

PATUXENT RESERVOIRS WATERSHED PROTECTION GROUP



2018 ANNUAL REPORT
OF THE
TECHNICAL ADVISORY COMMITTEE

FINAL

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Message from the Chair

I am pleased to present the 2018 Annual Report of the Technical Advisory Committee (TAC). Much of the TAC activity during the year built on and extended the work that was already well underway in 2017. We were particularly keen to advocate for progress toward reducing road salt application rates within the watershed and to see the completion of a gap analysis estimating the difference between loading rates and current TMDLs for the Patuxent Reservoirs.

The TAC's presentation to the Policy Board in late 2017 had stressed the need for effective stakeholder coordination to pursue a reduction in salt application rates without compromising road safety. In December 2018, WSSC hosted a Road Salt Summit, involving state, local and regional representatives in an informal discussion intended to begin shaping a collective approach across all the tributary areas supplying WSSC source water. Several TAC members participated, with some highlighting the value of tailoring any future strategy to the characteristics and function of the Patuxent Reservoirs Watershed in particular. The summit concluded with broad support for convening again in 2019.

The TAC, through its TMDL Subcommittee, continued to monitor consultant work on evaluating progress made to date toward meeting TMDLs in the Patuxent Reservoirs. The consultant's report addendum, delivered in September, offers a technical foundation for further work in identifying optimal approaches to reducing pollutant loads within the watershed.

The past year also saw the beginning of an effort to reassess land cover trends in the Patuxent Reservoirs Watershed. Our proposal to engage a NASA DEVELOP team in the analysis of available earth observation data was accepted, and the ten-week project was expected to commence in January 2019. The project is expected to provide useful insight into the changing characteristics of the watershed and help inform long-term land management decisions that will make a difference in the health of the reservoirs.

Sincerely,

Paul Koch, PhD, PE
2018 TAC Chair

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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)
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PGC	Prince George's County
NPDES	National Pollutant Discharge Elimination System
PRW	Patuxent Reservoirs Watershed
PRWPG	Patuxent Reservoirs Watershed Protection Group
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 TAC activities in 2018:

1. Revisions to the original TMDL gap analysis were completed to determine progress made towards achieving the TMDL goals. After approximately 15 years of urban and agricultural BMP implementation, as well as County government reforestation efforts, substantial progress has been made towards achieving the TMDL for sediment, but more work will be required to achieve the TMDLs for phosphorus.

	Triadelphia Reservoir Total Phosphorus	Rocky Gorge Reservoir Total Phosphorus	Triadelphia Reservoir Sediment
Load Reduction Needed To Meet TMDL	58%	48%	29%
Reduction Achieved (2015)	16%	5%	19%
Gap Remaining	42%	43%	10%

2. The FY18 Maryland Assessment Scenario Tool (MAST) modeling demonstrates that the phosphorus TMDL waste load allocation for Howard County's portion of the Rocky Gorge Reservoir Watershed has been met.
3. The Washington Suburban Sanitary Commission (WSSC) convened its first Salt Summit in December 2018 to share concerns about increasing trends in sodium and chloride observed at WSSC's water supply sources and to hear from authorities on current salt management efforts. This was an initial meeting of county and State transportation agencies, county and

State environmental agencies, and the WSSC. The WSSC is planning to convene a second summit after the 2018-19 winter season to continue to collaborate on this important source water protection issue.

4. The WSSC completed its 27th 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 2018 did not exceed either of two thresholds established by the MDE for public water supply reservoirs.
5. Construction for the Cattail Creek Stream Restoration Project at the Maple Dell Farm began in June 2018 and was substantially completed in December 2018. This cooperative, public-private partnership among Howard County, the HSCD, and the WSSC, among others, pooled resources to improve water quality conditions on the last remaining dairy farm in the County's portion of the Patuxent Reservoirs Watershed (PRW). The project includes stream restoration, selective harvesting of 10.6 acres of forest to establish new pasture, and the installation of new fencing to exclude the dairy herd from the restoration area. With assistance provided by Howard County Government, the WSSC continued its water quality monitoring project to determine pollutant loads upstream and downstream of the farm. Preliminary results from the pre-restoration monitoring revealed many opportunities for water quality improvements, because pollutant concentrations and yields from the farm are greater than those delivered upstream of the farm.
6. Howard (HSCD) and Montgomery (MSCD) Soil Conservation Districts used funding from local, State and federal programs to provide technical and financial assistance to landowners for the installation of 28 agricultural BMPs on farms within the PRW.
7. Both Districts continue to make good use of the Patuxent Reservoirs Watershed Agricultural Cost-Share Program and have used or allocated almost all of their remaining program funds. The HSCD requested additional funding in 2018 and received a portion of the request from the WSSC, with the remaining portion from Howard County expected in FY20. The MSCD will likely request additional funding during FY20.
8. A variety of successful outreach events occurred again in 2018 including: watershed, park, and Adopt-A-Road trash clean-ups; Montgomery County Department of Parks' Weed Warrior Programs; and annual WSSC-sponsored events (e.g., 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 Patuxent Reservoirs Watershed (PRW) encompasses an area of about 132 square miles above the T. Howard Duckett Dam, which forms the Rocky Gorge Reservoir (aka T. Howard Duckett Reservoir). 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 PRW drains to the Triadelphia Reservoir, which is formed by Brighton Dam.

In 1996, Howard, Montgomery and Prince George's Counties, the Howard and Montgomery Soil Conservation Districts, the Maryland-National Capital Park and Planning Commission, and the Washington Suburban Sanitary Commission signed an agreement to work cooperatively to protect the long-term biological, physical and chemical integrity of the Patuxent Reservoirs Watershed. This agreement established the Policy Board (Board) and the Technical Advisory Committee (TAC).

The Board is comprised of executive and management level staff from the member agencies. The Board considers strategies to address present or anticipated problems and work activities for the coming year. The Board agrees by consensus on all recommendations, determinations and proposals that it receives from the TAC.

The TAC consists of the seven member agencies plus members from the state of Maryland Departments of Agriculture, Environment, and Natural Resources. The TAC advises the Board on issues that may affect the reservoirs and their watershed. It recommends balanced pollution control strategies and management measures to minimize sediment and nutrient pollution to the reservoirs and their tributaries. It also encourages stewardship of these water resources by developing public education and outreach initiatives.

Since 1997, the TAC has completed an annual report for the Policy Board 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 2018.

In 2003, 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 7). This table contains goals, performance measures, implementation items, and a time line to achieve each goal for six priority resources. Those priority resources include the following:

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

The TAC continues 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 8) 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. The TAC agencies also work on related efforts to help achieve the Total Maximum Daily Loads for the reservoirs, and more recently have begun work to reduce road salt use within the watershed. This annual report presents the TAC's efforts on the TMDLs, road salt reduction and priority resources.

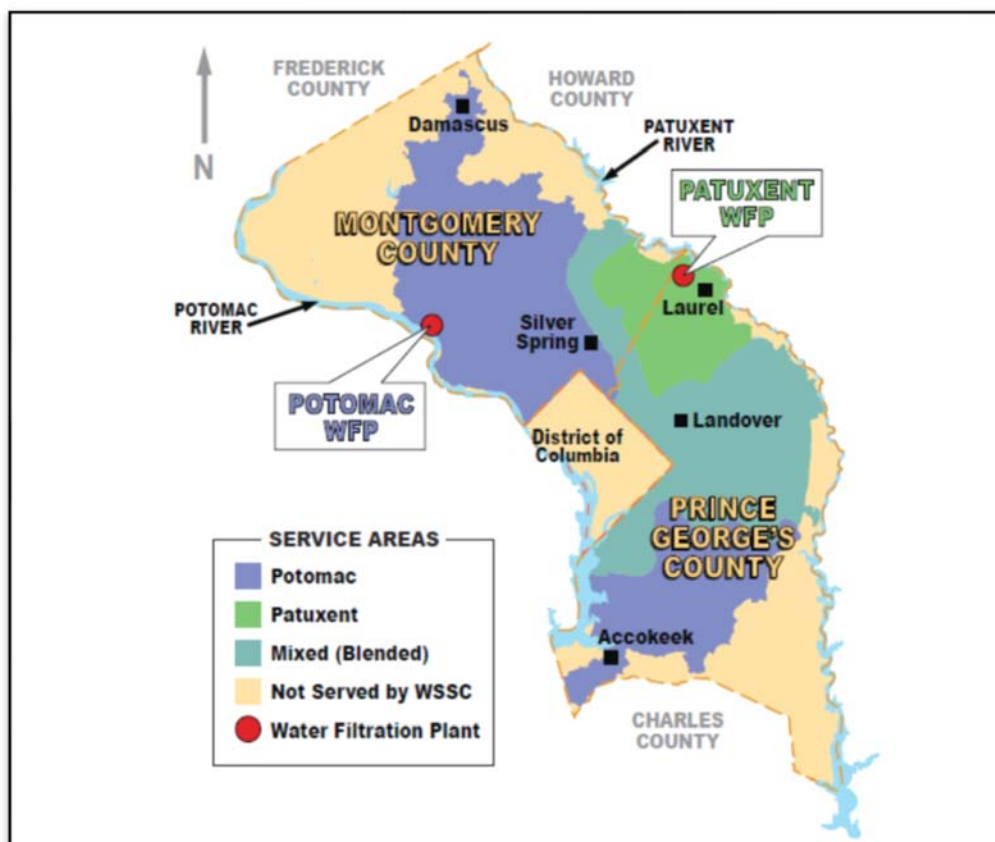


Figure 1. WSSC Drinking Water Service Area - Patuxent & Potomac Sources
(excludes wholesale service to Howard and Charles Counties)

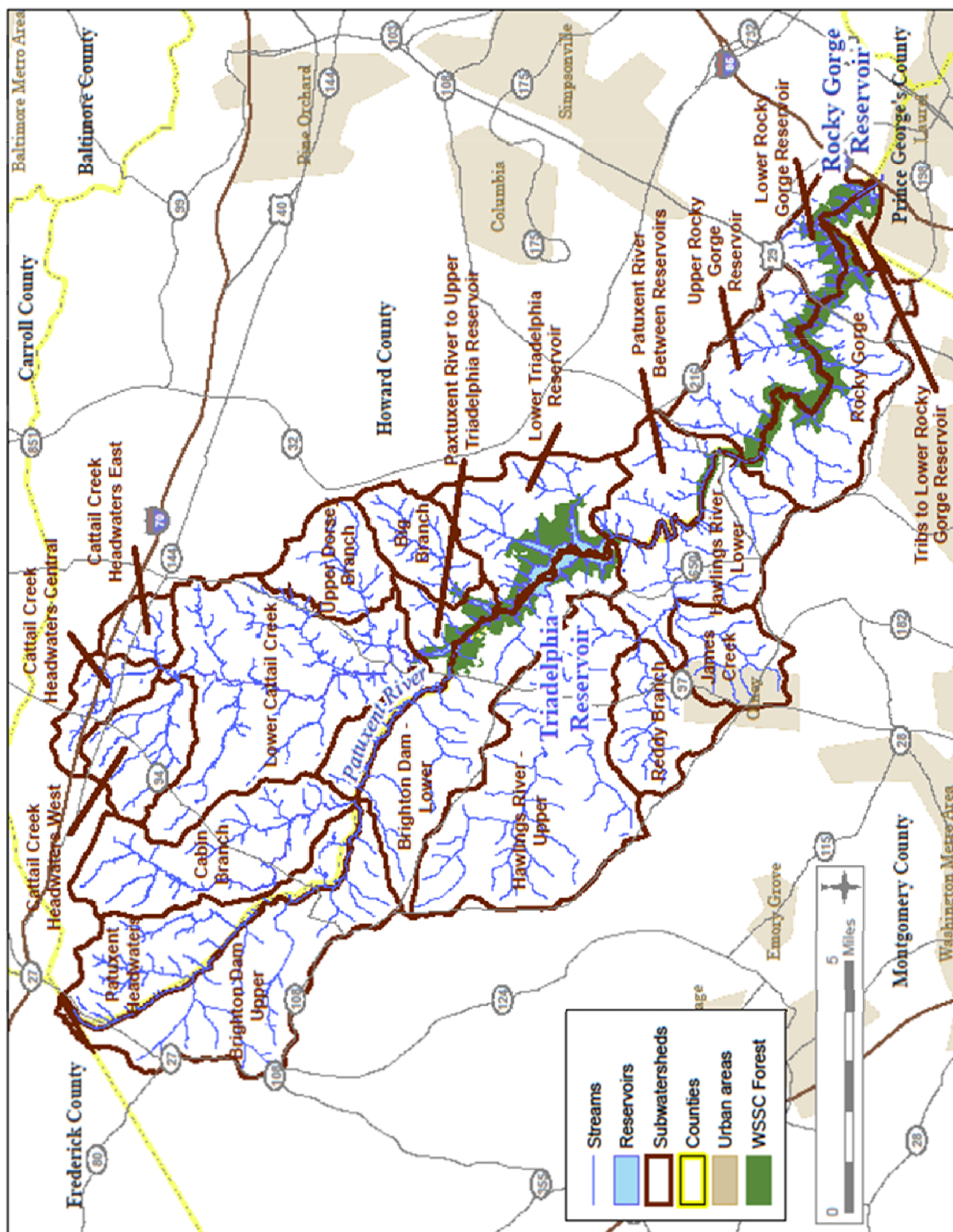


Figure 2. Patuxent Reservoirs Watershed (from Versar 2009)

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 U.S. 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 Reservoirs¹

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 ^A	5,288 19% ^D	7,429 30%	400 2%
LA ^B	21,027 76%	15,757 65%	22,420 98%
MOS ^C	1,385 5%	1,220 5%	Implicit

^A WLA is the sum of TMDL Waste Load Allocations from all **point sources**.

^B LA is the sum of TMDL Load Allocations from all **nonpoint sources** and background.

^C MOS is the Margin of Safety for the TMDL.

^D 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

¹ 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. Sources for modeled baseline pollutant loadings to the Patuxent Reservoirs²

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.

In September 2017 WSSC funding (\$11,566) was approved for the consultant to revise the Gap Analysis to address MDE's concerns. An initial meeting was held in the Fall of 2017, and further coordination between the TAC Subcommittee, MDE and the Maryland Department of Agriculture (MDA) continued in 2018. In particular, the consultant worked closely with MDA to build correspondence tables linking MDA agricultural best management practices (BMPs) to Maryland Department of Planning land use codes, and land use types defined in the Maryland Assessment Scenario Tool (MAST). MDE had made enhancements to MAST, accounting for

² 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.

additional agricultural BMPs, since the version available in 2015 that was used for the original evaluation.

A draft Gap Analysis Addendum report was delivered in June 2018, and the TAC Subcommittee reviewed it. MDE was consulted, and confirmed that its concerns with the earlier version had been addressed. Consolidated comments from the Subcommittee were returned in August, and the Final Addendum was delivered in September 2018. The consultant also updated the Data Dictionary and User Guide for the TMDL evaluation model, so that future updates could be made to the gap analysis once detail of additional, more recent BMPs in the PRW and/or land use changes become available. The findings from the 2018 Addendum are shown in Table 3.

Table 3. Pollutant reductions achieved as of 2015 for the Patuxent Reservoirs

	Triadelphia Reservoir Total Phosphorus	Rocky Gorge Reservoir Total Phosphorus	Triadelphia Reservoir Sediment
Load Reduction Needed To Meet TMDL	58%	48%	29%
Reduction Achieved (2015)	16%	5%	19%
Gap Remaining	42%	43%	10%

The good news is that, after approximately 15 years of urban and agricultural BMP implementation (since the TMDL baseline year 2000), as well as County reforestation efforts, there is measurable progress towards achieving the TMDLs. The bad news is that the rates of progress differ considerably for Sediment and Total Phosphorus, and more effort or planning may need to be done to accelerate Phosphorus load reductions.

Assuming that the same rates of load reduction continue for the foreseeable future (extrapolated linear trends), the TMDL for Sediment in Triadelphia Reservoir could be achieved within 5 years. However, the “gap” remaining for Total Phosphorus in both reservoirs is greater and will take more time for the respective TMDLs to be achieved. It may take over 35 years to achieve the Phosphorus TMDL in Triadelphia Reservoir, while the lower rate in Rocky Gorge Reservoir may mean at least 125 years to achieve its Phosphorus TMDL, unless more progress is made to accelerate implementation.

Proposed TAC TMDL-related activities in 2019 include using the results of the Gap Analysis Addendum to:

- Continue coordination with the MDE and the MDA;
- 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.

The TAC TMDL Subcommittee has been tracking WSSC’s sediment removal in Triadelphia Reservoir, which may have significance for the reservoir TMDLs and future efforts to implement

them. As of December 2018, the WSSC has removed approximately 53,000 cubic yards of sediment from the headwaters of Triadelphia Reservoir for maintaining the reservoir's capacity. The volume equivalence of the removed sediment is approximately 10.75 million gallons. Further sediment removal will continue in 2019. The TAC will pursue determining the implications, if any, on the Sediment TMDL for this reservoir.

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 PRW 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's modeled sources of pollution in the PRW for the waste load allocations 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 NPDES Report Number 23, submitted to the MDE in December 2018, 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 2018, BMPs within the Patuxent Reservoirs Watershed in Howard County produce the following pollutant load reductions, based on the approved Maryland Assessment Scenario Tool (MAST) pollutant load removal efficiencies (Table 4), as presented in the NPDES Annual Report Number 23. The Target Reduction shown in Table 4 is the waste load allocation portion of the TMDL.

Table 4. Phosphorus Reductions to Patuxent Reservoirs from Howard County Urban BMPs

Reservoir	Target Reduction	Progress Reduction
Triadelphia	398 lbs.	56 lbs.
Rocky Gorge	129 lbs.	466 lbs.

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.

The FY18 MAST modeling shows that the Rocky Gorge Reservoir Watershed phosphorus TMDL waste load allocation has been met in Howard County. The County is projecting to meet the Triadelphia Reservoir Watershed phosphorus TMDL waste load allocation with the projects currently programmed and described under the Stream Systems Priority Resource heading below.

Road Salt Issues

Summary of Sodium and Chloride Data and Trends in the Patuxent Reservoirs

Although chloride concentrations are not yet near regulatory (secondary drinking water maximum contaminant level) limits in the reservoirs, they are now at a concentration three times greater than 1990 levels, and the trend is steadily increasing in Rocky Gorge Reservoir, also known as Duckett Reservoir (Figure 3). Sodium levels are also increasing at a similar pace as chloride; furthermore, the sodium trend is approaching the EPA's public health advisory level (Figure 4). The trend line indicates that this advisory level may be reached around 2027.

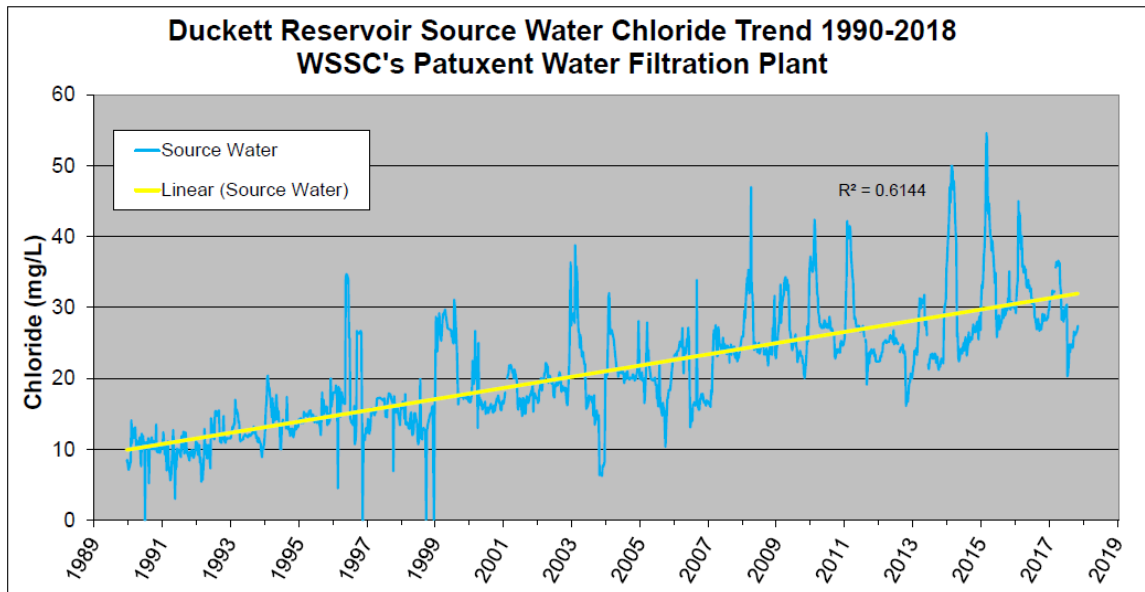


Figure 3. Long-term Chloride Trend at Patuxent Water Filtration Plant

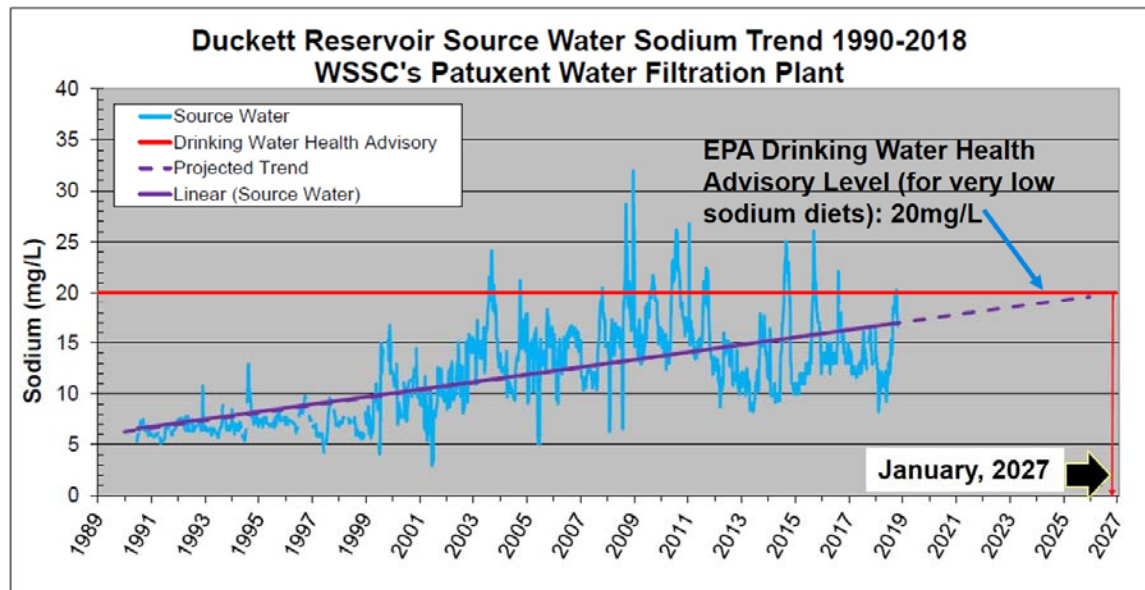


Figure 4. Long-term Sodium Trend at Patuxent Water Filtration Plant

Figures 5 and 6 show the chloride and sodium concentrations in the Triadelphia Reservoir from 2010-2018 respectively. Similar to the Rocky Gorge Reservoir values, there is a seasonal pattern evident with greater values in the winter and spring months and decreasing values through the rest of the year. The shorter period of monitoring for chloride and sodium in Triadelphia Reservoir does not allow for a trend analysis.

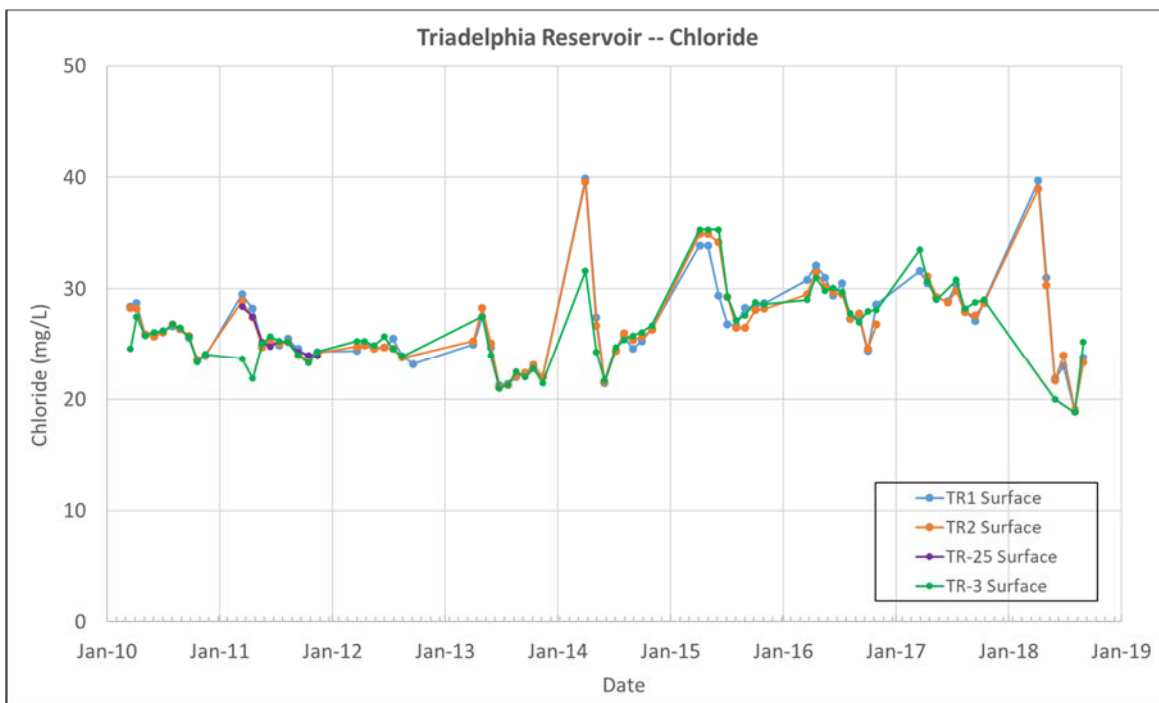


Figure 5. Chloride Concentrations in Triadelphia Reservoir (2010-2018)

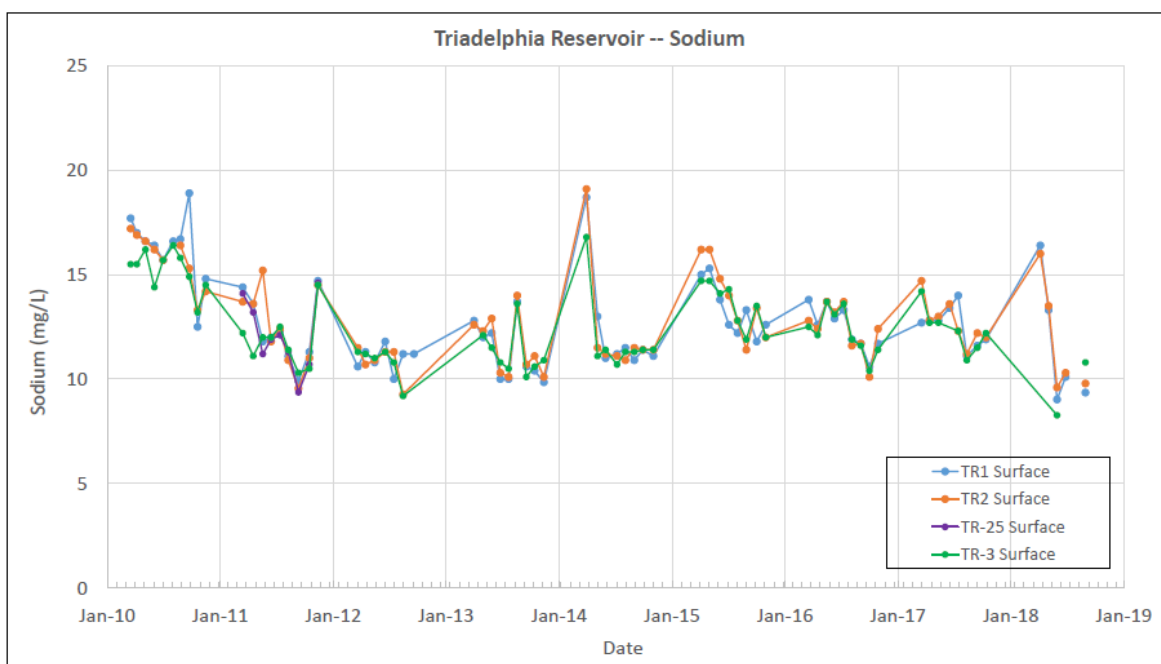


Figure 6. Sodium concentrations in Triadelphia Reservoir (2010-2018)

TAC Implementation Actions

Policy Board Recommendations

At the 2017 Policy Board Meeting, the TAC gave a presentation that summarized the road salt-related concerns in the Patuxent Reservoirs, results of the TAC's research on the issue, and recommendations for 2018. The TAC's key recommendations were:

1. Action should be taken at appropriately high policy-setting levels to manage 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 concerns become an issue.
2. The Policy Board should support the establishment of an interagency work group of stakeholders to:
 - a. 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
 - b. Determine a scope of work, approximate costs, and funding sources for developing a Comprehensive Salt Reduction Plan for the Patuxent Reservoirs Watershed.

In 2018, the Policy Board was unable to make progress in building interagency interest regarding the key 2017 TAC recommendations. At the 2018 Policy Board meeting, the TAC gave another presentation on the road salt issue that summarized the 2017 presentation, including road salt impacts, updated information on the sodium and chloride trends in both reservoirs, economic reasons for better management of road salt, local processes, planning and programs that deal with road salt use and management, and TAC recommendations for 2019. The TAC reiterated the importance and need for convening an interagency work group to begin and oversee the process of addressing the road salt issue.

The TAC presented the following recommendations, based on efforts in other jurisdictions.

- A Patuxent Reservoirs Watershed Salt Management Plan or set of watershed-specific protocols is needed. This will not only help protect the integrity of the reservoirs, but can serve as an important pilot project in Maryland for achieving water quality goals in a sensitive watershed.
- Such a plan or protocols can also provide an example of successful stakeholder cooperation and coordination that can serve as a template elsewhere in the State.

The TAC reported that the WSSC was currently working to convene a Salt Summit with stakeholder agencies in December 2018. This initiative would hopefully provide the basis for establishing a work group to address the salt-related issues in the PRW.

Howard County

Most of the roads in the reservoirs watershed are maintained by government agencies, with the majority (84%) of those under the jurisdiction of local governments. Only about one percent of the roads in the PRW are privately maintained. As a result, local governments have the greatest responsibility in taking actions that will safeguard the water quality of the reservoirs from road salt use.

In Howard County, 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 are applied on County roads during winter storm events. This minimizes the possibility of inadvertent multiple applications of deicing chemicals. The Bureau also continues to hold a *Snow Rodeo* event every October, with mandatory participation from Highways staff to test their snowplow driving skills. A total of 18,489 tons of salt, 8,240 gallons of liquid magnesium, and 29,997 gallons of salt brine were used for deicing the County's roads in FY18.

Runoff containing road salts is not only affecting water quality of stream and reservoirs in the PRW, but may also be affecting private wells in Howard County. During 2018, the Howard County Health Department (HCHD) tested 108 private wells in close proximity to public roads. Well water was tested for concentrations of sodium, chloride and total dissolved solids (TDS).

For a subset of wells tested that did not have additional on-site treatment (e.g., water softener, reverse osmosis), 38 sample results (46%) had sodium concentrations that exceeded 20 mg/L, which is the EPA's health advisory level for those on severely restricted salt diets. Additionally, 11 sample results (14%) had chloride concentrations that exceeded 250 mg/L, which is the National Secondary Maximum Contaminant Level (SMCL). Furthermore, 20 sample results (25%) had Total Dissolved Solid (TDS) concentrations that exceeded the SMCL of 500 mg/L.

Secondary drinking water standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects in drinking water. Noticeable effects including a salty taste is possible when well water exceeds the chloride SMCL. In addition to imparting a salty taste, colored water, deposits, and household metal pipe corrosion are possible when the SMCL is exceeded for TDS³.

Public Outreach and Education

In 2018, the TAC drafted an educational brochure for home and business owners on dealing with snow and ice, while protecting the environment and sources of drinking water. WSSC's Office of Communications and Community Relations recommended that this information would be better presented in a web page, so they are creating one that builds on and adds to the information in the brochure.

³ U.S. Environmental Protection Agency. (n.d.). *Secondary Drinking Water Standards: Guidance for Nuisance Chemicals*. Retrieved March 1, 2019 from <https://www.epa.gov/dwstandardsregulations/secondary-drinking-water-standards-guidance-nuisance-chemicals#main-content>

WSSC Salt Summit

The WSSC convened its first *Salt Summit* in December 2018 to share concerns about increasing trends in sodium and chloride observed at WSSC's water supply sources (Patuxent Reservoirs and Potomac River) and to hear from authorities on current salt management efforts. This was an initial meeting of county and State transportation agencies, county and state environmental agencies, and the WSSC. The Metropolitan Washington Council of Governments facilitated the discussion.

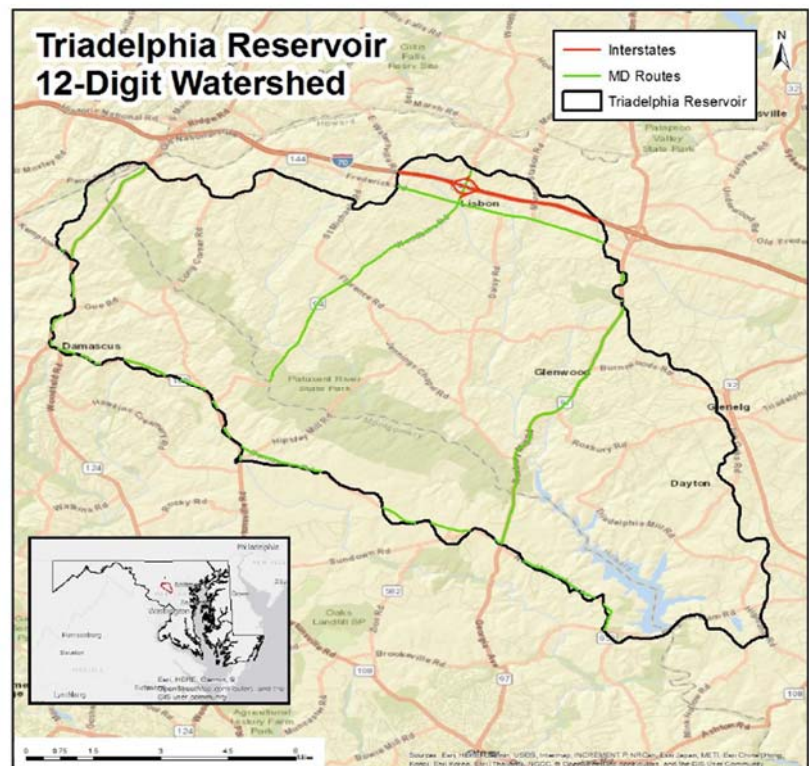
Staff from the MDE presented draft, enhanced requirements for MS4 stormwater permits regarding road salt management that include creating training and outreach materials, developing a county-wide salt management plan, and tracking and reporting materials applied.

Maryland's State Highway Administration (SHA) has reduced its salt usage State-wide from about 950 pounds/lane mile/inch of snow to about 430 pounds/lane mile/inch of snow since the 2013-14 winter season.

Furthermore, the SHA initiated a pilot project to estimate the amount of salt applied to all State-managed roads within the Triadelphia Reservoir's watershed.

The WSSC is planning to convene a second summit after the 2018-19 winter season to continue to collaborate on this important source water protection issue.

During this meeting, the possibility of creating two groups to focus on each of WSSC's two water sources will be discussed.



Annual Progress on Implementation Items for the Priority Resources

Reservoirs and Water Supply

Reservoir Water Quality Monitoring

The WSSC completed its 27th 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 (µg/L); and*
2. *The 90th-percentile of measurements taken during the growing season may not exceed 30 micrograms per liter.*

Weekly, total chl-*a* samples, collected from the Patuxent Water Treatment Plant's raw water sources, are used to determine compliance with the first criterion. The thirty-day moving average did not exceed the 10 µg/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 TMDL of Phosphorus for Rocky Gorge Reservoir, Howard, Montgomery and Prince George's Counties, MD. 2008*

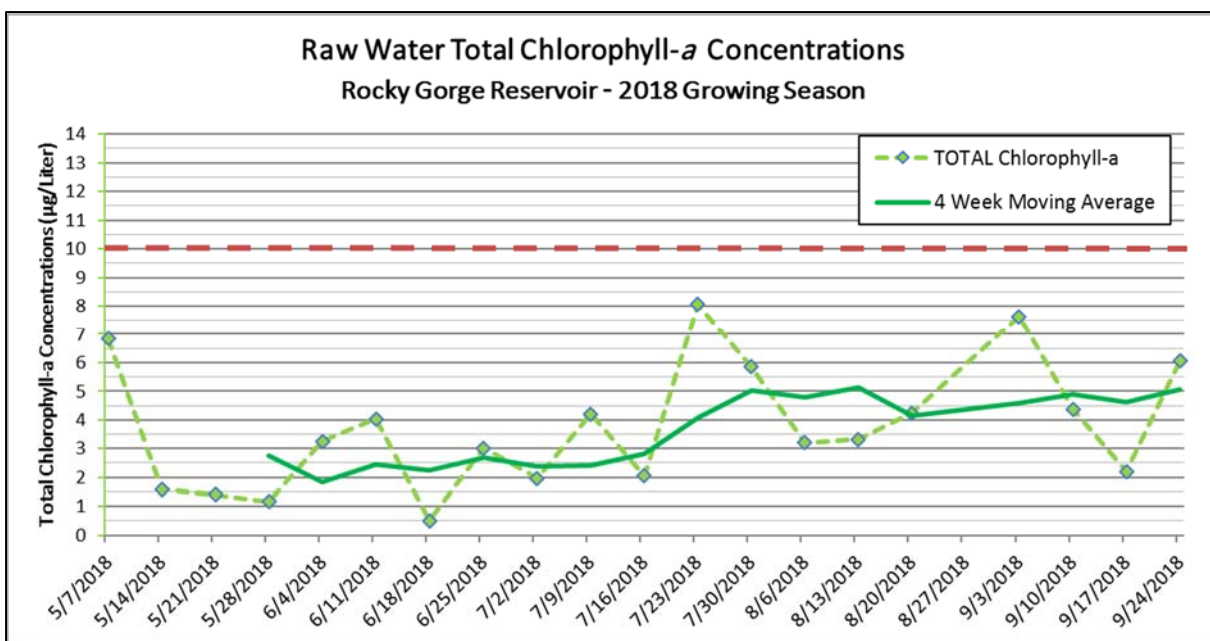


Figure 7. Total chlorophyll-*a* concentrations for 2018 growing season (May – September). Red, dashed line represents the thirty day moving average threshold for public water supply reservoirs.

For the second criterion, five sets of chl-*a* samples were collected from the reservoirs during the 2018 growing season (May-September). The 90th percentile threshold was not exceeded in either reservoir during 2018 (Figure 8).

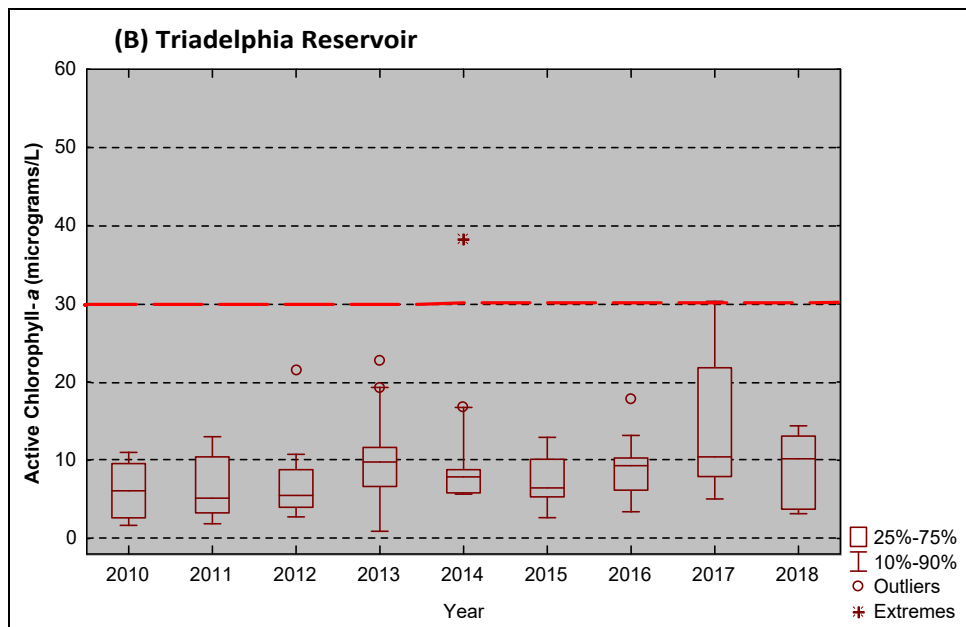
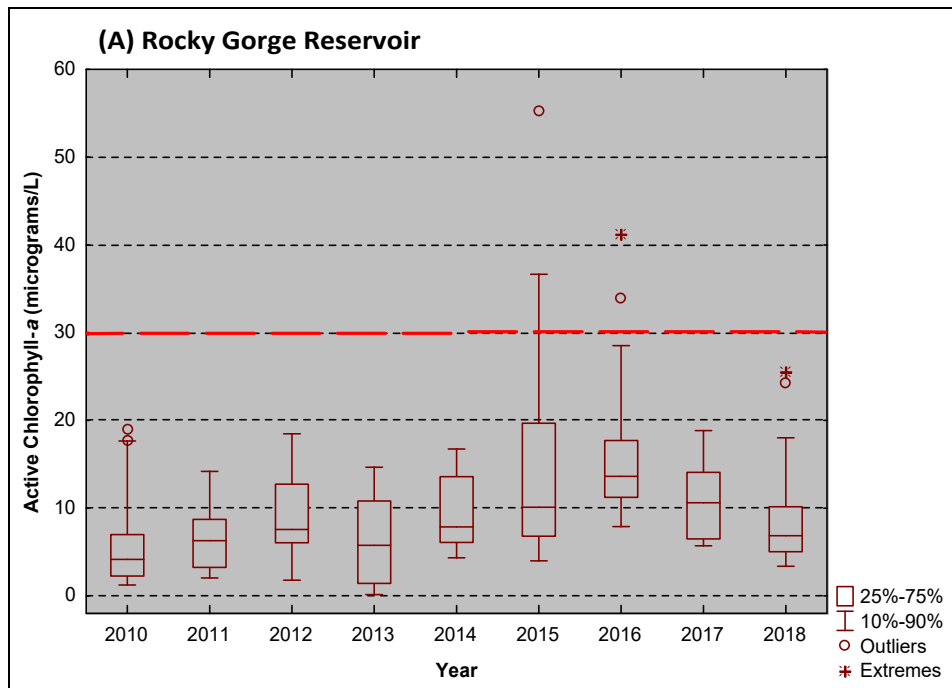


Figure 8. Annual variations (2010-2018) in active chlorophyll-*a* concentrations for (A) Rocky Gorge Reservoir and (B) Triadelphia Reservoir. Growing season data (May-Sept) shown for comparison with red, dashed line at 30 micrograms/Liter representing the 90th percentile threshold for public water supply 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. In the Patuxent Reservoirs Watershed in 2018, the DRP planted 350 trees on four properties through the *Turf to Trees* Program, and 70 trees on one property through the *Stream ReLeaf* 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.

WSSC Property Acquisition – Source Water Protection

During 2018, a total of 18.4 acres of property in the PRW within Howard County was added to WSSC's drinking water source protection buffer surrounding the Rocky Gorge Reservoir (Figure 9). Five lots, designated for rural residential homes, located off Reservoir Road near Fulton, have been added to WSSC's existing land holdings around the reservoir, and will increase the width of the protective buffer in this area. The lots contain steep slopes and tributary streams that will be protected, and open areas on the lots will be reforested.

Prior property acquisitions by WSSC, not previously documented in TAC Annual Reports, include 10.0 acres on Brighton Dam Road in Howard County near Highland, which adds to the protective buffer property around Triadelphia Reservoir. A plantation for American Chestnut trees has been established on the parcel. Also in 2016, WSSC received from the Maryland SHA, in a mitigation transfer associated with the construction of Route 200, a parcel of 49.5 acres on Santini Road in Montgomery County near Burtonsville. Although not directly adjacent to WSSC's existing land around Rocky Gorge Reservoir, portions this property had already been reforested by SHA, and help protect a major tributary to the reservoir. In

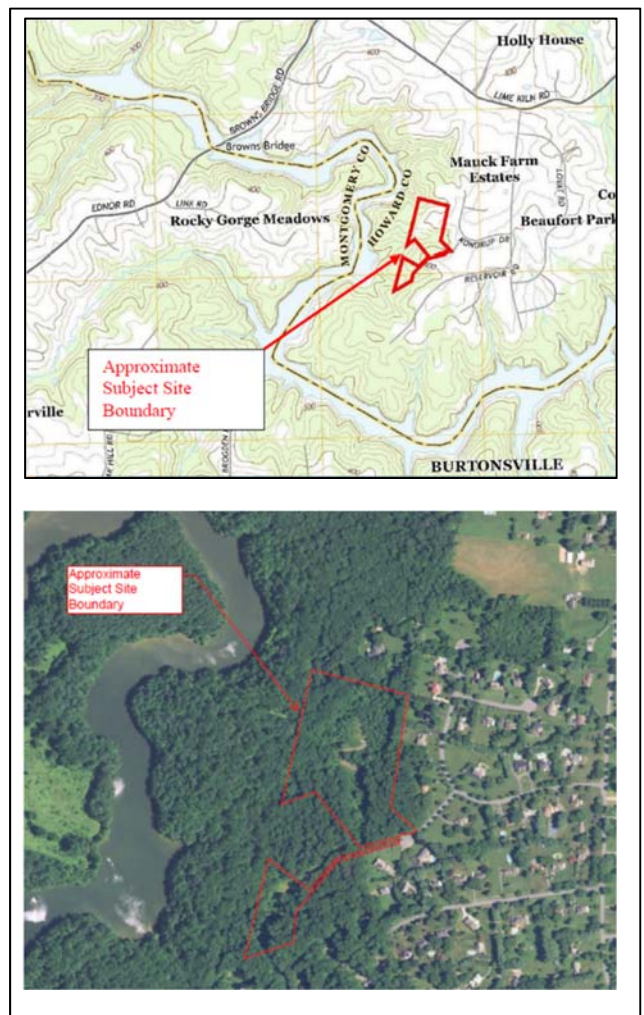


Figure 9. Location of WSSC's 2018 land purchases

2015, WSSC acquired a 6.7-acre property on Stansfield Road in Howard County near Laurel, which also adds to the protective buffer around Rocky Gorge Reservoir.

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 2018. 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.⁴

Howard County Deer Management Program

The Howard County Department of Recreation & Parks Deer Management Program includes annually scheduled bow and shotgun managed hunts and sharpshooting in County parks and open space. In 2018 in the Patuxent Reservoirs Watershed, managed hunts were held in Schooley Mill Park on January 4 and November 19. 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.

Montgomery County Planning Department and Department of Parks

During 2018, the Montgomery County Department of Parks continued to implement its Deer Management Program, 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 2018, 30 deer were harvested from the Rachel Carson Conservation Park. The program continues to be effective in reducing the deer population. Annual deer harvests have resulted in a continued declining deer population that fluctuates between 15-30 deer per square mile.

⁴ The Montgomery County Deer Management Work Group. *Comprehensive Management Plan for White-tailed Deer in Montgomery County, MD*. Revised 2004.

WSSC

The WSSC continued its managed hunting program focusing on selected areas surrounding both reservoirs. For the 2018 hunting season, nine managed hunts occurred, and a total of 77 deer were harvested during the season (Figure 10).

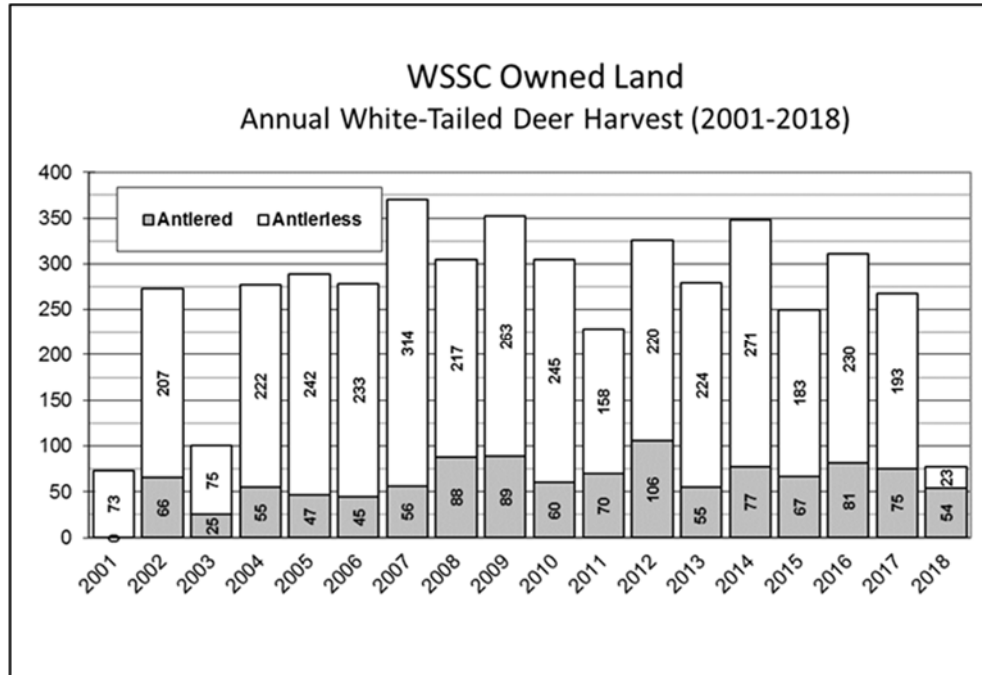


Figure 10. WSSC Deer Hunt Totals (2001-2018)

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 farm located in western Howard County near the town of Lisbon. It is one of three remaining dairy farms in Howard County and the last one remaining in the PRW. Lisbon's Little Creek and an unnamed tributary from the west converge on the farm, and eventually reach the Cattail Creek and the Triadelphia Reservoir. Three additional first order streams are within the project site boundary. The streams on the property have a drainage area of approximately 2,400 acres.

This cooperative, public-private partnership among Howard County, the HSCD, and the WSSC, among others, pooled resources to improve water quality conditions on the farm. 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 fencing to exclude the dairy herd from the easement 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.

Construction began in June 2018 and was substantially completed in December 2018. The tree planting within the riparian easement was mostly completed. With assistance from the HSCD, best management practices including stream fencing, cattle crossings, and watering troughs were installed to exclude the dairy herd from the streams.

With assistance provided by Howard County Government, the WSSC continued its water quality monitoring project 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 (Figure 11). The pre-restoration phase of the monitoring project was completed in June 2018 spanning about 13 months. Preliminary results from this phase of the project revealed many opportunities to improve water quality. Median nutrient and sediment concentrations downstream of the farm were greater than concentrations delivered from upstream of the farm. Similarly, median nutrient and sediment yields from the farm's subwatershed were greater than yields upstream of the farm.

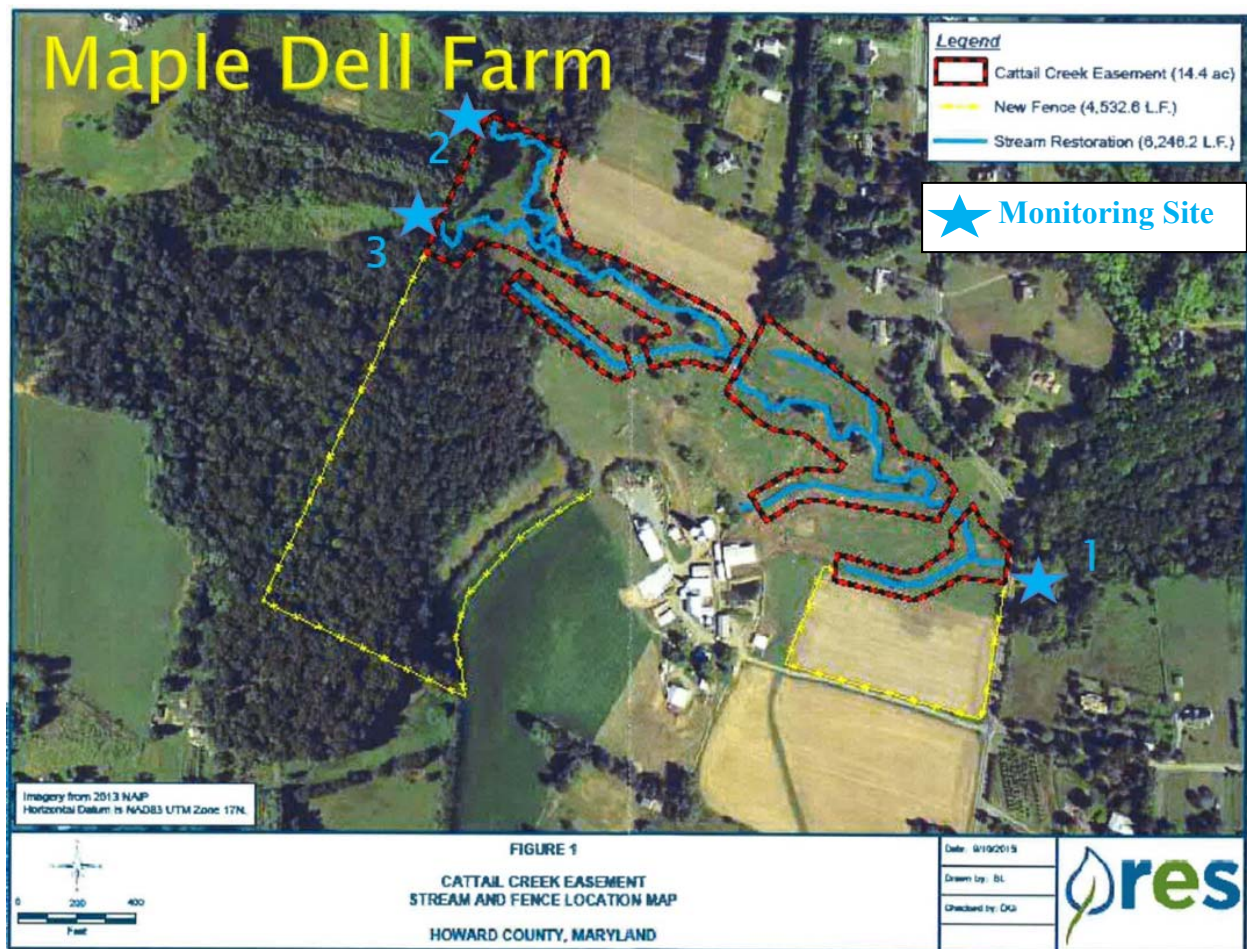


Figure 11. Cattail Creek Stream Restoration at Maple Dell Farm

Cherrytree Farms Pond Repair and Stream Restoration - Project 2

A pond repair project and a second stream restoration project in the Cherrytree Farms neighborhood in Howard County are currently under design and are anticipated to be constructed in FY20. The project sites are located east of Cherrystone Court (Figure 11). 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 that empties directly into the Rocky Gorge Reservoir. 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.

Cherrytree Farms Pond Repair (Section 1, Area 2)

A second pond repair project is underway in the Cherrytree Farms neighborhood. The pond is located near Sand Cherry Lane (Figure 12). The goal of the project is to bring the facility up to current design standards and to maximize water quality treatment credit provided by the facility within its contributing drainage area. The project is under design in FY19 and will likely be scheduled for construction in FY20 or FY21.

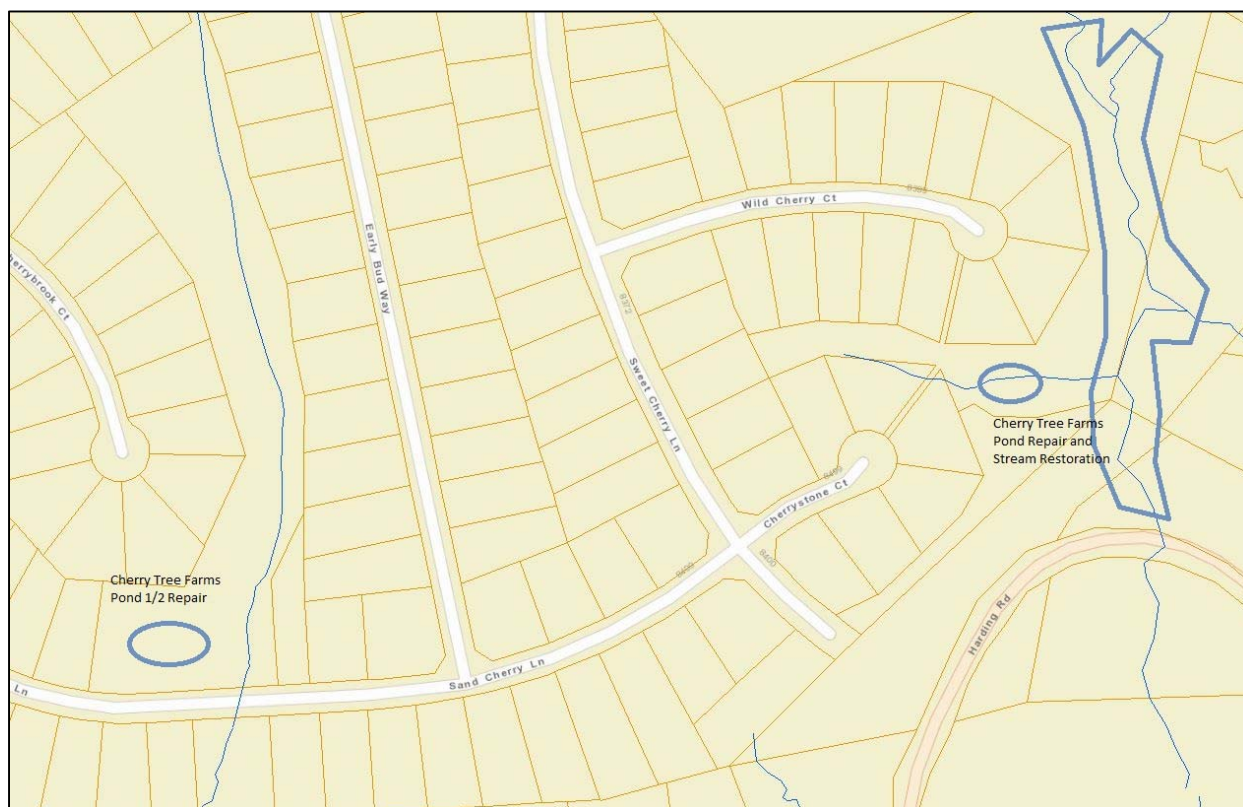


Figure 12. Cherry Tree Farm Projects in Howard County

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 BMP Progress

A summary of the progress made during 2018 by both the HSCD and the MSCD is provided in Table 5. The SCDs provide technical assistance, and use funding from local, state and federal programs to provide financial assistance to landowners for the installation of agricultural BMPs. Each cost-shared practice must be built according to United States Department of Agriculture, Natural Resources Conservation Service (NRCS) standards prior to reimbursement. The NRCS identifies each BMP by a unique code so that there is consistency across the nation when referring to BMPs and their standards. The numbers reported account for activity from July 1, 2017 through June 30, 2018. 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 5. Agricultural Progress for 2017-18 in the Patuxent Reservoirs Watershed

	BMP Code	Howard SCD	Montgomery SCD	Total
Conservation Plans developed (acres)		--	--	--
Conservation Plans revised (acres)		--	--	--
Best Management Practices Installed		18	10	28
Best Management Practice				
Grassed Waterway (acres)	412	--	2 (0.6)	2 (0.6)
Heavy Use Area Protection (acres)	561, 561 FE	2 (0.12)	3 (0.36)	5 (0.48)
Lined Waterway or Outlet (feet)	468	--	3 (967)	3 (967)
Livestock Pipeline (feet)	516	3 (2,406)	--	3 (2,406)
Riparian Forest Buffer (acres)	391	1 (16)	--	1 (16)
Roof Runoff Structure	558	--	2	2
Streamside Fencing (feet)	382 A,B D	4 (7,853)	--	4 (7,853)
Watering Facility (number)	614	8	--	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 might not qualify for other State and federal cost-share programs. In the PRW, 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. These changes widened the scope of the program beyond stream-side practices to include a wider range of eligible BMPs and farms. As anticipated, these new changes have had immediate benefits in Montgomery County.

The HSCD requested additional funding of \$50,000 for this program in 2018. The WSSC sent its contribution for one-third of the request in 2018. The remaining contribution from Howard County is expected in FY20. The remaining funds in this cost-share program as of June 30, 2018 are:

HSCD	13,769.83
MSCD	<u>5,806.51</u>
Total	\$19,576.34

For the HSCD, \$10,212.60 of the remaining balance has already been allotted for BMPs to be installed. Table 6 contains the BMPs constructed with assistance from the HSCD using this cost-shared program in 2018. Similarly, the MSCD has a project selected for their remaining funds.

Table 6. HSCD's use of the Patuxent Reservoirs Watershed Cost-Share Program in CY 2018

Description	Quantity	Unit
Watering Facility	9	Number
Underground Outlet	465	Linear feet
Grade Stabilization Structure	1	Number
Roof Runoff	1	Number
Heavy Use Area Protection	0.9	acres
Livestock Pipeline	2,090	Linear feet

Public Awareness and Stewardship

The TAC agencies and other groups in the watershed continued to coordinate public outreach and involvement initiatives during 2018. Staff from WSSC's Office of Communications and Community Relations continued to host many 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 in these counties.

Montgomery County Department of Parks

During 2018, Montgomery County stream valley buffer reforestation efforts in the PRW included ongoing management of about 16.5 reforested acres in the Hawlings River Watershed. In addition, about 68 reforested acres at the Oaks Landfill site continue to be managed.

Under the Department of Parks' Weed Warrior Program, which coordinates volunteer efforts to remove invasive plants from natural areas, 153 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 Patuxent Reservoirs Watershed. A total of 460 person-hours was logged, for a total of 905 pounds of trash and 425 pounds of recyclables removed.

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

Once again the WSSC hosted almost 1,000 students to the watershed recreation area 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.



During the 2017-2018 school year, students from Burleigh Manor Middle School in Howard County, worked with WSSC's watershed management team to build 18 reef balls. In May of 2018, 35 students visited the Greenbridge Recreation Area to help anchor the reef balls along the shoreline, to provide fish habitat when the reservoir water level recedes. The students also learned more about WSSC's work to protect water quality in the Triadelphia and Rocky Gorge Reservoirs, and planted birch trees in a seasonally wet area. While

the students enjoyed learning about WSSC's work, they really enjoyed spending the afternoon fishing!

The WSSC continued its Watershed Recreation Outreach on three separate 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.

During the summer, WSSC hosted three special groups to the reservoir properties. Middle school students from Montgomery County public schools participated in a summer science, technology, engineering and math (STEM) camp, students from DC public schools participated in the Rock Creek Conservancy's Conservation Corps Program, and elementary school teachers from Montgomery County public schools participated in the Chesapeake Classrooms program



organized by the Chesapeake Bay Foundation. Participants in all programs learned about WSSC's role in the community and the importance of keeping a forested buffer around water ways. During the STEM camp and Chesapeake Classrooms program, WSSC's environmental science team led groups through a demonstration of the work they do to monitor water quality in the reservoir. The Conservation Corp Program also highlighted careers in natural resource management.



The WSSC also welcomed its own employees, along with groups from Fort Meade and Sandy Spring Friends School, for 3 clean-ups at the recreation areas.

Table 7. 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"> 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 	<ul style="list-style-type: none"> Perform reservoir monitoring for chl-<i>a</i>, DO, and TOC during the growing season 	Ongoing	WSSC
Dissolved oxygen (DO)	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Perform reservoir monitoring for CHL-<i>a</i>, DO, and TOC during the growing season 	Ongoing	WSSC
Suite of water quality parameters in reservoir monitoring protocol	<ul style="list-style-type: none"> Five-year data trend analysis for other monitored water quality parameters shows no net deterioration 	<ul style="list-style-type: none"> Develop and begin implementation of a plan to reduce nutrients, based on model/TMDL requirements Update trend analysis for reservoir water quality parameters on a 5-year cycle 	Ongoing Next Update in 2021	TAC WSSC
Total organic carbon (TOC)	<ul style="list-style-type: none"> TOC – 20% annual reduction goal, with 40% reduction for peak quarter at the location where water is withdrawn for treatment purposes 	<ul style="list-style-type: none"> Perform reservoir monitoring for CHL-<i>a</i>, DO, and TOC during the growing season 	Ongoing	WSSC
Sediment	<ul style="list-style-type: none"> Sediment accumulation rate not to exceed previous years 	<ul style="list-style-type: none"> Perform bathymetric survey of reservoirs at 10 year intervals or less 	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"> Maintain and increase forest cover Increase forest interior habitat 	<ul style="list-style-type: none"> Encourage private property owners to participate in tree planting programs Ensure publicly owned parkland and open space is forested to the maximum extent possible 	<p>Ongoing</p> <p>2006 – 2023</p>	<p>TAC</p> <p>TAC</p>
Forest Connectivity	<ul style="list-style-type: none"> Improve forest connectivity (larger forest tracts are connected by forest corridors) 	<ul style="list-style-type: none"> Target reforestation and forest conservation programs to increase forest connectivity and forest interior habitat 	Ongoing	TAC
Forest Size	<ul style="list-style-type: none"> Increase forest size 	<ul style="list-style-type: none"> Encourage private property owners to participate in tree planting programs Ensure publicly owned parkland and open space is forested to the maximum extent possible 	<p>Ongoing</p> <p>2006 – 2023</p>	<p>TAC</p> <p>TAC</p>
Forest Diversity	<ul style="list-style-type: none"> Ensure diverse forest communities (communities contain a variety of species and ages) 	<ul style="list-style-type: none"> 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 	<p>2006 – 2013</p> <p>WSSC Plan completed FY08</p>	<p>TAC</p> <p>WSSC</p>
Forest Sustainability	<ul style="list-style-type: none"> Ensure forests are self-sustaining and capable of long-term natural regeneration 	<ul style="list-style-type: none"> Implement deer management programs Implement strategies for control of invasive plants 	<p>Ongoing</p> <p>Ongoing</p>	<p>TAC</p> <p>TAC</p>

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

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"> No subwatershed with a benthic IBI indicating "fair" or "poor" condition 	<ul style="list-style-type: none"> Pursue cost-share funds to construct agricultural BMPs, stream restoration, and storm water retrofit projects to address factors contributing to degraded biological integrity Mitigate runoff impacts from land use changes 	2006 – 2023	HC, HSCD, MC, MSCD, M-NCPPC
			2006 – 2023	HC, MC, M-NCPPC
	<ul style="list-style-type: none"> Preserve conditions in subwatersheds with "excellent" and "good" benthic IBIs 	<ul style="list-style-type: none"> 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 	2006 – 2023	HC, HSCD, MC, MSCD, M-NCPPC

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"> Total acres enrolled Number of farms enrolled 	<ul style="list-style-type: none"> Preserve the agricultural and rural nature, and open space of the watershed 	<ul style="list-style-type: none"> Continue easement acquisition through agricultural land preservation programs Continue agricultural economic development programs 	Ongoing	HC, MC
			Ongoing	HC, MC
Agricultural Demographics <ul style="list-style-type: none"> Acres of agricultural land Market value of agricultural production Size of farms Types of farms 	<ul style="list-style-type: none"> Preserve the agricultural and rural nature, and open space of the watershed 	<ul style="list-style-type: none"> Continue zoning and land use policies in the watershed to maintain rural character Continue agricultural economic development programs 	Ongoing	HC, M-NCPPC
			Ongoing	HC, MC
Open Space and Parkland Acquisition and Easement Programs <ul style="list-style-type: none"> Acres of open space land preserved by non-agricultural easements or acquisition 	<ul style="list-style-type: none"> Create a landscape that is protective of water quality 	<ul style="list-style-type: none"> Utilize effective open space land management practices that are beneficial to water quality 	Ongoing	HC, M-NCPPC, WSSC
Participation in agricultural conservation programs and percent of conservation plans that are implemented	<ul style="list-style-type: none"> Create a landscape that is protective of water quality 	<ul style="list-style-type: none"> Encourage participation in other conservation and open space preservation programs Encourage enrollment in federal and state nutrient management and stream protection programs Promote greater utilization of funding provided by the Reservoir Protection Group to supplement federal and state agricultural programs Create and routinely update an electronic map based system to track BMP implementation 	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"> Citizen action to improve watershed resources – see evidence of watershed friendly activities and practices 10 to 15 stewardship offerings per year 	<ul style="list-style-type: none"> Identify citizen groups throughout watershed and be available for presentations upon request Organize stewardship events and participate in other community events Recognize good stewards through annual awards Form “Friends of the Watershed” group of citizen volunteers that will take on tasks such as newsletter preparation and some Earth Month planning 	<p>2006 – 2009</p> <p>Ongoing</p> <p>2006 – 2008</p> <p>2006 – 2009</p>	<p>TAC</p> <p>TAC</p> <p>MC, PGC, HC, M-NCPPC TAC</p>
Schools participating in mentoring	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Continue and expand Green Schools Mentoring Partnership 	Ongoing	WSSC, HC, MC, PGC, M-NCPPC
Active support by elected officials	<ul style="list-style-type: none"> Routine communication with elected officials 	<ul style="list-style-type: none"> Routine communication with elected officials 	Ongoing	TAC
Routine coverage by media	<ul style="list-style-type: none"> Expanded media coverage of watershed events – print, radio and TV 	<ul style="list-style-type: none"> Increase communication with media Support regional efforts to establish media-savvy campaigns that emphasize water quality protection 	<p>2006 – 2009</p> <p>2006 – 2008</p>	TAC

Table 8. Expenditures for Current Fiscal Year

PATUXENT RESERVOIRS WATERSHED WORK PROGRAM FOR FY18				
PRIORITY RESOURCES PROTECTED	IMPLEMENTATION NEED	IMPLEMENTATION ITEM	AGENCY	FY 2018
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	\$50,041
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 FY18				
PRIORITY RESOURCES PROTECTED	IMPLEMENTATION NEED	IMPLEMENTATION ITEM	AGENCY	FY 2018
ALL Priority Resources	Complete Annual Report and Technical Supplement	Compilation and editing	WSSC	\$10,000 (in-kind)
			Other TAC Agencies	In-kind
	Coordination and Collaboration	Provide administrative support & coordination among partners	WSSC	\$35,000
ALL Priority Resources	Stream restoration	Cattail Creek Stream Restoration Project at Maple Dell Farm		
		Additional funding for stream restoration	HC	\$3,700,000
		Water quality monitoring (installation, maintenance and lab analysis)	WSSC	\$21,000 (in-kind)
Terrestrial Habitat	Increase forest cover, forest connectivity, forest interior habitat	Land acquisitions adjacent to Patuxent Reservoirs	WSSC	\$1,697,500
TOTAL FUNDING				\$6,043,041