Maryland
319 Nonpoint Source Program
2010 Annual Report

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Center: Tree planting project at the Kemptown Elementary School. Photograph by the Frederick County Community Development Division Watershed Management Section.

Top Left: Stormwater management pond retrofit project under construction adding cells and wetlands to improve water quality and habitat. Photograph by Eva Kerchner, Town of Centreville, Corsica Watershed Manager.

Top Right: Aaron Run acid mine drainage mitigation project, Owens South site, oxidizing pond in foreground with Successive Alkalinity Producing System (SAPS) Cell in background. Photograph by Connie Loucks, MDE Abandoned Mine Land Division.

Bottom Left: Spring Branch stream restoration project less than one year after completion. Photograph by Ken Shanks, MDE TMDL Implementation Division.

Bottom Right: Stormwater management site in Calvert County. Photograph from the cover of the December 2010 Draft Hall Creek Watershed Implementation Plan, Calvert County Dept. of Planning and Zoning. Planning project is 319(h) Grant-funded.

Preface

The report is produced by the Maryland Department of the Environment to meet a grant condition that appears in each annual 319(h) Grant award to Maryland from the US Environmental Protection Agency. This programmatic condition in the FFY10 award states:

> The report shall contain the following:
>
> a. A brief summary of progress in meeting the schedule of milestones in the approved Management Program, and,
>
> b. Reductions in nonpoint source pollutant loading and improvements in water quality that has resulted from implementation of the Management Program.
>
> c. Descriptions of priority Watershed Based Plan accomplishments. Accomplishments should be based the implementation milestone goals/objectives as identified in each priority plan. The goal information can be displayed in the form of a watershed goal/accomplishment chart showing percent achieved, supplemented by a short narrative that should give the reader a clear understanding of the actions being taken and the outputs and outcomes which are occurring from the actions. If monitoring was completed, a summary of that information should also be included. For example, if 1000 feet of streambank stabilization was completed, then how does that compare to the needs identified in the watershed based plan i.e. what percent of streambank stabilization was completed compared to the overall needs as identified by the plan. Similar comparisons should also be provided for each significant pollutant load reduction.
>
> d. A minimum of one Level 1, 2 or 3 success story as defined by the criteria established by EPA located @ http://www.epa.gov/owow_keep/NPS/Success319/info.htm#what

What is Nonpoint Source Pollution?

Nonpoint source (NPS) pollution is defined as polluted stormwater runoff caused 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 deemed pollutants.

The pollution contributed by nonpoint sources is the main reason why many of Maryland's waters are considered "impaired." Impaired waters are those waters that do not meet Water Quality Standards for designated uses (e.g., fishing, swimming, drinking water, shellfish harvesting, etc.). The most recent Chesapeake Bay model associates nonpoint source pollution into several land use categories as shown in Figures 1 and 2. The figures also show that the relative amount of nitrogen and phosphorus generated by the different land uses in Maryland varies significantly.

I. Executive Summary

This report documents the activities and accomplishments of the State of Maryland in general and the Maryland Department of Environment (MDE) Water Quality Protection and Restoratior Program, in particular the administration of the State's §319(h) Grant Program. MDE plays a lead role in helping to achieve protection and improvement of Maryland's water quality by promoting and funding state and local water quality monitoring, stream and wetland restoration, education and outreach, and other measures to reduce and track nonpoint source pollution loads.

MDE is the lead agency responsible for coordination of policies, funds, and cooperative agreements with state agencies and local governments. Several other state agencies have key responsibilities, including the Maryland Department of Natural Resources (DNR), Maryland Department of Agriculture (MDA), and Maryland Department of Planning (MDP). The NPS Program is housed within MDE's Science Services Administration (SSA). During the past 21 years, Maryland has received a total of nearly $44.3 million through the Federal Clean Water Act Section 319(h) Grant. (See Appendix A)

In calendar year 2010, there have been notable successes and accomplishments:

- Projects funded by 319(h) Grant that were completed during calendar year (Table 2) reported implementing 716 best management practices resulting in pollutant load reductions: nitrogen 171,728 pounds/year; phosphorus 22,293 pounds/year; sediment 264 tons/year. (These numbers include technical assistance projects that indirectly support implementation of best management practices and may vary significantly from year to year because the mix of 319(h) Grant-funded projects and the level of interest among land owners/operators change significantly over time.)
- Eight watershed plans in Maryland, including two plans completed in 2010, have been accepted by EPA. Watersheds addressed by these plans are eligible for 319(h) Grant implementation funding.
- Implementation results in the Spring Branch watershed were posted as a national success story by EPA. (See Section 4.C and Appendix E)

The Program continues to face several challenges and concerns. Because of increasing development, there has been in an increase in the urban/suburban component of nonpoint source pollution. While the funding in 319(h) Grant to Maryland has been approximately the same for the past several years, other federal and state budgets are continuing to decrease, which leads to an ever-tightening restraint on the amount of help, either technical or financial, that a state can provide. There is also the need to show effectiveness or environmental results in an area that may take years or decades to do so.

II. Mission and Goals of the NPS Program

Maryland's mission is to implement effective nonpoint source pollution control programs. These programs are designed to achieve and maintain beneficial uses of water, improve and protect habitat for living resources, and protect public health through a mixture of water quality and/or

technology based programs including: regulatory and/or non-regulatory programs; and financial, technical, and educational assistance programs.

Through leadership and financial support Maryland's Section §319(h) Nonpoint Source (NPS) Program plays a lead role in helping to achieve protection and improvement of Maryland's water quality. The Program promotes and funds state and local watershed planning efforts, implementation of NPS projects consistent with watershed plans, water quality monitoring, stream and wetland restoration, education and outreach, and other measures to reduce, prevent and track nonpoint source pollution loads. The NPS Program plays a key role in promoting partnerships and inter- and intra-governmental coordination to reduce nonpoint sources of pollution, and helps bring the necessary technical and financial resources to local watershed management planning, best management practices, and restoration of streams and wetland habitats. Program partners include State agencies, local government (counties, municipalities, Soil Conservation Districts), private landowners and watershed associations.

The NPS Program's three priority goals for funding of implementation projects through the 319(h) Grant are (FFY2010 RFP):

- Eliminating or reducing nonpoint source pollution
- Removing waters from the State's list of impaired waters (the 303(d) list)
- Restoring and protecting habitat in streams, riparian buffers and wetland areas

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 about 90% of the State.
- Maryland's Coastal Bays receives runoff from Maryland's east side.
- The Youghiogeny River, which is part of the Ohio and Mississippi Rivers drainage, receives runoff from Maryland's west side.

Historically, the Program's policy has been to maintain an active presence in all three major drainage areas. The mix of 319(h) Grant-funded projects during 2010 reflects this policy. Western Maryland, characterized by mountains and cold water streams, is also characterized by a history of coal mining and resultant acidic mine drainage impacts. The 319 Program has invested significantly in watershed planning in Maryland's Coastal Bays, a system characterized by shallow, highly diverse ecosystems that are sensitive to development pressure that accommodates tourist destinations like the beach. In the central part of the State, the 319 Program is undergoing a process of evolution as management of the Chesapeake Bay transitions from a voluntary framework to a more regulatory one.

In 2010, Program policy began to emphasize the Chesapeake Bay drainage area to help address existing goals, two-year milestones and the anticipated Chesapeake Bay Total Maximum Daily Load (TMDL).

Overall, Maryland has over 9,940 miles of non-tidal streams and rivers. Maryland's water resources provide food and water for its residents, jobs for the economy and a place where

people may relax and enjoy the natural environment. Maryland's water resources are under stress from a variety of causes, with nonpoint source pollution the greatest single factor.

Maryland's rich heritage and the bounty of its waters are threatened by the very prosperity that continues to draw newcomers. Recreation, tourism, commercial and recreational fishing, wildlife habitats, and our quality of life are ultimately dependant upon healthy watersheds. Yet, the state's waters are increasingly impacted by and remain impaired due largely to nonpoint sources of pollution and related habitat degradation due to altered land uses.

Addressing Nonpoint Source Pollution

Many agencies and programs in Maryland, including State agencies, Counties, Soil Conservation Districts and municipalities, have responsibilities in managing NPS pollutant. Contacts for key State agency programs with NPS management responsibility are listed in Appendix B.

The best methods for controlling NPS pollution are frequently called Best Management Practices (BMPs). These BMPs are designed to meet specific needs, like 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 generates a cumulative total of BMPs implemented in the State. The most recent findings through 2008 are summarized in Appendix C.

A wide array of approaches and programs help to prevent, reduce or eliminate pollution from nonpoint sources. The general approach employed in Maryland to manage NPS pollution is summarized in Appendix D.

Figure 1. 2009 Total Nitrogen Sources in Maryland

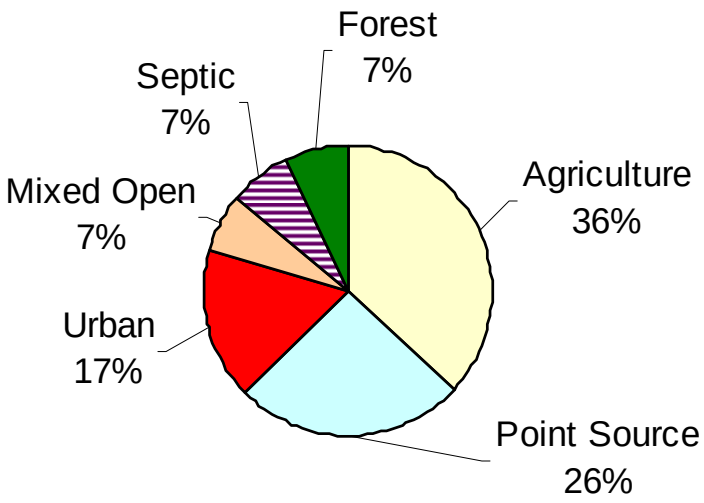
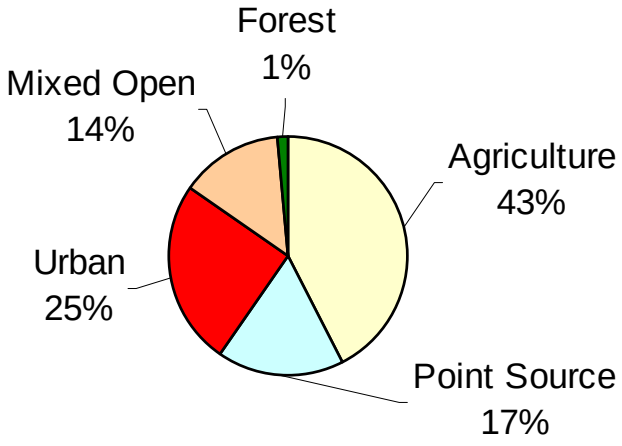


Figure 2. 2009 Total Phosphorus Sources in Maryland



* Data referenced from the Phase 4.3 Chesapeake Bay Model. The reported statistics include all of Maryland lands within the Chesapeake Bay Watershed except the main body of the Bay. Nitrogen pollutant loads for on-site sewage treatment systems (septic systems) are incorporated in the "urban" nitrogen loads.

IV. Accomplishments, Successes and Progress

In the past year, there have been notable program accomplishments, successes and challenges. Progress was made in implementing best management practices in all nonpoint source areas through the provision of technical assistance, project funding or both.

A. Active 319(h) Grant-Funded Projects and Project Outcomes

During calendar year 2010, 21 projects in Maryland were reimbursed using the Federal 319(h) Grant. The geographic area encompassed by this implementation and planning activity is shown in Figure 3.

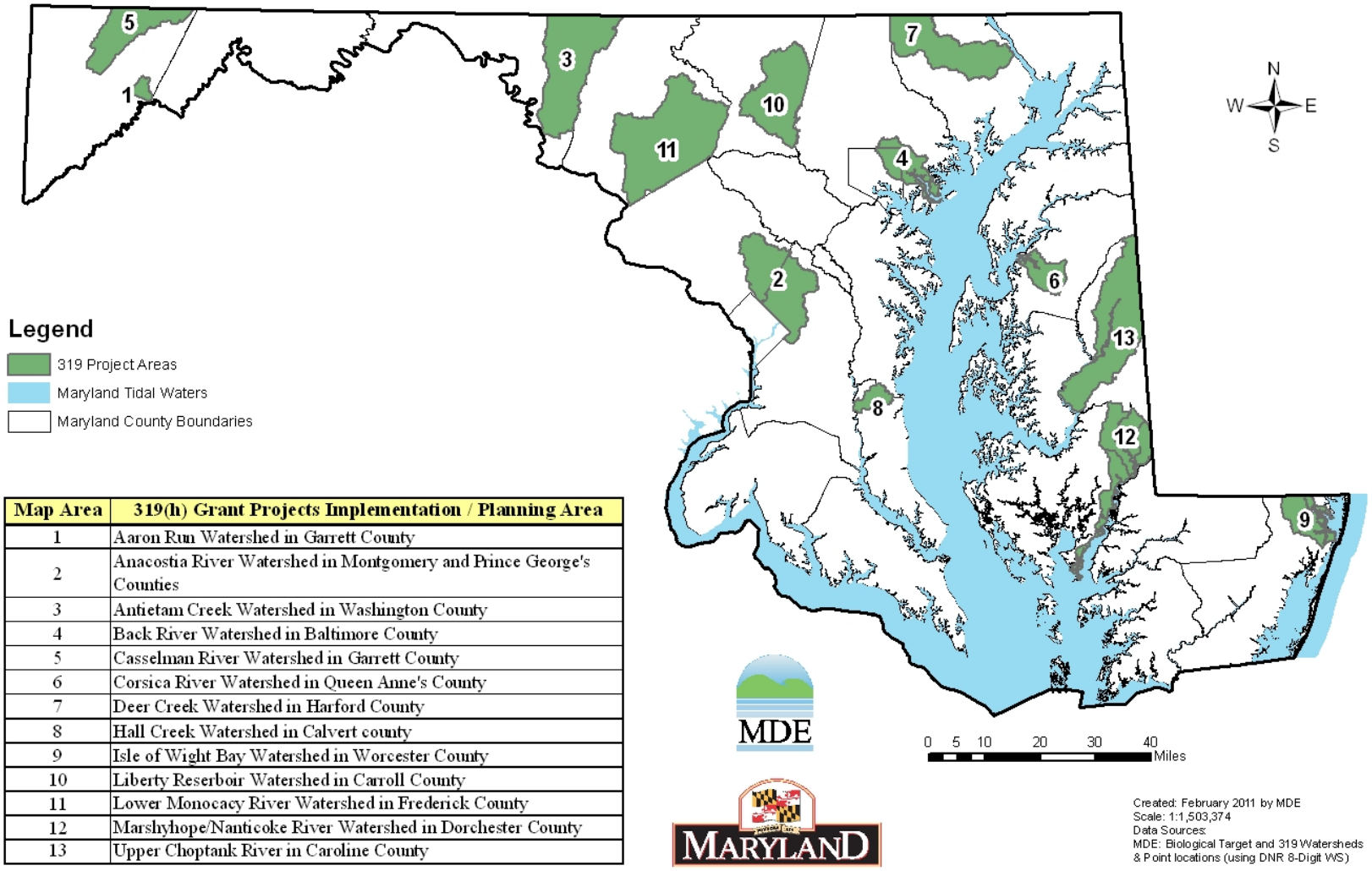
The status of all 32 projects that were active during 2010 is summarized in Table 1.
- 18 projects include on-the-ground implementation,
- 6 involve either monitoring implementation results or tracking implementation progress and
- 6 include planning in preparation for implementation.

Of these projects, outcomes resulting from 12 projects are presented in Table 2 as being completed in 2010 and all multi-year projects submitted annual reports that were reported to EPA. Overall, pollutant load reductions per year reported by these projects for the following key pollutants were nearly:

Nitrogen:	171,728	Pounds
Phosphorus:	22,293	Pounds
Sediment:	264	Tons

Figure 3. In 2010, construction was well underway on limestone leach bed and wetland mitigation portions of the Aaron Run acid mine drainage remediation project. (source: MDE Abandoned Mine Lands Division).

Figure 4
Map of Maryland Implementation and Planning Project Areas
Funded by the 319(h) Grant in 2010



Map Area	319(h) Grant Projects Implementation / Planning Area
1	Aaron Run Watershed in Garrett County
2	Anacostia River Watershed in Montgomery and Prince George's Counties
3	Antietam Creek Watershed in Washington County
4	Back River Watershed in Baltimore County
5	Casselman River Watershed in Garrett County
6	Corsica River Watershed in Queen Anne's County
7	Deer Creek Watershed in Harford County
8	Hall Creek Watershed in Calvert county
9	Isle of Wight Bay Watershed in Worcester County
10	Liberty Reserboir Watershed in Carroll County
11	Lower Monocacy River Watershed in Frederick County
12	Marshyhope/Nanticoke River Watershed in Dorchester County
13	Upper Choptank River in Caroline County

TABLE 1. Active Projects In Calendar Year 2010 Using Federal 319(h) Grant Funds					
Map Area	**Watershed Name (Md 8-Digit #)**	**TMDL or WQA**	**Impairment ***	**Project Name (Lead Agency, Grant Year)**	**Status**
1	Aaron Run Watershed (Savage River tributary) 02141006	Low pH, Nutrients	Low pH, Methylmercury-fish tissue	Acid Mine Drainage Remediation (MDE: FFY05 #19, FFY06 #1, FFY07 #12)	Project start Oct. 2005 Anticipate completion 2011
2	Anacostia River 02140205	Bacteria, PCBs, Sediment, Nutrients, Trash	Bioassessment, Fecal Coliform, Heptachlor Epoxide, Nitrogen, PCBs, Phosphorus, Total Suspended Solids, Trash	Green Streets – Green Jobs Partnership (Chesapeake Bay Trust FFY10 #12)	Project start 2010 Anticipate completion 2012
				Sligo Creek Watershed Plan (Prince George's Co. FFY08 #18)	Project start July 2008 Completed June 2010
3	Antietam Creek 02140502	Bacteria, BOD, Sediment	Bioassessment, Fecal Coliform, PCB in fish tissue, Phosphorus, Total Suspended Solids	Ag Technical Assistance (MDA/Washington SCD FFY09 #3)	Multi Year/Grant Project
				Watershed Plan (Washington SCD FFY08 #20)	Project start July 2010 Anticipate completion 2011
4	Back River 02130901	Bacteria, Chlordane, Nutrients, PCBs, Zinc	Bioassessment, Fecal Coliform, Nitrogen, Phosphorus PCB in fish tissue, Total Suspended Solids	Redhouse Run at St. Patrick Stream Restoration (Baltimore Co. FFY07 #18)	Project start 2009 Anticipate completion 2011
				Stormwater Conversions (Baltimore Co. FFY08 #21)	Project start 2011 Anticipate completion 2012
				Bread and Cheese Creek Restoration (Baltimore Co. FFY10 #11)	Project start 2011 Anticipate completion 2013
5	Casselman River (Youghioghy River trib.) 05020204	pH, WQA Nutrients	Low pH, Methylmercury –fish tissue	Watershed Plan (MDE FFY08 #12)	Project start July 2008 Anticipate completion 2011
				Acid Mine Drainage Remediation Implementation (MDE FFY09 #6)	Project start July 2008 Anticipate completion 2013
6	Corsica River (Chester River tributary) 02130507	Bacteria, PCBs, Nutrients	Estuarine Bioassessment, Nitrogen, Phosphorus, Fecal Coliform, PCB in fish tissue, Total Suspended Solids	Bioretention Swale (Queen Anne's County FFY08 #19)	Project start July 2008 Anticipate completion 2011
				Capacity / Implementation (Centreville FFY09 #1)	Project start April 2006 Anticipate completion 2011
				Ag. Technical Assistance (MDA / Queen Anne's SCD FFY10 #10)	Multi Year/Grant Project
				Monitoring Urban Stormwater and On-Site Domestic Systems (MDE FFY10 #2)	Multi Year/Grant Project
7	Deer Creek 02120202	None	None	Ag Technical Assistance (MDA / Harford SCD (FFY06 #17)	Multi Year/Grant Project
8	Hall Creek Watershed (L. Patuxent River trib.) 02121101	None	None (for the Hall Creek watershed)	Watershed Plan (Calvert County FFY07 #19)	Project start 2009 Anticipate completion 2011

TABLE 1. Active Projects In Calendar Year 2010 Using Federal 319(h) Grant Funds

Map Area	Watershed Name (Md 8-Digit #)	TMDL or WQA	Impairment *	Project Name (Lead Agency, Grant Year)	Status
9	Isle of Wight Bay Maryland Coastal Bays 02130103	Nutrients (N Coastal Bays) Bacteria (2 creeks)	Nitrogen, Phosphorus	Watershed Plan Revision (Worcester County FFY06 #16)	Project start Oct. 2007 Completed 2010
10	Liberty Reservoir Patapsco River trib. 02130907	Bacteria, Mercury, WQA Chrome/Lead	Methylmercury-fish tissue, Fecal Coliform, Phosphorus, Sediment	Targeted Watershed Project Ag Technical Assistance (MDA / Carroll SCD FFY06 #18)	Multi Year/Grant Project
11	Lower Monocacy River 02140302	Bacteria, Sediments	Bioassessment, Fecal Coliform, Phosphorus, Sedimentation, Total Suspended Solids	Bennett Creek Pilot Urban Wetlands Prog. (Frederick County, FFY07 #4)	Project start Nov. 2006 Anticipate completion 2011
				Bennett Creek Implementation (Frederick County, FFY08 #4)	Project start July 2008 Anticipate completion 2011
				Green Infrastructure Project (Frederick County, FFY10 #9)	Project start 2010 Anticipate completion 2012
12	Marshyhope Creek 02130306 Nanticoke Riv. 02130305	Nutrients (Marshyhope) Bacteria (Nanticoke)	Enterococcus, Fecal Coliform, PCB in fish tissue, Nitrogen, Phosphorus, Total Suspended Solids	Ag Technical Assistance (MDA / Dorchester SCD FFY06 #19)	Multi Year/Grant Project
	Statewide	N/A	N/A	Grant Administration (MDE FFY10 #3)	Multi Year/Grant Project
				Md Bioassessment Stream Survey (DNR, monitoring FFY09 #2)	Multi Year/Grant Project
				Nonpoint Source Prog. (MDE FFY10 #4)	Multi Year/Grant Project
				Nutrient Trading Pilot (Md Dept. of Agriculture FFY07 #22)	Project start 2009 Anticipate completion 2011
				Targeted Watershed (MDE monitoring/analysis FFY10 #5)	Multi Year/Grant Project
				Analysis and Local Technical Assistance (MDE FFY10 #1)	Multi Year/Grant Project
				Urban Stormwater Mgmt Implementation Tracking (MDE FFY10 #6)	Multi Year/Grant Project
13	Upper Choptank River 02130404	None	Bioassessment, Nitrogen, Phosphorus, PCB in fish tissue, Total Suspended Solids	Ag Technical Assistance (Caroline SCD FFY07 #21)	Multi Year/Grant Project
				Dept. of Publics SWM Retrofit (Caroline County FFY10 #7)	Project start 2011 Anticipate completion 2012
				Watershed Plan (Caroline County FFY07 #20)	Project start July 2009 Completed 2010

* The 2010 Integrated Report of Surface Water Quality in Maryland, in accordance with Clean Water Act Sections 303(d), 305(b) and 314.

TABLE 2. Projects Completed In Calendar Year 2010 Using Federal 319(h) Grant Funds					
Map Area	**Watershed Name (Md 8-Digit #)**	**Project Name * (Lead Agency)**	**Funding ** Federal $ Grant Year**	**Match $**	**Accomplishments**
1	Aaron Run Watershed Savage River trib. 02141006	Acid Mine Drainage Remediation (MDE)	250,142 FFY05 #19 TBD FFY06 #1	166,761 FFY05 TBD FFY06	This project is receiving funds from three 319(h) Grant years: 2005, 2006, and 2007. The first two grant projects ended in calendar year 2010 and the last will end calendar year 2011. Overall project accomplishments will be reported in the 2011 Annual Report.
2	Anacostia River Sligo Creek 02140205	Anacostia Community-Based Restoration: Lower Sligo Creek Watershed (Prince George's County)	50,224 FFY08 #18	33,483	The County drafted a watershed plan and conducted associated public participation.
3	Antietam Creek 02140502	Ag Tech. Assistance (Md Dept of Agriculture with the Washington SCD)	151,111 FFY09 #3	100,741	Ongoing project outcome for July 2009 through June 2010: 1) BMPs: 40 BMPS and 3,700 acres of cover crops were implemented resulting in annual pollutant load reductions: 42,007 lbs/yr nitrogen; 2,889 lbs/yr phosphorus. 2) Nutrient Management Plans: 119 were completed resulting in annual pollutant load reductions: 22,572 lbs/yr nitrogen; 2,177 lbs/yr phosphorus.
6	Corsica River Chester River trib. 02130507	Ag. Technical Assistance (Md Dept of Agriculture with the Queen Anne's SCD)	58,539 FFY09 #4	39,026	Ongoing project outcome for July 2009 through June 2010: 1) BMPs: 4 BMPs and 2,067 acres of cover crops were implemented resulting in annual pollutant load reductions: 19,740 lbs/yr nitrogen; 6,664 lbs/yr phosphorus; 33 tons/yr sediment. 2) Conducted manure composting education/outreach program.
7	Deer Creek 02120202	Ag Technical Assist. (Md Dept of Agriculture with the Harford SCD)	62,805 FFY06 #17	41,870	Project outcome for the period July 2009 through June 2010: 234 BMPs were implemented resulting in annual pollutant load reductions greater than 22,000 lbs/yr nitrogen and 1,000 lbs/yr phosphorus.
9	Isle of Wight Bay Maryland Coastal Bays 02130103	Watershed Plan Enhancement (Worcester County)	19,395 FFY06 #16	12,930	The County drafted a revision to a 2002 watershed plan, met water resources planning requirements according to State legislation HB1141 and conducted public participation associated with these activities.

TABLE 2. Projects Completed In Calendar Year 2010 Using Federal 319(h) Grant Funds

Map Area	Watershed Name (Md 8-Digit #)	Project Name * (Lead Agency)	Funding **		Accomplishments
			Federal $ Grant Year	Match $	
10	Liberty Reservoir Patapsco River trib. 02130907	Targeted Watershed Project (Md Dept of Ag. with the Carroll SCD)	16,302 FFY06 #18	10,868	Ongoing project outcome for July 2009 through June 2010: 30 BMPs and 1,800 acres of cover crops were implemented resulting in an overall estimated pollutant load reduction of 19,184 lbs/yr nitrogen, 581 lbs/yr phosphorus and 123 tons/yr sediment.
12	Marshyhope Creek 02130306 Nanticoke River 02130305	Ag Technical Assistance (Md Dept of Agriculture with the Dorchester SCD)	45,244 FFY06 #19	30,163	Ongoing project outcome for July 2009 through June 2010: 1) BMPs: 45 were implemented resulting in annual pollutant load reductions: 13,056 lbs/yr nitrogen; 3,150 lbs/yr phosphorus. 2) Conservation Plans: 6 new plans on about 295 acres and 26 revised plans on about 2,799 acres.
	Statewide	MD Biological Stream Survey (DNR)	215,934 FFY08 #3	143,956	Ongoing project outcome for 1/1/2009 through 6/30/2010: Conducted sampling at 50 sites in 12 watersheds to address MDE needs regarding impaired waters regarding: fish, benthic macroinvertebrates, periphyton, water chemistry, physical habitat. Reported on stressor identification for fish and macroinvertebrates. Data was reported in database/GIS.
13	Upper Choptank River 02130404	Ag Technical Assistance (Caroline Soil Conservation Dist.)	56,256 FFY07 #21	37,504	Ongoing project outcome for July 2009 through June 2010: 1) BMPs: 363 were implemented resulting in annual pollutant load reductions: 33,169 lbs/yr nitrogen; 5,832 lbs/yr phosphorus and 108 tons/yr sediment. 2) Conservation Plans: 20 new plans and 81 revised plans on a total of 11,000 acres.
		Watershed Plan (Caroline County)	35,694 FFY07 #20	23,796	The County drafted a watershed and received EPA acceptance by meeting EPA's expectations for components of a watershed-based plan (A-I criteria).

* Statewide MDE projects that re-occur year after year are listed in Table 1 Active Projects but are not repeated in Table 2.

** Federal: Project expenditures reimbursed by Federal grant rounded to the nearest dollar. Match: Project expenditures covered by non-Federal fund sources. Some projects may also involve funding sources in addition to the Federal grant and the funding documented as match for the grant.

B. Maryland 319 NPS Program Supports Stream Protection

The Clean Water Act requires states to protect healthy waters with conditions that are better than water quality standards. This principle, the *anti-degradation policy*, requires States to have implementation procedures as part of their state water quality standards regulation.

In Maryland, high quality streams have been identified using biological data. Maps of these streams, also known as Tier II streams, are available on the Internet: http://mde.maryland.gov/programs/Water/TMDL/Integrated303dReports/Pages/Antidegradation.aspx

High quality streams and their watersheds are compared to plans for proposed projects that are submitted to the Maryland Department of the Environment for review. Proposed projects receive additional scrutiny if there is potential to affect a high quality stream or its watershed, such as increasing stormwater discharge. Several steps must be taken before a decision can be made on the viability of the project. If alternative options for the project are not viable, an impact analysis must be conducted. If the project would degrade the stream, it can only do so by a small fraction. This fraction of degradation can be viewed as a type of *assimilative capacity*. For the State to allow this to occur, those who are proposing the project must provide a social and economic justification to determine if the consumption of the stream's assimilative capacity is warranted.

Maryland's 319 NPS Program has been funding monitoring of selected high quality waters that are under development pressure. In one case, a proposed county highway in the watershed of a high quality stream named Old Woman's Run in Charles County, would likely spawn secondary development. In 2010, MDE's pro-active monitoring determined that Old Woman's Run did not have assimilative capacity to spare. Based on this 319 NPS Program data, MDE determined that significant mitigation actions would be needed to increase the stream's assimilative capacity in order for the highway proposed to proceed. The feasibility of meeting this need is under consideration by the County.

In this example, the following 319(h) Grant funded projects contributed the capabilities necessary to perform this function:

- Monitoring/analysis: FFY2009 project #1: DNR MBSS – Delineating High Quality Maryland Streams;
- Review of road project and related GIS mapping: FFY2010 project #1: MDE Analysis and Local Government Assistance.

Additional information on these 319(h) Grant-funded projects is available on the Internet at: http://iaspub.epa.gov/pls/grts/f?p=110:199:709564902106899

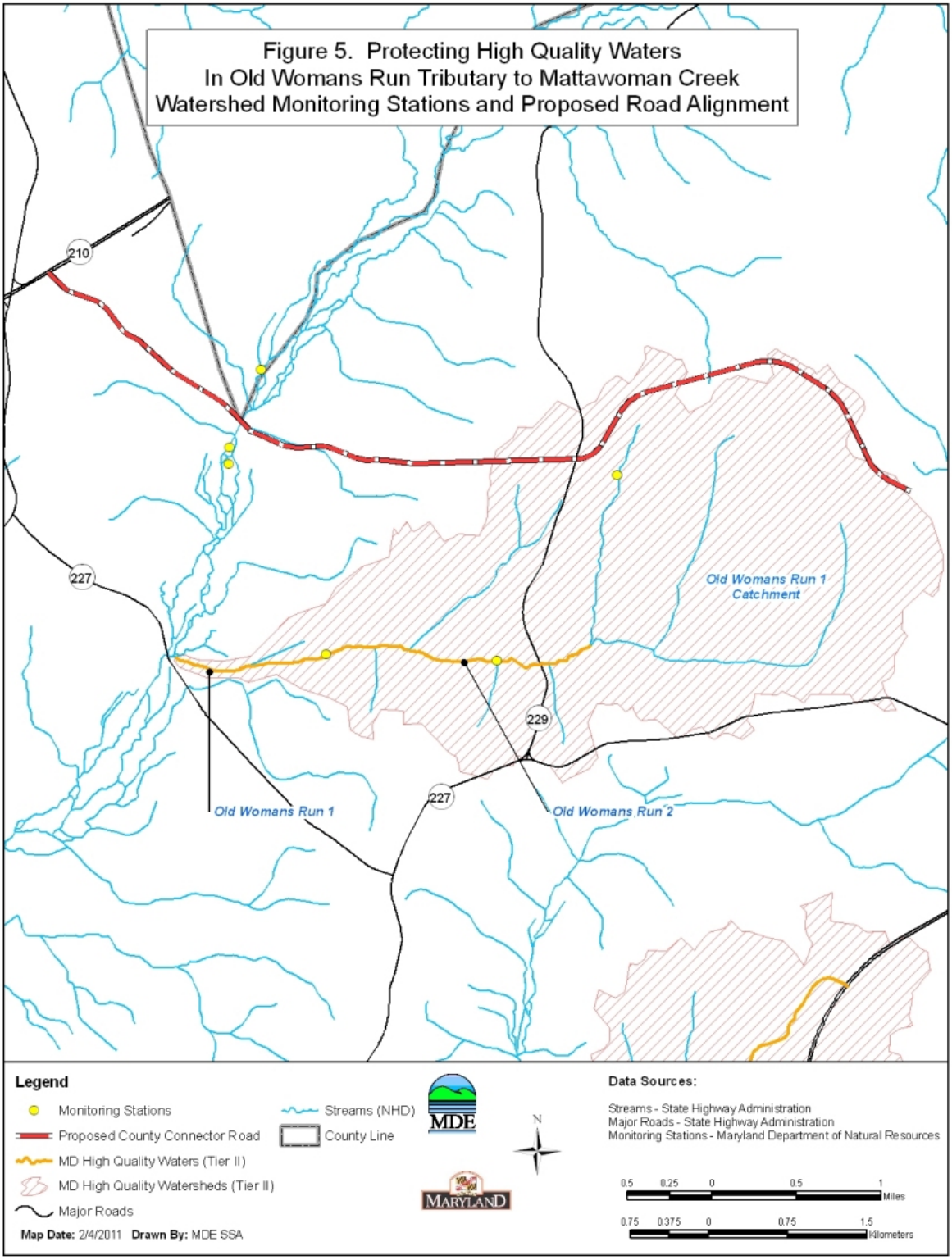


Figure 5. Protecting High Quality Waters
In Old Womans Run Tributary to Mattawoman Creek
Watershed Monitoring Stations and Proposed Road Alignment
210
227
229
227
Old Womans Run 1
Catchment
Old Womans Run 1
Old Womans Run 2
Legend
Monitoring Stations
Proposed County Connector Road
MD High Quality Waters (Tier II)
MD High Quality Watersheds (Tier II)
Major Roads
Streams (NHD)
County Line
Map Date: 2/4/2011 Drawn By: MDE SSA
MDE
MARYLAND
N
Data Sources:
Streams - State Highway Administration
Major Roads - State Highway Administration
Monitoring Stations - Maryland Department of Natural Resources
0.5 0.25 0 0.5 1 Miles
0.75 0.375 0 0.75 1.5 Kilometers

C. Success Story – Spring Branch

In 1979, Baltimore County, Baltimore City and other jurisdictions signed an agreement to protect three large drinking water reservoirs that serve over a million people in the metropolitan area. To help meet this important need, beginning in the 1990s, Baltimore County planned a series of stormwater management and stream restoration projects including those for Spring Branch, a tributary to Loch Raven Reservoir. The 1,005-acre Spring Branch watershed is mostly residential development, where nearly 89% was constructed between 1950 and 1980 before stormwater management requirements.

In 1997, Phase 1 of the Spring Branch work was completed including a stormwater wet pond and a stream restoration in the upstream/headwaters portion of the watershed with an overall design and construction cost of $2.25 million.

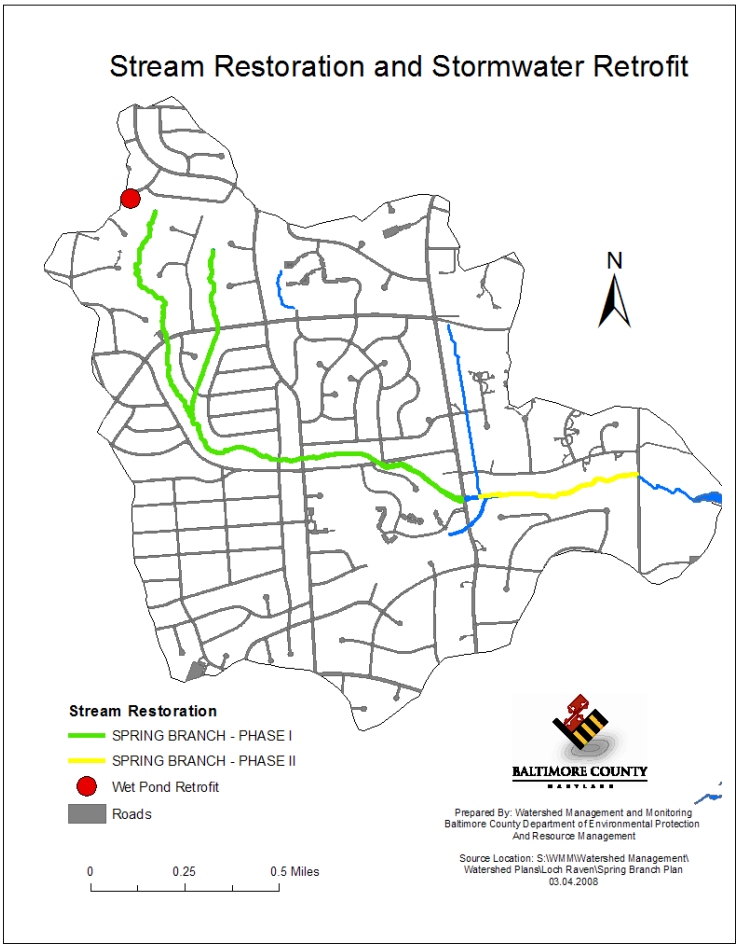


Figure 6. Spring Branch Stream Restoration Project Phases.

Table 3. Spring Branch Stream Restoration Pollutant Load Reductions

Monitoring Period	Annual Pollutant Load		Pollutant Load Reduction	
	Drainage Area	Per Acre	Percent	Per Linear Foot
Total Suspended Solids				
Before	44,237	92.0		
After	9,382	19.5	78.8	3.49
7 Years After	7,505	15.6	83.0	3.67
Total Nitrogen				
Before	5,393	11.2		
After	3,629	7.5	33.0	0.176
7 Years After	3,127	6.5	42.0	0.227
Total Phosphorus				
Before	203.9	0.42		
After	81.2	0.17	59.5	0.0123
7 Years After	114.2	0.24	42.9	0.0090

Source: Spring Branch Small Watershed Action Plan, Baltimore County, 2008, page 2-27.

Monitoring after completion of the Spring Branch Phase 1 stream restoration found that significant reductions in suspended solids, nitrogen and phosphorus occurred shortly after project completion and continuing for years thereafter as shown in the table to the left and the three graphs on the next page.

In 2005, Spring Branch was affected when EPA approved the Loch Raven Reservoir TMDL for phosphorus and sediment. This new pollutant limit and the success of Phase I provided impetus to continue with Phase II.

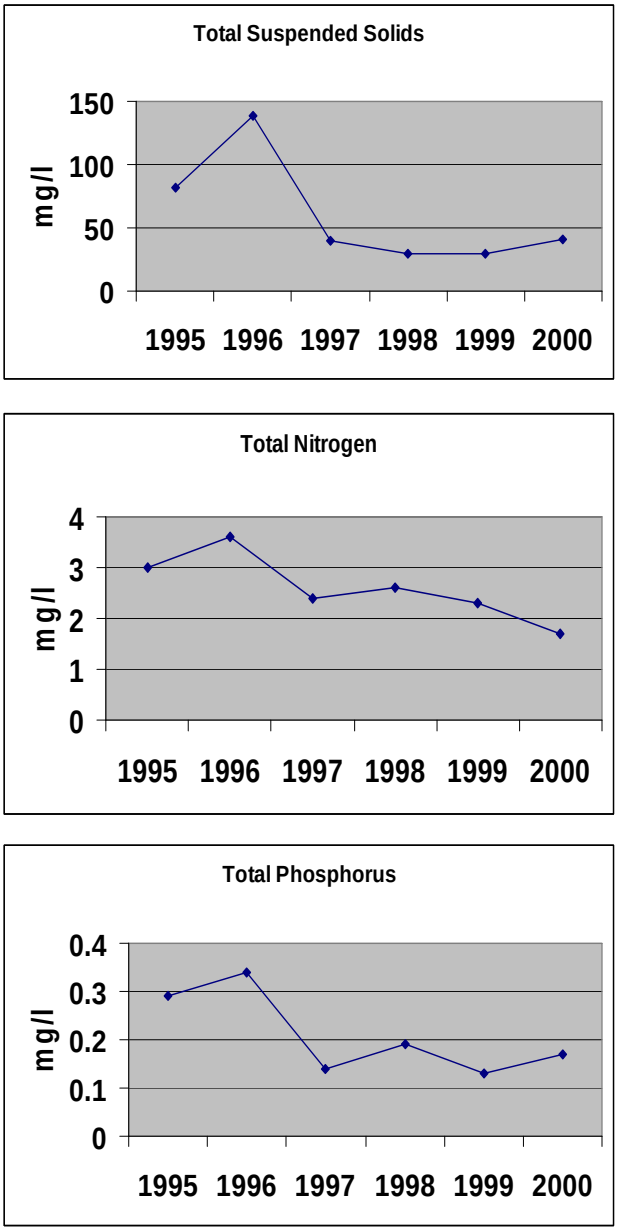


Figure 7. The three graphs (left) show concentrations of total suspended solids, total nitrogen and total phosphorus dropped significantly following the 2007 completion of the Spring Branch Phase I stream restoration compared to two years prior to the project. (Source for graphs: Baltimore County)

In 2007, Baltimore County began seeking funding for the Spring Branch Phase II stream restoration. The project was selected to receive $240,000 in FFY2008 319(h) Grant funding (project #1). Then in 2008-2009, Spring Branch Phase II work was completed for a total construction for $1,080,495 including the 319(h) Grant Federal funding.

For Phase II, the reported estimated pollutant reductions (rounded) are: total nitrogen 521 lbs/yr; total phosphorus 32 lbs/yr, and; total suspended solids 5.2 tons per year.

In 2009 about a year after construction, the Fish Index of Biological Integrity (IBI) improved from borderline very poor/poor to levels approaching fair conditions. At the same time, the Benthic IBI improved from very poor (no benthic organisms present) to poor (several tolerant species were found).

In 2010, the Spring Branch project was selected by EPA as a national success story. A copy of EPA's publication for this project is included in Appendix E.

Figure 8. Less than one year after Baltimore County's Spring Branch Phase II stream restoration project graded the stream bank in this stream segment to reduce slope, the trees planted in the riparian area are still protected by tree shelters made from bamboo laced together with twine. These shelters are designed reduce animal damage to the saplings for a several year period and then naturally fall apart and decompose. (Photograph was taken at the down-stream end of the project at Dulaney Valley Road by the MDE TMDL Implementation Division).

D. Implementation Tracking for Nonpoint Source Management

Two projects supported by Federal 319(h) Grant funds include responsibilities to collect and integrate information on implementation projects that protect or restore water bodies affected by nonpoint source pollution.

On urban lands in Maryland, numerous of stormwater management projects are constructed each year. These urban lands include residential, commercial, industrial and institution properties. In order to track stormwater management implementation progress, 23 Counties, Baltimore City and dozens of municipalities that each collect and maintain data for their jurisdiction using various methods designed to meet local needs. In cooperation with these jurisdictions, MDE's project called "Urban Stormwater Management Tracking Implementation in Urban Areas" collects this information and integrates it into a single system that supports statewide progress tracking.

On non-urban lands in Maryland, thousands of best management practices are implemented each year. These nonpoint source control practices include animal waster management, cover crops, forest management practices, stream buffers and restoration, wetland restoration, and others. Implementing and tracking these projects and involves many different entities such as Soil Conservation Districts, State and local agencies.

Coordination and integration of these divergent data from urban and non-urban is performed by MDE's project "Analysis and Local Technical Assistance of NPS Pollution in Maryland". This ongoing project has successfully coordinated the consolidation of nonpoint source Best Management Practices for use in the Chesapeake Bay Watershed Model.

The most current cumulative progress tracking data through 2009 is presented in Appendix C.

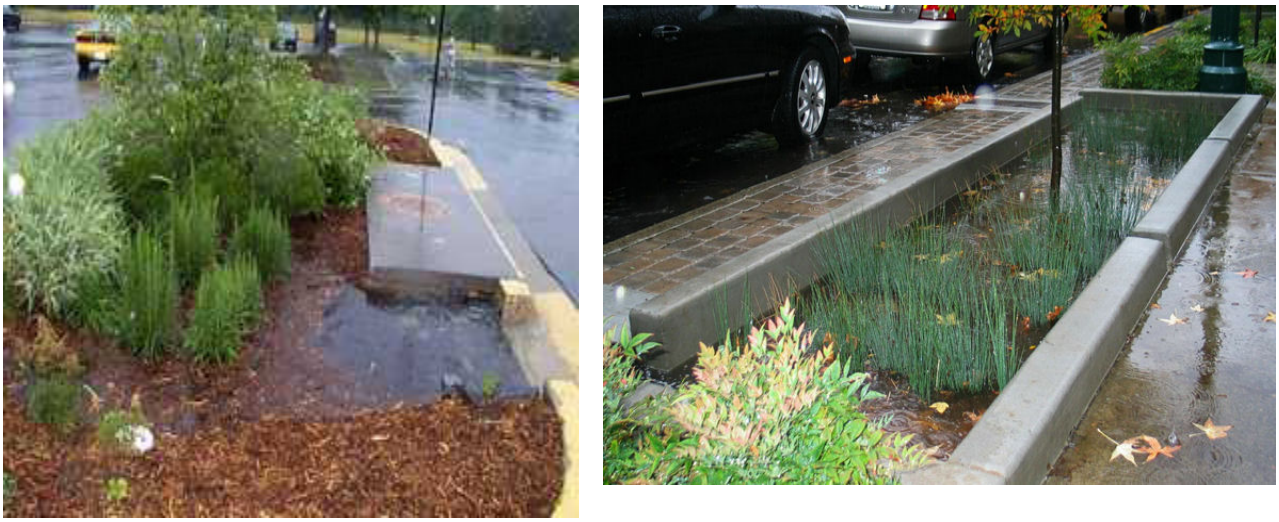


Figure 9. Urban Stormwater Infiltration Practices. Local jurisdictions may track and report this type of nonpoint source implementation. (source of photographs: *Final Draft Sligo Creek Subwatershed: Provisional Restoration Project Inventory*. Prepared by Prince Greorge's County Department of Environmental Programs and the Metropolitan Washington Council of Governments. August 2008.)

E. Watershed Plan Implementation

Protecting and restoring water quality depends on effective planning to be successful. To meet these needs, Maryland State agencies, counties, municipalities, watershed organizations and other groups conduct planning at a watershed scale. The form and focus of these watershed plans are as diverse as groups that produce them.

Some of these watershed-based plans are produced, in part to meet requirements under the Federal Clean Water Act including the 319(h) Grant. In particular, watershed plans must be accepted by EPA based on EPA guidance for components of a watershed-based plan (A-I Criteria) in order to expend funds for implementation from the "Incremental" portion of the 319(h) Grant. The table below lists watershed plans accepted by EPA in Maryland.

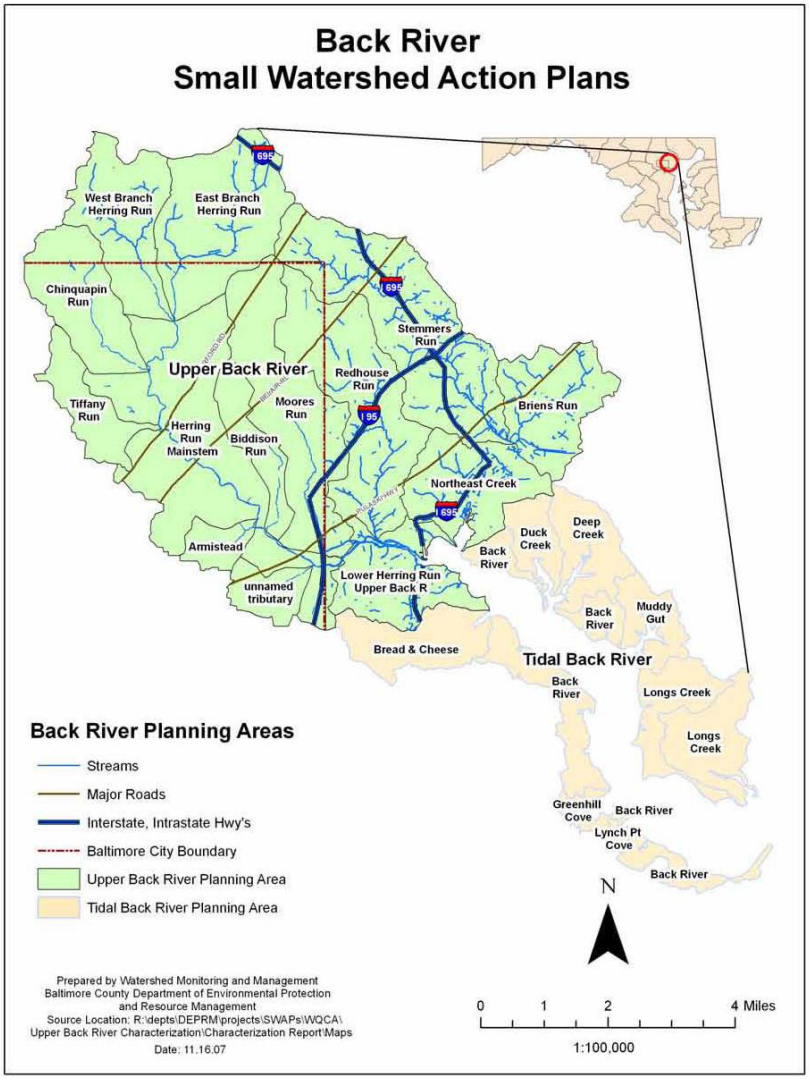
Table 4. Watershed Plans In Maryland Accepted by EPA

Watershed	Plan Description	2010 Implementation
Back River	*Upper Back River Small Watershed Action Plan.* Volume 1 and 2, Baltimore County Department of Environmental Protection and Resource Management, November 2008. Accepted by EPA 2008. (Drains to tidal Back River and then to Chesapeake Bay.) *Tidal Back River Small Watershed Action Plan.* Volume 1 and 2, Baltimore County Department of Environmental Protection and Resource Management, February 2010. Accepted by EPA 2010. (Drains directly to the Chesapeake Bay.) http://www.baltimorecountymd.gov/Agencies/environment/watersheds/ep_brmain.html	Progress Reported (go to summary)
Corsica River	*Corsica River Watershed Restoration Action Strategy*. Town of Centreville, Final Report September 2004. Accepted by EPA 2005. (Tributary to the Chester River and the Chesapeake Bay.) http://www.dnr.state.md.us/watersheds/surf/proj/wras.html	Progress Reported (go to summary)
Jones Falls	*Lower Jones Falls Watershed Small Watershed Action Plan.* Baltimore County, October 15, 2008. Accepted by EPA 2008. (Tributary to Patapsco River and Chesapeake Bay.) http://www.baltimorecountymd.gov/Agencies/environment/watersheds/ep_jonesmain.html	Progress Not Reported (no 319 projects)
Lower Monocacy River	*Lower Monocacy River Watershed Restoration Action Strategy (WRAS) Supplement*: *EPA A-I Requirements, Frederick County Maryland.* July 2008, Version 1.0. Accepted by EPA 2008. (Tributary to the Potomac River and the Chesapeake Bay.) http://www.watershed-alliance.com/mcwa_pubs.html	Progress Reported (go to summary)
Spring Branch	*Spring Branch Subwatershed – Small Watershed Action Plan (Addendum to the Water Quality Management Plan for Loch Raven Watershed).* Baltimore County, March 2008. Accepted by EPA 2008. (Tributary to the Loch Raven Reservoir, then to the Gunpowder River and then to the Chesapeake Bay.) http://www.baltimorecountymd.gov/Agencies/environment/watersheds/ep_lrmain.html	Completion reported in Maryland's 2009 319 NPS Annual Report
Sassafras River	*Sassafras Watershed Action Plan*. Sassafras River Association. Accepted by EPA 2009. www.sassafrasriver.org/swap/ (Drains directly to the Chespeake Bay.)	Progress Reported (go to summary)
Upper Choptank River	*Upper Choptank River Watershed Based Plan Developed to be Consistent with EPA's 319(h) Nonpoint Source Program Grant "A through I Criteria"*. Caroline County, November 2010. (Drains to the lower Choptank River and the Chesapeake Bay.)	Progress Reported (go to summary)

1. Back River Watershed

Location

The Back River watershed is located in Baltimore County and Baltimore City. This watershed is divided into two subwatersheds as shown in the map and summarized in the table on the page. A watershed plan was completed for each subwatershed.



Goal

In the 2008 Upper Back River Small Area Watershed Plan, by Baltimore County and Baltimore City, the goal with a measureable water quality result is to reduce nonpoint source nutrient loads by 15% to meet TMDL requirements:

- Total nitrogen reduction: 48,190 pounds
- Total phosphorus reduction: 6,056 pounds

In the 2010 Tidal Back River Small Area Watershed Plan by Baltimore County, the goal with a measureable water quality result is to reduce nonpoint source nutrient loads by 15% to meet TMDL requirements:

- Total nitrogen reduction: 6,498 pounds
- Total phosphorus reduction: 679 pounds

Implementation

Several implementation projects that have or will contribute to meeting watershed plan goals are partially funded by the 319(h) Grant as summarized on the next page. Other implementation progress that may contribute to nonpoint source goals was not available for this report.

Table 5. Back River Subwatershed Summary	
Upper Back River Watershed	**Tidal Back River Watershed**
Total drainage area: 27,716.7 acres (43.3 mi^2) Total open tidal water: NA Baltimore Co.: 55.5%; Baltimore City: 44.5%. Impervious cover: 30.7 % Land Use - Agriculture: --- - Commercial: 9.9% - Forest: 11.5% - Industrial: 6.5% - Institutional: 8.0% - Residential low density: 8.5% - Residential mid density: 26.5% - Residential high density: 20.4% - Urban open: 6.2% - Water/Wetlands: ---	Total Drainage area: 7,720 acres (12 mi^2) Total open tidal water: 3,947 acres (6.2 mi^2) Baltimore County: 100% Impervious cover: 18.4% Land Use - Agriculture: 4.4% - Commercial: 7.2% - Forest: 32.1% - Industrial: 3.5% - Institutional: 4.4% - Residential low density: 2.4% - Residential mid density: 23.0% - Residential high density: 8.6% - Urban other: 11.4% - Water/Wetlands: 3.0%

Table 6. Back River Watershed - 319(h) Grant Projects Funding Implementation

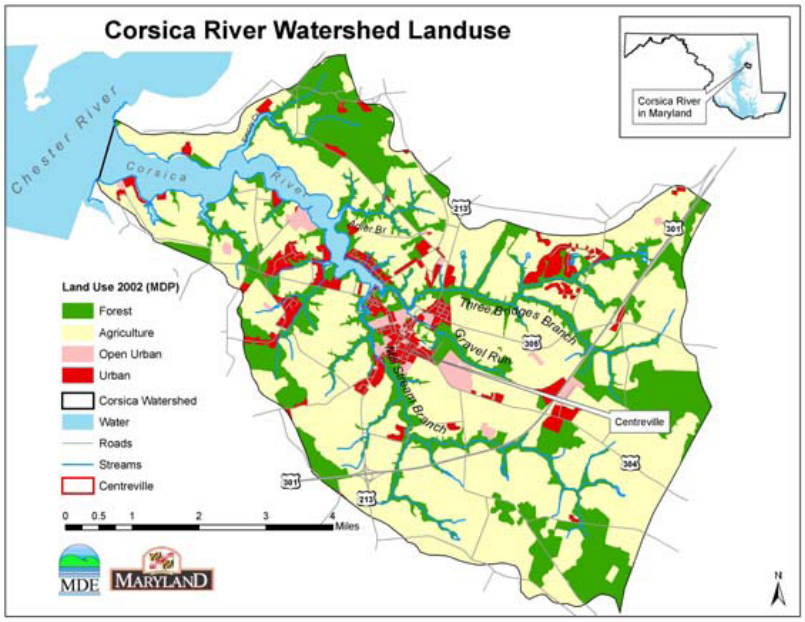
Baltimore County Project Description (1)	Grant Year Project # (2)	Grant Project Status	319(h) Funds (3)	Total Cost (4)	Estimated Load Reduction (5)		
					Nitrogen (lb)	Phosphorus (lb)	Sediment (ton)
Redhouse Run/Overlea stormwater NPS control and stream restoration	FFY2000 #16	Closed 2001	$130,000	$530,000	--	9.46	2.67
Redhouse Run at St. Patricks stream restoration	FFY2007 #18	Construction	$418,500	$1,000,000	60	10.5	3.8
Upper Back River stormwater NPS control	FFY2008 #21	Preconstruction	$422,373	$700,000	371.5	56.4	10.6
Bread and Cheese Creek stormwater NPS control and stream restoration	FFY2010 #11	Preconstruction	$556,443	$1,000,000	200.5	29.6	6.75

(1) Implementation directly or indirectly supported by the 319(h) Grant. Excludes projects/costs for management oversight, monitoring, etc.
(2) Additional information is available at http://iaspub.epa.gov/pls/grts/f?p=110:199:618139948454479 Select "Find Projects" and select "Maryland", grant year, project #.
(3) Closed projects = total 319(h) Grant funds expended for project. Other projects = 319(h) Grant allocated. Excludes match.
(4) Closed projects = reported total expenditure. Other projects = projected total cost.
(5) Closed projects = reported annual pollutant reduction. Other projects = projected future pollutant reduction.

2. Corsica River Watershed

Location

The Corsica River, which is 6.5 miles in length, is located in the upper eastern shore in Queen Anne's County. The watershed area is 40 square miles and is part of the larger Chester River Watershed (see map). Land use in the watershed can be aggregated into three broad categories:
- 66% agriculture,
- 26% woodland,
- 8% various types of developed lands.



Goal

The nonpoint source annual TMDL load allocation for nitrogen is 268,211lbs and for phosphorus is 19,380 lbs. Corsica River watershed ambient NPS nutrient loads already met the TMDL when it was approved by EPA, so the TMDL serves as a benchmark to prevent degradation (TMDL page 4 and 20). In addition, other goals were established as listed in the following implementation progress tables.

Implementation

Tables and photographs beginning below and continues on the next page summarize currently available watershed plan implementation progress.

Table 7 Corsica River Watershed - 2010 Implementation Progress Summary

Goals			Progress		
Control Measure	**Unit**	**Units Needed**	**Installed 2010**	**Prior Years 2005-2009**	**Goal % Achieved**
Ag Cover Crop	Acres per year	4,000	5,525	n/a	92
Ag Small Grain Enhancement	Acres per year	2,000		n/a	
Forest Buffers - Urban	Acres	200	0	12	6
CREP Buffers - Agriculture	Acres	100	57.4	121	178
Horse Farm BMPs	Acres	50	0	30	60
Septic System Retrofits	Individual systems	30	0	15	50
Stormwater Management	Acres served	300	78.7	27.7	35.5
Stream Restoration	Feet	10,560	0	0	0
Wetland Restoration	Acres	50	0	0	0

Figure 10. Corsica River Stormwater Management Retrofit at Symphony Village. The photographs above show before construction / during construction / after construction in a project by the Town of Centreville and the Maryland Department of Natural Resources that successfully converted a two-cell conventional stormwater retention pond into a multi-cell pond/wetland complex that improves water quality and habit diversity in the planned community of Symphony Village. (photos by Eva Kerchner, Corsica River Watershed Manager, Town of Centreville)

Table 8 Corsica River Watershed - 319(h) Grant Projects Funding Implementation

Project Description (1)	Grant Year Project # (2)	Grant Project Status	319(h) Funds (3)	Total Cost (4)	Estimated Load Reduction (5)		
					Nitrogen (lb)	Phosphorus (lb)	Sediment (ton)
Centreville Corsica Watershed Restoration Project	FFY2005 #2	Completed	232,666.15	155,110.77	0	0	NR
	FFY2006 #3	Completed	241,974.82	161,316.55	62	6	NR
	FFY2009 #1	In Progress	300,504	200,336	NR	NR	NR
MDA / Queen Anne's Soil Conservation District Agricultural Technical Assistance Project	FFY2005 #12	Completed	145,554.24	97,036.16	767	79	463
	FFY2006 #9	Completed	14,272.71	9,515.14	NR	NR	NR
	FFY2007 #6	Completed	22,187.16	14,791.44	286	10	755
	FFY2008 #7	Completed	50,780.00	33,853.33	46	3	62
	FFY2009 #4	Completed	58,539.00	39,026.00	19,740	6,664	33
	FFY2010 #10	In Progress	61,590	41,060	NR	NR	NR
Queen Anne's County Corsica and Beyond Project	FFY2006 #13	Completed	124,281.44	82,854.29	NR	NR	NR
Queen Anne's County Bioretension Swales Project	FFY2008 #19	In Progress	50,000	33,333	NR	NR	NR

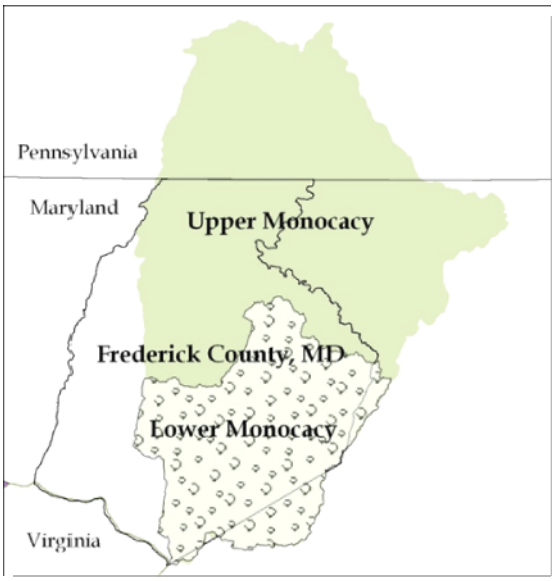
(1) Implementation directly or indirectly supported by the 319(h) Grant. Excludes 319(h) Grant projects that do not include implementation.
(2) Additional information is available at http://iaspub.epa.gov/pls/grts/f?p=110:199:618139948454479 Select "Find Projects" and select "Maryland", grant year, project #.
(3) Closed projects = total 319(h) Grant funds expended for project. Other projects = 319(h) Grant allocated. Excludes match.
(4) Closed projects = reported total expenditure. Other projects = projected total cost.
(5) NR = not reported. Closed projects = reported annual pollutant reduction rounded to nearest pound/ton. Other projects = projected future pollutant reduction.

3. Lower Monocacy River

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. About 304 square miles of watershed drain 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



Goals and Implementation

The Lower Monocacy River Watershed Restoration Action Plan was developed by Frederick County in 2004 to address the 168,960 acres (264 mi^2) that drain Frederick County. In 2008, the County used local funds to revise the Plan and EPA accepted the revision. The Plan's 25-year goals and implementation progress are presented in the following tables.

Figure 11.. Lower Monocacy Project Area.
Top: Location Map
Above: Volunteers led by the Potomac Conservancy, the Interstate Commission on the Potomac River Basin, and Frederick County Watershed Management Section staff install a rain garden to treat parking lot runoff at Bar-T Mountainside Challenge and Retreat Center.
Right: Kemptown Elementary School students participate in a tree planting to slow runoff, reduce erosion, and create wildlife habitat on their school grounds.
(The map and photos: Frederick County Community Development Division Watershed Management Section.)

Table 9. Lower Monocacy River Watershed - 2010 Implementation Progress Summary								
Lower Monocacy Goals				**Lower Monocacy Implementation Progress**				
Parameter		**Unit**	**Units Needed**	**2010**	**Previous Years**		**Total**	**Goal % Achieved**
					2008-2009	**Pre- 2008**		
Nitrogen	Agriculture	Pounds	582,949	NR	NR	NR	NR	NR
	Urban	Pounds	67,049	552.4	450.51	570.99	1573.9	2.35%
Phosphorus	Agriculture	Pounds	57,337	NR	NR	NR	NR	NR
	Urban	Pounds	11,615	41.27	34.89	33.44	109.6	0.94%
Sediment	Agriculture	Pounds	18,342,280	NR	NR	NR	NR	NR
	Urban	Pounds	2,348,084	13966.67	9,258.66	13,149.74	36375.07	1.55%
Lake Linganore Goals				**Lake Linganore Implementation Progress**				
Phosphorus	Agricultural	Pounds	601,489.60	NR	NR	NR	NR	NR
	Urban	Pounds	92,106.30	8.15	12.08	25.57	45.8	0.05%
	Forest	Pounds	4,186.70	NR	NR	NR	NR	NR
Sediment	Agricultural	Tons	38,401	NR	NR	NR	NR	NR
	Urban	Tons	3,615	2.06	2.46	4.61	9.13	0.25%
	Forest	Tons	1,033	NR	NR	NR	NR	NR

1. 2010 = Calendar year. NA = not applicable. NR = not reported. 2. All 319(h) Grant-funded implementation is reported.
3. Implementation Progress is tracked and reported by Frederick County Department of Public Works Watershed Management Section. Implementation accomplished with "other" funding sources may not be fully tracked or reported.
4. Lake Linganore drainage is a subwatershed with a TMDL that is within the larger Lower Monocacy River watershed.

Table 10. Lower Monocacy River Watershed - 319(h) Grant Projects Funding Implementation							
Frederick County Project Description (1)	**Grant Year Project # (2)**	**Grant Project Status**	**319(h) Funds (3)**	**Total Cost (4)**	**Estimated Load Reduction (5)**		
					Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
Lower Monocacy Watershed Restoration	FFY05 #17	Closed	$216,237.00	$360,395.00	615.9	43.9	8.2
Urban Wetlands Program, Bennett Creek Pilot	FFY07 #4	In Progress	$223,364	$294,170	69.57	11.18	1.7
Bennett Creek Urban BMP Demonstration	FFY08 #4	In Progress	$234,545	$390,900	194.5	45.1	4.4
Lower Monocacy Green Infrastructure	FFY10 #9	In Progress	$318,396	$530,660	247	25.9	4.9

(1) Implementation directly or indirectly supported by the 319(h) Grant. Excludes projects/costs for management oversight, monitoring, etc.
(2) Additional information at http://iaspub.epa.gov/pls/grts/f?p=110:199:618139948454479 Select "Find Projects".
(3) Closed projects = total 319(h) Grant funds expended for project. Other projects = total 319(h) Grant to project excluding match.
(4) Closed projects = reported total expenditure. Other projects = projected total cost, including project activities in addition to implementation.
(5) Closed projects = reported annual pollutant reduction. Other projects = projected future pollutant reduction in the project scope of work.

4. Sassafras River Watershed

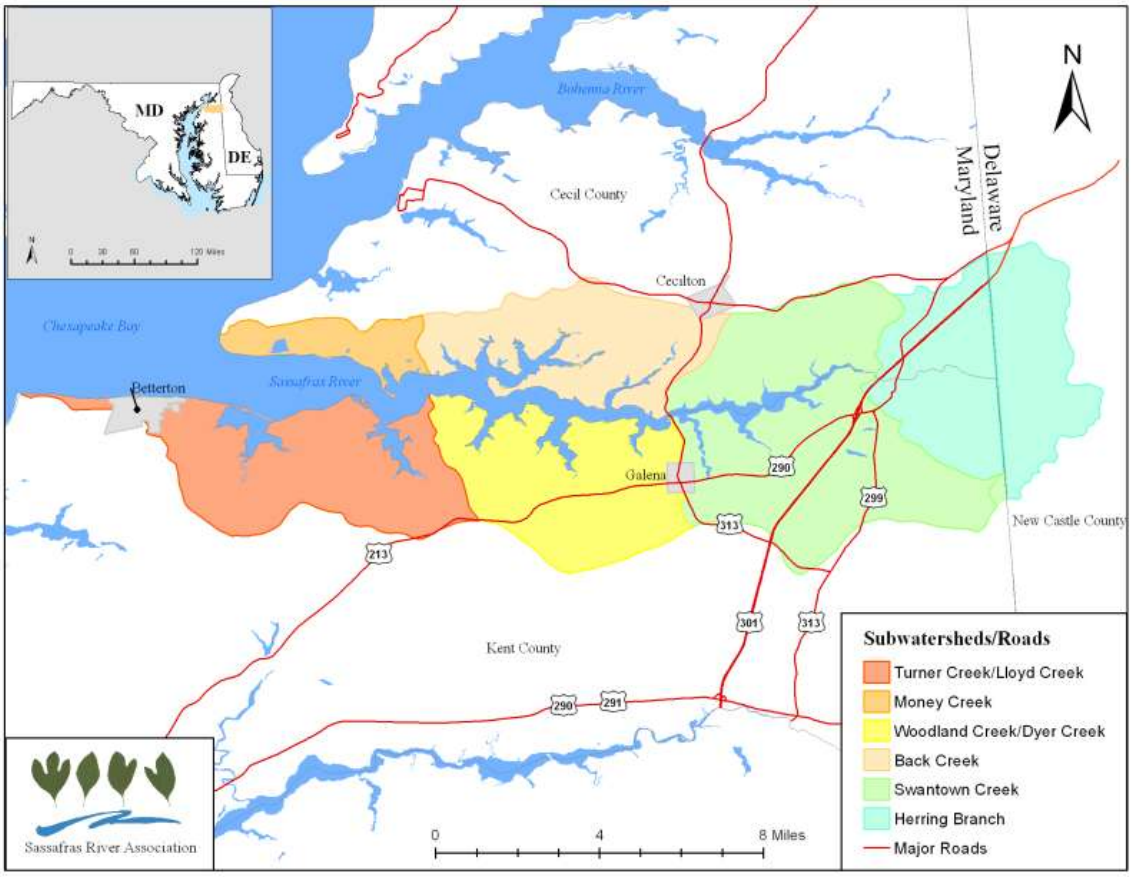
Location

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

Goal

The Sassafras River Watershed Action Plan (SWAP) was developed by the Sassafras River Association (SRA), a private nonprofit organization, in 2009. The Plan lists numerous goals to be achieved within 10 years.

Figure 12. The Sassafras River Watershed's Six Subwatershed Areas. (source: Sassafras Water Action Plan. Sassafras River Association in partnership with the Center for Watershed Projection. 2009. Page 3.)



Implementation

Most of the goals outlined in the Sassafras SWAP require significant preparatory work before implementation. In the past year, SRA has laid much of this ground work, which cannot be captured in load reduction totals. The Sassafras Summary table below lists Plan goals that have a measureable environmental outcome relating to nonpoint source management. Additionally, the SRA reports for 2010:

- Approximately 50 rain barrels were installed.
- The installation of a demonstration rain garden is underway at a public library.
- Grant funding has been secured to design a treatment wetland at the headwaters of a nutrient rich tributary of the Sassafras River. Implementation is projected for summer of 2011. (SWAP goal #21 for wetland creation.)
- In 2010, SRA organized six workshops for watershed residents on the topics of lawn care, septic maintenance and upgrade, as well as agricultural and stormwater best management practices. A desktop analysis was performed using GIS to locate significant erosion sites in wooded areas of the watershed. From a digital elevation model, factors such as slope and flow accumulation were combined with soil erosion potential to determine likely hot spots for sediment delivery. These sites were then ranked by anticipated severity and will be field verified in 2011. SRA continues to work with both the Towns of Galena and Betterton to advance progress on upgrades to their waste water treatment plants.

Table 11. Sassafras River Watershed - 2010 Implementation Progress Summary

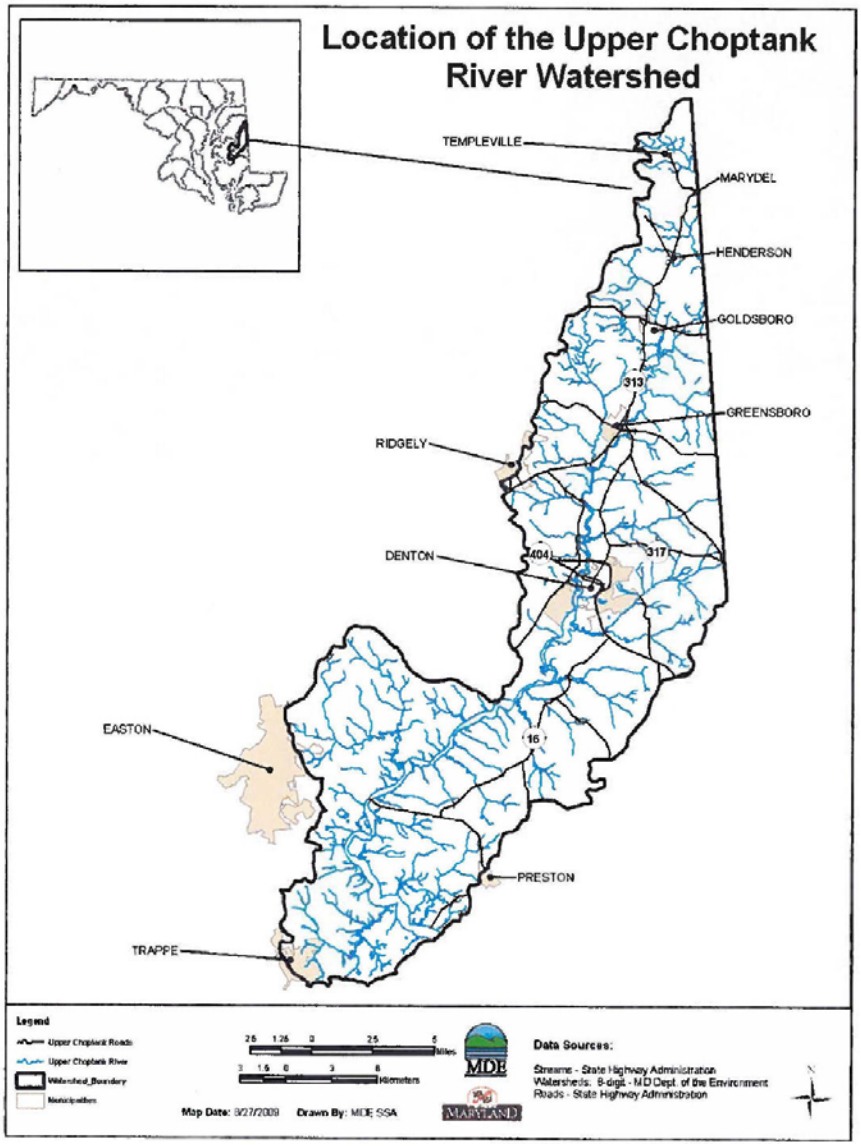
Goals			Progress					
			Implementation Progress (2)			Total Pollutant Reduction Reported		
Goal Number and Name	Unit	Units Needed	2010	Previous Years (2009)	Percent of Goal Achieved	Nitrogen (pounds/yr)	Phosphorus (pounds/yr)	Sediment (tons/yr)
#1 Road retrofit, stream restored	project	3	0	0	0%	NR	NR	NR
#2 Stormwater retrofits	project	4	1	0	25%	NR	NR	NR
#5 Septic system upgrades	project	150	NR	NR	0%	NR	NR	NR
#12 Stabilize eroding ravines	miles	1	0	0	0%	NR	NR	NR
#13 Stabilize eroding shoreline	miles	0.5	0	0	0%	NR	NR	NR
#14 Increase buffers (stream/shore)	miles	3	0	0	0%	NR	NR	NR
#17 Agricultural cover crops	acres/yr	5,000	NR	NR	0%	NR	NR	NR
#21 Wetland creation	projects	5	1	0	20%	NR	NR	NR
#22 Agricultural BMPs	acres	500	NR	NR	0%	NR	NR	NR

1. 2010 = Calendar year. NA = not applicable. NR = not reported.
2. No 319(h) Grant funds have been directed to this watershed. Implementation using other funding sources may not be fully tracked or reported.
3. Implementation progress reported was tracked and reported by the Sassafras River Association. Number of cover crop acres and septic systems tested was being compiled but was not available for this report.

5. Upper Choptank River

Location

The Upper Choptank River watershed encompasses 163,458 acres (255 mi^2) that drains portions of three Maryland counties (Caroline, Talbot and Queen Anne's Counties) and a portion of Delaware. 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: 58% agricultural; 31% forest; 8% developed and; 3% water.



Goal

In the Upper Choptank River watershed plan was developed by Caroline County in 2010, the goal with a measureable water quality result is to reduce nonpoint source nutrient loads:

- Total nonpoint source nitrogen reduction: 704,000 pounds/year
- Total nonpoint source phosphorus reduction: 34,500 pounds/year

Implementation

Reporting of implementation to meet watershed plan goals since plan completion in 2010 includes two 319(h) Grant-funded projects as summarized on the next page.

Table 12. Upper Choptank River Watershed – 2010 Implementation Progress Summary									
Categories (3)	**2010 Implementation (4)**					**Previous Implementation (5)**			
	Units	**Count**	**Nitrogen (lb)**	**Phosphorus (lb)**	**Sediment (ton)**	**Projects**	**Nitrogen (lb)**	**Phosphorus (lb)**	**Sediment (ton)**
Agricultural Cover Crops	acres	200	1,819	23	NR	NA	NA	NA	NA
Agricultural BMPs (all others)	# of BMPs	358	31,350	5,809	108	NR	NR	NR	NR
Urban BMPs (all)	# of BMPs	NR	NR	NR	NR	NR	NR	NR	NR
TOTAL Pollutant Reduction			33,169	5,832	108		0	0	0
					Watershed Plan Goal		704,000	34,500	
					Overall Total Pollutant Reduction		33,169	5,832	108
					Percent of Goal Achieved		4.7	16.9	

1. 2010 = Calendar year. NA = not applicable. NR = not reported. BMP = best management practice. 2. All 319(h) Grant-funded implementation is reported.

3. The Upper Choptank watershed plan has numberous BMP goals that are aggregated into the broad categories listed in this table. Implementation that does not involve 319(h) Grant funds may not be fully tracked or reported.

4. Agricultural implementation is reported by the Caroline Soil Conservation District through the FFY2007 319(h) Grant project #21 with the Maryland Department of Agriculture, which was active between July 1, 2009 and June 30, 2010.

5. The 319(h) Grant has funds several years of agricultural technical assistance projects that predate EPA acceptance of the Upper Choptank watershed plan in 2010, which is not presented in this table.

Table 13. Upper Choptank River Watershed - 319(h) Grant Projects Funding Implementation							
Baltimore County Project Description (1)	**Grant Year Project # (2)**	**Grant Project Status**	**319(h) Funds (3)**	**Total Cost (4)**	**Estimated Load Reduction (5)**		
					Nitrogen (lb)	Phosphorus (lb)	Sediment (ton)
MDA / Caroline Soil Conservation Plan Agricultural Assistance (July 2009 – June 2010)	FFY2007 #21	Closed	56,256.00	93,760.00	33,169	5,832	108
Caroline County DPW Stormwater Retrofit	FFY2010 #7	Preconstruction	46,440	77,400	NR	NR	NR

(1) Implementation directly or indirectly supported by the 319(h) Grant. Excludes projects/costs for management oversight, monitoring, etc. Project prior to July 2009 are not presented.

(2) Additional information is available at http://iaspub.epa.gov/pls/grts/f?p=110:199:618139948454479 Select "Find Projects" and select "Maryland", grant year, project #.

(3) Closed projects = total 319(h) Grant funds expended for project. Other projects = 319(h) Grant allocated. Excludes match.

(4) Closed projects = reported total expenditure. Other projects = projected total cost.

(5) Closed projects = reported annual pollutant reduction. Other projects = projected future pollutant reduction.

V. Areas of Concern/Recommendations/Future Actions

Key challenges addressed by the NPS Program in collaboration with other state efforts include:

Urban/Suburban Nonpoint Source Pollution is increasing: Maryland has seen tremendous population growth over the last 20 years and the trend is projected to continue. An accompanying trend is a decrease in the number of people per household. These trends contribute to increasing development acreage, increasing impervious area as a percentage of the landscape and increasing urban nonpoint source pollutant loads in affected watersheds. During 2009, the Maryland Department of the Environment (MDE) continued to promote new and innovative practices to control stormwater through environmentally sensitive design techniques described in the "2000 Maryland Stormwater Management Manual." Also during 2009, MDE's Stormwater Management Program was drafting a new manual with updated information, guidelines and requirements. MDE is committed to maintaining a state-of-the-art approach to stormwater management and can contribute to control and reduction of the negative affects of urban stormwater runoff.

One current and ongoing effort to improve NPS management in Maryland is State Agency assistance to local governments as they improve the Water Resource Elements (WRE) in their comprehensive plans. To promote increasingly effective local NPS management, MDE assisted local governments in 2009 in several key ways: 1) developed and made available NPS analysis tools for use by local governments, 2) provided direct staff assistance in using these tools and in meeting NPS program objectives, and 3) reviewed and commented on local government's draft WRE sections for their comprehensive plans. It is anticipated that the work to promote effective NPS management by local government must continue into the future.

Another important way to help address this issue is for erosion/sediment control practices to evolve toward increasingly efficient and cost effective ways to protect water quality. To promote this evolution, MDE initiated a comprehensive review of the State's erosion and sediment control standards in early 2009. An initial draft "2010 Maryland Standards and Specifications for Soil Erosion and Sediment Control" was released. This work addresses numerous suggestions that MDE received related to improvements of the State's erosion and sediment control requirements during the development of Montgomery County's municipal separate storm sewer system discharge permit, new stormwater regulations required by the State Stormwater Management Act of 2007, and the general discharge permit for stormwater related to construction activity. When final, this effort will result in revised minimum standards for erosion and sediment control and will be the official guide for erosion and sediment control principles, methods and practices in Maryland. One challenge that be met during evolution process is to define the best mix of pollutant control efficiency and practical, cost effective solutions.

Resource Constraints/Measurable Environmental Results: As federal and state budgets grow tighter, there is a push for all programs to demonstrate their effectiveness at producing results. The national Nonpoint Source Program is under pressure to demonstrate program effectiveness through measurable environmental results. Over the past two decades, the Maryland NPS Program has focused on a *targeted watershed* approach to help target resources in a way that

would generate measurable results. Although the logic is compelling, initial findings of a retrospective assessment of results the past two decades are not as compelling. Maryland's NPS Program, in coordination with EPA Region III, will evaluate the findings in a manner that has the greatest potential to generate measurable results. In the future in coordination with EPA Region III, the NPS Program will selectively target program resources to aid efforts aimed at the following priorities:

Protection of high quality (Tier II) waters: The 319 Program is supporting refinement and implementation of Maryland's anti-degradation regulations by funding biological monitoring. This is being targeted to Tier II waters in which proposed development activities serve to support MDE decision-making and test the effectiveness of the anti-degradation policies.

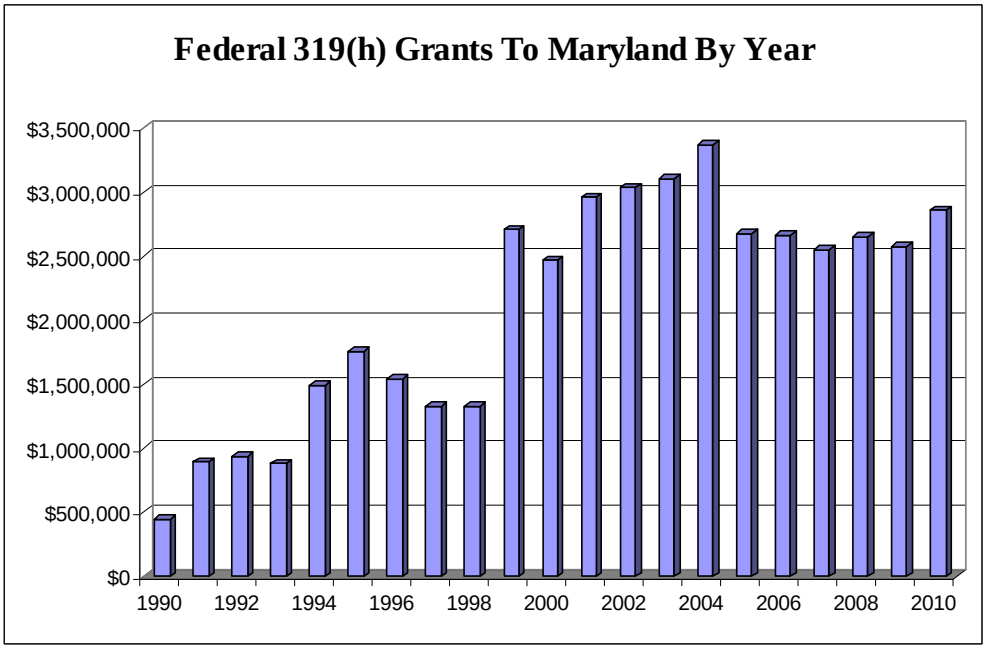
Biological Restoration Initiative: Maryland uses biological data from streams as one gauge of potential degraded conditions. If the percentage of degraded streams in a watershed exceeds a certain threshold, Maryland formally identifies that watershed on the State's list of impaired waters. Because watersheds that are just below the threshold of impairment may have a higher potential for restoration than those that are significantly more degraded, resources from the 319(h) NPS Program are being directed to these marginally impaired watersheds in an effort to remove them from the State's impaired waters list. The 319(h) Grant funding for this Biological Restoration Initiative (BRI) has been coordinated with the State's Chesapeake and Coastal Bays Trust Fund (Trust Fund) grant program trough the Trust Fund's targeting scheme. This coordination will assist in providing leveraging opportunities for funding in the future.

Reducing nutrient and sediment pollution to the Chesapeake Bay: Nutrient and sediment pollution are the main causes of impairment of our tidal waters. These pollutants were the focus of EPA's development of TMDLs for the Chesapeake Bay in 2010. The 319 Program provided resources to support the development of Maryland's Phase I Watershed Implementation Plan (WIP). In addition to this Chesapeake Bay restoration planning, the 319 Program is coordinating implementation grant proposals through Maryland's Trust Fund, which targets resources to areas with the greatest nutrient loading to the Bay and to the BRI target areas discussed above.

Improvement of Impaired Waters:
Removal of impaired waters from Maryland's 303(d) list, either entirely or partially, is a priority. This priority is designed in part to address EPA's Strategic goals that call for improvement in a state's living resources. During 2009, MDE assessed the list of waters with biological impairment in Maryland and ranked them to identify watersheds that appear to be the best opportunities for implementation to remove an entire watershed from the list. Each of these watersheds has multiple stream segments with biological impairments, which means that in-the-field assessment and implementation activities will be necessary in multiple locations across the watershed. Beginning in 2010, MDE will work to integrate these priorities into the selection process for implementation projects. It is anticipated that soliciting implementation partners and funding implementation projects will be a challenge because this priority must compete with other State implementation priorities.

Documenting Success Stories: Maryland is committed to documenting at least one success story each year. The results for 2010 are summarized in this Annual Report.

Appendix A
Financial Information - Federal 319(h) Grant Maryland Funding Summary



Federal Fiscal Year	319(h) Grant Funds (1)	Non-Federal Match (2)	Other Sources (3)	Total (4)
1990	$447,771	$298,514		$746,285
1991	$890,039	$593,359		$1,483,398
1992	$939,298	$626,199		$1,565,497
1993	$877,070	$584,713		$1,461,783
1994	$1,494,413	$996,275		$2,490,688
1995	$1,755,964	$1,170,643		$2,926,607
1996	$1,541,980	$1,027,987		$2,569,967
1997	$1,327,699	$885,133		$2,212,832
1998	$1,327,699	$885,133		$2,212,832
1999	$2,708,298	$1,805,532		$4,513,830
2000	$2,467,576	$1,645,051		$4,112,627
2001	$2,958,486	$1,972,324		$4,930,810
2002	$3,035,576	$2,023,717		$5,059,293
2003	$3,104,500	$2,069,667		$5,174,167
2004	$3,369,190	$2,246,127		$5,615,317
2005	$2,675,598	$1,783,732		$4,459,330
2006	$2,666,655	$1,777,770		$4,444,425
2007	$2,551,736	$1,701,157		$4,252,893
2008	$2,653,500	$1,769,000		$4,422,500
2009	$2,575,782	$1,717,188		$4,292,970
2010	$2,860,785	$1,907,190		$4,767,975
Total	$44,229,615	$29,486,410		$73,716,025

1) Grant award amount. 2) State and local match funds. 3) Other sources are not tracked.
4) 319(h) Grant funds plus non-federal match.

Appendix B
List of Agency Cooperators - Maryland Nonpoint Source Program (1)

State Lead Agency	Maryland Department of Environment Science Services 1800 Washington Blvd., Baltimore MD 21230 410-537-3902	Jim George - Director, Water Quality Protection and Restoration Program Ken Shanks - TMDL Implementation Division Eric Ruby - § 319(h) Grant Manager §319(h) Staff – Susan Douglas, Joe Woodfield Projects – James Forrest, Jen Jaber, Robin Pellicano, Sekhoane Rathhebe, Gregorio Sandi, Ian Spotts
State	(Maryland) Chesapeake Bay Trust 60 West Street, Suite 45, Annapolis MD 21401	Jana Davis, Associate Executive Director
	Maryland Department of Environment Acid Mine Drainage Section 160 South Water Street, Frostburg MD 21532	Constance Lyons Loucks - Chief
	Maryland Dept. of Natural Resources, Watershed Services 580 Taylor Ave. E-2, Annapolis MD 21401 410-260-8710	Matt Fleming – Chesapeake & Coastal Programs Kevin Smith – Ecosystem Restoration Services Catherine Shanks – Community & Local Government Services
	Maryland Dept. of Natural Resources, Resource Assessment Service, Monitoring and Nontidal Assessment Division 580 Taylor Ave. C-2, Annapolis MD 21401 410-260-8605	Daniel Boward, Chief, Data Management and Administration Program
	Maryland Department of Agriculture 50 Harry S. Truman Parkway Annapolis MD 21401	John Rhoderick- Office of Resource Conservation Projects – Janet Crutchley
	Maryland Department Of Planning 301 W. Preston Street Suite 1101 Baltimore MD 21201-2305	Joe Tassone- Landuse Planning and Analysis
Federal	EPA Region III Nonpoint Source Program Water Protection Division Mail Code 3WP10 1650 Arch Street, Philadelphia PA 19103-2029	Fred Suffian, Team Leader David Greaves, Maryland Project Officer

Appendix B
List of Agency Cooperators - Maryland Nonpoint Source Program (1)

Local (2)	Baltimore Co. Dept. of Env. Protection and Resource Mgmt	Candace Croswell, Manager Capital Programs and Operations
	Calvert County Dept. of Planning and Zoning	Dr. David Brownlee, Manager. Steven Kullen, Watershed Planner
	Caroline Soil Conservation District	John Shephard, District Manager
	Caroline County, Planning and Codes Administration	Kathleen Freeman, Director
	Carroll Soil Conservation District	via MDA
	Centerville, Town of	Bob McGrory, Town Manager. Eva Kerchner, Watershed Manager
	Dorcester Soil Conservation District	via MDA
	Frederick Co. Div. of Public Works Watershed Mgmt Sect.	Shannon Moore, Manager Project Managers: Jessica Hunicke, Heather Montgomery
	Harford County, Dept. of Public Works	Betsy Weisengoff, Environmental Engineer
	Harford Soil Conservation District	via MDA
	Maryland Coastal Bays Program	David Wilson, Executive Director
	Prince George's Co. Dept. of Environmental Resources	Dr. Mow-Soung Cheng, Assistant Associate Director
	Queen Anne's Co. Dept. of Public Works	Todd Mohn, Director. Lee Edgar, Civil Engineer
	Queen Anne's Soil Conservation District	via MDA
	University of Maryland Center for Environmental Science	Dr. Margaret Palmer, Professor and Director
	Washington Soil Conservation District	Elmer Weibley, District Manager
	Worcester Co. Dept. of Development Review & Permitting	Ed Tudor, Director. Keota Silaphone, Watershed/GIS Planner

(1) Projects active Through December 31, 2010 in the 319(h) Grant.
(2) Local includes all forms of local government.

Appendix C
2009 BMP Implementation Progress In Maryland

From MDE's Analyzing and Tracking Nonpoint Source Data Project, FFY08 319(h) Grant
Robin Pellicano, Febraury 2011

Type of Practice	Statewide Total	Nitrogen Reduction Approx. (lb/yr)	Phos Reduction Approx (lb/yr)
Animal Composters on Ag Lands	26	237	6
Animal Waste Management Systems-Livestock	1,202	1,446,967	163,841
Animal Waste Management Systems-Poultry	1,276	286,729	32,466
Grassed Buffers	45,674	447,122	52,909
Cover Crops	202,474	365,318	16,695
Dry Detention Ponds and Hydro Structures	70,391	25,703	3,181
Dry Extended Detention Ponds	43,677	95,689	9,870
Forest Conservation	5,180	N/A	N/A
Forest Harvesting Practices	12,179	8,337	109
Filtering Practices	7,750	22,638	2,102
Heavy Use Poultry Pads	288	N/A	N/A
Infiltration Practices	31,244	114,082	9,884
Nutrient Management Plan Implementation	1,262,747	1,437,381	253,170
Runoff Control	1,049	766	47
Riparian Forest Buffers on Ag Lands	21,036	244,246	29,992
Riparian Forest Buffers on Urban Lands	399	470	1,364
Retirement Of Highly Erodible Lands	18,496	87,442	918
Septic Connections to Sewers	11,547	84,325	0
Soil Conservation Water Quality Plans	845,788	962,758	169,573
Septic Denirification	3,014	13,864	0
Stream Protection w/Fencing	8,886	121,381	11,877
Stream Protection w/o Fencing	32,432	221,504	21,674
Tree Planting on Agricultural Lands	11,336	131,614	16,161
Stream Restoration	152,514	6,944	12
Water Control Structures	41	308	0
Wet Ponds	71,217	156,024	16,093
Wetland Restoration on Ag Lands	7,724	89,679	11,012

1. For each type of practice in the table, data represents cumulative totals through June 2009.
2. Nutrient load reduction estimates for each type of practice represent the affect of each BMP acting independently. The nutrient reduction estimates fo not account for the potential aggregate affect of multiple BMPs interacting together. For example, an agricultual field may have both cover crops and grassed buffers.

Appendix D

General Approach and Schedule to Implement Applicable Management Measures

Category / Priority		Implementation Timeline (Years)		
		1998-2002	2003-2007	2009-2012
Agriculture	Statewide	Farmers using commercial fertilizers must have n & P based plans by 2002	Soil Conservation Water Quality Plans (SCWQP) on 50% of all farms by 2003	
		Farmers using animal manure or sludge must have n & P based plans by 2002	SCWQP implemented on 25% of all farms by 2003	
			Farmers using animal manure or sludge must have N&P based plans by July 1, 2004	
	Watershed Focus	Tributary Strategies	Agricultural Priority Watersheds**	
		Agricultural Priority Watersheds**		
Forestry	Statewide	Riparian Forest Buffer (RFB) goal of 43 mi/yr	RFB goal of 43 mi/yr	600 miles of RFB created by 2010
	Watershed Focus	Coastal Bays		
		Special Streams Project		
		Monocacy		
		Anacostia		
		Susquehanna		
		Town Creek		
		Rock & Carroll Creek		
Urban runoff: developing and developed areas	Statewide			
	Watershed Focus	Washington - Baltimore Metro Area, Roland Run, Redhouse Run, Severn River SWM plan		
		Anacostia Watershed		

Appendix D

General Approach and Schedule to Implement Applicable Management Measures

Category / Priority		Implementation Timeline (Years)		
		1998-2002	2003-2007	2009-2012
Marinas and Recreational Boating	Statewide	96 Certified Clean Marinas by 2002	125 Certified Clean Marinas by 2004	270 Certified Clean Marinas by 2010
				Marine Sewage Pumpout Program goal of 460 facilities by 2010
	Watershed Focus	Chesapeake Bay		
		Coastal Bays		
		Deep Creek Lake		
Channelization and Channel Modification, dams, and shoreline erosion	Statewide			
	Watershed Focus	Chesapeake Bay Shoreline		
		CWAP Priority Watersheds		
		Anacostia Northwest Branch		
		Anacostia Town Park Stream		
Wetlands	Statewide	3000 acres by 2002	10,500 acres by 2007	15,000 acres by 2010
	Watershed Focus	CWAP Priority Watersheds		
		Coastal Bays		

From "Maryland Nonpoint Source Management Plan December 1999"

Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY
Maryland

Restoring Stream Improves Water Quality and Fish Community Health

Waterbodies Improved

During rainstorms, high volumes of rapidly moving stormwater flow off of impervious surfaces and into Maryland's Spring Branch, causing destructive erosion of the stream channel and contributing sediments and nutrients to a drinking water reservoir. The Maryland Department of the Environment (MDE) added Spring Branch to the state's Clean Water Act (CWA) section 303(d) list in 1996 for nutrient and sediment impairments and expanded the listing in 2002 to include biological impairments. Restoring two miles of stream has significantly reduced nutrient and sediment loads and improved fish habitat. Water quality continues to show progress toward meeting the total maximum daily load (TMDL) limits for phosphorus and sediment in the Loch Raven Reservoir, which is immediately downstream of the project area.

Problem

The 1,005-acre Spring Branch watershed drains a portion of Baltimore County in the urbanized Baltimore metropolitan region and empties into the Loch Raven Reservoir. Spring Branch is designated for water contact recreation use, aquatic life use and public water supply use.

Spring Branch was once a narrow, shallow trout stream. Fifty years of rapid urbanization created many impervious surfaces with few stormwater controls (Figure 1). Consequently, rainfall generates high volumes of runoff that quickly exceed the capacity of Spring Branch. Stormwater flows have eroded the stream channel so that it is now 30 feet deep and 15 feet wide. Erosion has exposed sewer pipes and created high sediment and nutrient loads that flow into the Loch Raven Reservoir.

MDE first added Spring Branch to the CWA section 303(d) list in 1996 for nutrient and sediment impairments. On the basis of biological monitoring results, MDE expanded the list of impairments to include a biological impairment in 2002.

In 2007 the U.S. Environmental Protection Agency approved MDE's TMDL for Loch Raven Reservoir, which includes the Spring Branch subwatershed. The TMDL requires that total phosphorus be reduced by 50 percent to meet water quality standards for dissolved oxygen and chlorophyll *a* (to prevent algae blooms in the reservoir). The TMDL also requires that suspended sediment be reduced by 25 percent to preserve the reservoir's volume. A TMDL for biological impairments has not yet been developed.

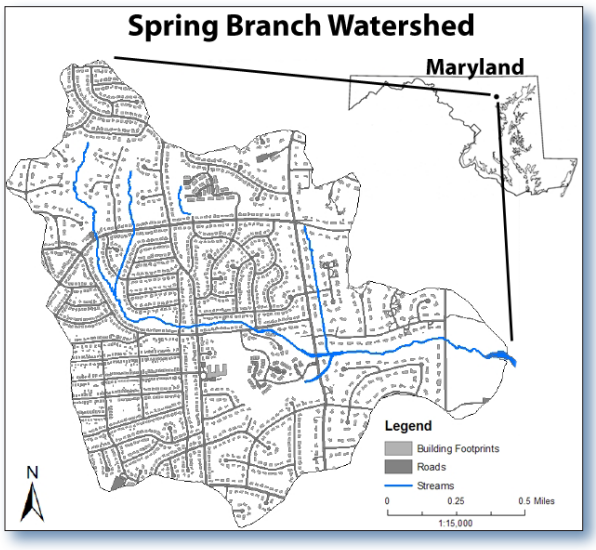


Figure 1. Impervious surfaces in northern Maryland's Spring Branch watershed.

Project Highlights

In 1997 Baltimore County developed a water quality management plan for the Loch Raven watershed. The plan identified and evaluated nonpoint sources of pollution and provided a watershed restoration and management framework. The Baltimore Metropolitan Council's Reservoir Technical Group wrote a *2005 Action Strategy for the Loch Raven Reservoir Watersheds*, which called for Baltimore County to reduce nutrient and sediment inputs to the reservoir through a variety of best management practices, including stream restoration. Baltimore County chose to focus restoration efforts on Spring Branch because of its proximity to the reservoir

and other factors, and completed a *Spring Branch Subwatershed Small Watershed Action Plan* in 2008.

The Baltimore County Department of Environmental Protection and Resource Management (DEPRM) conducted two phases of restoration activities on Spring Branch—one beginning in 1997 and the second in 2008. Both phases addressed effects of urbanization, including the flashy (quick-to-flood) flow regime, erosion, declining ecological function, failing infrastructure, poor water quality and property damage.

In phase I, DEPRM created a new channel of Spring Branch and added step pools, meander patterns and flood plains. That and other parts of the stream channel were stabilized using natural materials such as boulders, tree root wads, brush mattresses and live branch layers. In addition, DEPRM removed 1,740 feet of concrete channel (Figure 2), stabilized or removed sanitary sewer lines, added rock-lined step pools below storm drain pipes to dissipate energy from the flow, and constructed a stormwater wet pond to treat runoff from the headwaters. Replanting 12 acres with native trees and shrubs restored 10,000 linear feet of stream (Figure 3).

In phase II, DEPRM removed another 524 feet of concrete channel and restored 3.23 acres of native riparian buffer using 219 trees; 547 shrubs; 2,133 live stakes; 295 linear feet of live branch layering and 102 pounds of native riparian seed. Phase II restored 2,814 linear feet of stream.

Figure 2. At this site (looking toward Pot Spring Road) before restoration efforts, Spring Branch flowed through a concrete channel. The concrete step seen here obstructed fish passage.

Figure 3. After restoration, the concrete channel seen in Figure 2 has been removed. Sewer lines running along both sides of the stream prevented partners from restoring a natural meandering pattern.

Results

The phase I work reduced phosphorus loads by 27 percent, nitrogen loads by more than 30 percent and sediment loads by 45 percent. In 2003 and 2004, monitoring at station SB-2 (downstream end of the phase I portion of the project) showed that few or no fish were present, and the fish index of biotic integrity score (IBI) was classified as *very poor* (score of less than 1.9). However, the fish community responded to phase II restoration efforts. Fish monitoring in 2009 (less than one year after phase I was completed) showed significant increases in fish biomass and fish IBI at stations SB-2 and SB-8 (headwaters). Removing the concrete channel (see Figure 2) allowed the fish to swim upstream and colonize the area. As seen in Figure 4, Fish IBI scores at both stations improved to a classification of *poor* (scores between 2.0 and 2.9).

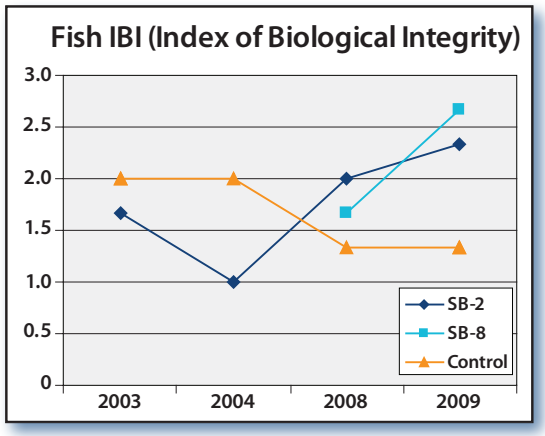


Figure 4. After phase II of the restoration (2008), fish IBI levels increased above (SB-8) and below (SB-2) the project area.

Although Spring Branch does not yet meet water quality standards, reduced pollutant loads and improving biological data indicate that progress is being made.

Partners and Funding

Project costs included $276,473 for a new wet pond serving 47 acres, $1.9 million for phase I work and $1.1 million for phase II work. Most of the funding came from Baltimore County bonds, MDE Small Creeks and Estuaries Grant and MDE stormwater cost share funds. A developer fee, required in lieu of mitigation funds, helped fund plantings. CWA section 319(h) funds contributed $240,000 for phase II work. Baltimore City, which owns and operates the Loch Raven Reservoir, was also a project partner.

U.S. Environmental Protection Agency
Office of Water
Washington, DC

EPA 841-F-10-001LL
December 2010

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