.8 | 3.8 | 0.2 | 0.0124 |
| | | Christ the King Church | Tree Planting Projects | Baltimore | 2,975.52 | Complete | acres | 0.5 | 2.3 | 0.1 | 0.008 |
| | Baltimore County | Woodlawn HS | Tree Planting Projects | Baltimore | 12,528.36 | Complete | acres | 2.16 | 10.9 | 0.8 | 0.74 |
| | | Powhatan ES | Tree Planting Projects | Baltimore | 6,380.18 | Complete | acres | 1.1 | 6.3 | 0.4 | 0.07 |
| | (1) Maryland DNR provided this data 11/30/17 and indicated it is the full extent available. | | | TOTALS | 706,745.56 | | | | 438.5 | 137.9 | 307.03 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FY14 | Baltimore County | Dead Run at Westview Park Stream Restoration | Stream Restoration | Baltimore | 1,225,312.00 | Construction | | | 401.0 | 185.0 | 31 |
| | (1) Maryland DNR provided this data 11/30/17 and indicated it is the full extent available. | | | TOTALS | 1,225,312.00 | | | | 401.0 | 185.0 | 31.00 |

## H.5.b. Nontidal Water Quality - Baltimore County Monitoring

Each year Baltimore County reports progress to meet their MS4 permit requirements. [4] In their report, findings from monitoring are summarized. The distribution of countywide water quality monitoring stations in Baltimore County is shown in the adjacent map.

According to the County, their Gwynns Falls water quality monitoring stations are showing the following trends for pollutant concentrations. (2017 County MS4 report Figure 9-19 page 9-53):
-- Nitrogen slope = -2.6578
-- Phosphorus slope = -0.0158
-- Sediment slope = -7.0469
(A negative slope indicates reduced pollutant load and improving water quality)




Baltimore County trend monitoring sites. (2017 County MS4 report Figure 9-21 page 9-46)

[4] Baltimore County. NPDES Municipal Stormwater Discharge Permit 2017 Annual Report. December 22, 2017.

## H.5.c. Nontidal Bacteria – Baltimore County Monitoring

Baltimore County also conducts bacteria monitoring at the stations shown in the map below. There are six bacteria trend monitoring sites in the Gwynns Falls watershed. Two of the monitoring sites are in the city and four are in the county. The table on the next page presents the number of samples and the geometric mean for high (wet) flow and low (dry) flow by year. It also presents the geometric mean of all samples by year regardless of condition. The table is stratified by annual data (includes all data collected for the year) and seasonal data (includes only those samples collected between May 1st and September 30th each year).

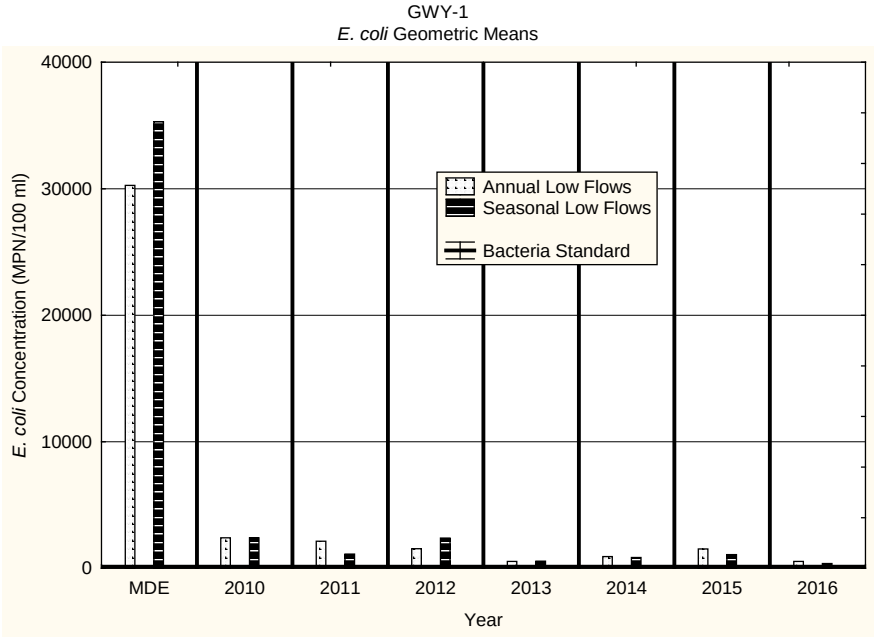

The County graphed E. coli geometric mean concentrations for both annual and seasonal flow periods stratified by flow condition as shown on the following pages. On the map (left), the same data used in the graphs is summarized further. In the map, the highlighted green monitoring stations indicate geometric means that do not meet the water quality standard of 126 MPN. Additionally, the County noted that samples taken in 2016 were almost completely during low flows.

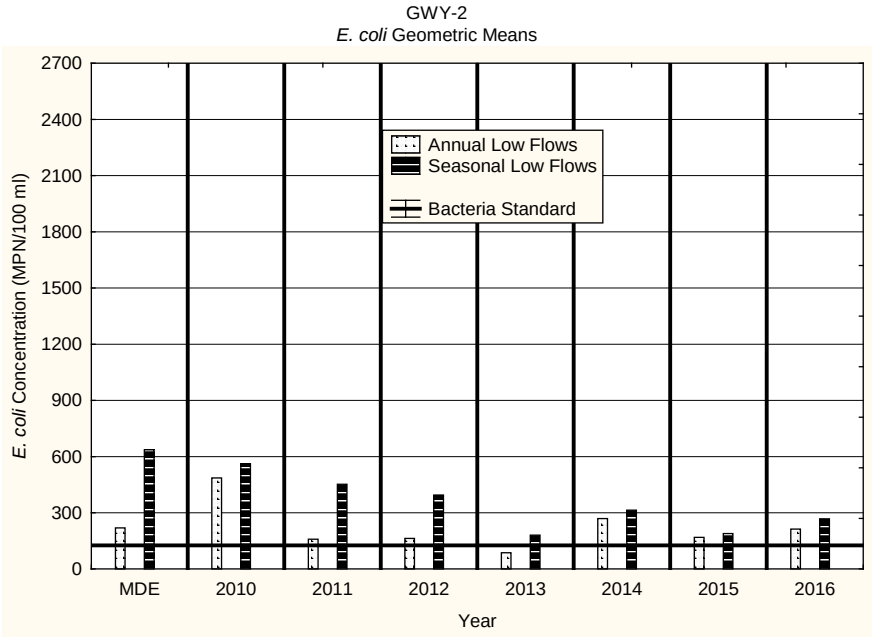
Map: Baltimore County bacteria monitoring sites. (2017 County MS4 report Figure 9-27 page 9-56)

Gwynns Falls E. coli Results on an Annual and Seasonal Basis (2017 County MS4 report Table 9-34 page 9-82)

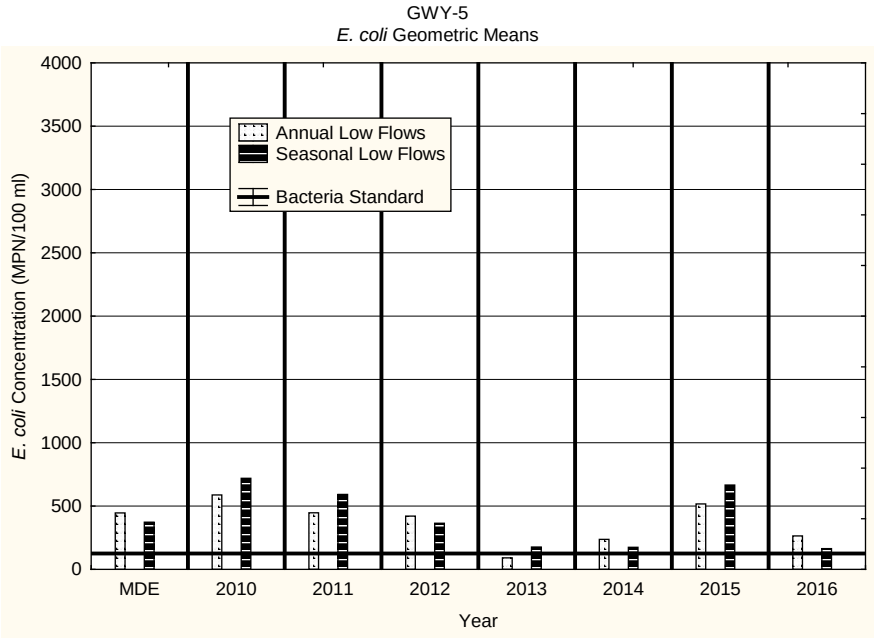
| **Annual Data (MPN/100 ml)** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Site** | **Flow Type** | **2012** | | **2013** | | **2014** | | **2015** | | **2016** | |
| | | **N** | **MPN** | **N** | **MPN** | **N** | **MPN** | **N** | **MPN** | **N** | **MPN** |
| **GWY-1 City** | High | 3 | 1726 | 2 | 2420 | 4 | 1742 | 3 | 1754 | 2 | 3404 |
| | Low | 9 | 1554 | 10 | 542 | 7 | 925 | 7 | 1534 | 7 | 546 |
| | All | 12 | 1595 | 12 | 696 | 11 | 1164 | 10 | 1597 | 9 | 921 |
| **GWY-2** | High | 3 | 567 | 2 | 212 | 4 | 1451 | 3 | 1372 | 2 | 517 |
| | Low | 9 | 163 | 10 | ***87*** | 8 | 269 | 8 | 132 | 7 | 213 |
| | All | 12 | 222 | 12 | 101 | 12 | 471 | 11 | 299 | 9 | 238 |
| **GWY-5 City** | High | 3 | 1083 | 2 | 1646 | 4 | 1844 | 3 | 970 | 2 | 2420 |
| | Low | 9 | 421 | 10 | ***91*** | 7 | 237 | 6 | 514 | 7 | 265 |
| | All | 12 | 533 | 12 | 148 | 11 | 499 | 9 | 635 | 9 | 364 |
| **GWY-6** | High | 3 | 526 | 3 | 927 | 4 | 1330 | 6 | 737 | 6 | 1396 |
| | Low | 8 | 169 | 9 | ***72*** | 7 | ***119*** | 11 | ***97*** | 11 | 140 |
| | All | 11 | 231 | 12 | 137 | 11 | 285 | 17 | 199 | 17 | 315 |
| **DR-B-10** | High | | | | | | | 6 | 2027 | 4 | 1566 |
| | Low | | | | | | | 11 | 465 | 12 | 198 |
| | All | | | | | | | 17 | 782 | 16 | 388 |
| **GF-B-8** | High | | | | | | | 6 | 1444 | 4 | 3609 |
| | Low | | | | | | | 11 | 300 | 12 | 804 |
| | All | | | | | | | 17 | 522 | 16 | 1171 |
| **Seasonal Data (May 1st to September 30th) (MPN/100 ml)** | | | | | | | | | | | |
| **Site** | **Flow Type** | **2012** | | **2013** | | **2014** | | **2015** | | **2016** | |
| | | **N** | **MPN** | **N** | **MPN** | **N** | **MPN** | **N** | **MPN** | **N** | **MPN** |
| **GWY-1 City** | High | 1 | 4352 | 1 | 2420 | 2 | 2420 | 1 | 2420 | 0 | |
| | Low | 4 | 2394 | 4 | 570 | 3 | 855 | 3 | 1081 | 4 | 376 |
| | All | 5 | 2698 | 5 | 761 | 5 | 1296 | 4 | 1322 | 4 | 376 |
| **GWY-2** | High | 1 | 816 | 1 | 172 | 2 | 2420 | 1 | 1553 | 0 | |
| | Low | 3 | 395 | 4 | 181 | 3 | 314 | 3 | 189 | 4 | 267 |
| | All | 4 | 474 | 5 | 180 | 5 | 711 | 4 | 321 | 4 | 267 |
| **GWY-5 City** | High | 1 | 3784 | 1 | 1120 | 2 | 2420 | 1 | 2420 | 0 | |
| | Low | 4 | 365 | 4 | 177 | 3 | 175 | 3 | 667 | 4 | 164 |
| | All | 5 | 404 | 5 | 256 | 5 | 501 | 4 | 921 | 4 | 164 |
| **GWY-6** | High | 1 | 579 | 1 | 921 | 2 | 1773 | 3 | 1685 | 3 | 1967 |
| | Low | 3 | 267 | 4 | ***96*** | 2 | 298 | 7 | 232 | 7 | 173 |
| | All | 4 | 324 | 5 | 151 | 4 | 727 | 10 | 420 | 10 | 358 |
| **DR-B-10** | High | | | | | | | 3 | 1971 | 1 | 2420 |
| | Low | | | | | | | 7 | 634 | 9 | 344 |
| | All | | | | | | | 10 | 891 | 10 | 418 |
| **GF-B-8** | High | | | | | | | 3 | 1727 | 1 | 2420 |
| | Low | | | | | | | 7 | 238 | 9 | 791 |
| | All | | | | | | | 10 | 432 | 10 | 885 |

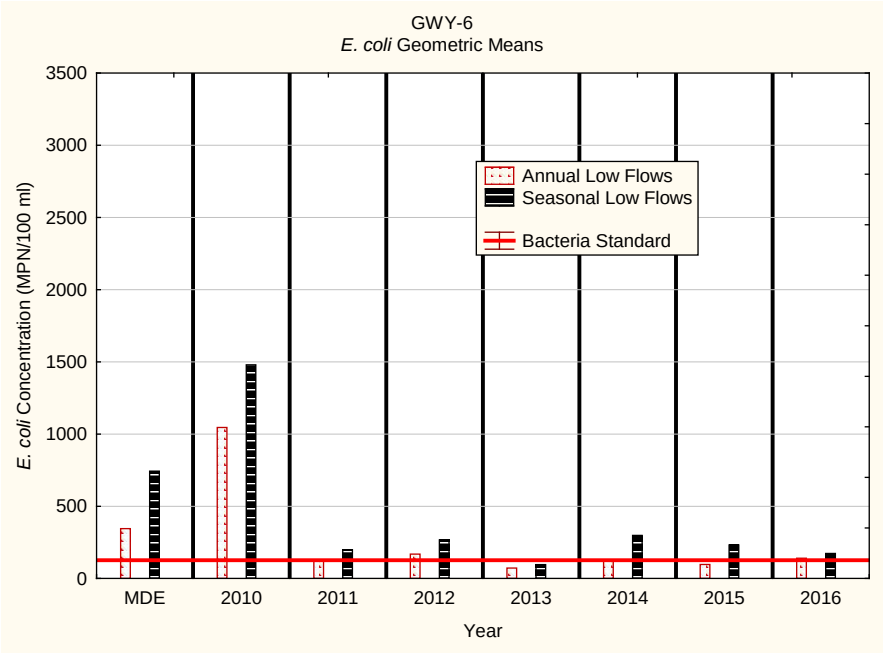
At stations GWY-1 and GWY-2, the E. coli geometric mean concentrations are presented below for both annual and seasonal flow periods stratified by flow condition. MDE monitoring results shown are from 2002-2003. The horizontal red line represents the water quality standard of 126 MPN/100 ml for E. coli. (2017 County MS4 report Figures 9-48 and 9-49, page 9-83)



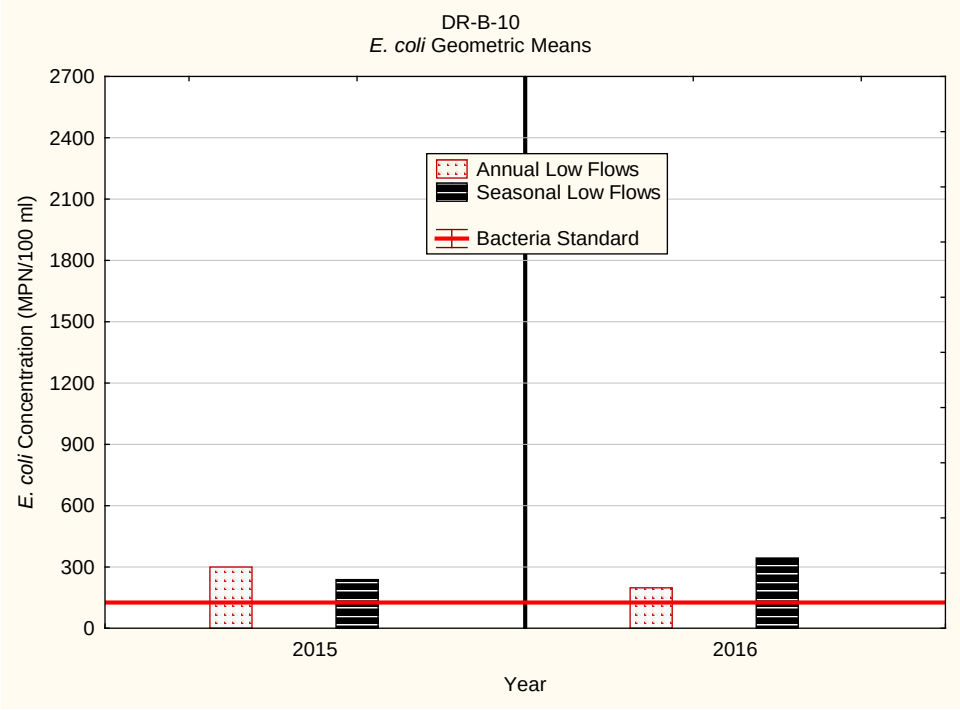



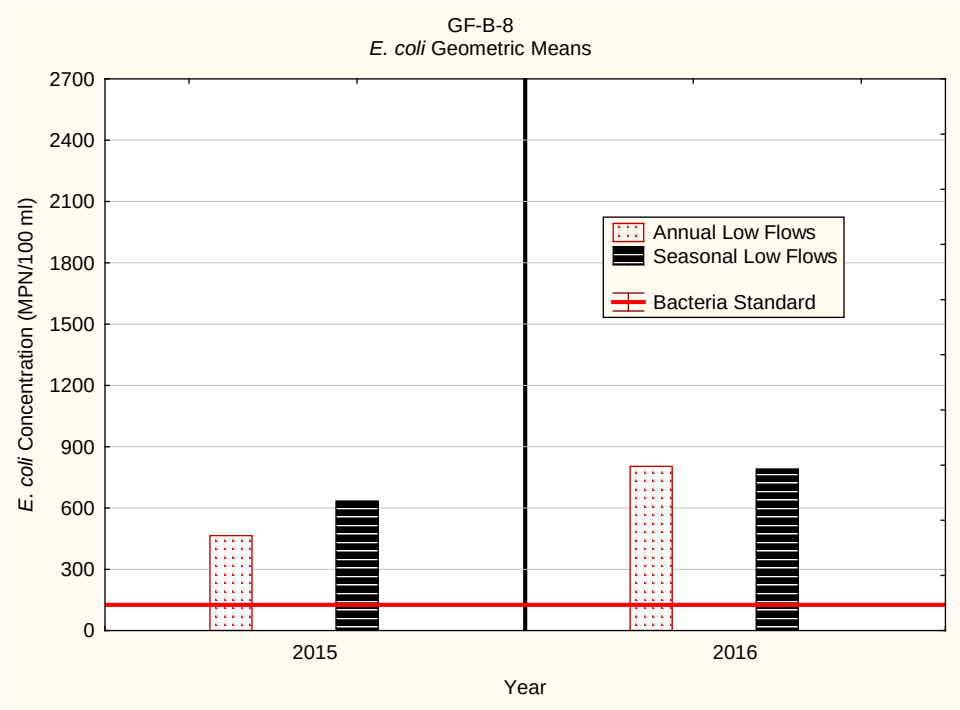
At stations GWY-5 and GWY-6, the E. coli geometric mean concentrations are presented below for both annual and seasonal flow periods stratified by flow condition. MDE monitoring results shown are from 2002-2003. The horizontal red line represents the water quality standard of 126 MPN/100 ml for E. coli. (2017 County MS4 report Figures 9-50 and 9-51, page 9-84)



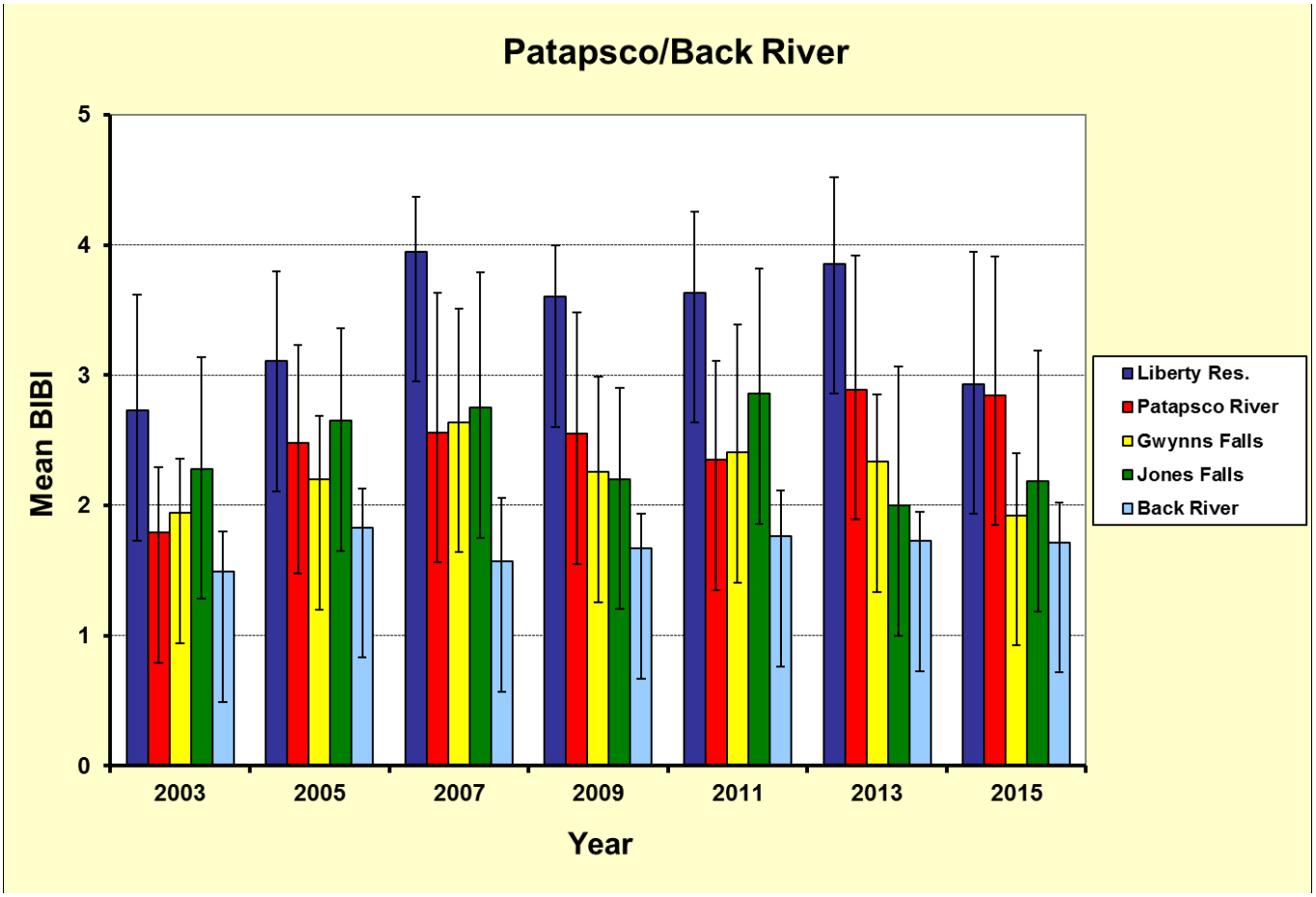
At stations DR-8-10 and GF-B-8, the E. coli geometric mean concentrations are presented below for both annual and seasonal flow periods stratified by flow condition. The horizontal red line represents the water quality standard of 126 MPN/100 ml for E. coli. (2017 County MS4 report Figures 9-52 and 9-53, page 9-85)



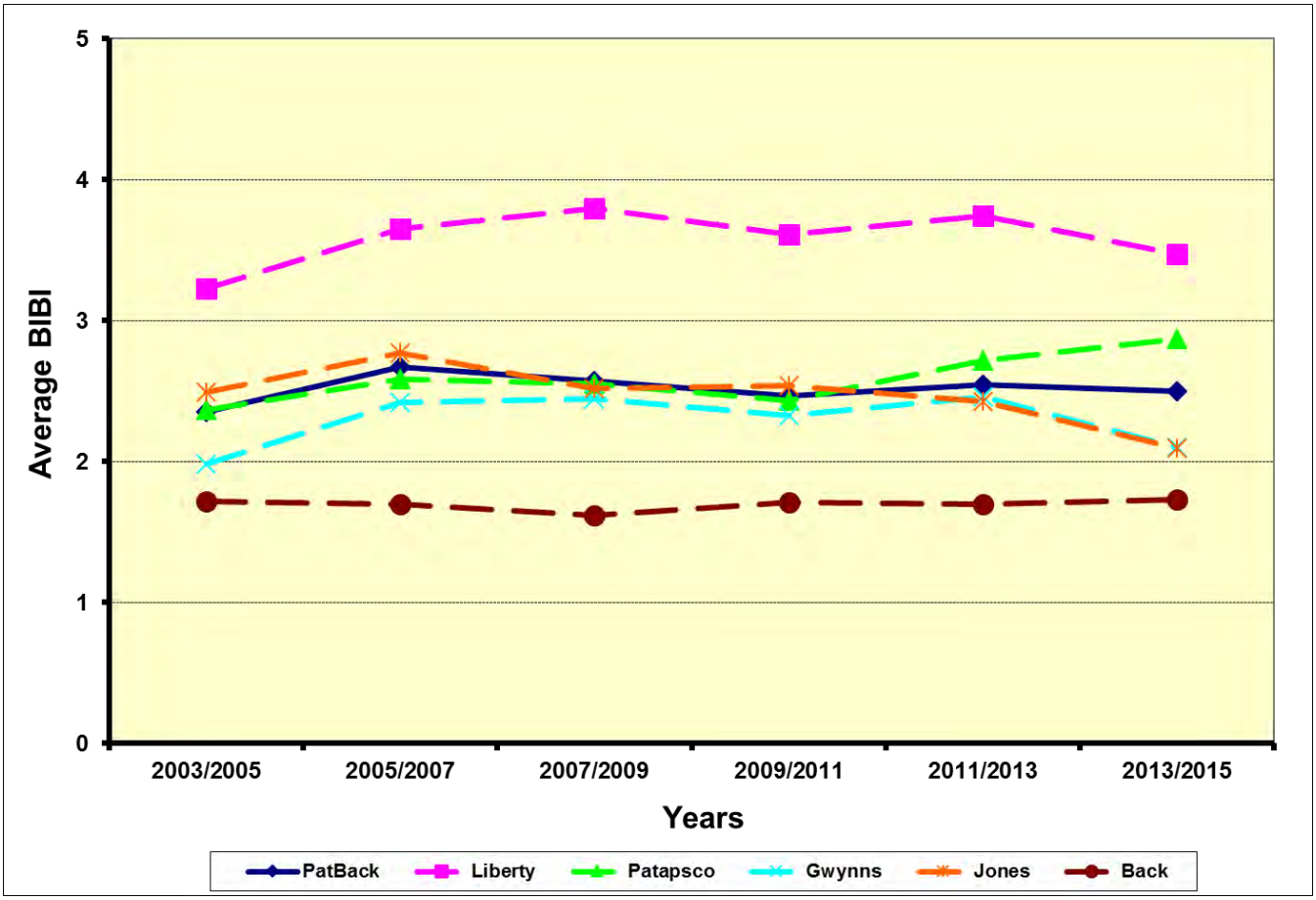



## H.5.d Nontidal Biology – Baltimore County

One the five biological monitoring programs conducted by Baltimore County is used to assess ecological health of streams using a probabilistic monitoring approach in freshwater and tidal waters using the Maryland Biological Stream Survey protocol. Fifty randomly selected sites are monitored annually for the entire County. Baltimore County visits areas associated with their 319 priority watersheds every other year. The MBSS system is used to rank the conditions observed, which as summarized in the two graphs below (Very Poor = 1.00 thru 1.99, Poor = 2.00 thru 2.99, Fair = 3.00 thru 3.99, Good = 4.00 thru 4.99):



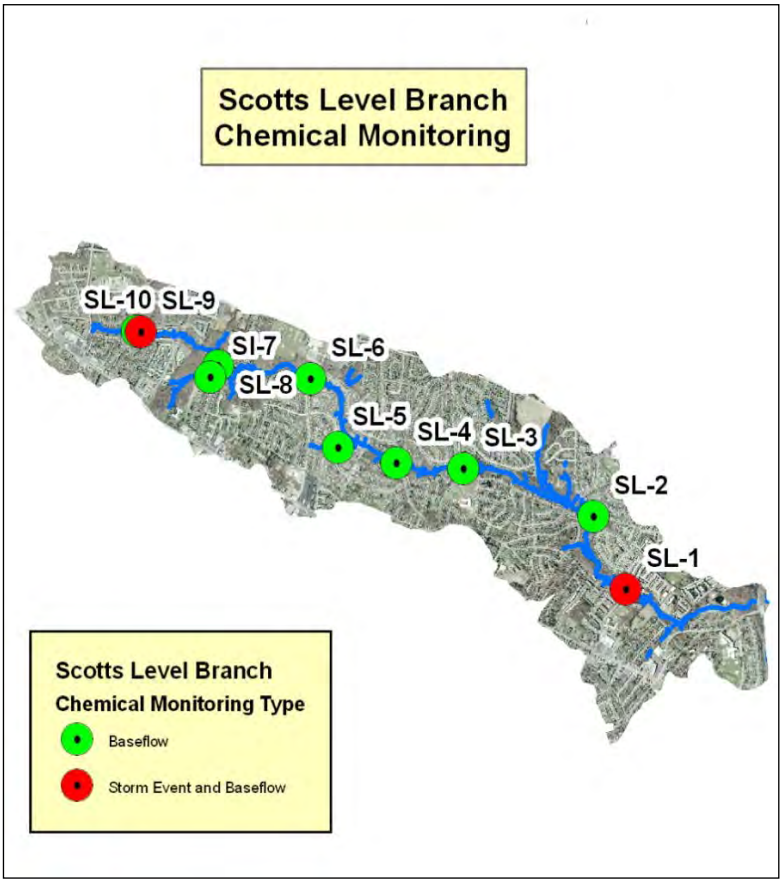

Means and one standard deviation of BIBI scores between 2003 and 2015
(2017 County MS4 report page 9-129)

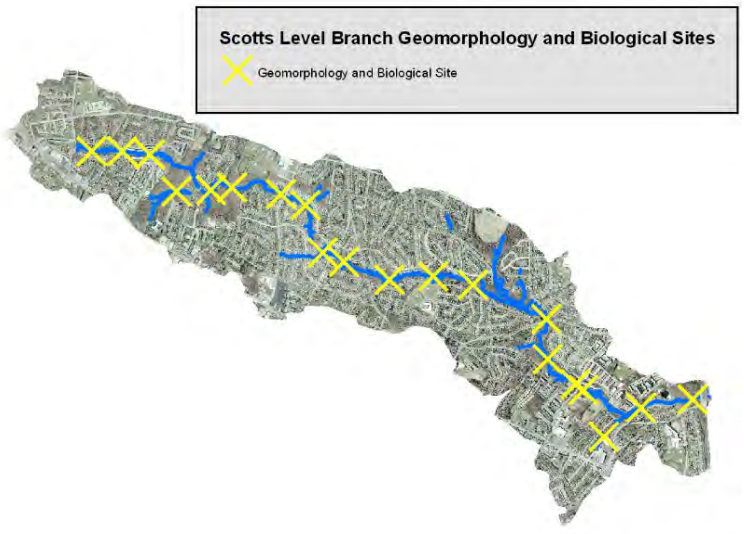



BIBI rolling averages for probabilistic monitoring sites between 2003 and 2015.
(2017 County MS4 report page 9-133)

## H.6 Scotts Level Branch Long Term Monitoring

The purpose of this long term monitoring program is to gauge environmental results in a suburban watershed where a number of restoration projects are implemented. According to Baltimore County, "The ability to detect effects of individual restoration projects will be dependent on the size of the restoration project in relation to the total subwatershed size. Therefore each restoration project will be monitored for project effectiveness, dependent on staff availability. The cumulative effects of restoration will be measured at the long-term in-stream monitoring site. In order to assess restoration progress in the Scotts Level Branch subwatershed, a before-after design concept will be used. Stream restoration work on Scotts Level Branch began in the fall of 2013 with the start of the McDonogh Road project. Construction was completed in the spring of 2014, which included 1,900 linear feet of stream channel, 2 acres of forested wetland, and 4 acres of floodplain wetlands, with a total of 7 acres of buffer plantings."




The map above shows the water quality monitoring station locations, including storm event and baseflow monitoring in the entire Scotts Level Branch watershed. The adjacent map shows the sites where geomorphic and biological monitoring is conducted. (2017 County MS4 report pages 9-5 and 9-7 respectively) The County has used short term findings to estimate source loads, etc. However, the monitoring timeline has not extended far enough to the begin determining trends for pollutant loads.

## H.7 Before/After Monitoring: McDonogh Road Stream Restoration Project

Baltimore County stream restoration work in the Scotts Level Branch at the McDonogh Road for stream restoration and riparian enhancement began in December 2013 on approximately 1600 linear feet of stream channel and 4 acres of land surface in Scotts Level Branch, upstream of McDonogh Road. The projected was completed in 2014. Pre-implementation had been conducted and post restoration monitoring began in Autumn 2014. The map below shows the water quality monitoring sites. The monitoring includes flow, chemical (water quality), geomorphological, and biological.


Scotts Level Branch McDonogh Road stream restoration project boundaries (yellow line) and water quality monitoring sites. (2017 County MS4 report page 9-25)

Baltimore County biological and habitat findings are shown in the table below. The County did not report finding any significant trend in the data for the 2011-2016 timeframe.

| Station | Status – Stream Restoration | Year | BIBI | FIBI | PHI |
|---|---|---|---|---|---|
| **S-11 Mainstem Downstream of Restoration** | Pre | 2011 | 1.33 | 1.67 | 58 |
| | Pre | 2012 | 1.00 | 2.00 | 53 |
| | Pre | 2013 | 1.00 | 1.67 | 59 |
| | Post – 0 Year | 2014 | 2.33 | 2.00 | 59 |
| | Post – 1 Year | 2015 | 2.00 | 1.67 | 57 |
| | Post – 2 Year | 2016 | 1.00 | 2.33 | 53 |
| **S-11a Mainstem Within Restoration** | Pre | 2011 | 1.33 | 1.67 | 52 |
| | Pre | 2012 | 1.00 | 1.67 | 55 |
| | Pre | 2013 | 1.00 | 2.00 | 58 |
| | Post – 0 Year | 2014 | 2.33 | 2.00 | 58 |
| | Post – 1 Year | 2015 | 2.33 | 1.67 | 57 |
| | Post – 2 Year | 2016 | 1.67 | 2 | 55 |
| **SL-12 Tributary Within Restoration** | Pre | 2011 | 1.33 | 1.67 | 54 |
| | Pre | 2012 | 1.00 | 2.00 | 46 |
| | Pre | 2013 | 1.00 | 1.33 | 56 |
| | Post – 0 Year | 2014 | NA | 2.00 | 56 |
| | Post – 1 Year | 2015 | 2.67 | 1.33 | 47 |
| | Post – 2 Year | 2016 | 1.00 | 2.33 | 50 |
| **SL-12a Tributary Upstream of Restoration** | Pre | 2011 | 2.00 | 1.33 | 40 |
| | Pre | 2012 | 1.33 | 1.00 | 25 |
| | Pre | 2013 | 1.00 | 1.33 | 43 |
| | Post – 0 Year | 2014 | 2.00 | 1.33 | 43 |
| | Post – 1 Year | 2015 | 2.00 | * | 44 |
| | Post – 2 Year | 2016 | 1.00 | 1 | 48 |
| **SL-13 Upstream of Restoration** | Pre | 2011 | 2.00 | 1.33 | 52 |
| | Pre | 2012 | 1.00 | 1.67 | 55 |
| | Pre | 2013 | 1.67 | 1.67 | 66 |
| | Post – 0 Year | 2014 | 1.66 | 2.00 | 66 |
| | Post – 1 Year | 2015 | 2.00 | 1.33 | 45 |
| | Post – 2 Year | 2016 | 1.33 | 1.33 | 63 |

BIBI, FIBI and PHI findings for the steam restoration project at McDonogh Road (2017 County MS4 Report pages 9-27 thru 9-28.

# Appendix I
# Sassafras River Watershed in Cecil and Kent Counties, Maryland
# Watershed Eligible for 319(h) Grant Implementation Funding

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.

## Monitoring

The Sassafras River Association (now part of ShoreRivers) conducts tidal and nontidal water quality monitoring in the Sassafras River watershed. Their most recent assessment is presented at the end of this Appendix for the Sassafras River watershed.

Maryland Department of Natural Resources information [1]

- Water quality in the 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. Summer bottom dissolved oxygen levels are good.
- 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.

Maryland Department of the Environment information [2, 3]

- MDE nontidal monitoring projects funded by the 319(h) Grant have not been active in this watershed.

[1] DNR. *Water Quality Summary 2013-2015*. Preliminary report received via personal communication 11/6/17.
[2] Maryland Department of the Environment. MDE Targeted Watershed Project. 319(h) Grant FFY2016 Project 4.
[3] Maryland Department of the Environment. MDE Biological Assessment for Water Quality Protection and TMDL Implementation. 319(h) Grant FFY2016 Project 5.

| Sassafras River Watershed | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **2009-SFY17 Completed 319(h) NPS Implementation Projects - 319(h) Grant and State Revolving Fund** | | | | | | | | | | |
| **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 traps | SFY15 | 319 FFY13 #8 | $50,000 | | $33,333 | $83,333 | 99.3 | 19.9 | 2.6 |
| | No 319 project completed in SFY17 | | | | | | | 0.0 | 0.0 | 0 |
| | No SRF projects in this watershed | | | | | | | 0.0 | 0.0 | 0 |
| | | | TOTAL | $64,000.00 | $0.00 | $42,666.67 | $108,333.33 | 100.7 | 20.2 | 2.65 |

SRA: Sassafras River Association, a private nonprofit organization.
For phosphorus pollutant load reduction, BMPs installed 1999 and later can be counted toward watershed plan implementation.

| SFY17 NPS Implementation Projects In Progress - 319(h) Grant and State Revolving Fund - 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** | | | | | |
| Kent SCD | Harbor View and Colchester Farms (SFY17 pending execution of subaward) | TBD | 319 FFY17 #10 | $216,234 | | $144,156 | $360,390 | 2,783.0 | 162.0 | 65.85 |
| | Starkey Project (SFY17 pending execution of subaward) | TBD | 319 FFY17 #11 | $144,514 | | $96,343 | $240,857 | 1,992.5 | 105.5 | 0.67 |

**Sassafras River Watershed**
**Chesapeake and Atlantic Coastal Bays Trust Fund**
**SFY17 NPS Implementation Project Status (1)**

| Year Funded | PartnerCD | ProjectTitle | ProjectType | County | TrustFund Dollars | Status | BMP Units | BMPs Reported | Annual LbsN | Annual LbsP | Annual TonsTSS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FY12 | Md Dept of Agriculture | Poultry Manure Subsurfer | Agricultural Practices | Cecil | 65,628.00 | Complete | | | 7,800.0 | 7,500.0 | 0 |
| FY12 | Sassafras River Association | Phipps Dairy Farm Vertical Flow Treatment Wetland | Wetland Restoration | Kent | 224,350.00 | Complete | | | 75.0 | 7.0 | 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 | acres | 15 | 442.5 | 18.3 | 3.4 |
| | Sassafras River Association | Budds Landing | Stream Restoration | Cecil | 170,864.00 | Complete | | | 0.0 | 90.0 | 1.1 |
| | | Crawford Treatment Wetland | Stormwater Management | Cecil | 165,100.50 | Complete | | | 2,993.0 | 863.0 | 12 |
| | | Rt 301 Stormwater Conveyance | Stream Restoration | Cecil | 440000 | Complete | | | 120 | 108.8 | 12.1 |
| | | Salfner Farm Stream Restoration | Stream Restoration | Cecil | 90,000.00 | Complete | | | 120.0 | 40.8 | 93 |
| FY14 | Chesapeake Bay Trust | Greener Wheeler Avenue Project, Phase 1 | Stormwater Management | Kent | 43000 | Complete | | | 0.0 | 0.0 | 0 |
| | Kent County Public Schools | Sassafras Natural Resource Management Area Site II | Tree Planting Projects | Kent | 16,865.00 | Complete | acres | 3.65 | 162.3 | 6.7 | 1.24575 |
| | Sassafras River Association | Turners Creek Natural Resource Area Ravine Restoration | Stream Restoration | Kent | 121,643.80 | Complete | | | 37.9 | 6.7 | 0.4 |
| FY16 | Washington College | Leigh | Agricultural Practices | Kent | 14,102.05 | Complete | | | 133.0 | 7.9 | 3.6 |
| FY16 | Washington College | Oldfield Farm | Agricultural Practices | Kent | 18630 | Complete | | | 190 | 11.38 | 5.3 |
| FY16 | Washington College | Leigh Farm | Agricultural Practices | Kent | 4657.5 | Complete | | | 47.7 | 2.85 | 1.32 |
| | | | | | | | | | | | |
| | (1) Maryland DNR provided this data 11/5/17 and indicated it is the full extent available. | | | TOTALS | 1,404,829.65 | | | | 12,121.4 | 8,663.4 | 133.5 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FY16 | Ridge to Reefs | Harbor View Farm Project 1 - Multi-celled Treatment Wetland | Agricultural Practices | Kent | 85,000.00 | Design/Planning | | | 112.0 | 11.0 | 1.1715 |
| | | Harbor View Farm Project 2 - Forebay and Bioretention | Agricultural Practices | Kent | 23,000.00 | Design/Planning | | | 359.0 | 29.0 | 5.081 |
| | | Harbor View Farm Project 3 - Woodchip Infiltration Trench | Agricultural Practices | Kent | 25,000.00 | Design/Planning | | | 53.0 | 0.0 | 0 |
| | | Colchester Farm Project 1 - Multi-celled Treatment Wetland | Agricultural Practices | Kent | 44,000.00 | Design/Planning | | | 94.0 | 10.2 | 1.264 |
| | | Colchester Farm Project 2 - Woodchip Infiltration Trench | Agricultural Practices | Kent | 23,000.00 | Design/Planning | | | 51.0 | 0.0 | 0 |
| | Town of Betterton | Main St. Outfall | Stormwater Management | Kent | 187,775.00 | Design/Planning | | | 44.1 | 13.9 | 5.511 |
| | | Betterton Beach Parking Lot | Stormwater Management | Kent | 304,500.00 | Design/Planning | | | 1.0 | 0.7 | 0.185 |
| FY17 | Sassafras River Associatio | Starkey Farm | Stormwater Management | Kent | 286500 | Design/Planning | | | 2300 | 99 | 35 |
| | Washington College | Natural Lands: Sassafras NRMA | Agricultural Practices | Kent | 60955 | Design/Planning | | | 572 | 34 | 15 |
| FY18 | Sassafras River Associatio | Oakshire/ISE Floodplain Restoration | Stream Restoration | Cecil | 992492 | Design/Planning | | | 194 | 135 | 14.8 |
| | | | | | | | | | | | |
| | (1) Maryland DNR provided this data 2/21/17 and indicated it is the full extent available. | | | TOTALS | 2,032,222.00 | | | | 3,780.1 | 332.8 | 78.01 |

| **SFY2017 Agricultural BMP Implementation Sassafras River Watershed In Cecil County and Kent County, MD** | | | Estimated Pollutant Load Reduction | | | **Sassafras River Watershed Plan** | | | | | **Prior Years' Progress Toward Watershed Plan Goals** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Management Measures | | | Progress | | Prior to SFY14 | Extracted from State Data reported by MDE to EPA Bay Program | | | | |
| Agricultural BMP | Unit | SFY16 Total | Nitrogen Total (lbs) | Phosphorus Total (lbs) | Sediment Total (tons) | Watershed Plan Table 5.1 | Goal | Units | SFY14-SFY17 | Units | | **SFY14** | **SFY15** | **SFY16** | | **Units** |
| **Annual Practices** | | | | | | | | | | | | | | | | |
| Cover Crops | acres | 16,537 | 71,357.1 | 375.41 | 199.02 | Cover Crops (#17, 19) | 5000 | acres/yr | | | | | | | | |
| **Multi-Year Practices** | | | | | | | | | | | | | | | | |
| Alternative Crops | acres | 0 | | | | | | | 0 | acres | Data by locals in annual reports is not compatible with this reporting methodology. | 0 | 0 | 0 | | acres |
| Amendments for Treatment of Ag Waste | AU | 0 | | | | | | | 0 | AU | | 0 | 0 | 0 | | AU |
| Animal Mortality Facility | count | 0 | | | | | | | 0 | count | | 0 | 0 | 0 | | count |
| Conservation Cover | acres | 48.3 | 408.6 | 13.04 | 3.02 | | | | 91.2 | acres | | 0 | 17.3 | 25.60 | | acres |
| Conservation Plans/SCWQP | acres | 2011 | 1,592.5 | 130.8 | 67.76 | | | | 11,674 | acres | | 3512 | 3824 | 2,327.00 | | acres |
| Critical Area Planting | acres | 0 | | | | | | | 0.5 | acres | | 0.5 | 0 | 0 | | acres |
| Dead Bird Composting Facility | acres | 0 | | | | | | | 0 | acres | | 0 | 0 | 0 | | acres |
| Fencing | feet | 0 | | | | | | | 0 | feet | | 0 | 0 | 0 | | feet |
| Field Border | acres | 0 | | | | | | | 0 | acres | | 0 | 0 | 0 | | acres |
| Filter Strip | acres | 0 | | | | | | | 1.2 | acres | | 1.2 | 0 | 0 | | acres |
| Grassed Waterway | acres | 7.6 | 217.9 | 4.4 | 1.70 | | | | 14.04 | acres | | 5 | 0.24 | 1.20 | | acres |
| Horse Pasture Management | acres | 0 | | | | | | | 0 | acres | | 0 | 0 | 0 | | acres |
| Loafing Lot Management System | acres | 0.15 | 1.3 | 0.2 | 0 | | | | 1.25 | acres | | 1 | 0.1 | 0 | | acres |
| Pasture & Hay Planting | acres | 0 | | | | | | | 0 | acres | | 0 | 0 | 0 | | acres |
| Prescribed Grazing | acres | 0 | | | | | | | 0 | acres | | 0 | 0 | 0 | | acres |
| P-sorbing Materials | acres | 0 | | | | | | | 0 | acres | | 0 | 0 | 0 | | acres |
| Riparian Forest Buffer | acres | 0 | | | | | | | 0 | acres | | 0 | 0 | 0 | | acres |
| Riparian Herbaceous Cover | acres | 1.4 | 0.0 | 2.2 | 90.89 | #15 Stream Buffers | 2 | miles | 26.2 | acres | | 24.8 | 0 | 0 | | acres |
| Roof Runoff Structure | count | 1 | 84.7 | 14.6 | 0.14 | | | | 3 | count | | 2 | 0 | 0 | | count |
| Stream Restoration Ag | feet | 0 | | | | | | | 720 | feet | | 0 | 720 | 0 | | feet |
| Tree/Shrub Establishment | acres | 0 | | | | | | | 0.25 | acres | | 0 | 0.25 | 0 | | acres |
| Waste Storage Facility | count | 0 | | | | | | | 2 | count | | 2 | 0 | 0 | | count |
| Wastewater Treatment Strip | acres | 0 | | | | | | | 0 | acres | | 0 | 0 | 0 | | acres |
| Water Control Structure | count | 0 | | | | | | | 6 | count | | 2 | 4 | 0 | | count |
| Watering Facility | count | 0 | | | | | | | 0 | count | | 0 | 0 | 0 | | count |
| Wetland Creation | acres | 0 | | | | #21 Wetland Creation | 5 | count | 0.5 | acres | | 0 | 0.5 | 0 | | acres |
| Wetland Restoration | acres | 0 | | | | | | | 0 | acres | | 0 | 0 | 0 | | acres |
| Windbreak/Shelterbelt Establishment | feet | 0 | | | | | | | 0 | feet | | 0 | 0 | 0 | | feet |
| Total Annual Practices (2) | | | 71,357.1 | 375.4 | 199.02 | | | | | | | | | | | |
| Total Multi-year Practices | | | 2,304.9 | 165.3 | 163.5 | | | | | | | | | | | |
| Total Pollutant Load Reduction | | | 73,662.0 | 540.8 | 362.5 | | | | | | | | | | | |

"SFY17 Total" column data is MDA 1/22/18. 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.

**SFY17 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 | 4 | 31.20 | | |
| Septic Denitrification outside of 1000 feet | count | 2 | 6.20 | | |
| Septic Denitrification within 1000 feet | count | 2 | 11.20 | | |
| 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 | | | 48.60 | 0 | 0 |

(1) "BMPs Reported" is MDE data 1/25/18. MDE used MAST to estimate polutant load reduction.

**Sassafras River Watershed Plan**

| Urban Management Measures Watershed Plan Table 5.1 | GOAL | Units | Progress SFY17 | Progress SFY14-SFY17 | Progress Units |
|---|---|---|---|---|---|
| | | | | | acres |
| | | | | | acres |
| | | | | | acres |
| | | | | | acres |
| | | | | | acres |
| | | | | | acres |
| | | | | | acres |
| | | | | | acres |
| | | | | | acres |
| | | | | | acres |
| | | | | | acres |
| | | | | | acres |
| | | | | | acres |
| | | | | | acres |
| | | | | | acres |
| | | | | | count |
| #5, #6, #10 Septic system upgrades | 150 | count | 8 | 10 | count |
| | | | | 5 | count |
| | | | | 12 | count |
| | | | | | count |
| | | | | | feet |
| | | | | | acres |
| | | | | | acres |
| | | | | | acres |
| | | | | | acres |
| #1 Road retrofit & stream restore | 3 | count | | | |
| #12 Stabilize eroding ravines | 1 | miles | | | |
| #13 Stabilize eroding shoreline | 0.5 | miles | | | |

Note: The watershed plan goals tracked in this table are consistent with units of measure used for State reporting. All other watershed plan goals differ and are not tracked in this table.

**Prior Years' Progress Toward Watershed Plan Goals**

| Data reported by locals | Extracted from State Data reported by MDE to EPA Bay Program | | | | |
|---|---|---|---|---|---|
| | SFY14 | SFY15 | SFY16 | | Units |
| Data by locals in annual reports is not compatible with this reporting methodology. | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | count |
| | 0 | 3 | 3 | | count |
| | 0 | 1 | 2 | | count |
| | 0 | 9 | 1 | | count |
| | 0 | 0 | 0 | | count |
| | 0 | 0 | 0 | | feet |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | 0 | 0 | 0 | | acres |
| | | | | | |
| | | | | | |
| | | | | | |

## GLOBAL CHANGES IMPACT OUR RIVER

According to NASA and NOAA scientists, the past three years were the hottest on record - each year topping the previous one. The signs of a globally changing climate become more evident with each passing year as incrementally increasing temperatures lead to more frequent and severe storms and prolonged coastal flooding.

But how do these changes impact our local communities and the ecosystem of the Sassafras River? Below are just a few examples of how the changing global climate can impact our community, and what we can do to mitigate these negative and potentially dangerous effects.

Warmer air temperatures result in an increase of water temperatures in the Chesapeake Bay and its tributaries (ie: the Sassafras River). While swimmers may rejoice in the warmer water and longer swim season, it also threatens our local water bodies by fostering rapid growth of bacteria and algae. This sometimes results in harmful algal blooms, and can result in local fish kills.

In addition, the seasonal uptick in storms will likely result in more severe coastal flooding. As high water recedes, it carries fertilizers, bacteria, spilled oil, trash, and even leaked septic effluent, transporting the pollutants into our rivers and bays - further impairing our precious water bodies.

By monitoring important river health indicators, such as temperature, turbidity, dissolved oxygen, and nutrients, Sassafras River Association tracks seasonal and yearly trends in the health of the Sassafras. The monitoring efforts by our RIVERKEEPER® and year-round volunteers allow us to identify and fix sources of pollution, helping to restore and protect our river.

*Sassafras Samplers work hard for the river!*

Remember that what we do on land has a profound impact on the quality of the water that we all enjoy and rely on. The pollution in the Sassafras is local pollution. It comes from the land around the river.

Clean water increases tourism, business, and the value of properties in the watershed.

We all benefit from a cleaner river. As water temperatures continue to rise in future years, we must be more aware of how our everyday actions affect the health of our beautiful Sassafras River.

## WHAT'S THE DAM PROBLEM?

The Susquehanna River is responsible for much of the sediment and nutrient pollution in the Chesapeake Bay, but the Conowingo Dam is sometimes targeted with the blame. The Dam has been an effective sediment trap for nearly 90 years, but the sediment trap behind the Dam is so full now that fast flowing waters from large storms in the Susquehanna watershed cause scouring, and pour sediment into the Bay in large quantities.

Some claim that when scouring occurs at the Dam, the work of watershed organizations like the Sassafras River Association is negated. To the contrary, a decade of extensive tidal and non-tidal water quality testing clearly shows that the highest concentrations of sediment and nutrients in the Sassafras are in the headwaters of the river - and that's where we implement our restoration projects. There are legitimate reasons to advocate for dredging the sediment trap at the Conowingo Dam, but the myth that storm surges negate the work of watershed organizations is not one of them.

If we are serious about our goal to "Save the Bay", we must concentrate on cleaning the rivers that flow into the Bay. Our restoration projects will continue to provide benefits into the future - regardless of what happens at the Conowingo Dam.

SRA is a member of WATERKEEPER® ALLIANCE, Waterkeepers Chesapeake, and a number of other organizations in order to network, communicate issues, and share initiatives. We are active in the Cecil County Watershed Implementation Plan (WIP) Advisory Committee and the Kent County WIP Committee. We also participate in the Upper Shore WIP and the Eastern Shore WIP groups.

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Make a gift to support SRA's efforts to protect and restore the Sassafras River.

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___ up to $100 - Sassafras Supporter

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*The Sassafras River Association is a 501(c)(3) nonprofit organization.*
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_____

_____

Ph/Email: _____

☐ Save resources - thank me by email!

☐ I would like to volunteer

**sassafrasriver.org | 410-275-1400 | riverkeeper@sassafrasriver.org**

Sassafras River Association

Your Support helps to restore the Sassafras... ***Join Today!***

# SASSAFRAS RIVER
## Report Card 2017

**Science-based**

**Advocacy**

**Restoring the health of the Sassafras River**

**Restoration**

**Outreach**

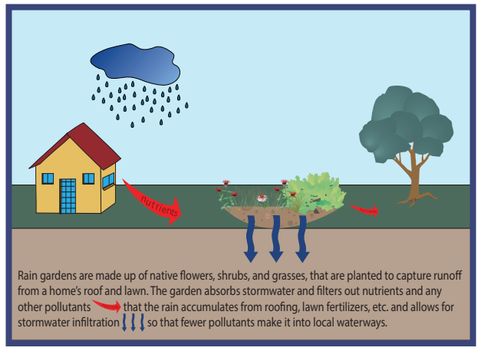
## WE LOVE BMPs!

A BMP, or Best Management Practice, is any endeavor that reduces the negative impact of human activity on the river. There are many BMP's being implemented by homeowners, farmers, and boaters in our watershed.

The wastewater treatment plants in Betterton and Galena are being upgraded with Enhanced Nutrient Removal systems, greatly reducing nitrogen and phosphorus emissions into our waters.

Farmers are implementing grass waterways, cover crops, vegetative buffers, no-till practices, and GPS-targeted nutrient application. The Sassafras River Association has worked with local farmers to install treatment wetlands, and to construct projects which reduce gully and stream erosion.

Homeowners are using rain barrels, constructing rain gardens, removing or reducing impervious surfaces, installing Best Available Technology septic systems, routinely pumping out their septic tanks, and applying fertilizer only after having a soil test to establish the amount needed. These BMPs are not only good for the river, but also may enhance property values!




Rain gardens are made up of native flowers, shrubs, and grasses, that are planted to capture runoff from a home's roof and lawn. The garden absorbs stormwater and filters out nutrients and any other pollutants that the rain accumulates from roofing, lawn fertilizers, etc. and allows for stormwater infiltration so that fewer pollutants make it into local waterways.

More and more boaters understand that they should always use pump-out facilities at marinas. It's important to know that bacteria-killing marine sanitation devices do not remove any nitrogen or phosphorus, and therefore add to the pollution of the river.

The BMP that we all can implement is proper trash disposal. Every April, the Sassafras River Association conducts a watershed cleanup where volunteers walk the river banks and roads in our watershed picking up trash. The amount of trash we collect every year is astonishing.

We invite you to join the SRA! Help us educate more and more people, so that every resident and visitor in the Sassafras River Watershed can say, "We love BMP's!"

## SCIENCE-BASED WATER QUALITY SAMPLING:

THIS ANNUAL SASSAFRAS RIVER REPORT CARD is primarily a report on the water quality of the tidal and non-tidal segments of our watershed. Water samples are taken and analyzed either with our own scientific equipment or at the University of Delaware. SRA uses protocols and standard operating procedures established by the Mid-Atlantic Tributary Assessment Coalition.

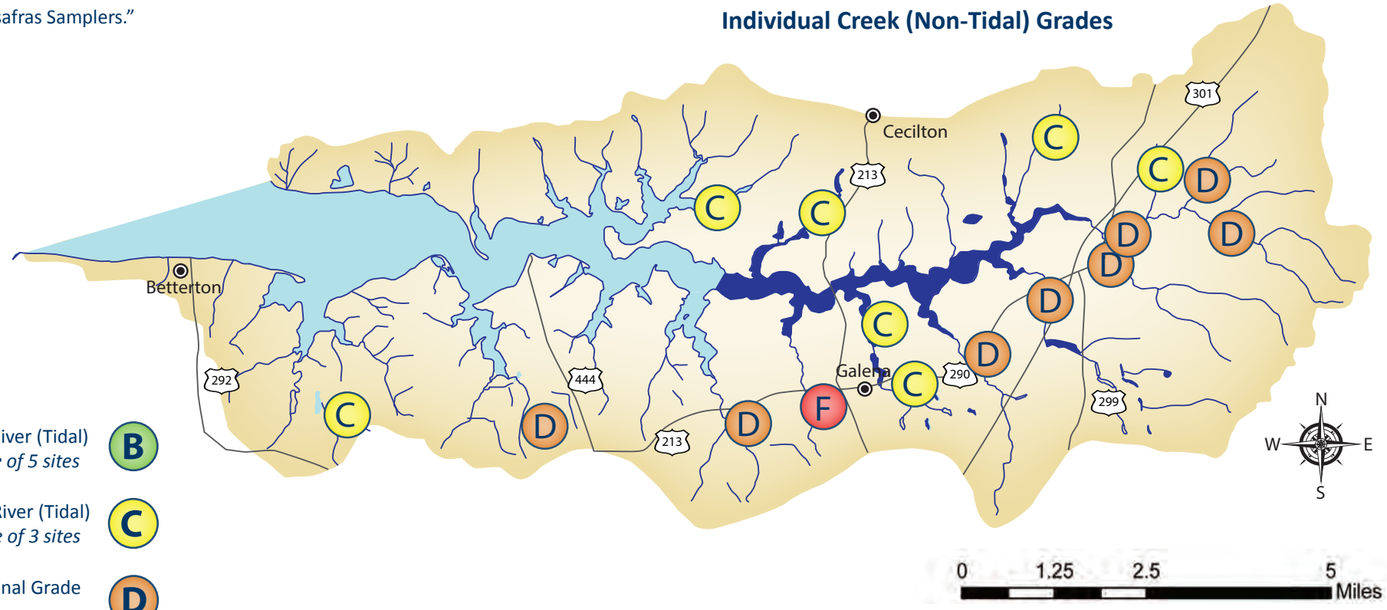
TIDAL: Eight sites on the Sassafras River are sampled for water quality indicators – dissolved oxygen, specific conductivity, temperature, total nitrogen, total phosphorus, salinity, turbidity, pH, and chlorophyll-a. Our RIVERKEEPER™ samples seven sites weekly from April through October, and one site is electronically monitored by the Maryland Department of Natural Resources for the same indictors every 15 minutes throughout the year. The grading includes SAV (submerged aquatic vegetation), which is measured in acres by the Virginia Institute of Marine Science.

NON-TIDAL: The Sassafras River Association is fortunate to have 24 trained - and periodically re-trained - volunteers who conduct year round water quality monitoring at 16 sites on the non-tidal streams that run into the Sassafras River. We proudly call our volunteers the "Sassafras Samplers."

## OUR MISSION:

The Sassafras River Association is dedicated to promoting good water quality, a balance among recreation, wildlife and economic activity, and an educated community that takes action to restore and maintain the health of the watershed.

### Individual Creek (Non-Tidal) Grades




Lower River (Tidal) *Average of 5 sites* — B

Upper River (Tidal) *Average of 3 sites* — C

Creek (Non-Tidal) Final Grade *Average of 16 sites* — D

### What do grades mean?

- **A** All water quality and biological health indicators meet desired levels (80-100%) leading to very good habitat conditions for fish and shellfish.
- **B** Most water quality and biological health indicators meet desired levels (60-79%) leading to good habitat conditions for fish and shellfish.
- **C** There is a mix of good and poor levels of water quality and biological health indicators (40-59%)leading to fair habitat conditions for fish and shellfish.
- **D** Some or few water quality and biological health indicators meet desired levels (20-39%) leading to poor habitat conditions for fish and shellfish.
- **F** Very few or no water quality and biological health indicators meet desired levels (0-19%) leading to very poor habitat conditions for fish and shellfish.

| River (Tidal) Health Indicators | | Lower River | Upper River |
|---|---|---|---|
| Dissolved Oxygen | | A | A |
| Water Clarity | | C | C |
| Chlorophyll-*a* | | A | D |
| Aquatic Vegetation | | F | F |
| Nutrients (TN TP) | Total Nitrogen | A | B |
| | Total Phosphorus | A | C |

| Creek (Non-Tidal) Health Indicators | |
|---|---|
| Dissolved Oxygen | A |
| Turbidity | F |

| | | |
|---|---|---|
| Nutrients (TN TP) | Total Nitrogen | D |
| | Total Phosphorus | B |
| Creek Bed Organisms | | F |

# Appendix J
# Upper Choptank River Watershed in Caroline County, Maryland
# Watershed Eligible for 319(h) Grant Implementation Funding

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 are counted toward meeting watershed plan goals. The baseline year and plan goals are derived from Maryland Tributary Team work 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. Caroline County completed review and determined that an update was not necessary.

## Water Quality Monitoring Activity, Overall Condition, Trends

| Maryland DNR's water quality analysis Summary Information [1] | |
|---|---|
| Nontidal | Nitrogen, phosphorus and sediment loads from the watershed to the non-tidal waters of the Choptank have increased. Nitrogen and phosphorus levels in the water have increased when the effect of flow is accounted for |
| Tidal | Maryland DNR's most recent reporting said that water quality in the tidal upper Choptank is poor. Nitrogen, phosphorus and sediment levels are too high. Habitat quality for underwater grasses is poor because algal densities are too high and water clarity is poor. Summer bottom dissolved oxygen levels are good. There are no long-term water quality monitoring stations in the middle Choptank River.<br><br>The Choptank River is in the 'High Agriculture/ Low Developed' land use category. In the Choptank River overall, nitrogen and phosphorus levels are moderate compared with other high agricultural systems. Sediment and algal densities are low compared to other high agricultural systems. Water clarity is high and summer bottom dissolved oxygen levels are moderate compared with other high agricultural systems. |

Nontidal – Index of Biological Integrity [2]

MDE's 319(h) Grant-funded biological monitoring project samples benthic macroinvertebrates and fish in healthy nontidal streams as part of Maryland's Tier II Antidegradation Program. These two measures serve as a gauge of existing stream health using a scale of 1 to 5:

good (4.0-5.0), fair (3.0-3.9), poor (2.0-2.9), very poor (1.0-1.9)
BIBI = benthic index of biological integrity
FIBI = fish index of biological integrity

In previously identified healthy waters within the Upper Choptank River watershed in Caroline County four sites have been sampled to determine if healthy conditions are continuing. A score of 4.000 or above means Tier II healthy water criteria are continuing to be met. A lower score indicates that conditions have degraded below Maryland's Tier II healthy water criteria:

- Forge Branch MDE-UPCK-311-A-2016
  - FIBI 4.667 on 6/9/16
- Marsh Creek MDE-UPCK-201-A-2014
  - BIBI 3.857 on 3/12/14, FIBI 4.67 in 2014
- Unnamed Tributary MDE-UPCK-119-A-2015
  - BIBI 4.143 on 3/4/15, FIBI 3.667 on 8/4/15
- Watts Creek MDE-UPCK-212-A-2016
  - FIBI 4.000 on 6/14/16

The 2016 fish sampling results are presented in tables on the next page. [3]

[1] Maryland Department of Natural Resources. *Water Quality Summary 2013-2015*. Preliminary report received via personal communication 11/6/17 from Renee Karrh.
[2] Maryland Department of the Environment. MDE Biological Assessment for Water Quality Protection and TMDL Implementation. 319(h) Grant FFY2016 Project 5.
[3] Maryland Department of the Environment. *Q3Report MDE Biological Assessment FFY-16 GRTS#5 thru 3-30-2017*. Charles Poukish. May 8, 2017. 47 pages.

| Forge Branch (Upper Choptank River tributary), Station MDE-UPCK-311-A-2016 FIBI = 4.667 June 9, 2016 | | | | | | |
|---|---|---|---|---|---|---|
| Common Name | Tolerance | Native or Introduced | Trophic Status | Lithophilic Spawner | Composition | # sampled @ Station |
| Least Brook Lamprey | NOTYPE | N | FF | N | B | 13 |
| American eel | NOTYPE | N | GE | N | | 53 |
| Fallfish | I | N | GE | Y | | 15 |
| Creek chubsucker | NOTYPE | N | IV | N | R | 3 |
| Tadpole madtom | NOTYPE | N | IV | N | B | 8 |
| Yellow bullhead | NOTYPE | N | OM | N | | 1 |
| Chain pickerel | NOTYPE | IY | TP | N | | 1 |
| Redfin pickerel | T | IY | TP | N | | 13 |
| Eastern mudminnow | T | N | IV | N | | 82 |
| Pirate perch | T | N | IV | N | | 9 |
| Bluegill | T | IC | IV | N | | 2 |
| Bluespotted sunfish | NOTYPE | N | IV | N | | 1 |
| Green sunfish | T | IC | GE | N | | 6 |
| Pumpkinseed | T | IY | IV | N | | 13 |
| Redbreast sunfish | NOTYPE | IY | GE | N | | 8 |
| Tessellated darter | T | N | IV | N | B | 52 |

| Watts Creek (Upper Choptank tributary), Station MDE-UPCK-212-A-2016 FIBI = 4.000 June 14, 2016 | | | | | | |
|---|---|---|---|---|---|---|
| Common Name | Tolerance | Native or Introduced | Trophic Status | Lithophilic Spawner | Composition | # sampled @ Station |
| Least Brook Lamprey | NOTYPE | N | FF | N | B | 14 |
| American eel | NOTYPE | N | GE | N | | 41 |
| Fallfish | I | N | GE | Y | | 5 |
| Satinfin shiner | I | N | IV | N | | 23 |
| Spottail shiner | I | N | OM | Y | | 2 |
| Brown bullhead | T | N | OM | N | | 3 |
| Margined madtom | I | IY | IV | N | B | 20 |
| Tadpole madtom | NOTYPE | N | IV | N | B | 6 |
| Yellow bullhead | NOTYPE | N | OM | N | | 3 |
| Chain pickerel | NOTYPE | IY | TP | N | | 2 |
| Redfin pickerel | T | IY | TP | N | | 4 |
| Eastern mudminnow | T | N | IV | N | | 5 |
| Pirate perch | T | N | IV | N | | 1 |
| Bluegill | T | IC | IV | N | | 22 |
| Green sunfish | T | IC | GE | N | | 21 |
| Largemouth bass | T | IC | TP | N | | 1 |
| Pumpkinseed | T | IY | IV | N | | 12 |
| Redbreast sunfish | NOTYPE | IY | GE | N | | 36 |
| Tessellated darter | T | N | IV | N | B | 27 |

## Nontidal - Water Quality Monitoring Before/After Plan Implementation

MDE nontidal monitoring projects funded by the 319(h) Grant have not been active in this watershed. [4]

[4] Maryland Department of the Environment. MDE Targeted Watershed Project. 319(h) Grant FFY2016 Project 4.

## Upper Choptank River Watershed
## 2004-SFY17 Completed NPS Implementation Grant Projects - 319(h) Grant and State Revolving Fund

| 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 |
| | Volunteer Fire Comp. SWM upgrades | SFY16 | 319 FFY12 #14 | $37,834.00 | | $25,222.67 | $63,056.67 | 4.29 | 0.75 | 0.12 |
| | Dept. Emergency Services Porous Parking | SFY16 | 319 FFY14 #6 | $137,449.01 | | $91,632.67 | $229,081.68 | 2.37 | 0.17 | 0.01 |
| | | | | | | | | | | |
| | | | | | | | | | | |
| TOTAL for completed projects | | | | $1,174,095.43 | $0.00 | $782,730.29 | $1,956,825.72 | 220,891.3 | 13,092.6 | 1,129.07 |
| TOTAL Pollutant Load Reduction for Multi-Year Projects excluding cover crop projects (grey shaded) | | | | | | | | 145,137.3 | 11,988.1 | 666.91 |

## SFY17 NPS Implementation Projects in Progress - 319(h) Grant and State Revolving Fund - 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 | Lockerman Middle School Stormwater Retrofits (SFY17 pending execution of subaward) | TBD | 319 FFY17 #7 | $100,000.00 | | $66,667.00 | $166,667 | 3.23 | 0.38 | 0.09 |
| Caroline Soil Conservation District | Morton Farm Bio-retention and Bioswale Project (SFY17 pending execution of subaward) | TBD | 319 FFY17 #8 | $88,220.00 | | $53,813.00 | $142,033 | 98 | 162 | 65.85 |

Footnote: No State Revolving Fund projects have been reported during the period 2004 to SFY2017.

**Upper Choptank River Watershed**
**Chesapeake and Atlantic Coastal Bays Trust Fund**
**SFY 2017 NPS Implementation Project Status (1)**

| Year Funded | PartnerCD | ProjectTitle | ProjectType | County | TrustFund Dollars | Status | BMP Units | BMPs Reported | Annual LbsN | Annual LbsP | Annual TonsTSS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FY13 | Delmarva RC & D Council | Choptank Wetlands Restoration: Royal Oak | Wetland Restoration | Statewide | 10,804.00 | Complete | | | 143.6 | 9.7 | 1.8 |
| | | Choptank Wetlands Restoration: Knox Farm | Wetland Restoration | Statewide | 10,143.00 | Complete | | | 301.56 | 20.37 | 3.68 |
| | | Choptank Wetlands Restoration: Morris Farm | Wetland Restoration | Statewide | 14,754.25 | Complete | | | 114.88 | 7.76 | 1.4 |
| | | Choptank Wetlands Restoration: Snowdon Farm | Wetland Restoration | Statewide | 9,747.95 | Complete | | | 545.68 | 36.86 | 6.65 |
| | | Choptank Wetlands Restoration: Toulson Farm | Wetland Restoration | Statewide | 25,650.00 | Complete | | | 215.4 | 14.55 | 2.63 |
| | | Choptank Wetlands Restoration: Durham Farm | Wetland Restoration | Statewide | 13,500.00 | Complete | | | 129.24 | 8.73 | 1.58 |
| | | Choptank Wetlands Restoration: Brenner Farm | Wetland Restoration | Statewide | 13,000.00 | Complete | | | 157.96 | 10.67 | 1.93 |
| FY14 | Caroline County | Ober Community Park (Greensboro) | Tree Planting Projects | Caroline | 3,771.09 | Complete | | | 5.89 | 0.25 | 0.04 |
| | | Ganey's Wharf Public Landing (west of Harmony) | Tree Planting Projects | Caroline | 2,285.76 | Complete | | | 2.87 | 0.2 | 0.03 |
| | | Marydel Community Park (Marydel) | Tree Planting Projects | Caroline | 14,072.00 | Complete | | | 148.19 | 6.45 | 1.29 |
| | | Town of Denton (Sharp Road) | Tree Planting Projects | Caroline | 10,592.00 | Complete | | | 8.6 | 0.59 | 0.09 |
| | | Caroline Co. Dept. of Emergency Services Facility | Tree Planting Projects | Caroline | 11,946.00 | Complete | | | 17.19 | 1.17 | 0.189 |
| | Town of Greensboro | Greensboro Stream Restoration Project | Stream Restoration | Caroline | 99,696.00 | Complete | | | 8.12 | 0.136 | 15 |
| | Ducks Unlimited | Furr | Wetland Restoration | Statewide | 38,897.43 | Complete | | | 416 | 34.5 | 12.2 |
| FY15 | Midshore Riverkeeper Conservancy | Voorhees | Agricultural Practices | Caroline | 17,638.00 | Complete | | | 1609 | 0 | 0 |
| | Delmarva RC & D Council | Street #1 | Wetland Restoration | Caroline | 2,201.40 | Complete | | | 15.55 | 1.37 | 417 |
| | Delmarva RC & D Council | Street #2 | Wetland Restoration | Caroline | 2,931.10 | Complete | | | 33.33 | 2.94 | 194 |
| | Delmarva RC & D Council | Street #3 | Wetland Restoration | Caroline | 1,842.80 | Complete | | | 15.55 | 1.37 | 194 |
| | | | | | | | | | | | |
| | (1) Maryland DNR provided this data 11/30/17 and indicated it is the full extent available. | | | TOTALS | 303,472.78 | | | | 3,888.6 | 157.6 | 853.5 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FY17 | Town of Greensboro | Choptank River Park | Stormwater Management | Caroline | 299,734.00 | Design/Planning | | | 0 | 0 | 0 |
| FY14 | Town of Greensboro | Choptank River Park at Greensboro | Wetland Restoration | Caroline | 0.00 | Design/Planning | | | 0 | 0 | 0 |
| FY17 | Delmarva RC & D Council | Wegener Wetland | Wetland Restoration | Caroline | 22,965.50 | Design/Planning | | | 21.33 | 2.7 | 0.06 |
| FY17 | Delmarva RC & D Council | Street Floodplain reconnection | Stream Restoration | Caroline | 7,219.50 | Design/Planning | | | 30.48 | 3.8 | 0.08 |
| | | | | | | | | | | | |
| | (1) Maryland DNR provided this data 11/30/17 and indicated it is the full extent available. | | | TOTALS | 329,919.00 | | | | 51.8 | 6.5 | 0.14 |

| **SFY2017 Agricultural BMP Implementation Upper Choptank River Watershed In Caroline County, Maryland** | | | Estimated Pollutant Load Reduction | | | **Upper Choptank River Watershed Plan** Agricultural BMP Implementation Goals | | | | **Prior Years' Progress Toward Watershed Plan Goals** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 2003-2013 2013 Annual Report | Extracted from State Data reported by MDE to EPA Bay Program | | | |
| **Agricultural Best Management Practice** | **Unit** | SFY2017 Total | Total Nitrogen (lbs) | Total Phosphorus (lbs) | Total Sediment (tons) | Management Practice Watershed Plan Table 4 | Goal | Units | Progress 2003 thru SFY2017 | | SFY14 | SFY15 | SFY16 | **Units** |
| **Annual Practices** | | | | | | | | | | | | | | |
| Cover Crops | acres | 42,396 | 149,326.1 | 0.1 | 71.63 | Cover Crops | 50,000 | acres/yr | 42,396 | | | | | |
| | | | | | | Commodity Cover Crops | 15,000 | acres/yr | | | | | | |
| **Multi-Year Practices** | | | | | | | | | | | | | | |
| Alternative Crops | acres | 0 | | | | | | | 0 | | 0 | 0 | 0 | acres |
| Amendments for Treatment of Ag Waste | AU | 0 | | | | | | | 1,000 | | 180 | 0 | 820 | AU |
| Animal Mortality Facility | count | 6 | 23.9 | 2.3 | 0 | | | | 10 | | 0 | 0 | 4 | count |
| Conservation Cover | acres | 12.3 | 92.6 | 0.5 | 0.24 | | | | 52 | | 0 | 0 | 39.9 | acres |
| Conservation Plans/SCWQP | acres | 8,789 | 5,184.9 | 0.1 | 52.70 | Soil Conservation WQ Plans | 66,000 | acres | 41,999 | 4,699.9 | 8,401 | 8792 | 11317 | acres |
| Critical Area Planting | acres | 0 | | | | | | | 5 | | 0.3 | 3.95 | 0.3 | acres |
| Dead Bird Composting Facility | count | 0 | | | | | | | 7 | | 5 | 2 | 0 | count |
| Fencing | feet | 0 | | | | Stream protection with fencing | 130 | acres | 0 | 0 acres | 0 | 0 | 0 | feet |
| Field Border | acres | 10.3 | 90.6 | 2.1 | 0.40 | | | | 12.4 | | 0.5 | 1.61 | 0 | acres |
| Filter Strip | acres | 0 | | | | | | | 0 | | 0 | 0 | 0 | acres |
| Grassed Waterway | acres | 0 | | | | | | | 1.2 | | 1.2 | 0 | 0 | acres |
| Horse Pasture Management | acres | 0 | | | | | | | 19 | | 0 | 0 | 19.1 | acres |
| Loafing Lot Management System | acres | 1.41 | 978.5 | 166.4 | 0.01 | | | | 4.7 | | 1.6 | 1.56 | 0.1 | acres |
| Pasture & Hay Planting | acres | 7.4 | 55.7 | 0.5 | 0.15 | | | | 7 | | 0 | 0 | 0 | acres |
| Prescribed Grazing | acres | 55 | 0 | 0 | 0.03 | | | | 88 | | 0 | 0 | 33.2 | acres |
| P-sorbing Materials | acres | 0 | | | | | | | 0 | | 0 | 0 | 0 | acres |
| Riparian Forest Buffer | acres | 0 | | | | Buffers Forested - Agriculture | 1,000 | acres | 0 | 0 | 0 | 0 | 0 | acres |
| Riparian Herbaceous Cover | acres | 16.17 | 261.6 | 13.9 | 0.80 | Buffers Grassed - Agriculture | 5,500 | acres | 105.9 | 64.2 | 14.1 | 9.06 | 2.33 | acres |
| Roof Runoff Structure | count | 0 | | | | Runoff Control | 8 | count | 4 | 2 | 1 | 0 | 1 | count |
| Stream Restoration Ag | feet | 0 | | | | | | | 1,045 | | 0 | 995 | 50 | feet |
| Tree/Shrub Establishment | acres | 23.6 | 0.0 | 0.0 | 0.01 | Tree Planting - Agriculture | 100 | acres | 119 | 0 | 0 | 0 | 95.7 | acres |
| Waste Storage Facility | count | 10 | 4,744.5 | 676.8 | 0 | Animal Waste Mgmt - Livestock | 2 | count | 37 | 1 | 4 | 3 | 4 | count |
| | | | | | | Animal Waste Mgmt - Poultry | 4 | | | 15 | | | | |
| Wastewater Treatment Strip | acres | 0 | | | | | | | | | 0 | 0 | 0 | acres |
| Water Control Structure | count | 4 | 19.4 | 0 | 0 | Drainage Control Structures | 65 | count | 11 | no report | 1 | 5 | 1 | count |
| Watering Facility | count | 0 | | | | | | | | | 0 | 0 | 0 | count |
| Wetland Creation | acres | 0 | | | | Wetland - Agriculture | 1,200 | acres | 262.4 | 12.1 | 1.5 | 0 | 0 | acres |
| Wetland Restoration | acres | 52.6 | 0 | 26.8 | 0.34 | | | | | | 0 | 1.9 | 194.3 | acres |
| Windbreak/Shelterbelt Establishment | feet | 0 | | | | | | | 2,206 | | 0 | 2206 | 0 | feet |
| | | | | | | 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 | | | | | | |
| Total Annual Practices (2) | | | 149,326.1 | 0.1 | 71.6 | | | | | | | | | |
| Total Multi-year Practices | | | 11,451.8 | 889.3 | 54.7 | | | | | | | | | |
| Total Pollutant Load Reduction | | | 160,777.9 | 889.4 | 126.3 | | | | | | | | | |

(1) "SFY17 Total" column is Maryland Dept. of Agriculture 1/22/18 data.

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

## SFY2017 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 | | | |
| 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 | 6 | 58.80 | | |
| Septic Denitrification outside of 1000 feet | count | 11 | 37.40 | | |
| Septic Denitrification within 1000 feet | count | 1 | 5.50 | | |
| 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 | | | 101.70 | 0.00 | 0 |

(3) "BMPs Reported" column is MDE data 1/25/2018. MDE used MAST to estimate pollutant reduction.

## Upper Choptank River Watershed Plan
## Urban BMP Implementation Goals

| | Management Practice | Goal | Units | Progress SFY14 thru SFY17 |
|---|---|---|---|---|
| | | | acres | 0 |
| | | | acres | 0 |
| | | | acres | 0 |
| | | | acres | 0 |
| | | | acres | 0 |
| | | | acres | 0 |
| | | | acres | 0 |
| | | | acres | 0 |
| | | | acres | 0 |
| | | | acres | 0 |
| | | | acres | 0 |
| | | | acres | 0 |
| | | | acres | 0 |
| | | | acres | 0 |
| Table 6 | Septic Connections to WWTP | 750 | count | 0 |
| Table 6 | Enhanced Septic Denitrification | 5,051 | count | 125 |
| | | | count | 0 |
| | | | feet | 0 |
| | | | acres | 0 |
| | | | acres | 0 |
| | | | acres | 0 |
| | | | acres | 0 |
| | | | acres | 0 |
| Table 5 | Buffers Forested, Urban (2) | 60 | acres | 0 |
| Table 5 | Erosion and Sediment Control | 895 | acres/yr | |
| Table 5 | Nutrient Management, Urban | 12,000 | acres | 0 |
| Table 5 | Stormwater Management (1) | 8,400 | acres | 7.4 |
| | | | | |

(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).

## Prior Years' Progress Toward Watershed Plan Goals

| Local Data 2003-2013 in 2013 Annual Report | Extracted from State Data reported by MDE to EPA Bay Program | | | |
|---|---|---|---|---|
| | SFY14 | SFY15 | SFY16 | Units |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| no report | 0 | 0 | 0 | count |
| no report | 15 | 7 | 12 | count |
| no report | 8 | 14 | 21 | count |
| no report | 21 | 5 | 4 | count |
| | 0 | 0 | 0 | count |
| | 0 | 0 | 0 | feet |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| | 0 | 0 | 0 | acres |
| 0 | | | | |
| | | | | |
| 0 | | | | |
| 6.9 | | | | |