

PATUXENT RESERVOIRS WATERSHED  
PROTECTION GROUP



2017 ANNUAL REPORT  
OF THE  
TECHNICAL ADVISORY COMMITTEE

FINAL

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Special recognition goes to William "Bill" E. Barnes (HSCD) who was the last original member of the Policy Board. Mr. Barnes passed away in late 2017, and Justin Brendel filled his position. In addition, Lisa Feldt (MCDEP) and 2016 Policy Board Chair was replaced by Patty Bubar.

## Message from the Chair

The 2017 Patuxent Reservoirs Watershed Annual Report presents the Patuxent Reservoirs Watershed Protection Group's Technical Advisory Committee's (TAC) progress during the past year towards achieving long-term protection of the priority resources associated with the reservoirs and their watershed. The Report documents the TAC's continued assessment of issues and needs involved in improving implementation of the reservoirs Total Maximum Daily Loads (TMDLs), research and recommendations regarding the impacts on the reservoirs resulting from road salt applications, as well as the TAC's proposed work program and expenditures for the coming year.

Since the approval of the Triadelphia and Rocky Gorge Reservoirs TMDLs by EPA in 2008, the principal focus of the TAC has shifted to the need to implement the TMDLs. In 2015, the TAC undertook a TMDL implementation gap analysis, to establish an understanding of the progress made over the years under various programs to reduce pollutant loadings to the reservoirs. As was detailed in last year's annual report, a Patuxent Reservoirs TMDL Gap Analysis was completed in 2016.

Continuing this work in 2017, the TAC, through its TMDL Subcommittee, coordinated with the Maryland Department of the Environment (MDE) and the Maryland Department of Agriculture (MDA) on ways to address outstanding MDE concerns regarding the gap analysis. Progress in resolving these concerns is documented in this report, and will serve as a foundation for work in 2018 to revise the gap analysis. In 2017, the Washington Suburban Sanitary Commission (WSSC) allocated funds for the original consultant to make the needed modifications to the gap analysis. Once revised, the gap analysis will provide a basis for assessing options for improving progress in closing the TMDL implementation gap for the reservoirs.

The other principal task assigned to the TAC for 2017 by the Patuxent Reservoirs Watershed Protection Group's Policy Board was to research the road salt-related issues in the watershed, and make recommendations for addressing those issues. A TAC Road Salt Issue Subcommittee was created to work on this assignment, and the results of the research conducted and the associated recommendations, are also detailed in this report.

In addition to the work on TMDL and road salt-related issues, TAC member agencies made progress in a variety of areas including: agricultural BMP implementation, agricultural easement acquisitions, the Cattail Creek Stream Restoration at Maple Dell Farm, stream buffer plantings and maintenance, reservoir monitoring, deer management, invasive plant removal, trash cleanup efforts, public outreach to youth and landowners, and other environmental efforts in the watershed. These are discussed in more detail in this report.

Clearly, there are many challenges ahead in assuring the success of this partnership in 2018 and beyond. Reducing pollutant loadings to comply with the reservoir TMDLs will require developing a strategy for increasing the implementation of the most cost-effective Best

Management Practices (BMPs), and the resolve at the local level to fund the needed enhancements in BMP implementation. This will in turn likely require changes in TAC agency work programs and resource allocations that will be difficult to realize in the current economic climate. Nevertheless, safeguarding our drinking water reservoirs and the surface and ground water that supply them is not optional, and will necessitate future actions by policy makers that are commensurate with their importance.

Mark Symborski, Maryland-National Capital Park and Planning Commission  
2017 Chair, Technical Advisory Committee

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## Abbreviations

Abbreviation	Definition
AEP	Agricultural Easement Program (Montgomery County)
aka	Also Known As
BIBI	Benthic Index of Biotic Integrity
BMP	Best Management Practice
ca.	Approximately; about
chl- <i>a</i>	Chlorophyll- <i>a</i>
DEP	(Montgomery County) Department of Environmental Protection
DO	Dissolved Oxygen
DOT	(Montgomery County) Department of Transportation
DPW	(Howard County) Department of Public Works
ea	Each
EPA	U.S. Environmental Protection Agency
ESD	Environmental Site Design
FY	Fiscal Year
GIS	Geographic Information System
HC	Howard County
HSCD	Howard Soil Conservation District
LID	Low Impact Development
MAST	Maryland Assessment Scenario Tool
MC	Montgomery County
MDA	Maryland Department of Agriculture
MDE	Maryland Department of the Environment
M-NCPPC	Maryland-National Capital Park and Planning Commission
MS4	Municipal Separate Storm Sewer System
MSCD	Montgomery Soil Conservation District
mg/L	Milligrams per Liter (equivalent to part per million)
µg/L	Micrograms per Liter (equivalent to part per billion)
PGC	Prince George's County
NPDES	National Pollutant Discharge Elimination System
PRW	Patuxent Reservoir Watershed
PRWPG	Patuxent Reservoirs Watershed Protection Group
PSA	Planned Service Area (Howard County)
RC	Rural Conservation (Howard County)
RR	Rural Residential (Howard County)
SCD	Soil Conservation District
TAC	Technical Advisory Committee
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
WSSC	Washington Suburban Sanitary Commission

## Executive Summary

Two reservoirs on the upper Patuxent River, Triadelphia and Rocky Gorge (aka T. Howard Duckett), are significant water supply sources for the Washington D.C. metropolitan area, serving about 650,000 customers primarily in Montgomery and Prince George's Counties (Figure 1). The Patuxent Reservoirs' 132-square mile watershed includes land mostly in Howard (53%) and Montgomery Counties (46%) with the remaining land in Prince George's and Frederick Counties (1%) (Figure 2).

In 1998, the Maryland Department of the Environment (MDE) identified both reservoirs as impaired by nutrients and identified Triadelphia Reservoir as impaired by sediment; consequently, MDE determined that the reservoirs were unable to achieve State water quality standards for their designated uses, one of which is public water supply. To address these impairments, the US Environmental Protection Agency (EPA) approved Total Maximum Daily Loads (TMDL) for both reservoirs in November 2008. A phosphorus TMDL was established for each reservoir, and a sediment TMDL was established for Triadelphia Reservoir.

The following are highlights from 2017:

1. At the December 2017 meeting of the Patuxent Reservoirs Watershed Protection Group (PRWPG), the TAC provided a summary of findings on impacts to the reservoirs and watershed from road salt use, and recommendations to the Policy Board that included the development of a comprehensive salt reduction plan for the Patuxent Reservoirs Watershed. As an initial step, the TAC recommended that the Policy Board establish an interjurisdictional/interagency work group, and the Policy Board agreed.
2. The 2014 updates to the Patuxent Reservoirs Watershed Agricultural Cost-Share Program have allowed the Montgomery Soil Conservation District (MSCD) to use this funding source with much greater success. Although historical interest in the program had been spotty in Montgomery County, these updates have sparked new interest, especially among small horse farms. The MSCD used \$8,909 of the Patuxent Cost-Share program funds during fiscal year (FY) 17; only \$5,807 remains and this program will soon need refunding.
3. Technical and financial assistance from the Howard and Montgomery Soil Conservation Districts (SCDs) resulted in the installation of 20 agricultural BMPs.
4. The Washington Suburban Sanitary Commission (WSSC) completed its 26<sup>th</sup> year of reservoir water quality monitoring to provide data for technical analysis and long-term trend evaluation to support protection of the reservoirs and drinking water supply. Chlorophyll-*a* is one indicator of water quality presented in this annual report. Chlorophyll-*a* results from 2017 in Triadelphia Reservoir did (just) exceed one of the two thresholds established by the MDE for public water supply reservoirs. Chlorophyll-*a* results from 2017 in Rocky Gorge (or T. Howard Duckett) Reservoir did not exceed either threshold.



5. A variety of successful outreach events occurred again in 2017 including: watershed and Adopt-A-Road clean-ups, Montgomery County Department of Parks' Weed Warrior Program, and annual WSSC-sponsored events (Children's Water Festival, Sunfish and Students Program).

## Introduction

The Washington Suburban Sanitary Commission (WSSC) continues to provide potable water from the Patuxent Reservoirs system to about 650,000 customers, most of whom are located in eastern Montgomery County and Prince George's County (Figure 1). The WSSC created two reservoirs in the upper reaches of the Patuxent River. Brighton Dam, the most upstream, formed the Triadelphia Reservoir in 1944, and the T. Howard Duckett Dam formed the Rocky Gorge Reservoir (aka T. Howard Duckett Reservoir) in 1954.

The Patuxent Reservoirs Watershed (the Watershed) encompasses an area of about 132 square miles above the T. Howard Duckett Dam. This drainage area is located almost entirely in Howard County (53%) and Montgomery County (46%), with the remaining drainage area (1%) located in Prince George's and Frederick Counties (Figure 2). About 77 square miles (58%) of the entire drainage area drains to the Triadelphia Reservoir.

Since 1997, the Technical Advisory Committee (TAC) has completed an annual report to summarize its accomplishments and identify funding needs to address watershed priority resource issues. This annual report provides an update of on-going efforts and those completed in 2017.

In 2003, the Goals-Setting Workgroup of the TAC re-evaluated the original list of action items from 1997 and proposed a revised action plan, which was approved by the Policy Board. This revised list of action items, titled *Performance Measures and Goals for Priority Resources*, represents a continuation of the commitment to coordinate protection efforts in coming years (Table 6). This table contains goals, performance measures, implementation items, and a time line to achieve each goal for six priority resources selected by the TAC. Those priority resources include the following:

- Reservoirs and water supply
- Terrestrial habitat
- Stream systems
- Aquatic biota
- Rural character and landscape, and
- Public awareness and stewardship.

The TAC will continue to implement items associated with each of the priority resources primarily through existing TAC agency responsibilities and work programs. A table of expenditures is provided at the end of this report (Table 7) containing a list of implementation needs and action items for each of the priority resources, along with the responsible agency or agencies, and the corresponding expenditures for the current year.

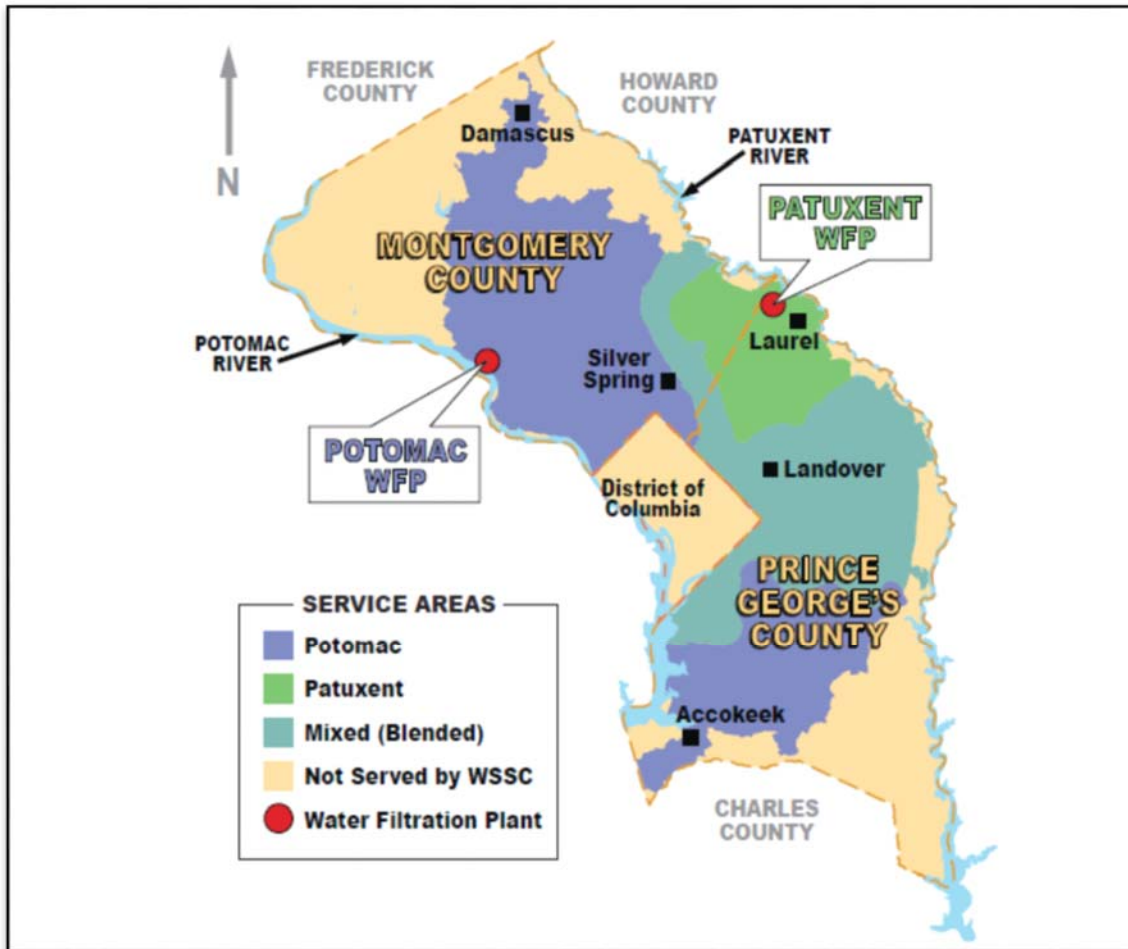


Figure 1. WSSC Drinking Water Service Area - Patuxent & Potomac Sources (excludes wholesale service to Howard and Charles Counties)

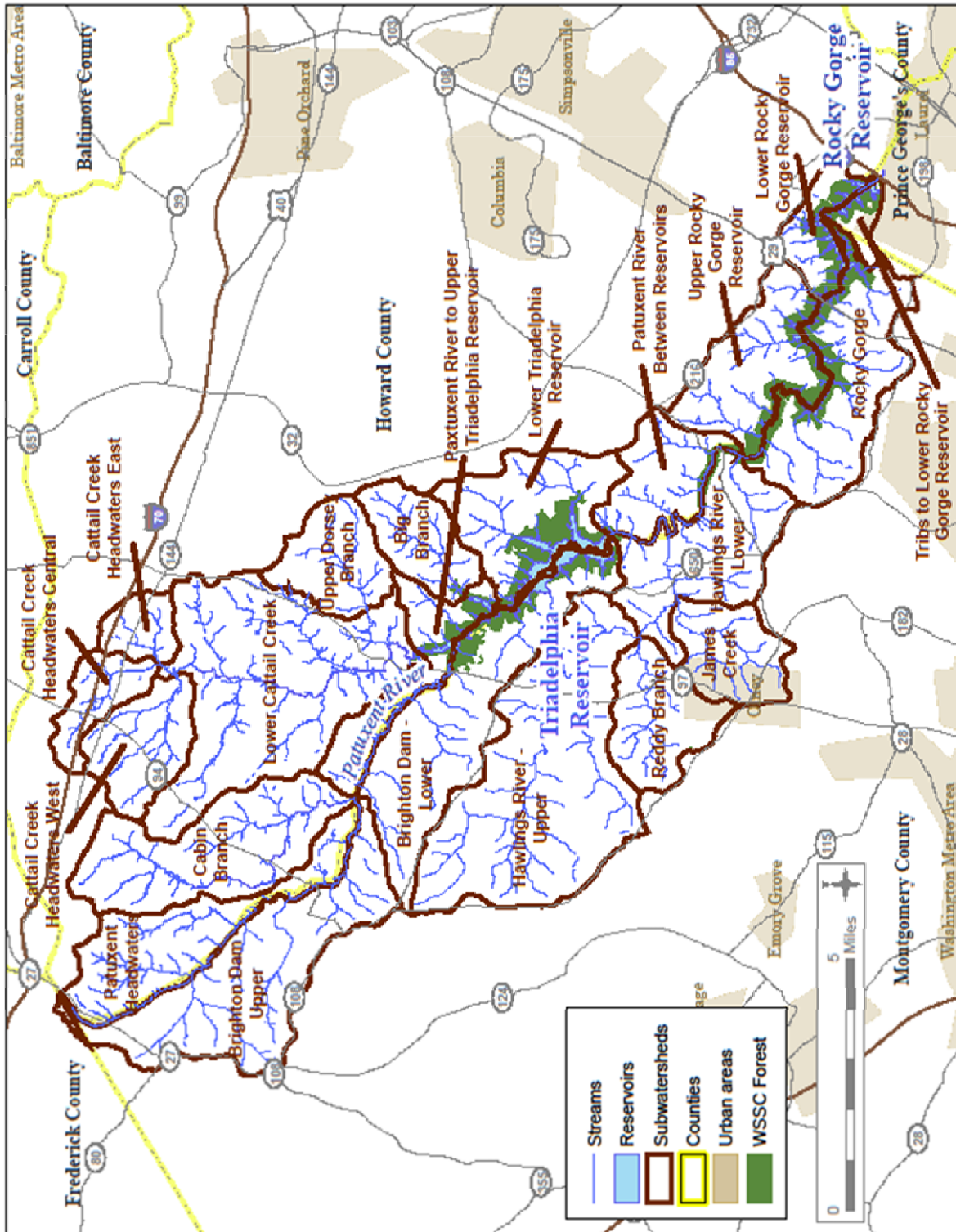


Figure 2. Patuxent Reservoirs Watershed (from Versar 2009)

## Total Maximum Daily Load Implementation

In 1998, the Maryland Department of the Environment (MDE) identified both reservoirs as impaired by nutrients and identified Triadelphia Reservoir as impaired by sediment; consequently, MDE determined that the reservoirs were unable to achieve State water quality standards for their designated uses, one of which is a public drinking water supply. To address these impairments, the US Environmental Protection Agency (EPA) approved Total Maximum Daily Loads (TMDL) for both reservoirs in November 2008. A phosphorus TMDL was established for each reservoir, and a sediment TMDL was established for Triadelphia Reservoir (with a 29% sediment reduction required). Significant phosphorus load reductions are required (58% for Triadelphia Reservoir, 48% for Rocky Gorge Reservoir) to meet Maryland’s water quality standards (Table 1). A majority of the needed phosphorus load reductions were allocated to non-point sources of pollution (i.e., load allocation). Runoff from land uses such as low density residential and agricultural land, in addition to eroding stream banks, are considered nonpoint sources of pollution in the Patuxent Reservoirs Watershed (Table 2).

Table 1. TMDLs for the Patuxent Reservoirs<sup>1</sup>

Water Body	Triadelphia Reservoir	Rocky Gorge Reservoir	Triadelphia Reservoir
Constituent	Total Phosphorus	Total Phosphorus	Sediment
Unit of Measure	(lbs/yr)	(lbs/yr)	(tons/yr)
Baseline Load	65,953	46,935	32,141
Percent Reduction	58%	48%	29%
TMDL	27,700	24,406	22,820
WLA <sup>A</sup>	5,288 19% <sup>D</sup>	7,429 30%	400 2%
LA <sup>B</sup>	21,027 76%	15,757 65%	22,420 98%
MOS <sup>C</sup>	1,385 5%	1,220 5%	Implicit

<sup>A</sup> WLA is the sum of TMDL Waste Load Allocations from all **point sources**.

<sup>B</sup> LA is the sum of TMDL Load Allocations from all **nonpoint sources** and background.

<sup>C</sup> MOS is the Margin of Safety for the TMDL.

<sup>D</sup> WLA, LA, and MOS percentages represent the reductions needed to achieve each TMDL.

The TMDLs were determined using linked dynamic models simulating the loadings rates into the reservoirs and water quality in the reservoirs.

“Nonpoint source loads and urban stormwater loads entering the Triadelphia and Rocky Gorge Reservoirs were estimated using the Hydrologic Simulation Program-Fortran (HSPF). The HSPF model is used to estimate flows, suspended solids and nutrient loads from the

<sup>1</sup> Maryland Department of the Environment. June 2008. *Total Maximum Daily Loads of Total Phosphorus and Sediments for Triadelphia Reservoir (Brighton Dam) and Total Maximum Daily Loads of Total Phosphorus for Rocky Gorge Reservoir, Howard, Montgomery and Prince George’s Counties, Maryland*. Baltimore, MD.

watershed’s sub-basins, which are linked to two-dimensional CE-QUAL-W2 models of each reservoir. These are used to determine the maximum loads of total phosphorus (TP) that can enter each reservoir while maintaining the water quality criteria associated with their designated uses.” (TMDL report, page 8)

Table 2. Contributing sources for modeled baseline pollutant loadings to the Patuxent Reservoirs<sup>2</sup>

Water Body	Triadelphia Reservoir	Rocky Gorge Reservoir	Triadelphia Reservoir
Constituent	Total Phosphorus	Total Phosphorus	Sediment
Cropland	50%	24%	54%
Pasture	6%	6%	3%
Animal Waste	3%	4%	--
Developed Land	9%	18%	1%
Forest	4%	6%	4%
Stream Scour	28%	8%	38%
Point Source	--	0%	--
Triadelphia Reservoir	--	34%	--

## TMDL Implementation-Related Activities

As detailed in last year’s annual report, a consultant was tasked in 2014 with determining the degree to which progress had been made toward reducing loads to meet the TMDLs. The project, called the “Patuxent Reservoirs TMDL Gap Analysis,” concluded in July 2016 with the completion of the consultant’s report, *Accounting for Interim Progress Achieved Towards Meeting Patuxent Reservoirs Watershed TMDLs*.

That report and the data used to determine load reductions were provided to the MDE for the purpose of approving the methodology to measure progress. Upon reviewing the report, MDE recommended three key refinements to the analysis: (1) incorporate the effect of cover crops, (2) incorporate nutrient management plan implementation, (3) account for the effect of suspected overlapping agricultural BMPs.

Subsequently, during 2017, the TAC’s TMDL Subcommittee held discussions with MDE about their concerns and then deliberated over the way forward. With the concurrence of the TAC, in September 2017 WSSC funding (\$11,566) was approved for the consultant to revise the Gap Analysis to address MDE’s concerns.

During the Fall 2017, a coordination meeting with the various stakeholders was held to discuss the particular revisions needed to the Gap Analysis and the best strategies to accomplish the

<sup>2</sup> Maryland Department of the Environment. June 2008. *Total Maximum Daily Loads of Total Phosphorus and Sediments for Triadelphia Reservoir (Brighton Dam) and Total Maximum Daily Loads of Total Phosphorus for Rocky Gorge Reservoir, Howard, Montgomery and Prince George’s Counties, Maryland*. Baltimore, MD.

tasks involved. The meeting included representatives from the TAC, MDE, and the Maryland Department of Agriculture (MDA). The need for additional agricultural data (e.g., cover crop acreage) was a key discussion item and the MDA agreed to coordinate with the project consultant to provide relevant data that had become available since the original gap analysis. Continued coordination with the MDE and the MDA is planned for 2018, to guide the revision and develop recommendations for BMP enhancements to improve progress in meeting the TMDLs.

The TAC TMDL Subcommittee identified additional issues in 2017 that may have significance for the reservoir TMDLs and future efforts to implement them:

- Sediment removal activities: In 2017, the WSSC removed sediment from the headwaters of Triadelphia Reservoir for the purpose of maintaining the reservoir's capacity. The TAC will pursue determining the implications, if any, on the Sediment TMDL for this reservoir.
- Potential adjustments recognizing a decade of additional data collection: About 10 years of water quality data have been collected since the reservoir TMDLs were determined in 2008, and those additional data may justify revisions to the TMDLs. WSSC has submitted its long-term water quality data to MDE for an assessment, and the TAC is awaiting the results. Completion of the assessment may take more than a year.

Proposed TAC TMDL-related activities in 2018 include:

- Continue coordination with MDE and MDA;
- Complete the revisions to the Patuxent Reservoirs TMDLs Gap Analysis; and
- Use the results of the Revised Gap Analysis to:
  - analyze current rate of progress towards TMDL compliance;
  - analyze potential future progress under alternative BMP implementation scenarios; and
  - develop recommendations for the Policy Board regarding BMP-based strategies for improving progress in meeting the TMDLs.

## Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System (NPDES) Permit Implementation Plans

According to the 2008 TMDL document for the reservoirs, one way to provide assurance that the TMDLs will be implemented is through the MS4 permits that regulate urban stormwater systems. Every county within the Watershed has an MS4 permit that requires each jurisdiction to develop an implementation plan for meeting its waste load allocation, which is the sum of the point source loads for all local TMDLs. While reductions required under the MS4 permit are important, MDE modeled sources of pollution in the Watershed and the waste load allocation represents just 15% of the total reductions needed to achieve the reservoirs' TMDL goals.

## Howard County

Howard County reports on progress towards meeting MS4 permit requirements in its NPDES Annual Report. Howard County also reported on its strategy to meet the MS4 permit impervious restoration requirement and its TMDL goals in its Countywide Implementation Strategy (CIS). Annual Report Number 22 and the CIS, submitted to MDE in December 2017, are available through the County government's Stormwater Management web page at <https://www.howardcountymd.gov/Departments/Public-Works/Bureau-Of-Environmental-Services/Stormwater-Management>.

As of 2017, BMPs within the Patuxent Reservoirs watersheds of Howard County produce the following pollutant load reductions, based on the approved Maryland Assessment Scenario Tool (MAST) pollutant load removal efficiencies (Table 3), as presented in the 2017 CIS.

Table 3. Phosphorus Reductions to Patuxent Reservoirs from Howard County Urban BMPs

Reservoir	Target Reduction	Progress Reduction
Triadelphia	398 lbs. (15%)	158 lbs. (6.0%)
Rocky Gorge	129 lbs. (15%)	78 lbs. (9.0%)

The MDE also designated Triadelphia Reservoir as impaired by sediment, but no target reduction was included because it was assumed that achieving the phosphorus TMDL would result in the needed sediment reductions for the waste load allocation portion.

According to the CIS, only one project in the Rocky Gorge Reservoir Watershed and one project in the Triadelphia Reservoir Watershed are needed to meet the County's phosphorus waste load TMDL goals. These projects are currently programmed and described in the Stream Systems section below.

Detailed watershed assessments and restoration plans for the Patuxent Reservoirs Watershed (PRW) were completed in 2016. Due to the large overall study area, the field work was conducted in three distinct areas: Brighton Dam/Triadelphia Reservoir, Rocky Gorge Reservoir, and Patuxent River Upper watersheds. The results of the field assessments were used to score and rank the potential project sites, and concept plans were developed for the highest rated 180 sites. Opportunities for restoration were identified, including BMP conversions, new BMPs, outfall stabilization, stream restoration, and reforestation. A report was generated for the Patuxent River watersheds, which includes the study methodology, results, and the concept plans. Some concept plans are on private properties; however, these potential projects will only move forward with the permission of the property owners. These reports and associated mapping are also available on the County's Stormwater Management web page.



## Road Salt Management

As reported in the County's NPDES MS4 Annual Report Number 22, the Bureau of Highways continues to utilize and update automatic vehicle location and geographic information system (GIS) technologies to record where and when de-icing chemicals were applied on County roads during winter storm events. This minimizes the possibility of inadvertent multiple applications of deicing chemicals. A total of 10,229 tons of salt, 2,150 gallons of liquid magnesium, and 42,000 gallons of salt brine were used for deicing the County's roads in FY17.

The Bureau of Highways holds a Snow Rodeo event every October, with mandatory participation from Highways staff. At this event staff drive a full-size snow plow through a course containing narrow pathways while missing all obstacles. In addition the crews practice backing up without hitting a barrier and pushing a log into a designated slot. This event is a fun activity that also allows the County snow plow/salt truck drivers to hone their skills and make them more efficient during actual snow/ice events.

## Prince George's County

The MS4 NPDES Permit for Prince George's County became effective in January 2, 2014 and will expire January 1, 2019. In partial fulfillment of the County's permit requirements, the *Restoration Plan for the Upper Patuxent River and Rocky Gorge Reservoir Watersheds in Prince George's County* was completed in December 2015. A load reduction target for the Rocky Gorge Reservoir watershed has been established for total phosphorus only, and in FY2017 the reduction achieved by BMPs amounted to 81% of the total target of just 27 lbs/yr.

Among the programs the County has established to comply with its MS4 NPDES Permit, a key program is the County's partnership with Corvias Solutions to form the Clean Water Partnership. The types of activities to be implemented by the partnership can include Environmental Site Design (ESD) type stormwater Best Management Practices (BMP), pond retrofits, and other urban BMPs, such as stream restoration, outfall stabilization, and tree planting.

The County provides a variety of volunteer opportunities and outreach activities to promote environmental awareness, green initiatives and community involvement towards protecting the environment. The County has integrated water quality outreach as a key component of watershed restoration projects. Since January 2015, the County has engaged grade K-12 students as well as the public in several outreach and education events in the Patuxent River Watershed. The County also conducts numerous tree planting activities through its *Arbor Day Every Day* and *Tree ReLeaf* programs, as well as litter reduction campaigns through its Comprehensive Community Cleanup Program. These programs occur throughout the County as strategic areas are identified.

### **Road Salt Management**

There are almost five miles of County maintained roads within the County's portion of the Rocky Gorge Reservoir Watershed. This total represents 4.8% of road miles in the PRW. During 2017, County road crews applied about 38 tons of salt on these roads at a rate of ½ ton per road mile.

## Road Salts – 2017 Related Activities

During the 2016 meeting of the Patuxent Reservoirs Watershed Protection Group (PRWPG), the Policy Board directed the TAC to research impacts to the reservoirs and the watershed from road salt use and make recommendations for addressing the issues at the 2017 meeting of the PRWPG. In early 2017, the TAC created a Road Salt Subcommittee to respond to this request. The principal objectives of the subcommittee were to review road salt-related information pertaining to the Patuxent Reservoirs and their watershed, research measures taken by other jurisdictions in the Country to address road salt-related water quality problems, and develop recommendations based on the findings.

The following summarizes the TAC's findings and recommendations, which were presented to the Policy Board at the 2017 Annual Meeting.

The TAC's findings include information regarding a variety of topics including:

- a summary of road salt impacts to the environment, infrastructure, and public health
- sodium and chloride trends in the Patuxent Reservoirs
- basic road infrastructure data that was collected for the Patuxent Reservoirs watershed
- strategies and methods that other jurisdictions are using to deal with road salt-related water quality problems
- the basic lessons learned from efforts in other jurisdictions to reduce the use of road salt
- additional economic factors of note related to the road salt issue
- basic salt reduction plan elements from other jurisdiction's efforts
- alternative practices for controlling ice and snow on roads
- the Twin Cities Chloride Management Plan as an example of a comprehensive plan
- TAC Recommendations

Impacts of salt on the environment, infrastructure, and public health include:

- Contributes sodium and chloride pollutants directly to streams and impoundments
- Infiltrates into groundwater and thence to wells, streams, and impoundments
- Threatens sensitive aquatic life
- Alters and degrades soils and soil biota
- Damages plant life, alters ecosystems, and causes erosion
- Deteriorates paved surfaces, buildings, pipes, and other infrastructure
- Deteriorates vehicles
- Accumulates in drinking water reservoirs
- Contributes to cardiovascular, kidney and liver diseases, and is directly linked to high blood pressure
- Imparts an unpleasant taste to water

## Groundwater Impacts

Groundwater contamination from road salt is particularly of concern due to the large amounts of salt that can infiltrate into aquifers, the large areas subject to such contamination, the impracticality of remediating salt contamination once it gets into groundwater, and the long period of time in which contaminated groundwater will continue to contribute to base flow water quality of streams and impoundments, even if salt use is curtailed. This problem makes it even more important to address the issue sooner than later.

Groundwater contamination from road salt is well documented in other jurisdictions where it is used, as well as in the counties that share the Patuxent Reservoirs watershed. Both Howard and Montgomery Counties have documented impacts to many private residential wells near roads. In Howard County, 123 out of 198 wells tested (62%) show elevated sodium levels, and 73 out of 198 wells tested (37%) show elevated chloride levels. The Montgomery County Health Department reports elevated sodium and chloride levels in many wells near roadways. The Montgomery County Department of Environmental Protection (DEP) reports late summer/fall increasing stream conductivity due to salt applications earlier in the year. Conductivity is used as a surrogate for sodium and chloride (among other ions) because conductivity increases as ions increase in the stream. The data demonstrate a latent effect due to the time interval during which salt contamination to groundwater from road salt applications works its way to streams.

## Direct Surface Water Impacts

Road salt contamination to surface water that does not infiltrate to groundwater runs off directly into streams and impoundments. In both streams and impoundments, salt pollution degrades water quality and is toxic to aquatic life. Surface water contaminated by road salt can dramatically increase salt concentrations in streams during and immediately after storm and snowmelt events. Although the salt concentrations in streams decrease relatively rapidly after such events, the acute toxicity for aquatic life can be dramatic, often resulting in mass mortality of fish and other stream animals. As noted above, however, chloride levels in streams have been noted to rise later in the year due to delayed transmission of contaminated groundwater inputs occurring during the winter. Impoundments, on the other hand, tend to retain salt loadings for much longer periods than streams that may pose significantly longer-term impacts to aquatic life and drinking water quality. In the case of impoundments, however, over the course of a typical year salt levels generally decrease gradually after the winter months.

## Other Road Salt-Related Factors

- Increased expenses are incurred to remedy affected infrastructure and vehicles, and to remove salt from household water
- In the U.S., 137 lbs./person/year of road salt are applied to roads, or about 22.3 million tons/year
- Road salt use is growing 40% faster than impervious land cover

- Bulk road salt purchases (\$ spent) nationwide: 7% Private, 13% Commercial, 80% Government
- Baltimore County: an average of 1.2 tons of salt is used per lane mile
- By comparison, in Massachusetts, where efforts are underway to reduce road salt applications, an average of 300 lbs. or less of salt is used per lane mile
- Chloride concentrations are increasing in streams and groundwater across the northern US and other areas that use road salt applications in winter

### Summary of Sodium and Chloride Data and Trends in the Patuxent’s Duckett Reservoir and in Baltimore County

Although chloride levels are not yet near regulatory limits in the reservoirs, they are at a concentration three times greater than levels from the 1990’s, and the trend is steadily increasing (Figure 3). Sodium levels are also increasing at a similar pace as chloride (Figure 4). In the case of sodium, however, the average levels are approaching the EPA’s public health guidance criterion. The trend line indicates that the EPA guidance criteria will be reached around 2025.

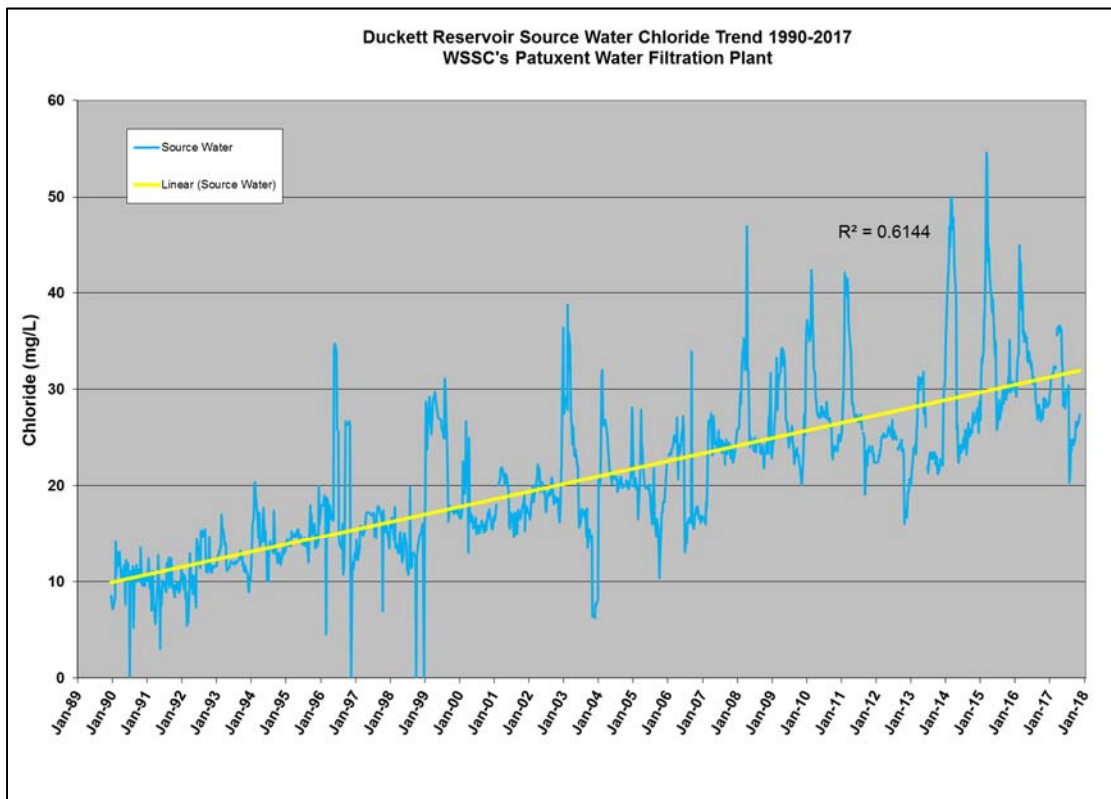


Figure 3. Long-term Chloride Trend at Patuxent Water Filtration Plant

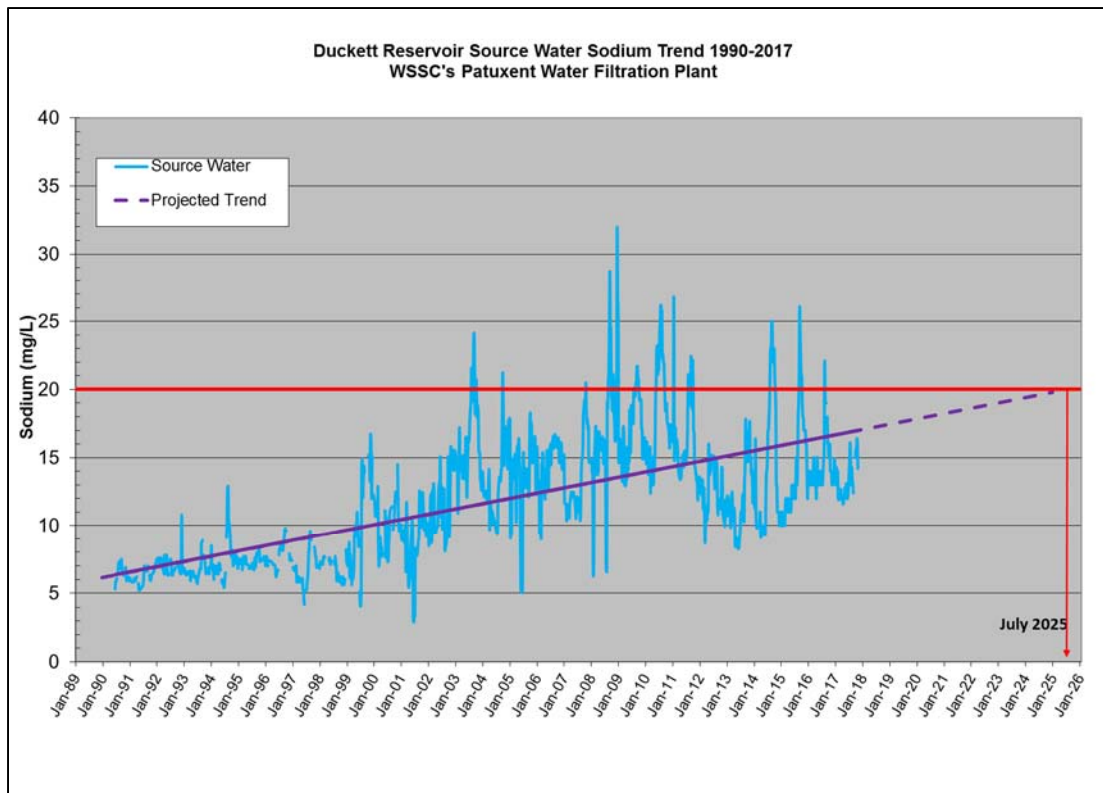


Figure 4. Long-term Sodium Trend at Patuxent Water Filtration Plant

Water quality data from Baltimore’s streams and reservoirs show similar trends illustrating the regional aspect to this problem. In this case, however, Baltimore’s sodium and chloride levels in streams and reservoirs are even greater than those in Montgomery County. For sodium, Baltimore’s reservoirs have already exceeded the EPA guidance criterion. This underscores the need for action to be taken sooner than later, to lower road salt use in the Patuxent Reservoirs watershed.

### Patuxent Reservoirs Watershed Basic Infrastructure Data Collection

The WSSC, with input from representatives on the Road Salt Subcommittee, has begun compiling basic information for paved surfaces that receive road salt applications. Figures 5 and 6 present basic road infrastructure data, including total miles and total percent of road by type per county, for the three counties that share the Patuxent Reservoirs watershed. Most of the roads in the reservoirs watershed are maintained by government agencies, with the majority of those under the jurisdiction of local governments (Figure 6).

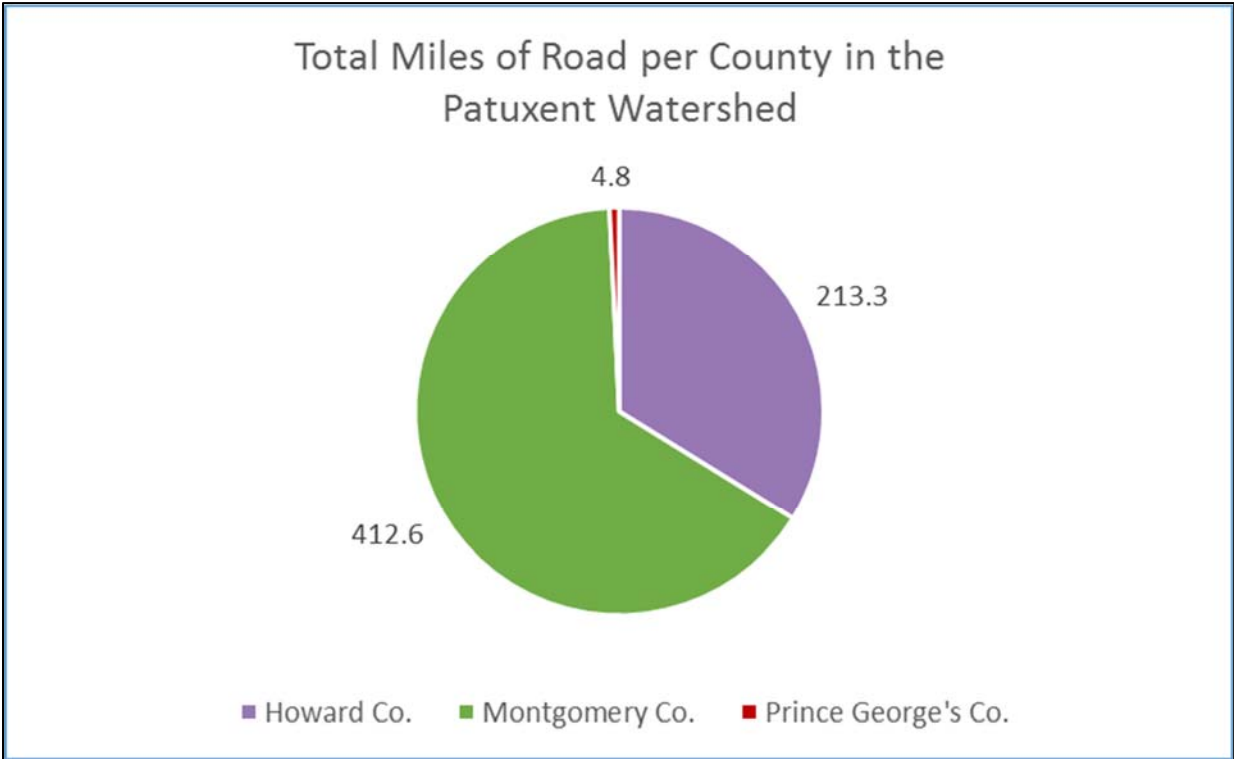


Figure 5. Road mileage totals per county in the Patuxent Reservoirs Watershed

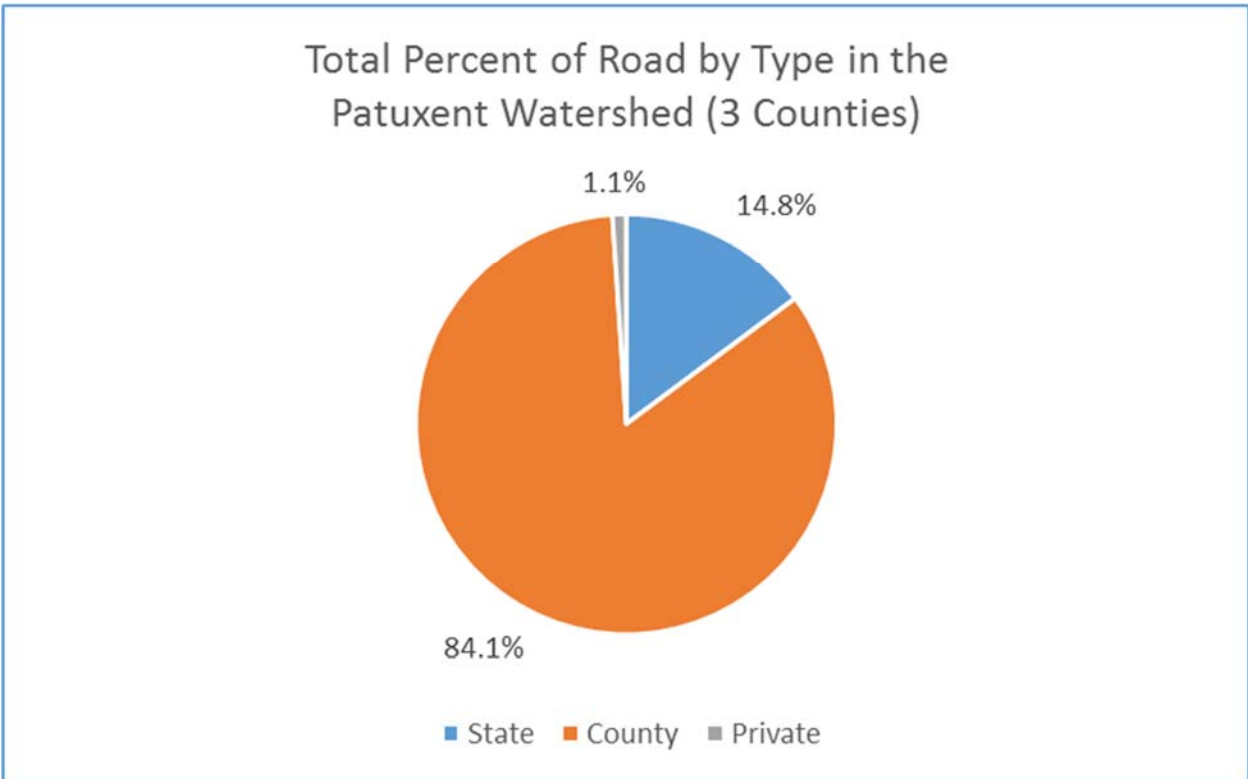


Figure 6. Road percentage by jurisdiction in the Patuxent Reservoirs Watershed.

## Efforts in other Jurisdictions to Address Water Quality Problems from Road Salt Applications

Across the large portion of the United States where road salt is used, many jurisdictions are experiencing salt-related water quality problems, especially in sensitive watersheds. Many of these jurisdictions have salt-related water quality standard impairments, some of these have already been issued TMDLs, and most with TMDLs have established comprehensive long-term processes to address salt-related water quality problems.

Some of the jurisdictions that have initiated planning and programmatic strategies to address road salt-related water quality issues include Minnesota, New Hampshire, Illinois, New York, Rhode Island, Texas, Wisconsin (City of Madison), and Massachusetts. Although the examples of road salt management planning in other jurisdictions were initiated to address approved chloride TMDLs in streams, it stands to reason that preventing a water body from reaching a state which requires a TMDL is a more effective strategy for ensuring water quality that meets regulatory standards, and is less expensive as well. A preventive approach is even more advisable for water bodies that are important as sources of drinking water.

The State of Maryland and some of its jurisdictions have also initiated planning and programmatic strategies to address road salt-related water quality issues. The Maryland State Highway Administration (SHA) has created a Statewide Salt Management Plan (2014). This plan did not include either a comprehensive assessment of water quality impairments, or a set of recommendations and implementation milestones designed to meet water quality criteria, but it does describe various strategies and techniques that can be used to reduce road salt applications. SHA has also begun to explore the use of brine applications to reduce road salt use.

Frederick and Montgomery Counties, are also experimenting with the use of brine applications, some of which are being combined with salt alternatives such as beet molasses. Baltimore County convened a Road Salt Work Group that included various stakeholders in the use of road salt. This workgroup produced a set of road salt recommendations for pursuing a comprehensive strategy for the county to address the water quality problems that are resulting from road salt applications.

The experiences in other jurisdictions seeking to manage and reduce road salt-related water quality impacts show that there are a wide variety of complicated issues and concerns, including regional, local, economic, watershed-specific, technical, climate, winter storm pattern, public expectations, public health and safety, outreach and education, interjurisdictional, and inter-agency perspectives. The wide variety of needs, concerns, and areas of expertise involved in managing the use of road salt underscores the need for an interagency work group to evaluate the needs and options to address those needs, and to make progress towards solutions that can achieve multiple objectives without compromising public health and safety.



Most jurisdictions attempting to better manage the use of salt with the goal of improving water quality in specific watersheds have developed, or are in the process of developing, comprehensive salt reduction plans. The TAC's research indicates that given the highly complicated technical, jurisdictional, and interagency issues involved, targeted salt reduction initiatives and plans are generally developed and implemented using a long-term, multi-staged, multi-stakeholder process that is typically initiated and guided by an interjurisdictional/interagency work group. It is important to note, however, that despite the complicated issues and difficulties involved in reducing road salt applications without compromising public health and safety on the roads, the examples from other jurisdictions show that it can be done.

In addition to the benefits from maintaining good water quality, there are many additional economic reasons for reducing the use of road salt. These include reduced material and application costs, and reduced costs associated with degraded bridge and road infrastructure, and vehicle corrosion. The associated cumulative savings can amount to millions of dollars.

### **Basic Elements of Road Salt Management Plans Developed in Other Jurisdictions**

Some basic elements found in watershed road salt reduction plans in other jurisdictions include:

- Assessments of current sodium and chloride levels, trends and trend projections
- Cost/Benefit analyses for various BMPs
- Setting goals, considering the amount of salt currently used, for targeted reduction amounts by applicator sector
- Timelines and milestones to meet goals
- Comprehensive implementation plan with detailed BMPs, protocols, and procedures to use by applicator sector
- Public education and outreach strategies
- Recordkeeping and reporting protocols to track progress towards goals, and use adaptive management, where needed, to make refinements
- Annual review of new technologies, practices, and information
- Periodic plan updates to address deficiencies and incorporate new technologies and practices

Some of the *alternative practices* for reducing road salt applications recommended and being used in other jurisdictions include:

- Real-time road and weather conditions information systems
- Improved application equipment and calibration on response to specific weather and road conditions
- Avoiding equipment overfill
- Returning unused materials to storage
- Onboard temperature sensors

- Use of brine
- Prewetting solid salt to prevent bouncing off pavements
- Reduce salt content of sand to what is needed to keep sand from freezing
- Alternative de-icers
- Mandatory training and certification for all applicators
- Public education and awareness campaigns
- Legislative changes (e.g. to reduce liability for private applicators, level of service, lower speed limits during winter storm events, etc.)

The Twin Cities Metropolitan Area Chloride Management Plan provides a useful example of a comprehensive plan to reduce road salt applications to achieve water quality goals, while maintaining adequate public health and safety on the roads. Access the plan at <https://www.pca.state.mn.us/sites/default/files/wq-iw11-06ff.pdf>.

### **Basic TAC Conclusions Based on Efforts in Other Jurisdictions**

A Patuxent Reservoirs Watershed Salt Reduction Plan is needed, and will not only help protect the integrity of the reservoirs, but can serve as an important pilot project in Maryland for achieving pollutant reductions in a sensitive watershed shared by multiple jurisdictions. Such a plan can provide an example of successful stakeholder cooperation and coordination that can serve as a template elsewhere in the State.

### **TAC 2017 Road Salt Issue-Related Recommendations**

1. Action should be taken at appropriately high policy-setting levels to reduce salt use in the Patuxent Reservoirs watershed, before water quality standards are exceeded, before significant economic impacts to WSSC and rate payers are incurred, or before public health is impacted.
2. Policies, practices, and standards that apply to public and private applicators should be modified to effect the reduction of salt used in the PRW.
3. A comprehensive salt reduction plan should be developed for the PRW.
4. As a first step, the Policy Board should establish an interjurisdictional/interagency work group to:
  - Assess the current sodium and chloride status and trends in the reservoirs, level of salt reduction needed, and the practices and opportunities for realizing salt use reductions while maintaining public safety, and
  - Determine a scope of work, approximate costs, and funding sources for developing a Comprehensive Salt Reduction Plan for the Patuxent Reservoirs Watershed.

In 2018, additional work on the road salt issue will focus on potential actions to be taken by the Policy Board regarding the recommendations of the TAC, and any additional research and assistance the TAC can provide to the Policy Board in support of their decisions.

# Annual Progress on Implementation Items for the Priority Resources

## Reservoir and Water Supply

### Reservoir Water Quality Monitoring

The WSSC completed its 26<sup>th</sup> year of reservoir water quality monitoring to provide data for technical analysis and long-term trend evaluation to support protection of the reservoirs and drinking water supply. Several sites on each reservoir are normally monitored bi-weekly, except during winter months. The parameters measured monthly are alkalinity, chloride, chlorophyll-*a*, color, nitrogen, phosphorus, sodium, total organic carbon, and turbidity. In addition, in-situ transparency and depth profile measurements are made of chlorophyll-*a*, conductivity, dissolved oxygen, dissolved organic matter, oxidation-reduction potential, pH, phycocyanin (indicator of cyanobacteria or blue-green algae), temperature and turbidity.

#### Chlorophyll-*a*

Chlorophyll-*a* (chl-*a*) is one type of chlorophyll present in all algae, and it is often used as a surrogate for algal abundance. The monitoring results for this constituent are summarized in this report and used as one indicator of reservoir water quality. The MDE amended Maryland's water quality standards by adding chl-*a* criteria for public water supply reservoirs in 2010 (Code of Maryland Regulations 26.08.02.03-3). The two criteria for public water supply reservoirs are:

1. *The arithmetic mean of a representative number of samples of chlorophyll-*a* concentrations, measured during the growing season (May 1 to September 30) as a 30-day moving average may not exceed 10 micrograms per liter ( $\mu\text{g/L}$ ); and*
2. *The 90th-percentile of measurements taken during the growing season may not exceed 30 micrograms per liter.*

Active chl-*a* results were used to better indicate living algal biomass rather than *total*/chl-*a*. Weekly, active chl-*a* samples, collected from the Patuxent Water Treatment Plant's raw water source, are used to determine compliance with the first criterion. The thirty-day moving average did not exceed the 10  $\mu\text{g/L}$  threshold during the growing season (Figure 7). These results do not characterize water quality conditions throughout the reservoir, but only near Duckett Dam.

*The water quality goal of the nutrient TMDLs is to reduce high chlorophyll-*a* concentrations that reflect excessive algal blooms, and to maintain dissolved oxygen at a level supportive of the designated uses for Triadelphia and Rocky Gorge Reservoirs. The water quality goal of the sediment TMDL for Triadelphia Reservoir is to increase the useful life of the reservoir for water supply by preserving storage capacity.*

TMDLs of Phosphorus and Sediments for Triadelphia Reservoir and TMDLs of Phosphorus for Rocky Gorge Reservoir, Howard, Montgomery and Prince George's Counties, MD. 2008

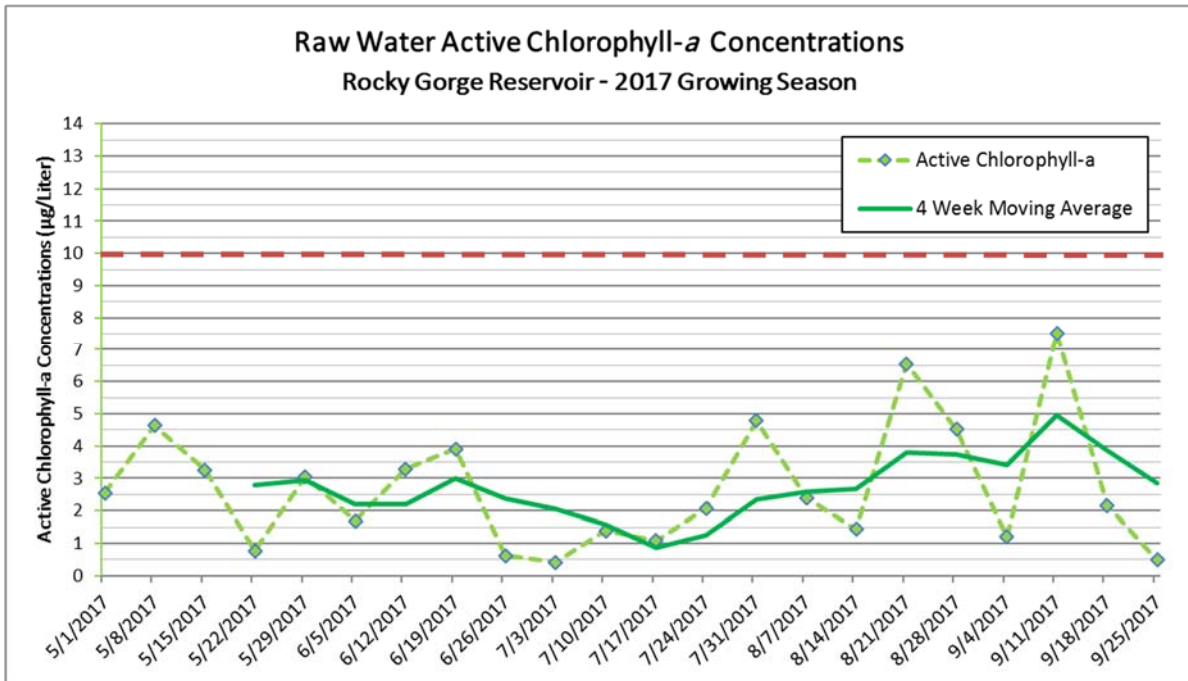


Figure 7. Active chlorophyll-*a* concentrations for 2017 growing season (May – September). Red, dashed line represents the thirty day moving average threshold for public water supply reservoirs.

For the second criterion, five sets of chl-*a* samples were collected from the reservoirs during the 2017 growing season (May-September). The 90<sup>th</sup> percentile threshold was not exceeded in Rocky Gorge (18.8 µg/L), but was exceeded in Triadelphia (30.3 µg/L) during 2017 (Figure 8).

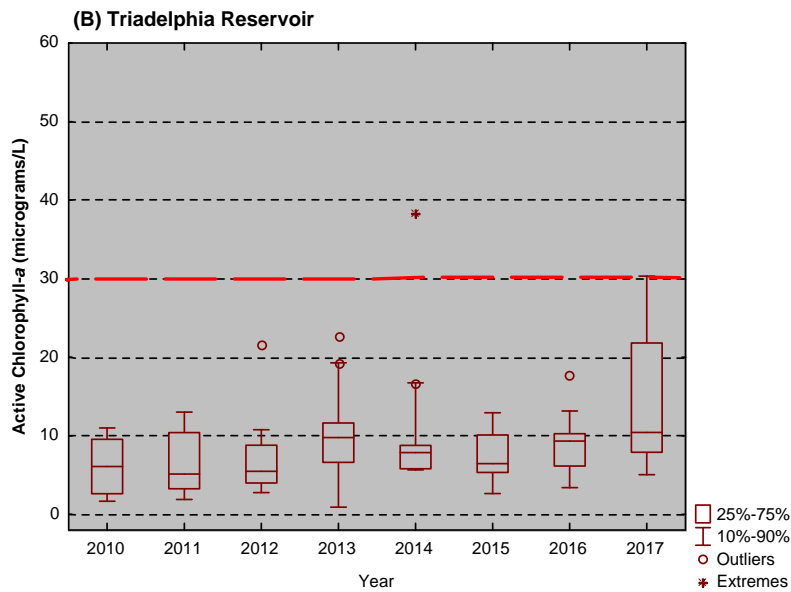
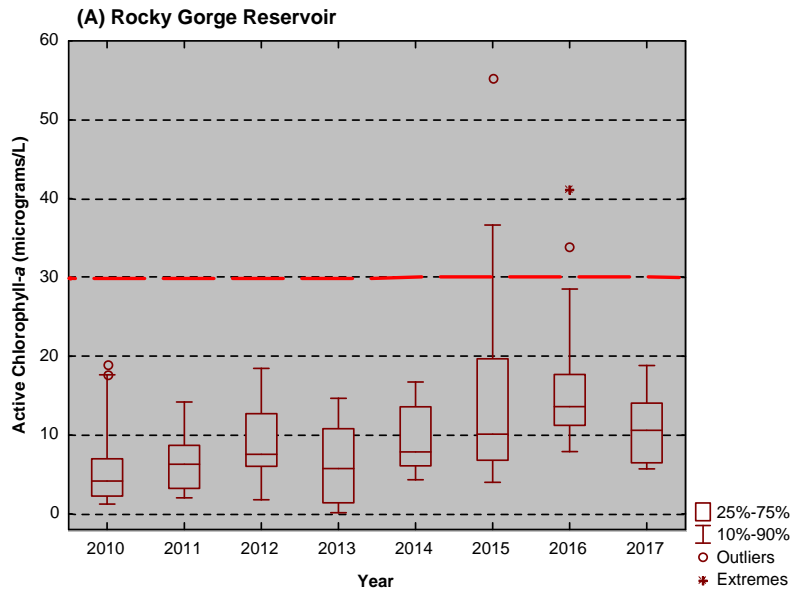


Figure 8. Annual variations (2010-2017) in active chlorophyll-*a* concentrations for (A) Rocky Gorge Reservoir and (B) Triadelphia Reservoir. Growing season data (May-Sept) shown for comparison with red, dashed line at 30 micrograms/Liter representing the 90<sup>th</sup> percentile threshold for public water supply reservoirs.

## Terrestrial Habitat

The focus of this priority resource continues to be the preservation and management of forested land that provides water quality benefits to the reservoirs and their tributaries. Forests provide numerous, well-documented water quality benefits such as filtering and infiltrating runoff, stabilizing stream banks, and reducing thermal impacts, as well as providing habitat for wildlife.

### Howard County Stream ReLeaf and Tree Canopy Programs

Howard County's Department of Recreation and Parks (DRP) manages both the *Stream ReLeaf* and the *Turf to Trees* tree planting programs on private property. The DRP planted 212 trees on two properties in the Patuxent Reservoirs Watershed in 2017, through the *Turf to Trees* Program. Trees planted via the *Turf to Trees* Program can be planted anywhere on a property, while *Stream ReLeaf* trees are planted to establish stream buffers.

### White-tailed Deer Management

One of the TAC's goals for this priority resource is to ensure forests are self-sustaining and capable of long-term natural regeneration, and one way to implement this goal is by managing the white-tailed deer population within the watershed. The Department of Natural Resources (DNR), the Montgomery County Department of Parks, the Howard County DRP, and the WSSC continued to implement their deer hunting programs in 2017. Deer population control is needed given the many harmful effects associated with an over-abundance of deer, including deer-vehicle collisions, agricultural crop damage, and damage to a naturally regenerating and self-sustaining forest ecosystem.<sup>3</sup>

### Howard County Deer Management Program

The Howard County DRP Deer Management Program includes annually scheduled bow and shotgun managed hunts and sharpshooting in County parks and open space. In 2017 in the Patuxent Reservoirs Watershed, sharpshooting was conducted in the Fulton South Area Park on September 20, and managed hunts were held in Schooley Mill Park on October 11 and November 16. The managed hunts and sharpshooting are held in an effort to help maintain a stable, balanced white-tailed deer population in parks where deer browsing has been shown to reduce biodiversity. Since the program began in 1998, there has been an observable improvement in habitat quality and vegetation abundance in many of the parks where managed hunting and sharpshooting has taken place.

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<sup>3</sup> The Montgomery County Deer Management Work Group. *Comprehensive Management Plan for White-tailed Deer in Montgomery County, MD*. Revised 2004.

### Patuxent River State Park

The DNR’s Wildlife and Heritage Service manages the deer population in Maryland. DNR lands include the majority of parkland in the Patuxent Reservoirs Watershed, with extensive areas adjacent to the Patuxent River. Totals reported include data from Howard and Montgomery Counties (Figure 9). The DNR primarily relies on the annual, antlered harvest to indicate the deer population density.<sup>4</sup>

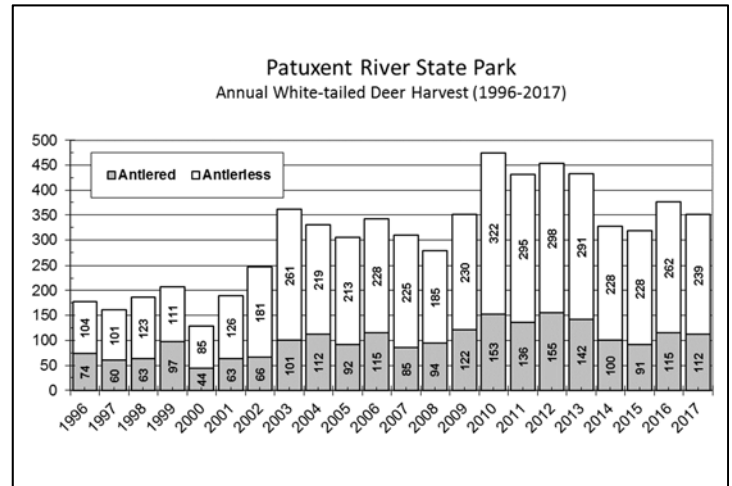


Figure 9. Patuxent River State Park Annual Deer Hunts (1996-2016)

### Montgomery County Planning Department and Department of Parks

The Montgomery County Department of Parks continued to implement its Deer Management Program during 2017, which reduces the number of deer in M-NCPPC parkland, and the adverse effects of deer overpopulation on forest and other ecosystems. The M-NCPPC Deer Management Program focuses on large wooded areas within parkland and along stream valley parks. Within the Patuxent Reservoirs Watershed, the program has centered on the Rachel Carson Park. During 2017, 22 deer were harvested from Rachel Carson Conservation Park. The program continues to be effective in reducing deer. Annual deer harvests have resulted in a continued declining deer population that fluctuates between 15-30 deer per square mile.

### WSSC

The WSSC continued its managed hunting program on most of its 6,000 acres of land surrounding both reservoirs. For the 2016-17 hunting season, 29 managed hunts occurred. During 2017, a total of 268 deer were harvested (Figure 10).

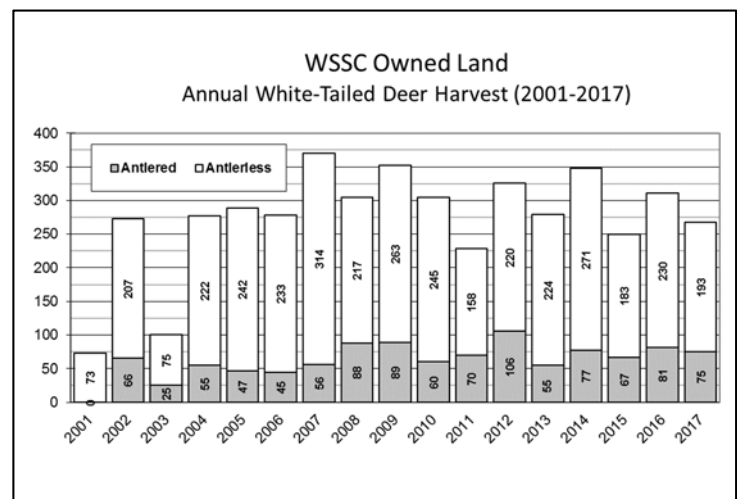


Figure 10. WSSC Deer Hunt Totals (2001-2017)

<sup>4</sup> Personal communication, March 10, 2017 with Brian Eyley, MD DNR Deer Project Leader.

## Stream Systems

Stream corridor management activities include stream channel stabilization and restoration, and implementing streamside BMPs. These activities help restore and protect the stream system, improve habitat and water quality for aquatic biota, and support protection of the reservoirs and water supply (i.e., minimize loss of capacity due to sedimentation).

### Cattail Creek Stream Restoration Project at Maple Dell Farm

Maple Dell Farm is a 96-acre dairy and row crop farm, one of three remaining dairy farms in Howard County. Lisbon's Little Creek and an unnamed tributary from the west converge on the farm eventually reaching the Cattail Creek and the Triadelphia Reservoir. Three additional first order tributaries are within the project site boundary. The streams on the property have a drainage area of approximately 2,400 acres.

All of the stream reaches are located in the dairy farm pasture areas, with only a sparse or absent riparian forest stream bank cover along the mainstem. A large wetland is located on the mainstem in the middle of the project area, but little wetland character is present in this location. Floodplain areas have been cleared of trees and maintained in pasture cover.

The current project includes 6,182 linear feet of stream restoration, selective harvesting of 10.6 acres of trees to establish new pasture, and the installation of 4,527 linear feet of new fencing to exclude the dairy herd from the restoration area. The restoration and repair of stream and riparian areas will support base flow discharge while diverting storm flow discharge onto adjacent floodplains. This will temporarily store, treat, and infiltrate precipitation discharges and will contribute to the restoration of the shallow groundwater table. These efforts will improve the wetland hydrology of the site and the quality of the water moving through the property. They will also serve to reverse the effects of watershed changes that have increased runoff volumes, peak discharges, velocities and erosive forces. A ribbon cutting for the project was held in January 2017, and construction is anticipated in fiscal year 2019.

With assistance provided by Howard County Government, the WSSC began its water quality monitoring project in May 2017 to determine pollutant loads of nutrients and sediment pre- and post-restoration, and upstream and downstream of the restoration activities. Three monitoring stations were established, with two stations located upstream of the farm and the third monitoring station located along Daisy Road just downstream of the farm.

### Cherrytree Farms Pond Repair and Stream Restoration - Project 2

A pond repair project and a second stream restoration project in the Cherrytree Farms neighborhood are currently under design and are anticipated to be constructed in FY20. The project sites are located east of Cherrystone Court. The pond repair project entails upgrading the corroded metal riser to a concrete riser. The facility will remain a dry pond, because of site constraints that prohibit upgrading the facility with improved water quality elements. The stream restoration project, however, will provide improved water quality for the system with



the restoration of approximately 1,200 linear feet of an unnamed tributary to the Rocky Gorge Reservoir.

The unnamed tributary to the Rocky Gorge Reservoir is a first order stream with a drainage area of 90 acres that enters the project area from the north, flowing south from Scaggsville Road for approximately 1,100 feet to the start of the project reach. From here, the project reach extends approximately 1,200 linear feet through a confined forested valley corridor to the project terminus at a culvert beneath Harding Road. The stream reach then continues south of the project area, eventually draining to the Rocky Gorge Reservoir. In addition, three tributaries enter the project area and are included as part of the project. The project area and immediate vicinity consists of relatively steep hill slopes with mature deciduous forest, bordered by residential homes to the north, east, and west. The majority of the project area is located on open space owned by Howard County, with the exception of a portion of the downstream extent that is owned by the WSSC. Multiple easements border or cross the project area, including several County storm drain easements and one Colonial Pipeline Company Right-of-Way for a gas pipeline that crosses through the center of the project area. The goals of the project include reducing stream bed and bank erosion to maximize pollutant removal and impervious area treatment credits, and creating opportunities for ecological uplift.

## Aquatic Biota

### Tributary Biological and Habitat Monitoring

As land cover changes and stream restoration and streamside BMPs are implemented, biological and habitat monitoring are often used to track progress in protecting the stream system and aquatic biota. These monitoring efforts can also identify problem areas and provide indicators for possible problem sources to help guide future restoration efforts.

### Howard County

The Howard County Department of Public Works, Stormwater Management Division initiated the Howard County Biological Monitoring and Assessment Program during 2001 to establish a baseline ecological stream condition for all of the County's watersheds. The program involves monitoring the biological health and physical condition of the County's water resources and is designed on a five-year rotating basis, such that each of the County's 15 subwatersheds is sampled once every five years.

The 2017 year of sampling is the first year of round four, which included sampling in the Upper Brighton Dam, Cattail Creek, and Lower Brighton Dam subwatersheds (Figure 11). All three subwatersheds are within the Triadelphia Reservoir watershed. Results from the 2017 assessment indicate minimally impaired biological conditions in all three subwatersheds, and no statistically significant changes in mean Benthic Index of Biotic Integrity (BIBI) scores were observed in any of the subwatersheds over time. Average habitat assessment scores were much greater in 2012, when compared to all other years. This may be a result of the subjectivity

of habitat assessment scoring and the fact that different teams conducted the assessments each year.

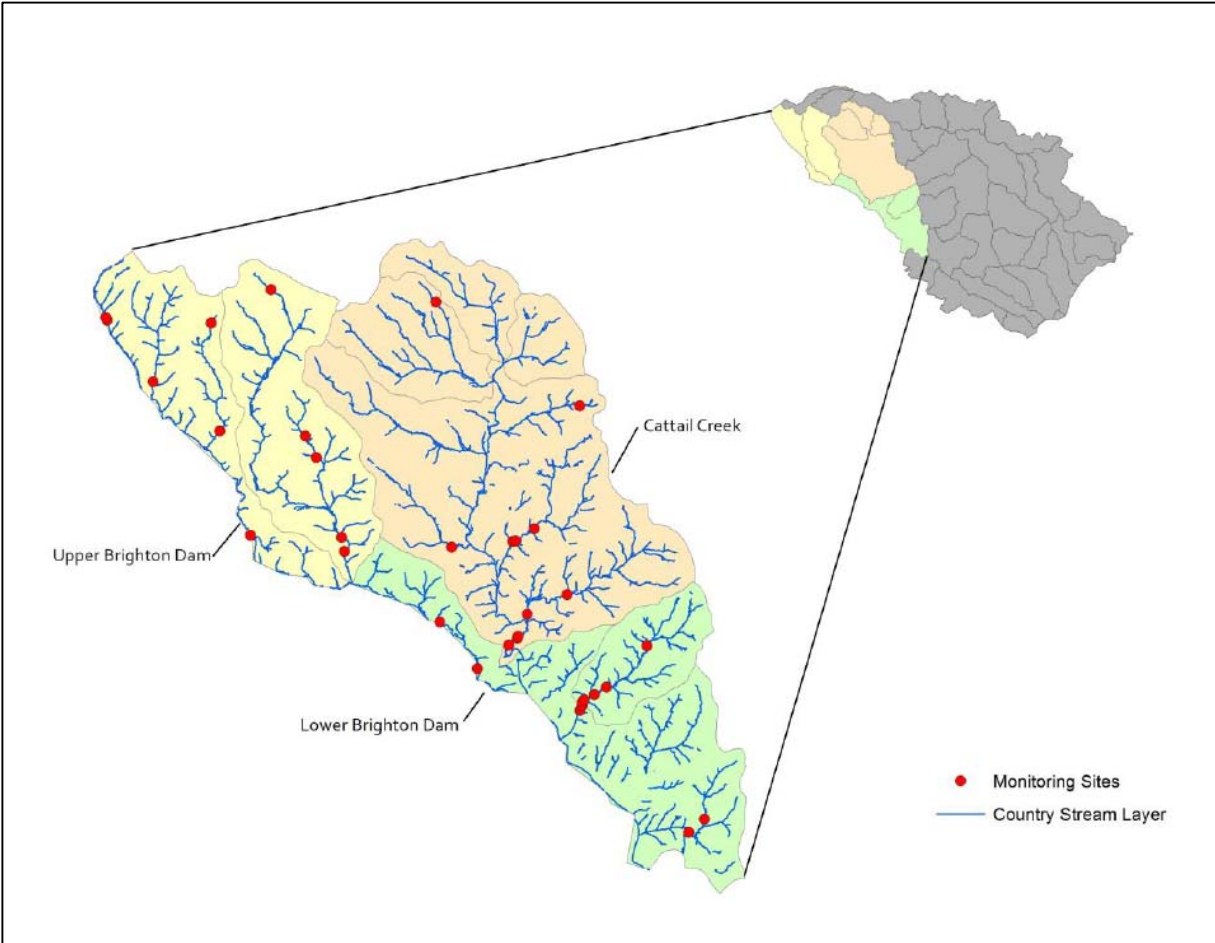


Figure 11. 2017 Bioassessment sampling location (30) in Cattail Creek and Upper/Lower Brighton Dam subwatersheds of Triadelphia Reservoir.

Comparisons were made between BIBI results and the contributing subwatershed percent imperviousness and specific conductivity data collected at each site (Figure 12). Similar to 2016 results for sampling locations within the Rocky Gorge Dam subwatershed, significant, negative correlations were found between *decreasing* BIBI scores and *increasing* percent impervious surface ( $r = -0.428$ ,  $p\text{-value} = 0.018$ ) and conductivity measurements ( $r = -0.613$ ,  $p\text{-value} < 0.01$ ).

The complete report, including a comparison of the three rounds of survey results, is available at the DPWs' Watershed Survey web page at <https://www.howardcountymd.gov/Departments/Public-Works/Bureau-Of-Environmental-Services/Stormwater-Management/Watershed-Management/Watershed-Surveys1>.

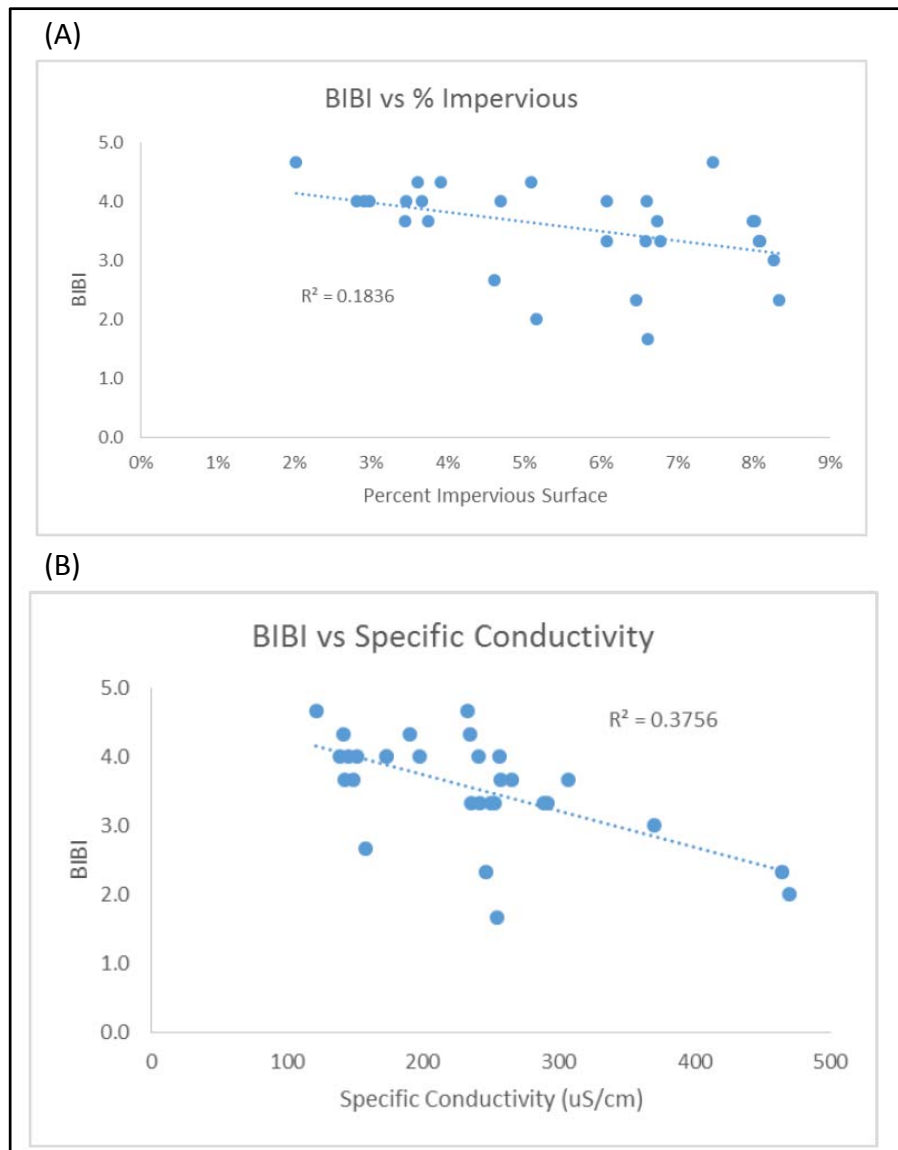


Figure 12. Relationships between 2017 benthic index BIBI and (A) Percent Imperviousness and (B) Specific Conductivity

## Rural Character and Landscape

The aim of this priority resource is to preserve open spaces while maintaining an economically viable and environmentally protective agricultural community.

### Agricultural Land Preservation Easement enrollments

#### Howard County

The Howard County Agricultural Land Preservation Program purchased easements on three farms in the reservoirs watershed during 2017. The easement acreage on the farms is 20.6, 29.6 and 166.8 acres, for a total of 217 acres. The farms are all located within the Triadelphia Reservoir watershed. Approximately one-third of the reservoirs watershed (or 15,016 acres) in Howard County is in agricultural, environmental or historic easements (Figure 13).

About one-third of the reservoirs' watershed in Howard County is preserved by agricultural, environmental, or historic easements.

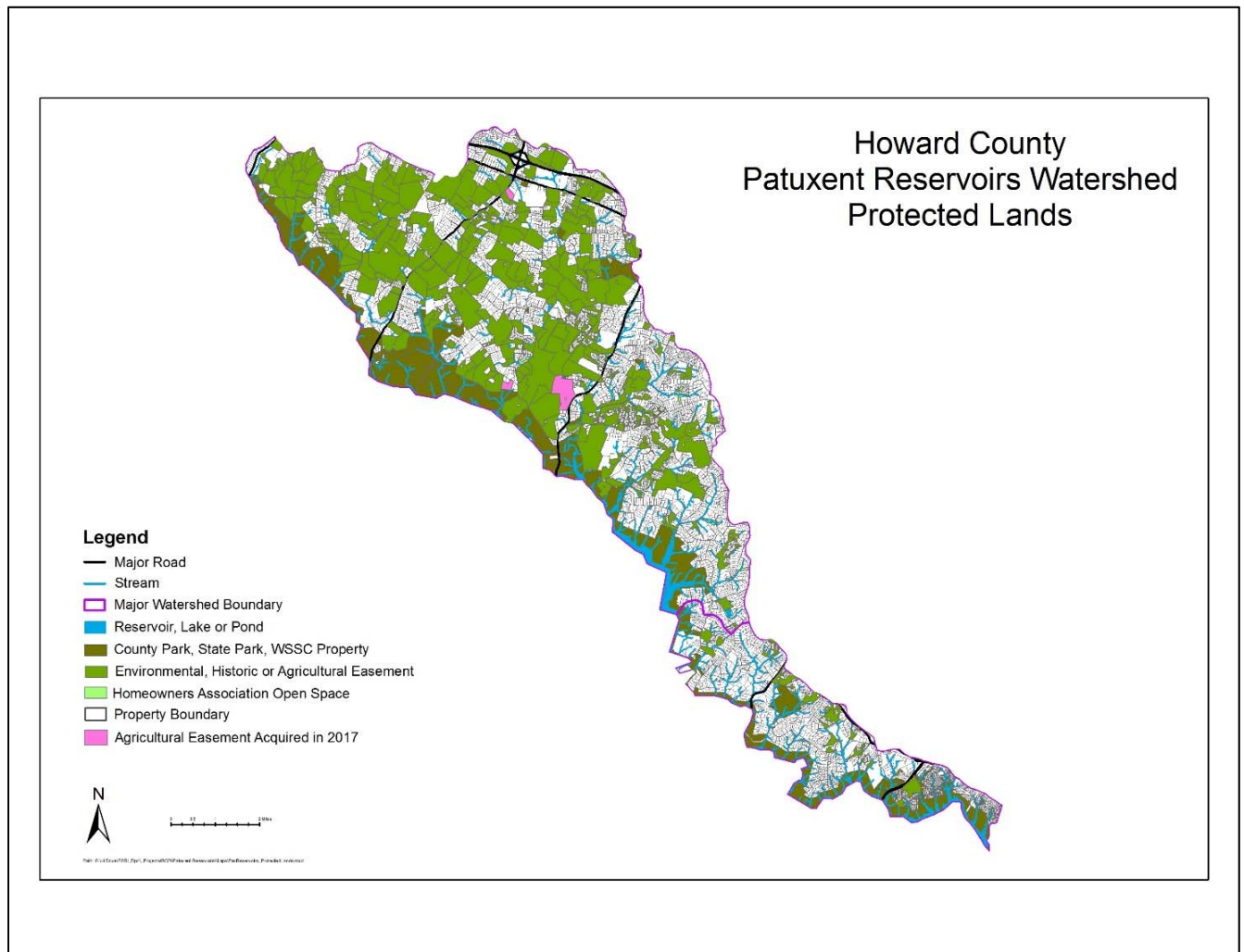


Figure 13. Howard County Protected Lands within the reservoirs watershed

In 2013 Howard County amended the easement purchase price formula for the Agricultural Land Preservation Program to increase the purchase price if the landowner agreed to additional protection and management of the County's Green Infrastructure Network (GIN). The GIN is a mapped system of hubs (large areas of forests and wetlands) and connecting corridors that are intended to protect and link the most ecologically significant natural areas in the County. Two of the three farms enrolled in the reservoirs watershed in 2017 included protection of the GIN on their property. This covered 76 acres of the GIN, protecting forest interior habitat, wetlands, 100-year floodplain and streams.

#### Montgomery County

During 2017, about 84 acres of agricultural land in the Reservoirs Watershed were placed under permanent agricultural easements purchased through the County's Agricultural Easement Program (AEP) (Figure 14). This easement extinguished two of the three permissible development rights under zoning and requires the implementation of both the Soil Conservation and Water Quality plan and compliance with nutrient management. Additionally, 176 acres were protected through a private Building Lot Termination Easement (BLT) that reduced the permissible density on 176 acres to a total of two dwellings. While not a requirement for a privately acquired BLT easement, this farm has a current Soil Conservation and Water Quality Plan, and this farm is in compliance with its nutrient management plan as required by State law. These preservation programs are designed to enhance the effectiveness of the County's transfer of development rights program, by further increasing the protection of agricultural land through extinguishing remaining development rights on agricultural properties, and enhance the protection of the resources through certain land management plans.

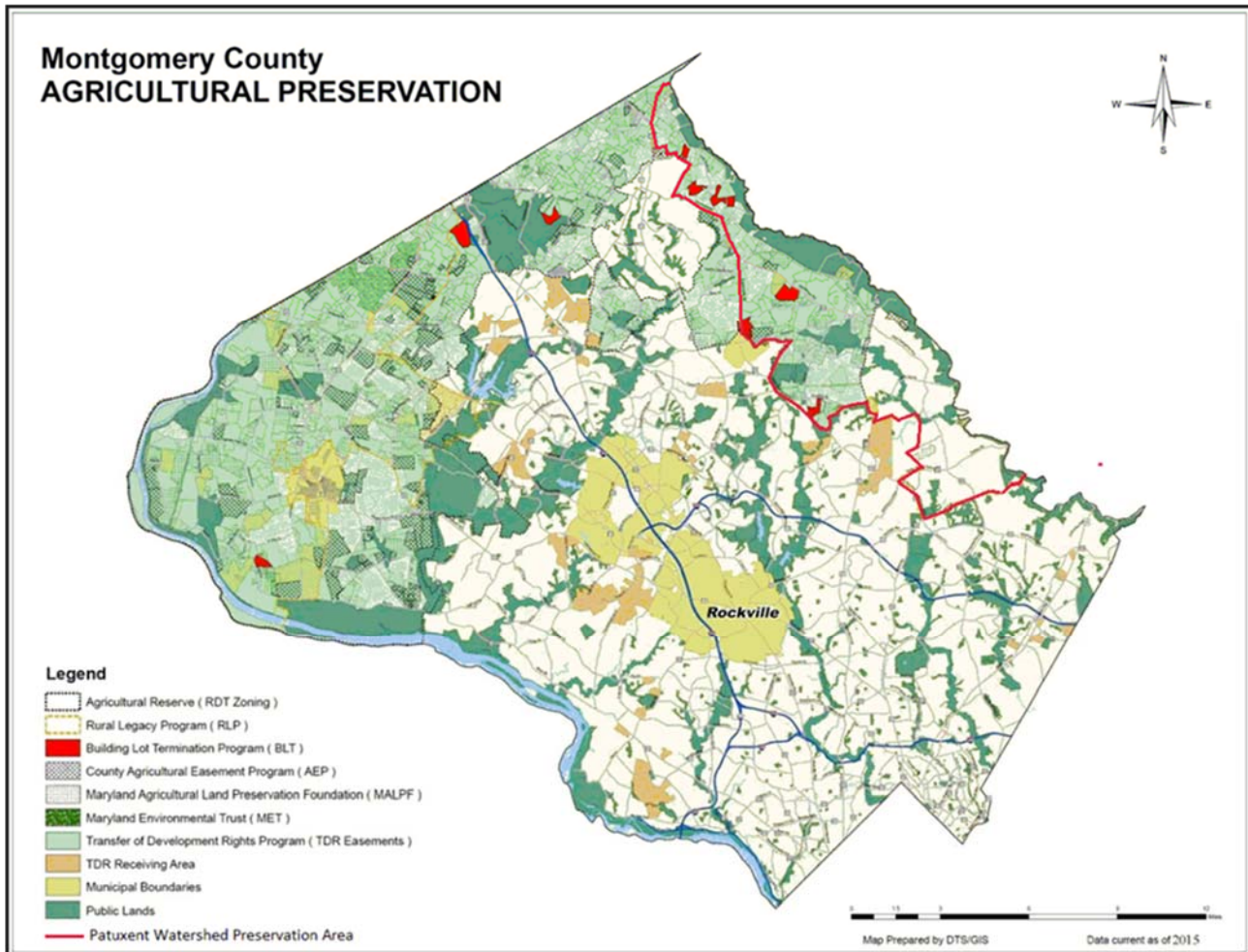


Figure 14. Montgomery County Agricultural Preservation including the Patuxent Watershed Area

## Agricultural Progress

A summary of the progress made during 2017 by both the Howard and Montgomery Soil Conservation Districts (SCDs) is provided in Table 4. The SCDs use funding from local, state and federal programs to provide technical and financial assistance to landowners for the installation of agricultural BMPs. The numbers reported account for activity from July 1, 2016 through June 30, 2017. Estimating load reductions from agricultural BMPs was part of the TAC's assessment of progress made thus far toward achieving the reservoir TMDL goals.

Table 4. Agricultural Progress for 2016-17 in the Patuxent Reservoirs Watershed

	Howard SCD	Montgomery SCD	Total
Conservation Plans developed (acres)	-	-	-
Conservation Plans revised (acres)	-	-	-
Best Management Practices Installed	12	8	20
<b>Best Management Practice</b>			
Ag Waste Storage Structure	-	-	-
Conservation Crop Rotation (acres)	-	-	-
Contour Farming (acres)	-	-	-
Cover Crop (acres)	-	-	-
Critical Area Planting (acre)	-	-	-
Diversion (feet)	-	-	-
Field Border (feet)	-	-	-
Forage and Biomass Planting (acres)	1 (14.5)	2 (6.1)	3 (20.6)
Grade Stabilization Structure	1	0	1
Grassed Waterways (acres)	0	4 (2.6)	4 (2.6)
Heavy Use Area Protection (acres)	-	-	-
Livestock Exclusion Fencing (feet)	1 (810)	0	1 (810)
Livestock Pipeline (feet)	1 (125)	0	1 (125)
Livestock Watering System/Watering Facility	1	0	1
Nutrient Management (acres)	-	-	-
Residue Management – Mulch Till (acres)	-	-	-
Residue Management – No Till (acres)	-	-	-
Roof Runoff System	-	-	-
Sediment Control Pond	-	-	-
Spring Development	-	-	-
Stream Buffer – forested (acres)	1 (2.8)	0	1 (2.8)
Stream Crossing	1	1	2
Streamside Fencing (feet)	2 (6,449)	1 (1,048)	3 (7,497)
Waste Utilization/Recycling (acres)	3 (135.8)	0	3 (135.8)



## Patuxent Reservoirs Watershed Agricultural Cost-Share Program

In 1998, the PRWPG created the *Patuxent Reservoir Protection Strategy Memorandum of Understanding* (MOU), which established the Patuxent Reservoirs Watershed Agricultural Cost-Share Program. This cost-share program focuses on implementing BMPs that will benefit nearby stream systems. The program is targeted at small agricultural operations that may not qualify for other State and federal cost-share programs. In the Patuxent Reservoirs Watershed, many of these operations are small horse farms. Many details of the original program were outdated and did not reflect current conservation objectives; consequently, it was updated and improved, with changes taking effect in May 2014. As anticipated, these new changes have had immediate benefit in Montgomery County (Table 5).

Table 5. MSCD's use of the Patuxent Reservoirs Watershed Cost Share Program

BMP#	Description	Extents		Cost Share Amount	Date Completed
574	Spring Development	1.00	ea	\$2,465.00	5/9/2008
614	Watering Facility	1.00	ea	--	5/9/2008
561	Heavy Use Area	0.10	ac	\$5,000.00	11/1/2013
561	Heavy Use Area	0.10	ac	\$5,000.00	12/4/2014
313	Waste Storage Structure	1.00	ea	\$9,810.00	8/26/2015
342	Critical Area Planting	0.10	ac	\$190.00	8/26/2015
558	Roof Runoff	1.00	ea	\$5,368.98	2/12/2016
382	Fencing	1000.00	L.F	\$2,393.60	7/14/2016
382	Fencing	740.00	L.F	\$2,368.00	11/29/2016
382	Fencing	1563.00	L.F	\$5,001.60	8/15/2017
382	Fencing	1426.00	L.F	\$3,907.24	10/13/2017

Although historical interest in the program had been spotty in Montgomery County, these updates have sparked new interest, especially among small horse farms. The MSCD used \$8,909 of the Patuxent Cost-Share program funds during FY17 that were used to cost share on the installation of 2,989 linear feet of fencing under the NRCS 382 standard and specification for protecting environmentally sensitive areas including streams. The MSCD's Equine Planner is currently working with a cooperator to utilize the remaining cost share fund balance of \$5,807. It is anticipated that the SCDs will request additional funding for the Patuxent Cost Share Program, update the cost-share rates, and explore ways to broaden program applicability and availability that will lead to increased participation throughout the PRW.

The HSCD requested additional funding of \$50,000 in 2014. The HSCD distributed \$1,204 from this Cost Share Program to one farmer during FY17. The remaining funds in this cost-share program as of June 30, 2017 are:

HSCD	47,144
MSCD	<u>5,807</u>
Total	\$52,951



### **Composting and Wood Waste Recycling Facilities (Mulch Task Force)**

In 2014, the Howard County Council convened a Task Force to study current zoning regulations for mulching, composting and wood processing facilities, and to make recommendations for changes to these regulations, if necessary. Bert Nixon was appointed to be a member of the Task Force, which began to meet regularly in July 2014. The Task Force was unable to fully resolve some issues, resulting in both a majority and a minority report being submitted to the County Council in March 2015.

In August 2015, the Dayton Rural Preservation Society submitted a Zoning Regulation Amendment (ZRA-160) request to the County, which proposed to “incorporate recommendations of the Mulch and Wood Task Force . . . Specific regulations are a composite of the recommendations of the majority and minority members on the task force as written by the minority members.” In response, the Department of Planning and Zoning was asked to convene a work group to assess the proposed ZRA and to provide recommended changes. The outcome of this work, along with discussions with Fire and Rescue Services, Howard Soil Conservation District, Environmental Services, Economic Development Authority, and Office of Community Sustainability, formed the basis for ZRA 180, which was introduced as Council Bill (CB) 60-2017 in July 2017.

CB 60 established two new Conditional Use categories - Composting Facilities (CF) and Natural Wood Waste Recycling Facilities (NWWRF) – and included over a dozen Conditional Use criteria that must be met, but only after receiving an MDE composting or wood waste recycling permit. Such criteria included, but were not limited to: setbacks to property lines, residential dwellings on other properties, wetlands and schools; screening and buffering; review by the Fire Marshall; hours of operation; and size limitations. Mulch and composting operations not requiring an MDE permit are considered accessory uses to a farming operation. The bill also incorporated MDE's recently revised composting regulations.

The Council considered CB 60 between July and November 2017, and approved the Bill (3-2) with a number of amendments on November 6, 2017. However, a procedural timing error occurred causing CB 60 to expire and the approval to be invalidated. A new proposed ZRA (ZRA 183) was submitted in December 2017 that reflects the amended version of ZRA 180 that was approved as CB 60 and subsequently invalidated.

## Public Awareness and Stewardship

The TAC agencies and other groups in the watershed continued to coordinate public outreach and involvement initiatives during 2017. Staff from WSSC's office of Communications and Community Relations hosted over 50 environmentally focused outreach programs in Howard, Montgomery and Prince George's Counties. There were also a number of successful outreach events coordinated by other TAC agencies that occurred in Howard, Montgomery, and Prince George's Counties.

### Howard SCD

The HSCD held one Farm Academy event in the PRW during 2017. This event targeted Howard County employees so that they can better serve their constituents.

### Montgomery SCD

During 2017, the MSCD co-hosted with the Natural Resources Conservation Service (NRCS) a "Locally-Led Conservation Workgroup Meeting" to address resource concerns and practices. The workshop was attended by local farmers and MSCD staff to gain a better understanding of eligibility for federally funded programs. The workshop provided instructions for program applications and highlights of some BMPs for the various programs, and prioritized areas of special interest and concern, such as the Patuxent Watershed Area.

The MSCD, in partnership with the University of Maryland Extension, also hosted several equine pasture walks and equine workshops. This year's pasture walk was conducted on a farm located within the PRW in Olney. In February 2017, MSCD and the University hosted a Pasture Workshop for Equine Operations. Topics included Heavy Use Area Design, Herbs for Horses, Soil and Hay Testing and How to Interpret the test results, and how to test the quality of forage. This workshop was attended by over 50 equine operators from within the Patuxent Watershed and across the county's agricultural reserve. The District produced several videos of the presentations and made them available for streaming from the District's website.

The District also hosted two major events within the Patuxent Watershed in 2017. In September, the District's Annual Cooperator's Dinner was held at Waredaca Farm. During this dinner, the District recognized the equine conservation cooperator of the year and the outstanding conservation cooperator of the year. The MSCD recognized Dr. Charles Mess as the recipient of the 2017 Equine Conservation Award at the dinner. Dr. Mess has been a conservation leader in the agricultural community for about 32 years. He has demonstrated his commitment to conservation by installing numerous BMPs on his 203-acre farm in



Olney within the PRW. His farming operation has been certified by The Maryland Association of Soil Conservation Districts under the Farm Stewardship Certification and Assessment Program.

In October of 2017, the MSCD sponsored and co-hosted a Legislative Tour coordinated by the Montgomery County Office of Agriculture and the MDA. The goal of the tour was to educate local and state elected officials about conservation practices and to show how laws and policies can negatively impact agriculture and agri-business. The tour included visits to a cash grain farm operation, an orchard/on farm cidery, and a visit to a local equine operation, which was also home to the County's first on farm brewery where elected officials could interact directly with farmers and to see the impact of conservation and sound agricultural business entrepreneurship.

### **Montgomery County Department of Parks**

During 2017, Montgomery County stream valley buffer reforestation efforts in the Patuxent watershed included projects covering about 0.5 acres in the Hawlings River Watershed. In addition, volunteers have been regularly taking care of the newest reforested section within this area.

Under the Department of Parks' Weed Warrior Program, which coordinates volunteer efforts to remove invasive plants from natural areas, 129 person-hours within the PRW were logged. Some of the Weed Warrior group efforts are coordinated with other events, such as Earth Day, to draw more attention to the environmental needs of natural areas and the importance of stewardship.

The Montgomery County Parks Department also hosted three trash cleanups in the parks within the PRW. About 162 person-hours were logged, and a total of 479 pounds of trash and 25 pounds of recyclables were removed.

### **Patuxent River Clean-up**

The WSSC's Office of Communications and Community Relations coordinated six cleanups on WSSC-owned lands along the Patuxent Reservoirs. Community volunteers, scouts, and school groups assisted in removing hundreds of pounds of debris from the recreation areas, as well as along access roads. Due to the closing of recreation areas on the Triadelphia Reservoir, public clean-up events were greatly reduced.

## WSSC's "Watershed" Property Surrounding the Reservoirs - Environmental Outreach



In 2017, WSSC once again hosted the annual Children's Water Festival at the Brighton Dam Recreation Area. During this two-day event almost 500 fourth grade students from Montgomery and Prince George's Counties gathered at Brighton Dam to learn about water and the importance of protecting local waterways and ecosystems. Students rotated among 12 activity stations including: recycling, watersheds, water pollution, and water conservation.

During the spring, WSSC hosted almost 1,000 students to the watershed property at Supplee Lane as part of the *Sunfish and Students* Program through Prince George's County Public Schools. During the field trip, third grade students and their teachers not only released fish that they raised in their classrooms (blue gill) into the reservoir, but also learned about where their drinking water comes from, why it is important to protect local watersheds and actions they can take to avoid polluting waterways, including removing invasive plants.



A new outreach program for WSSC's staff was Watershed Recreation Outreach on the weekends. On three days between June and September, WSSC's Environmental Outreach Coordinator and members of WSSC's police force were stationed at popular recreation areas and boat ramps to talk with watershed users about responsible recreation and the importance of helping to protect this valuable source of drinking water. The program was well received by the watershed users and will continue for the 2018 season.

Table 6. Performance Measures and Goals for Priority Resources

Priority Resources: Goals & Performance Measures				
Resource: Reservoir/Water Supply				
Issue: The public need for a sufficient quantity of safe and high quality drinking water calls for adopting a proactive and multi-barrier approach, which starts with utilizing raw water of the highest quality and sustainable quantity, now and in the future. To achieve this for the Patuxent water filtration plant, we need to control reservoir eutrophication, reduce disinfectant by-products precursors, and limit reservoirs capacity loss.				
Measures	Goals	Implementation Items	Time Line	Responsible Partner
Chlorophyll- <i>a</i> (chl- <i>a</i> )	<ul style="list-style-type: none"> <li>Chl-<i>a</i> not to exceed a 10 µg/L mean during the growing season and not to exceed a 30 µg/L instantaneous concentration</li> </ul>	<ul style="list-style-type: none"> <li>Perform reservoir monitoring for chl-<i>a</i>, DO, and TOC during the growing season</li> </ul>	Ongoing	WSSC
Dissolved oxygen (DO)	<ul style="list-style-type: none"> <li>DO not to fall below 5 mg/L at any time in the epilimnion, not to fall below 5 mg/L in the entire water column during completely mixed periods, and not to fall below 10% saturation at any time in the hypolimnion</li> </ul>	<ul style="list-style-type: none"> <li>Perform reservoir monitoring for CHL-<i>a</i>, DO, and TOC during the growing season</li> </ul>	Ongoing	WSSC
Suite of water quality parameters in reservoir monitoring protocol	<ul style="list-style-type: none"> <li>Five-year data trend analysis for other monitored water quality parameters shows no net deterioration</li> </ul>	<ul style="list-style-type: none"> <li>Develop and begin implementation of a plan to reduce nutrients, based on model/TMDL requirements</li> <li>Update trend analysis for reservoir water quality parameters on a 5-year cycle</li> </ul>	Ongoing  Next Update: 2020	TAC  WSSC
Total organic carbon (TOC)	<ul style="list-style-type: none"> <li>TOC – 20% annual reduction goal, with 40% reduction for peak quarter at the location where water is withdrawn for treatment purposes</li> </ul>	<ul style="list-style-type: none"> <li>Perform reservoir monitoring for CHL-<i>a</i>, DO, and TOC during the growing season</li> </ul>	Ongoing	WSSC
Sediment	<ul style="list-style-type: none"> <li>Sediment accumulation rate not to exceed previous years</li> </ul>	<ul style="list-style-type: none"> <li>Perform bathymetric survey of reservoirs at 10 year intervals or less</li> </ul>	Next Survey in 2025	WSSC

Priority Resources: Goals & Performance Measures (continued)

Resource: Terrestrial Habitat

Issue: Preservation of forests provides water quality benefits by reducing sediment and nutrient loading of streams from surrounding land uses.

Measures	Goals	Implementation Items	Time Line	Responsible Partner
Forest Cover	<ul style="list-style-type: none"> <li>Maintain and increase forest cover</li> <li>Increase forest interior habitat</li> </ul>	<ul style="list-style-type: none"> <li>Encourage private property owners to participate in tree planting programs</li> <li>Ensure publicly owned parkland and open space is forested to the maximum extent possible</li> </ul>	Ongoing	TAC
			2006 – 2023	TAC
Forest Connectivity	<ul style="list-style-type: none"> <li>Improve forest connectivity (larger forest tracts are connected by forest corridors)</li> </ul>	<ul style="list-style-type: none"> <li>Target reforestation and forest conservation programs to increase forest connectivity and forest interior habitat</li> </ul>	Ongoing	TAC
Forest Size	<ul style="list-style-type: none"> <li>Increase forest size</li> </ul>	<ul style="list-style-type: none"> <li>Encourage private property owners to participate in tree planting programs</li> <li>Ensure publicly owned parkland and open space is forested to the maximum extent possible</li> </ul>	Ongoing	TAC
			2006 – 2023	TAC
Forest Diversity	<ul style="list-style-type: none"> <li>Ensure diverse forest communities (communities contain a variety of species and ages)</li> </ul>	<ul style="list-style-type: none"> <li>Develop a forest management plan to ensure forest diversity and long-term natural regeneration, identifying and addressing potential problems such as excessive deer populations, invasive species and human impacts</li> </ul>	2006 – 2013  WSSC Plan completed FY08	TAC  WSSC
Forest Sustainability	<ul style="list-style-type: none"> <li>Ensure forests are self-sustaining and capable of long-term natural regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Implement deer management programs</li> <li>Implement strategies for control of invasive plants</li> </ul>	Ongoing	TAC
			Ongoing	TAC

Priority Resources: Goals & Performance Measures (continued)

Resource: Stream System

Issue: Preventing stream habitat degradation - The stream system includes all intermittent and perennial streams and their adjacent floodplains. A stable stream system provides significant nutrient and sediment removal during both baseflow and storm flow events. The stream and its associated riparian buffer are also important as sources of high quality food and habitat for both aquatic and terrestrial organisms.

Measures	Goals	Implementation Items	Time Line	Responsible Partner
Buffer corridor width and continuity	<ul style="list-style-type: none"> <li>A minimum 35-foot riparian buffer on all streams on properties that were developed prior to current stream buffer requirements</li> </ul>	<ul style="list-style-type: none"> <li>Establish and maintain minimum 35-foot riparian buffers on all publicly-owned land</li> <li>Accelerate programs to establish and maintain streamside buffers to a minimum of 35 feet on privately-owned lands to the maximum extent possible</li> </ul>	<p>2006 – 2013</p> <p>2006 – 2023</p>	<p>WSSC, M-NCPPC, HC, MC</p> <p>WSSC, M-NCPPC, HC, HSCD, MC, MSCD</p>
Stream bank and stream channel stability	<ul style="list-style-type: none"> <li>No areas of "severe" or "very severe" stream bank erosion based on the Stream Corridor Assessments and other locally collected data.</li> </ul>	<ul style="list-style-type: none"> <li>Establish and maintain streamside fencing programs to keep all livestock out of streams to the maximum extent possible</li> <li>Address <u>significant</u> areas of stream bank and channel instability through stream restoration projects and storm water retrofits to the maximum extent possible</li> </ul>	<p>2006 – 2013</p> <p>2006 – 2013</p>	<p>HSCD, MSCD</p> <p>HC, HSCD, M-NCPPC, MC</p>

Priority Resources: Goals & Performance Measures (continued)

Resource: Aquatic Biota

Issue: Biological Integrity– This is the condition of the benthic macroinvertebrate communities based on a comparison to a reference stream in Montgomery County. A reference stream is relatively undisturbed and therefore the best quality to be expected in the region that includes the Patuxent Reservoirs Watershed.

Measures	Goals	Implementation Items	Time Line	Responsible Partner
IBI - Index of Biological Integrity	<ul style="list-style-type: none"> <li>No subwatershed with a benthic IBI indicating "fair" or "poor" condition</li> </ul>	<ul style="list-style-type: none"> <li>Pursue cost-share funds to construct agricultural BMPs, stream restoration, and storm water retrofit projects to address factors contributing to degraded biological integrity</li> <li>Mitigate runoff impacts from land use changes</li> </ul>	<p>2006 – 2023</p> <p>2006 – 2023</p>	<p>HC, HSCD, MC, MSCD, M-NCPPC</p> <p>HC, MC, M-NCPPC</p>
	<ul style="list-style-type: none"> <li>Preserve conditions in subwatersheds with "excellent" and "good" benthic IBIs</li> </ul>	<ul style="list-style-type: none"> <li>Protect existing habitat and water quality of streams in high-quality subwatersheds to the maximum extent possible by pursuing programs to maintain or increase existing land cover</li> </ul>	<p>2006 – 2023</p>	<p>HC, HSCD, MC, MSCD, M-NCPPC</p>

IBI - Index of Biological Integrity is also referred to as Index of Biotic Integrity in Maryland Biological Stream Survey publications.



Priority Resources: Goals & Performance Measures (continued)

Resources: Rural Character and Landscape

Issue: Preserving open spaces and maintaining an economically viable and environmentally protective agricultural community.

Measures	Goals	Implementation Items	Time Line	Responsible Partner
Agricultural Preservation Enrollment <ul style="list-style-type: none"> <li>Total acres enrolled</li> <li>Number of farms enrolled</li> </ul>	<ul style="list-style-type: none"> <li>Preserve the agricultural and rural nature, and open space of the watershed</li> </ul>	<ul style="list-style-type: none"> <li>Continue easement acquisition through agricultural land preservation programs</li> <li>Continue agricultural economic development programs</li> </ul>	Ongoing	HC, MC
			Ongoing	HC, MC
Agricultural Demographics <ul style="list-style-type: none"> <li>Acres of agricultural land</li> <li>Market value of agricultural production</li> <li>Size of farms</li> <li>Types of farms</li> </ul>	<ul style="list-style-type: none"> <li>Preserve the agricultural and rural nature, and open space of the watershed</li> </ul>	<ul style="list-style-type: none"> <li>Continue zoning and land use policies in the watershed to maintain rural character</li> <li>Continue agricultural economic development programs</li> </ul>	Ongoing	HC, M-NCPPC
			Ongoing	HC, MC
Open Space and Parkland Acquisition and Easement Programs <ul style="list-style-type: none"> <li>Acres of open space land preserved by non-agricultural easements or acquisition</li> </ul>	<ul style="list-style-type: none"> <li>Create a landscape that is protective of water quality</li> </ul>	<ul style="list-style-type: none"> <li>Utilize effective open space land management practices that are beneficial to water quality</li> </ul>	Ongoing	HC, M-NCPPC, WSSC
Participation in agricultural conservation programs and percent of conservation plans that are implemented	<ul style="list-style-type: none"> <li>Create a landscape that is protective of water quality</li> </ul>	<ul style="list-style-type: none"> <li>Encourage participation in other conservation and open space preservation programs</li> <li>Encourage enrollment in federal and state nutrient management and stream protection programs</li> <li>Promote greater utilization of funding provided by the Reservoir Protection Group to supplement federal and state agricultural programs</li> <li>Create and routinely update an electronic map based system to track BMP implementation</li> </ul>	Ongoing	HC, MC, M-NCPPC
			Ongoing	HSCD, MSCD
			Ongoing	HSCD, MSCD
			2006 – 2013	HSCD, MSCD

PRIORITY RESOURCES: GOALS & PERFORMANCE MEASURES (continued)

Resource: Public Awareness and Stewardship

Issue: Awareness and support by residents and resource users

Measure	Goals	Implementation Items	Time Line	Responsible Partner
Residents participating in stewardship activities	<ul style="list-style-type: none"> <li>• Citizen action to improve watershed resources – see evidence of watershed friendly activities and practices</li> <li>• 10 to 15 stewardship offerings per year</li> </ul>	<ul style="list-style-type: none"> <li>• Identify citizen groups throughout watershed and be available for presentations upon request</li> <li>• Organize stewardship events and participate in other community events</li> <li>• Recognize good stewards through annual awards</li> <li>• Form “Friends of the Watershed” group of citizen volunteers that will take on tasks such as newsletter preparation and some Earth Month planning</li> </ul>	2006 – 2009	TAC
			Ongoing	TAC
			2006 – 2008	MC, PGC, HC, M-NCPPC
			2006 – 2009	TAC
Schools participating in mentoring	<ul style="list-style-type: none"> <li>• School and community involvement – 20 participating Green School partners by end of 2003 and 5 additional schools participating each year thereafter until all 43 are attained</li> </ul>	<ul style="list-style-type: none"> <li>• Continue and expand Green Schools Mentoring Partnership</li> </ul>	Ongoing	WSSC, HC, MC, PGC, M-NCPPC
Active support by elected officials	<ul style="list-style-type: none"> <li>• Routine communication with elected officials</li> </ul>	<ul style="list-style-type: none"> <li>• Routine communication with elected officials</li> </ul>	Ongoing	TAC
Routine coverage by media	<ul style="list-style-type: none"> <li>• Expanded media coverage of watershed events – print, radio and TV</li> </ul>	<ul style="list-style-type: none"> <li>• Increase communication with media</li> <li>• Support regional efforts to establish media-savvy campaigns that emphasize water quality protection</li> </ul>	2006 – 2009	TAC
			2006 – 2008	

Table 7. Expenditures for Current Fiscal Year

PATUXENT RESERVOIRS WATERSHED WORK PROGRAM FOR FY17				
PRIORITY RESOURCES PROTECTED	IMPLEMENTATION NEED	IMPLEMENTATION ITEM	AGENCY	FY 2016
Reservoir/Water Supply	Reservoir and tributary water chemistry and flow monitoring	Reservoir monitoring and lab analysis	WSSC	\$162,000 (in-kind)
		5 US Geological Survey stream flow gauging stations	WSSC	\$60,000
ALL Priority Resources	Management of agricultural cost-share initiatives	Program oversight for voluntary implementation of agricultural BMPs through existing local, State of Maryland, and Federal programs	HSCD, MSCD	\$165,000 (SCD in-kind)
	Patuxent Reservoirs Watershed MOU and Cost-Share Agreement	Cost-share funds spent	HSCD, MSCD, HC, MC, WSSC	\$10,113
ALL Priority Resources	Public outreach and involvement initiatives	RainScapes Rewards	MC	Rebates available to county residents for Low Impact Development (LID)
ALL Priority Resources	Public outreach and involvement initiatives	Earth Month, and other outreach activities	WSSC	\$140,000 (in-kind)
			Other TAC agencies	\$2,500 (in-kind)

PATUXENT RESERVOIRS WATERSHED WORK PROGRAM FOR FY17				
PRIORITY RESOURCES PROTECTED	IMPLEMENTATION NEED	IMPLEMENTATION ITEM	AGENCY	FY 2016
ALL Priority Resources	Complete Annual Report and Technical Supplement	Compilation and editing	WSSC	\$10,000
			Other TAC Agencies	In-kind
	Coordination and Collaboration	Provide administrative support & coordination among partners	WSSC	\$35,000
Aquatic Biota	Biological Monitoring	Round 4 monitoring within Triadelphia Reservoir subwatersheds	HC	\$75,000
ALL Priority Resources		Cattail Creek Stream Restoration Project at Maple Dell Farm		
		Stream restoration preparation, construction, and monitoring	HC	\$872,000
		Purchase of riparian easement	WSSC	\$128,000
		Water quality monitoring (installation, maintenance and lab analysis)	WSSC	\$21,050 (in-kind)
<b>TOTAL FUNDING</b>				<b>\$1,680,663</b>