

PATUXENT RESERVOIRS WATERSHED
PROTECTION GROUP



2019 ANNUAL REPORT
OF THE
TECHNICAL ADVISORY COMMITTEE

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Message from the Chair

I am pleased to present the 2019 Annual Report of the Technical Advisory Committee (TAC). In 2019 the TAC continued its ongoing activities related to protection and enhancement of the watershed's priority resources and initiated new ones. The priority resources are the reservoirs and drinking water supply, terrestrial (forest) habitat, stream systems, aquatic biota, rural character and landscape, and public awareness and stewardship.

New initiatives included updating the measures, goals, implementation items and time lines for protection and enhancement of the priority resources. This update helped to better align the work for these resources with efforts to achieve the reservoirs' TMDLs. It also emphasized the need for watershed scale mapping to track changes in resource status and possibly present this information in a clear and concise manner to the public. The TAC formed a new Watershed Mapping Workgroup to focus on this task and the Policy Board offered additional staff resources to move this effort forward at its annual meeting.

The TMDL Implementation Gap Analysis Workgroup determined that adding more stream buffers throughout the watershed would be a cost-effective method to close the TMDL implementation gap. Stream buffers are also identified as a primary implementation item to support stream systems. Watershed mapping will help define the current state of riparian buffers and prioritize areas for creating new or enhanced buffer installations.

Ongoing activities included reservoir water quality monitoring, implementation of the agricultural best management practice cost-share programs, stream restoration, management of recently planted forest, and public outreach and education. The Road Salt Management Workgroup attended a second Salt Summit, an interjurisdictional and interagency meeting to share information about road salt management efforts, that was organized by WSSC Water.

I was honored to be the TAC Chair this year and wish to express my admiration and gratitude for the TAC members who continuously work to improve conditions within the reservoirs' watershed through their normal work activities and through additional tasks they voluntarily accept to support TAC initiatives. I especially wish to thank Steve Nelson, coordinator for the TAC, who provides the consistency over time and the background work needed to keep the TAC moving forward.

Sincerely,
Susan Overstreet
2019 TAC Chair

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Acronyms

Abbreviation	Definition
aka	Also Known As
BMP	Best Management Practice
BOH	(Howard County) Bureau of Highways
CAST	Chesapeake Assessment Scenario Tool
chl- <i>a</i>	Chlorophyll- <i>a</i>
DEP	(Montgomery County) Department of Environmental Protection
DO	Dissolved Oxygen
DOT	(Montgomery County) Department of Transportation
DRP	(Howard County) Department of Recreation and Parks
EPA	US Environmental Protection Agency
FY	Fiscal Year
GIS	Geographic Information System
HAB	Harmful Algal Bloom
HC	Howard County
HSCD	Howard Soil Conservation District
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
SMCL	Secondary Maximum Contaminant Level
TAC	Technical Advisory Committee
TDS	Total Dissolved Solids
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 identified both reservoirs as impaired by nutrients and identified Triadelphia Reservoir as impaired by sediment; consequently, the Maryland Department of the Environment 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 the Technical Advisory Committee (TAC) activities in 2019:

1. The TAC initiated an assessment of opportunities to improve pollutant load reductions to the reservoirs through enhanced implementation of certain best management practices (BMPs). As a first step, the TAC reviewed the BMPs currently used in the Patuxent Watershed along with a BMP cost-effectiveness study. The study revealed that, by far, the most cost-effective BMP, and the one with the greatest potential for implementation, is riparian stream buffer restoration. Based on the cost-effectiveness study results, the TAC decided to focus its attention on identifying opportunities for stream buffer restoration and assessing the potential for increased efforts to restore stream buffers to enhance the rate of progress in meeting the TMDLs.
2. The FY19 Chesapeake Assessment Scenario Tool modeling demonstrates that the waste load (i.e., point source) allocation portion of the phosphorus TMDL has been met in Howard County for both the Rocky Gorge and Triadelphia Reservoir Watersheds. However, this achievement represents only 15% of the amount needed to meet the TMDL; the rest must come from load allocation (i.e., non-point source) reductions.
3. Several important initiatives were taken during 2019 to better manage winter roadway deicing chemicals.

- a. The Howard County Bureau of Highways updated its draft Comprehensive Salt Management Plan; continued to expand brine pretreatment on the County's primary roads; and identified a second liquid-only route in the Patuxent Reservoirs Watershed.
 - b. The Montgomery County Department of Transportation implemented its *Road Salt Management Plan* based on the *Maryland Statewide Salt Management Plan*, experimented with using rubber-tipped snowplow blades to reduce road damage and salt use, calibrated contractor equipment, required contractors to clean up excess salt, and expanded its use of salt brine.
 - c. WSSC Water convened its second *Salt Summit* in October 2019 to hear from authorities on current salt management efforts. Attendees included key personnel from county and State transportation agencies, county and State environmental agencies, and WSSC Water. Prior to convening another Summit, creating three working groups (Outreach, Monitoring, and Management Options) was recommended to further investigate each topic. WSSC Water also created a [Be Salt-Wise in Winter](#) webpage to educate customers.
4. WSSC Water completed its 28th year of reservoir water quality monitoring 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 2019 in Triadelphia Reservoir exceeded one threshold established by the Maryland Department of the Environment for public water supply reservoirs; however, during rehabilitation of Brighton Dam the water level was lowered well below the normal pool elevation, prohibiting access to the far upstream monitoring station, and thereby reducing the number of samples collected for the comparison. Also, the WSSC Water continued to monitor its public recreation areas at Rocky Gorge Reservoir for harmful algal blooms. A Water Contact Health Advisory was initiated for one month beginning in late August 2019 based on high concentrations of potentially toxic cyanobacteria. During the advisory, traces of algal toxins were detected, but were well below advisory threshold values established by EPA guidance for recreational waters.
5. 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 49 agricultural BMPs on farms within the Patuxent Reservoirs Watershed.
6. Both Soil Conservation Districts continue to make good use of the Patuxent Reservoirs Watershed Agricultural Cost-Share Program. The HSCD received the remaining portion of a funding request for \$50,000 from Howard County. The MSCD has spent all of the funds from this program and will request additional funding from WSSC Water during 2020.

7. A variety of successful outreach events occurred again in 2019 including: watershed, park, and Adopt-A-Road trash clean-ups; a HSCD Farm Academy, Montgomery County Department of Parks Weed Warrior Programs; and annual WSSC Water-sponsored events (e.g., Sunfish and Students Program).
8. The TAC revised two of the Priority Resource charts including the addition of specific criteria to track progress using geographic information system mapping capabilities.

Introduction

WSSC Water 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 impounds 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 impounded 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 and funding 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 2019.

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 8). 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 9) 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 (TMDL) 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 addressing the TMDLs, road salt reduction and priority resources.

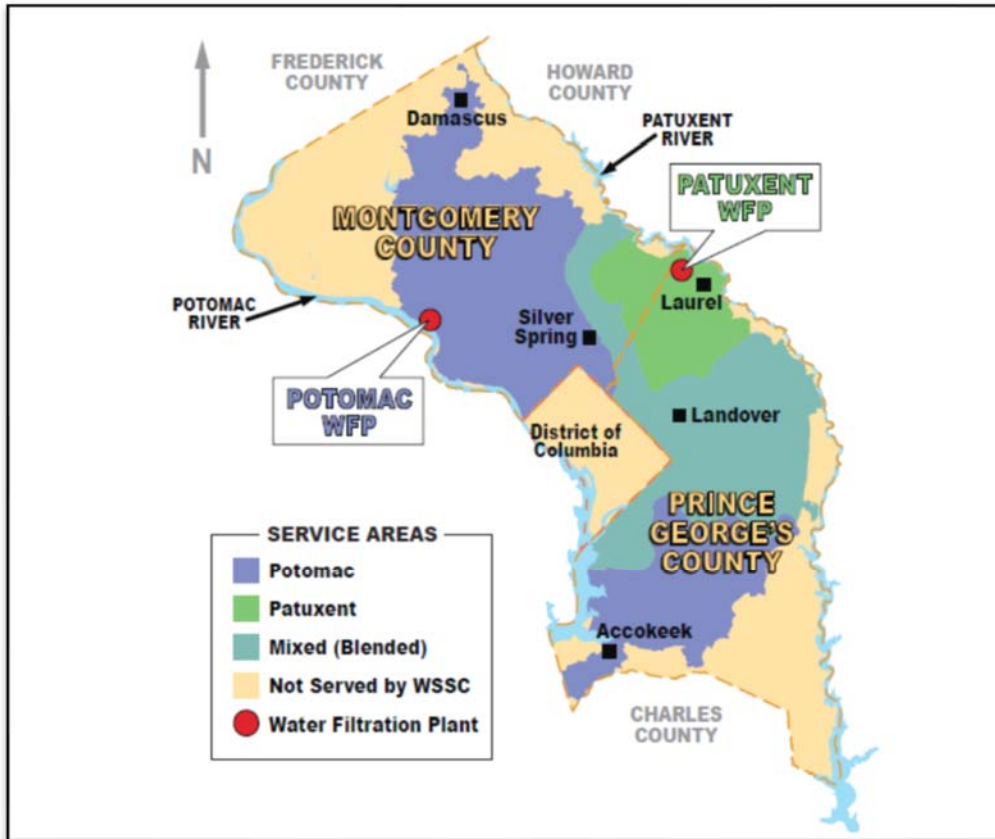


Figure 1. WSSC Water Drinking Water Service Area - Patuxent & Potomac Sources (excludes wholesale service to Howard and Charles Counties)

Total Maximum Daily Load Implementation

In 1998, the Maryland Department of the Environment (MDE) identified both Patuxent 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 non-point 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	7,429	400
	19% ^D	30%	2%
LA ^B	21,027	15,757	22,420
	76%	65%	98%
MOS ^C	1,385	1,220	Implicit
	5%	5%	

^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 **non-point 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.

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.

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

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*. To respond to recommendations from the MDE, an addendum to the 2016 Gap Analysis, funded by WSSC Water, was completed in 2019 to: (1) incorporate the effect of cover crops, (2) incorporate nutrient management plan implementation, and (3) account for the effect of suspected overlapping agricultural BMPs. The report, the addendum, and the data used to determine load reductions were provided to the MDE for the purpose of approving the methodology used to measure progress.

A draft Gap Analysis Addendum report was delivered in June 2018, and the TAC’s TMDL Workgroup reviewed it. The MDE was consulted, and confirmed that its concerns with the earlier version had been addressed. Consolidated comments from the Subcommittee were returned to the consultant in August 2018, and the Final Addendum was delivered in July 2019. 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 2019 Addendum are shown in Table 3.

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.

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 phosphorus, and more BMP implementation effort or planning may need to be done to accelerate phosphorus load reductions, especially in the Rocky Gorge subwatershed.

Assuming the same annual pollutant source loadings and the rates of reducing those loads through BMP implementation continue (extrapolated linear trends), the TMDL for sediment in Triadelphia Reservoir could be achieved within 5 years. However, the gap remaining for 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 slower progress rate for Rocky Gorge Reservoir may mean at least 125 years to achieve its phosphorus TMDL, unless more progress is made to accelerate BMP implementation.

2019 TMDL Implementation-Related Activities

In 2019 the TAC initiated an assessment of opportunities to improve pollutant load reductions to the reservoirs through enhanced implementation of certain BMPs. As a first step, the TAC reviewed the BMPs currently used in the PRW along with a BMP cost-effectiveness study that was recently completed for the Chesapeake Bay Program and incorporated into the Chesapeake Assessment Scenario Tool (CAST). The BMP study results can be accessed within CAST.

The study revealed that, by far, the most cost-effective BMP, and the one with the greatest potential for implementation in the watershed, is riparian stream buffer restoration. The opportunities for making additional TMDL implementation progress using other agricultural or urban BMPs are limited. Implementation of other BMPs can and should be enhanced, but they

cannot be expected to contribute additional substantial load reductions that will help meet the TMDLs.

Based on the cost-effectiveness study results, the TAC decided to focus its attention on identifying opportunities for stream buffer restoration, and assessing the potential for increased efforts to restore stream buffers to enhance the rate of progress in meeting the TMDLs. This project will use results of a Geographic Information System (GIS)-based analysis in conjunction with other data to identify stream buffer restoration opportunities and assess the load reductions that might be achieved under different implementation scenarios and timeframes.

This project was planned in several phases:

1. Assemble the needed data and GIS layers from the three counties and merge the data sets to provide a consistent watershed-wide database;
2. Basic GIS Analysis to Identify Potential Buffer Restoration Sites;
3. Load Reduction and Costs Assessments, and Implementation Scenario Development
 - a. Determine total potential load reductions and costs, including load reductions/costs on public versus private lands; and
4. Develop Policy Board Recommendations.

In 2019, the TAC compiled most of the basic data sets needed as part of Phase 1.

TAC Proposed 2020 Activities

Proposed TAC TMDL-related activities in 2020 include:

- Continue coordination with the MDE and the Maryland Department of Agriculture (MDA);
- Complete the stream buffer restoration assessment; and
- Develop recommendations for the Policy Board for stream buffer restoration implementation options for improving progress in meeting the TMDLs.

The TAC's TMDL Workgroup has also been tracking WSSC Water's sediment removal in Triadelphia Reservoir, which may have significance for the reservoir's sediment TMDL. WSSC Water has removed approximately 172,000 cubic yards of sediment from the headwaters of Triadelphia Reservoir and the Pigtail recreation area to help maintain the reservoir's capacity. By removing the sediment delivered to the reservoir from its 77 square mile watershed, approximately 35 million gallons of storage capacity was recovered. It is understood that the original rationale for MDE's inclusion of a sediment impairment in Triadelphia Reservoir was loss of water supply capacity.

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

According to the 2008 TMDL 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 represent just 15% of the total reductions needed to achieve the reservoirs' TMDL goals.

Howard County

In its NPDES Annual Report, Howard County Government reports on progress towards meeting its MS4 permit requirements (including compliance with pollutant source identification; stormwater management, erosion and sediment control, and illicit discharge detection/elimination programs; restoration plans; watershed assessments; TMDLs; assessment of controls and monitoring; program funding; and special programmatic conditions). Annual NPDES Report Number 24, submitted to the MDE in November 2019, is 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 2019, the BMPs within Howard County's portion of the PRW produce the following pollutant load reductions, based on the approved CAST pollutant load removal efficiencies (Table 4), as presented in the NPDES Annual Report Number 24. 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	399 lbs.	925 lbs.
Rocky Gorge	129 lbs.	394 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 FY19 CAST modeling shows that the phosphorus TMDL waste load allocation has been met in Howard County for both the Rocky Gorge and Triadelphia Reservoir Watersheds.

Road Salt

At the 2018 Policy Board Meeting, the TAC made a presentation that summarized the road salt-related concerns in the PRW, results of the TAC's research on the issue, and recommendations for 2019. At the 2019 Policy Board meeting, the TAC gave a follow-up presentation on the same issues, including road salt impacts, updated information on the sodium and chloride trends in both the Triadelphia and Duckett Reservoirs, economic reasons for better management of road salt, local processes, planning and programs that deal with road salt use and management, and the TAC recommendations for 2020. Most of the roads in the PRW 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 to reduce road salt use that will safeguard the water quality of the reservoirs watershed.

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

Although chloride concentrations are not yet near the non-mandatory, National, secondary maximum contaminant level (SMCL) of 250 milligrams/liter (mg/L) in the reservoirs, chloride concentrations by 2019 are two to three times greater than 1990 levels; and the linear regression trend line indicates concentrations may increase in Rocky Gorge Reservoir, also known as T. Howard Duckett Reservoir (Figure 3). Sodium levels are also increasing at a similar rate 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 2031.

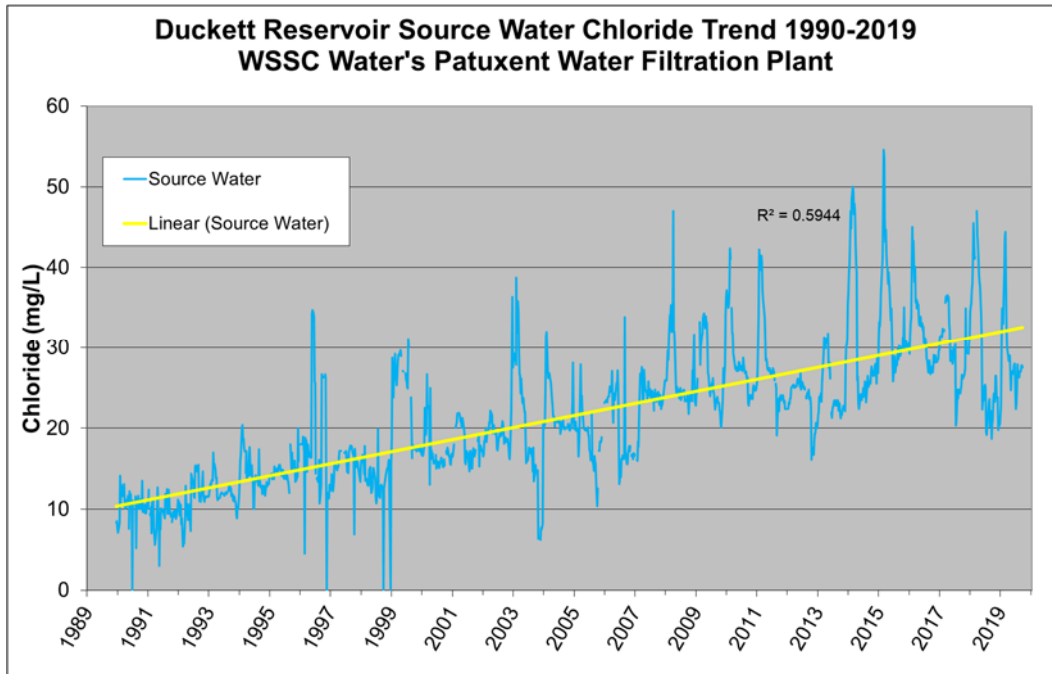


Figure 3. Long-term Chloride Trend at Patuxent Water Filtration Plant

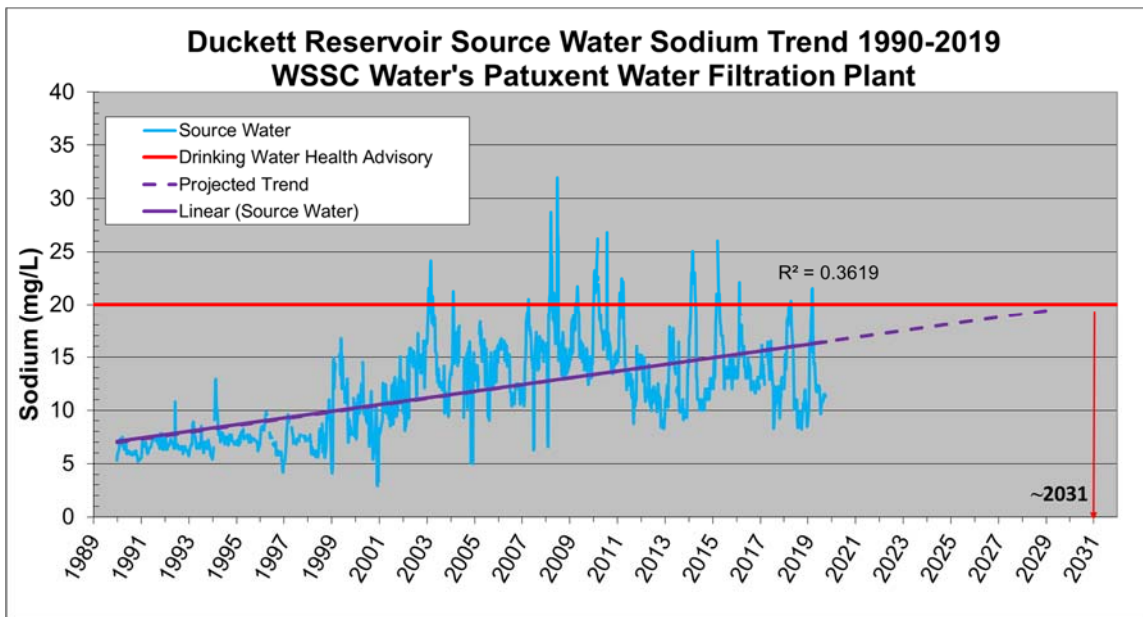


Figure 4. Long-term Sodium Trend at Patuxent Water Filtration Plant

Figures 5 and 6 show the chloride and sodium concentrations in the Triadelphia Reservoir from 2010-2019 respectively. Similar to the Rocky Gorge Reservoir values, there is a seasonal pattern evident with greater values in the spring months and decreasing values through the

rest of the year. These graphs were generated from in-reservoir samples usually collected from March through November and may miss winter maximum values. Sodium concentrations in Triadelphia Reservoir vary from about 10-20 mg/L and do not appear to indicate an increasing trend.

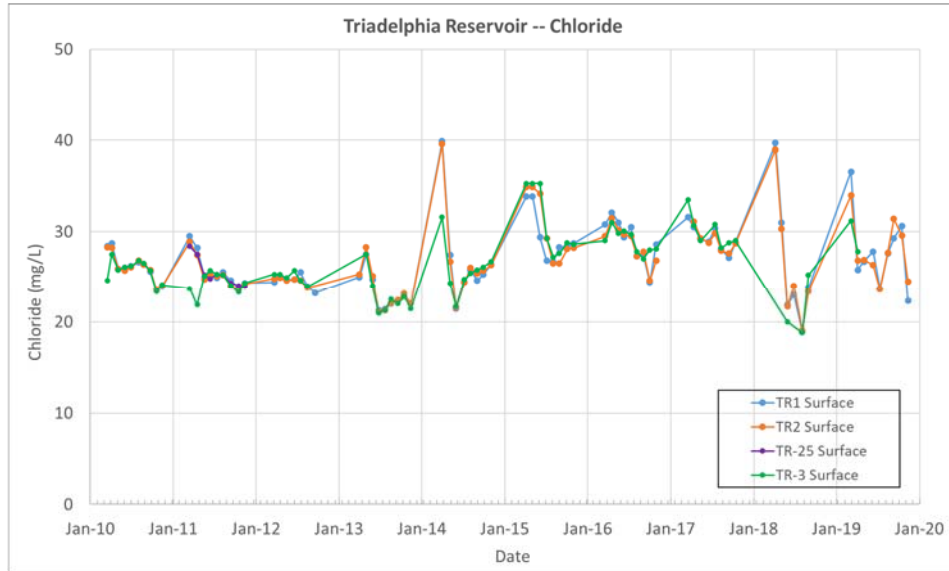


Figure 5. Chloride Concentrations in Triadelphia Reservoir (2010-2019)

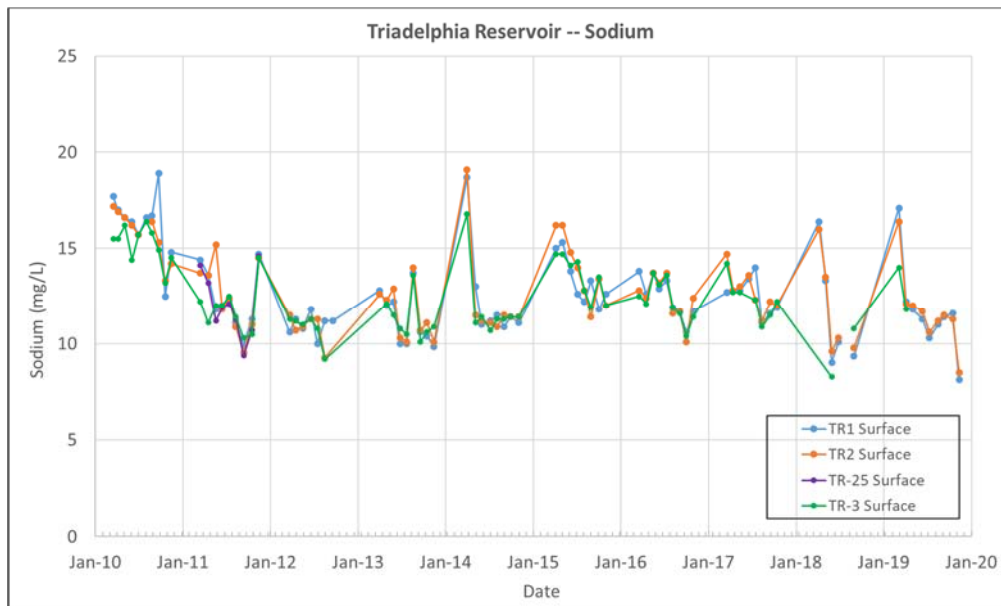


Figure 6. Sodium concentrations in Triadelphia Reservoir (2010-2019)

TAC Implementation Actions (2019)

Howard County Government Initiatives

Bureau of Highways

As reported in Howard County’s MS4 Stormwater Permit, Annual Report Number 24, the Department of Public Works, Bureau of Highways (BOH) continues to use and update automatic vehicle location and GIS technologies to record where and when deicing chemicals are applied on county roads during winter storm events. This minimizes the possibility of inadvertent multiple applications of deicing chemicals. Recent efforts by the County’s BOH to manage salt include the following initiatives:

- Update its draft comprehensive salt management plan;
- Continue to expand brine pretreatment on the county’s primary roads;
- Identify a second liquid-only route in the Patuxent Reservoir Watershed; and
- Install a new brine maker in Highways Central Zone and upgrade the brine maker in Highways East Zone.

A total of 10,980 tons of salt, 2,825 gallons of liquid magnesium, and 80,109 gallons of salt brine were used for de-icing the county’s roads during the 2018-19 winter season. Applications of salt and liquid magnesium by the BOH have decreased since 2014, while the use of salt brine has increased dramatically as the BOH has implemented pilot projects using salt brine (Table 5). The practice of using salt brine (a mixture of salt and water) to wet roads prior to a winter storms event results in less solid salt being applied.

Table 5. Howard County Bureau of Highways Salt Related Product Use (FY15-FY19)

Fiscal Year	Salt (tons)	Liquid Magnesium (gallons)	Salt Brine (gallons)
FY15	35,686	21,415	0
FY16	18,386	10,147	600
FY17	10,229	2,150	42,000
FY18	18,489	8,240	29,997
FY19	10,980	2,825	80,109

The BOH also continues to hold a *Snow Rodeo* event every October, with mandatory participation from Highways staff to test their snowplow driving skills.

Howard County Health Department

Runoff containing road salts not only affects the water quality of streams and reservoirs in the PRW, but increasing evidence supporting adverse impacts to private wells in Howard County continues to be uncovered. During 2019, the Howard County Health Department (HCHD) tested approximately 55 private wells in close proximity to public roads, or in areas of new development, that is intended to build information on baseline data for potential future

comparative considerations. Due to staffing turnover, sampling activities (and corresponding database management) in this area were curtailed for portions of 2019, but resumed near the end of the year. Additionally, the HCHD agreed to partner with the Maryland Geological Society as part of their Phase 2 study evaluating wells with potential salt concerns and developing any correlations with a variety of metals. Both new and existing wells will be considered, and the project will extend into 2020 until sufficient local sampling has been concluded to meet planned objectives. Phase I of the Maryland Geological Society study generally focused on a select number of wells in the Piedmont region (some previously sampled) to evaluate changes in parameters like chloride and provided a basis for an expanded, more detailed sampling regime devised for Phase II.

The HCHD continued its sampling approach for well water testing focusing on concentrations of sodium, chloride and total dissolved solids (TDS). As noted above, sampling performed as part of the Maryland Geological Society study also included an expanded list of metals. To evaluate the impact of treatment and overall effectiveness towards providing improved drinking water quality, sampling included pre- and post-treatment analyses. For a subset of wells tested that did not have additional on-site treatment (e.g., water softener, reverse osmosis), 28 out of 49 sample results (57%) had sodium concentrations that exceeded 20 mg/L, which is the EPA's Health Advisory level for those on severely restricted salt diets. Additionally, 9 out of 55 sample results (16%) had chloride concentrations that exceeded 250 mg/L, which is the SMCL. Furthermore, 8 out of 31 sample results (26%) had TDS concentrations that exceeded the SMCL of 500 mg/L. Relative to 2018 findings, similar percentage findings were seen for chloride and TDS, while an increase in the percentage of sodium results exceeding 20mg/L was noted.

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, are 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.

Montgomery County Department of Transportation Initiatives

The Montgomery County Department of Transportation (DOT) initiated a number of initiatives in 2019 all designed to reduce the amount of salt applied to county roads. Those initiatives include:

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>

- Implementing a Road Salt Management Plan based on the *Maryland Statewide Salt Management Plan*;
- Using, on a trial basis, rubber-tipped snowplow blades to begin plowing earlier, reduce road damage and salt use;
- Calibrating contractor equipment to reduce salt use;
- Requiring contractors to clean up excess salt; and
- Expanding the use of salt brine.

MS4 Stormwater Permits – Draft Road Salt Permit Conditions

The MDE has added several, new permit conditions to the next round of MS4 Stormwater Permits related to road salt management. These draft permit conditions will be part of a new or updated county-wide Salt Management Plan that is based on the *Maryland Statewide Salt Management Plan*. Those expanded conditions include:

1. Creating an equipment replacement schedule that provides for technological improvements that limit salt application rates;
2. Training personnel and contractors in salt management;
3. Developing best salt management practices to educate homeowners;
4. Tracking and recording deicing chemicals used per snowfall event; and
5. Reporting salt tonnage used per event, monthly, and annually (salt tons/lane mile/inch of snow).

Public Outreach and Education

WSSC Water finalized an educational brochure drafted by the TAC for home and business owners on dealing with snow and ice (on sidewalks and driveways) while protecting the environment and sources of drinking water. WSSC Water also created a webpage called Be Salt Wise in Winter that builds on and adds to the information in the brochure.

WSSC Water’s Salt Summit

In October 2019, WSSC Water held its second *Salt Summit* to continue the discussion initiated at the first *Salt Summit* in 2018.

Salt Summit participating agencies included: Center for Watershed Protection, City of Rockville, Maryland Department of Environment, Maryland State Highway Administration, Howard County Government, Maryland-National Capital Park and Planning Commission (M-NCPPC), Metropolitan Washington Council of Governments, Montgomery County Government, University of Maryland, and WSSC Water. Important summary points from the 2019 *Summit* include:

1. The MDE and State Highway Administration's pilot study of salt application in the Triadelphia Reservoir watershed is continuing, but no data are available yet;
2. The creation of three working groups was recommended: Outreach, Monitoring, and Management Options;
3. Some discussion of developing a subwatershed salt management pilot study. It is not clear yet if this will happen, or, if so, what subwatershed might be selected; and
4. Currently, WSSC Water's *Salt Summit* appears to be the best venue for bringing the various interjurisdictional stakeholders together to begin to address this concern. It is not clear at this time, however, how effective any recommendations or actions resulting from this process will be in addressing the specific road salt management needs within the PRW.

TAC 2017 Road Salt Issue-Related Recommendations

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.

Policy Board Recommendations

At the 2019 Annual Policy Board Meeting, the TAC reviewed the TAC's original 2017 (see immediately above) road salt-related recommendations and revisited them considering road salt-related developments that have occurred since that time. The TAC noted that there have been, and continue to be, encouraging changes in road salt application practices at both the State and county levels. If these changes continue and their use is expanded by county DOTs to include all county-maintained roads, the result should be decreasing road salt loadings to the Patuxent Reservoirs. The TAC noted, however, that such an expansion will be very costly and time consuming to implement. It is also not certain whether the reduction from this expansion, even if it occurred, would be enough to adequately manage salt use in the PRW before water quality standards are exceeded, or before public health concerns become an issue. It is also

uncertain if there is sufficient understanding of the need to reduce road salt applications to protect the reservoirs among all the key county leaders and decision makers. Until there is, of course, there may not be the political will to address this issue.

Accordingly, the TAC will continue to monitor developments in road salt management, participate as an advocate for the PRW in local salt summits, and report back to the Policy Board. In the meantime, the TAC made 2020 recommendations to the Policy Board that are intended to help increase awareness of this issue and the need to provide additional attention and funding for further enhancements in road salt management, and to raise awareness of additional technical issues that need to be addressed to facilitate better management and reduced use of road salt.

TAC 2020 Road Salt Issue-Related Policy Board Recommendations

- Raise awareness of the needs of the PRW among county policy makers;
- Advocate for adequate additional funding needed to implement the new/updated MS4 salt management plans;
- Advocate for State certification for contractors; and
- Advocate for legislation to reduce liability for applicators.

TAC Proposed 2020 Activities

- Continue to track interagency progress in addressing salt-related water quality concerns;
- Explore the potential for monitoring salt related pollutants in tributary streams;
- Continue to participate in the *Salt Summit* process; and
- Conduct additional research and make recommendations as needed.

Annual Progress on Implementation Items for the Priority Resources

The TAC continued to update the Priority Resource charts during 2019, completing the update for the Terrestrial Habitat and Stream System Priority Resource charts. Improvements made included better coordination with local TMDLs for the reservoirs and adding an implementation item to track progress every 5-10 years. The remaining charts will be updated during 2020.

Reservoirs and Water Supply

Reservoir Water Quality Monitoring

WSSC Water completed its 28th year of reservoir water quality monitoring 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. *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. In addition, samples are collected monthly and delivered to WSSC Water's laboratory for analysis of alkalinity, chloride, chlorophyll-*a*, iron, manganese, nitrogen, phosphorus, sodium, total organic carbon, 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.

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

Due to construction at the location where weekly chl-*a* samples are collected, a statistical comparison with the first criterion was not possible during 2019. For the second criterion, five sets of chl-*a* samples were collected from the reservoirs during the 2019 growing season (May-September). The 90th percentile threshold was not exceeded in Rocky Gorge Reservoir during 2019, but it was exceeded in Triadelphia Reservoir (34.0 µg/L) (Figure 7). During the rehabilitation project at Brighton Dam (2017-2019), the water level for Triadelphia Reservoir was lowered to a depth well below the normal pool elevation, which prohibited access to the far upstream monitoring station, thus reducing the number of samples collected (n=10). A significant algal bloom was also observed within Triadelphia Reservoir, which explains the elevated chl-*a* results for 2019.

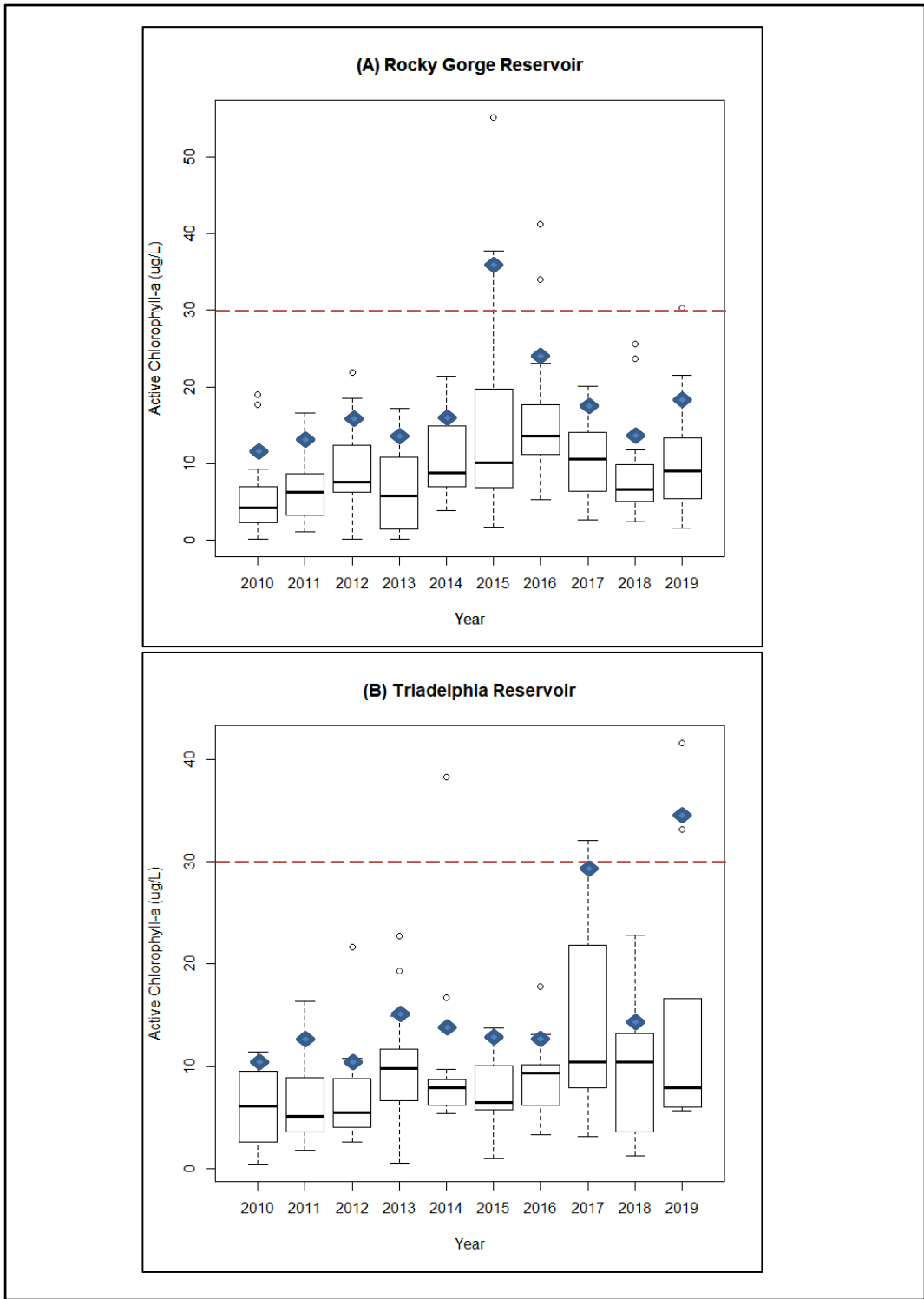


Figure 7. Annual variations (2010-2019) in active chl-*a* concentrations for (A) Rocky Gorge Reservoir and (B) Triadelphia Reservoir. Growing season data (May-Sept) and 90th percentile (◆) for comparison with red, dashed line at 30 µg/L representing the 90th percentile threshold for public water supply reservoirs.

Harmful Algal Bloom (HAB) Monitoring at WSSC Water’s Public Recreation Areas

In reservoirs, a class of phytoplankton (suspended, aquatic algae) known as blue-green algae or cyanobacteria can sometimes proliferate during the summer months, and can persist at high concentrations into early autumn. If this occurs, it is often referred to as a harmful algal bloom (HAB) because high concentrations of algae can cause skin reactions upon contact and potentially produce toxins.

WSSC Water continued to monitor its public access recreation areas at Rocky Gorge Reservoir for HABs during 2019. Triadelphia Reservoir was closed to public access during 2019 for the rehabilitation project at Brighton Dam. There are three public recreation areas at Rocky Gorge Reservoir; namely, Scotts Cove (in Howard County), Supplee Lane (in Prince George’s County), and Brown’s Bridge (in Howard and Montgomery Counties).

On August 20, 2019, WSSC Water initiated a Water Contact Health Advisory because potentially harmful algal cell concentrations exceeded a 100,000 cells/mL threshold established by the World Health Organization (Figure 8). To inform the public of the advisory, WSSC Water issued a press release, posted advisory signs at all recreation areas, and notified county and State of Maryland health and environmental agencies. During the advisory, traces of algal toxins were detected below the limit of analytical reporting. These toxin concentrations were well below advisory threshold values that are based on US EPA guidance for recreational waters. The Health Advisory was lifted on September 20, 2019.

Note that the recreational HAB monitoring effort is separate from WSSC Water’s other algal toxin monitoring efforts for drinking water purposes.

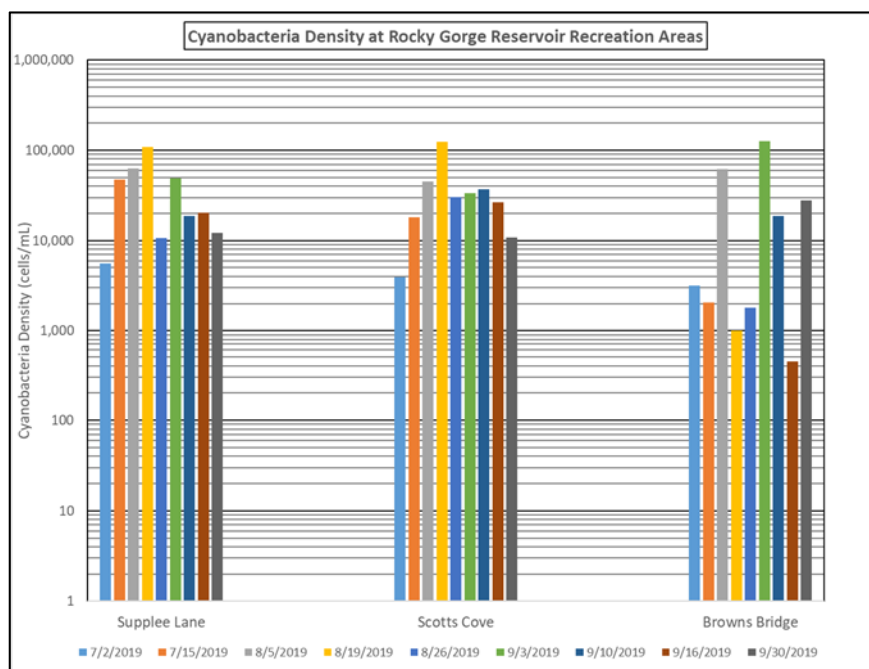


Figure 8. Cyanobacteria Density at Rocky Gorge Reservoir Recreation Areas

Terrestrial Habitat

The focus of this priority resource continues to be the increase, 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 to streams, 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 PRW in 2019, the DRP planted 539 trees on eight properties through the *Turf to Trees* Program, and 120 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 Water Property Acquisition – Source Water Protection

During 2019, a total of 60.1 acres of mostly forested land in the PRW, within both Howard and Montgomery Counties, was added to WSSC Water's drinking water source protection buffer surrounding the Rocky Gorge and Triadelphia Reservoirs (Figures 9 and 10). One property located on Batson Road in Montgomery County near Spencerville (41.5 acres) has been added to WSSC Water's existing land holdings around Rocky Gorge Reservoir, and will increase the width of the protective buffer in this area. Two parcels near Triadelphia Reservoir provide the same function there: one is on Brighton Dam Road in Howard County (16.1 acres), and the other is on Greenbridge Road in Montgomery County (2.5 acres).

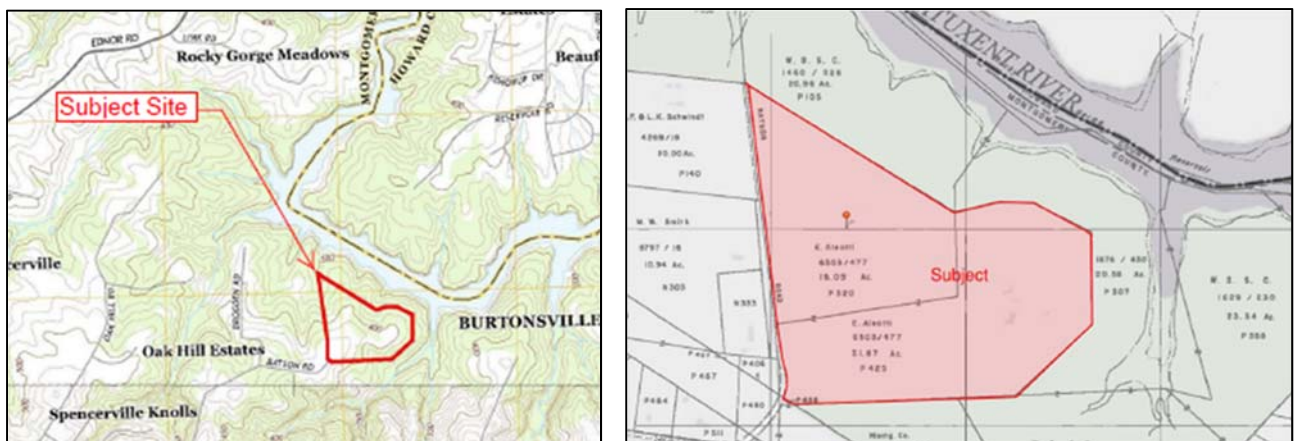


Figure 9. Location of WSSC Water's 2019 land purchases, Rocky Gorge Reservoir (Batson Rd.)

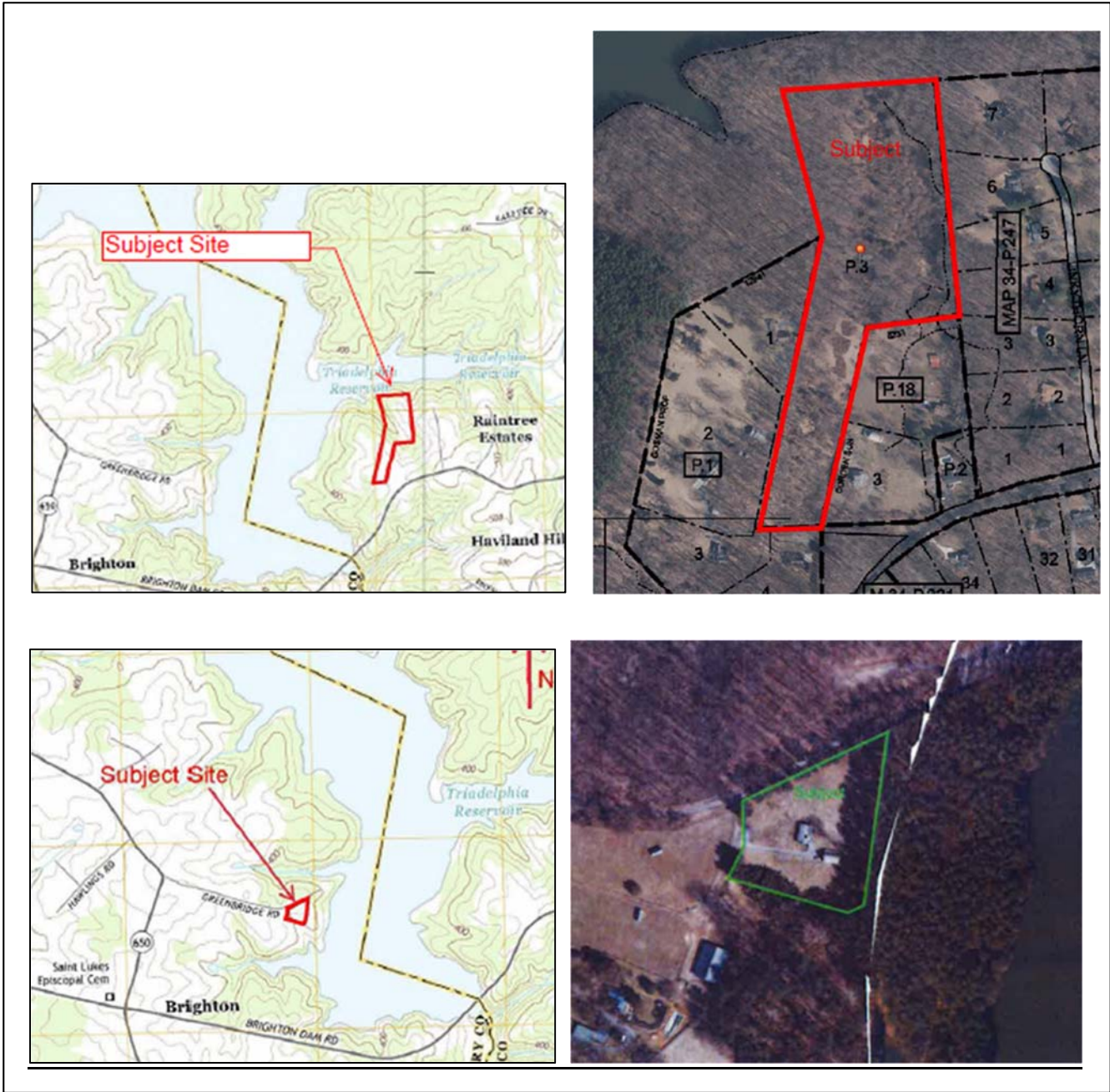


Figure 10. Location of WSSC Water’s 2019 land purchases, Triadelphia Reservoir (Brighton Dam Rd – above and Greenbridge Rd - below)

White-tailed Deer Management

One of the TAC's goals for the terrestrial habitat 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 Maryland Department of Natural Resources, the Montgomery County Department of Parks, the Howard County DRP, and the WSSC Water continued to implement deer hunting programs in 2019. 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 2019 in the PRW, managed hunts (shotgun only) were held in Schooley Mill Park on October 29 and December 19, but only two deer were harvested. Sharpshooting was conducted in Fulton South Park on February 19 and March 11, but only two deer were harvested. 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 2019, 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 Deer Management Program focuses on large wooded areas within parkland and along stream valley parks. Within the PRW, the program has centered on the Rachel Carson Conservation Park. During 2019, 26 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.

Stream Systems

Stream corridor management activities include stream channel stabilization and restoration, and implementing streamside BMPs, especially forested stream buffers. 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 the few remaining dairy farms in Howard County. Lisbons 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.

A cooperative, public-private partnership established among Maple Dell Farm, Howard County, the HSCD, and WSSC Water pooled their resources to improve water quality and habitat conditions on the farm. The project includes 6,182 linear feet of stream channel restoration, the planting of trees within the 15-acre riparian easement, selective harvesting of 10.6 acres of trees to establish new pasture away from the streams, and the installation of fencing and a livestock watering system to exclude the dairy herd from the riparian easement area. Live stakes were planted along the restored stream banks, within the fenced riparian buffer, in early 2019 to stabilize the banks. The restoration of the stream and riparian areas will support stable base flow discharge while diverting storm flow discharge onto adjacent floodplains. This will temporarily store, treat, and infiltrate runoff 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.

With assistance provided by Howard County Government, WSSC Water continued its water quality monitoring project to determine pre- and post-restoration pollutant loads of nutrients and sediment, enabling upstream and downstream comparisons of the restoration activities. Three monitoring stations were established, with two stations located upstream of the farm on each tributary 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. Construction began in June 2018 and was substantially completed by December 2018. So far in the first year of post-restoration, only slight differences were

observed when comparing pre- and post-restoration nutrient and sediment concentrations; consequently, more samples will be collected to determine the ultimate pollutant reductions as the newly restored stream and its riparian buffer planting become stabilized and established. Additional BMPs at the farm have yet to be installed, and these are expected to also substantially reduce pollutant loads originating on the farm.

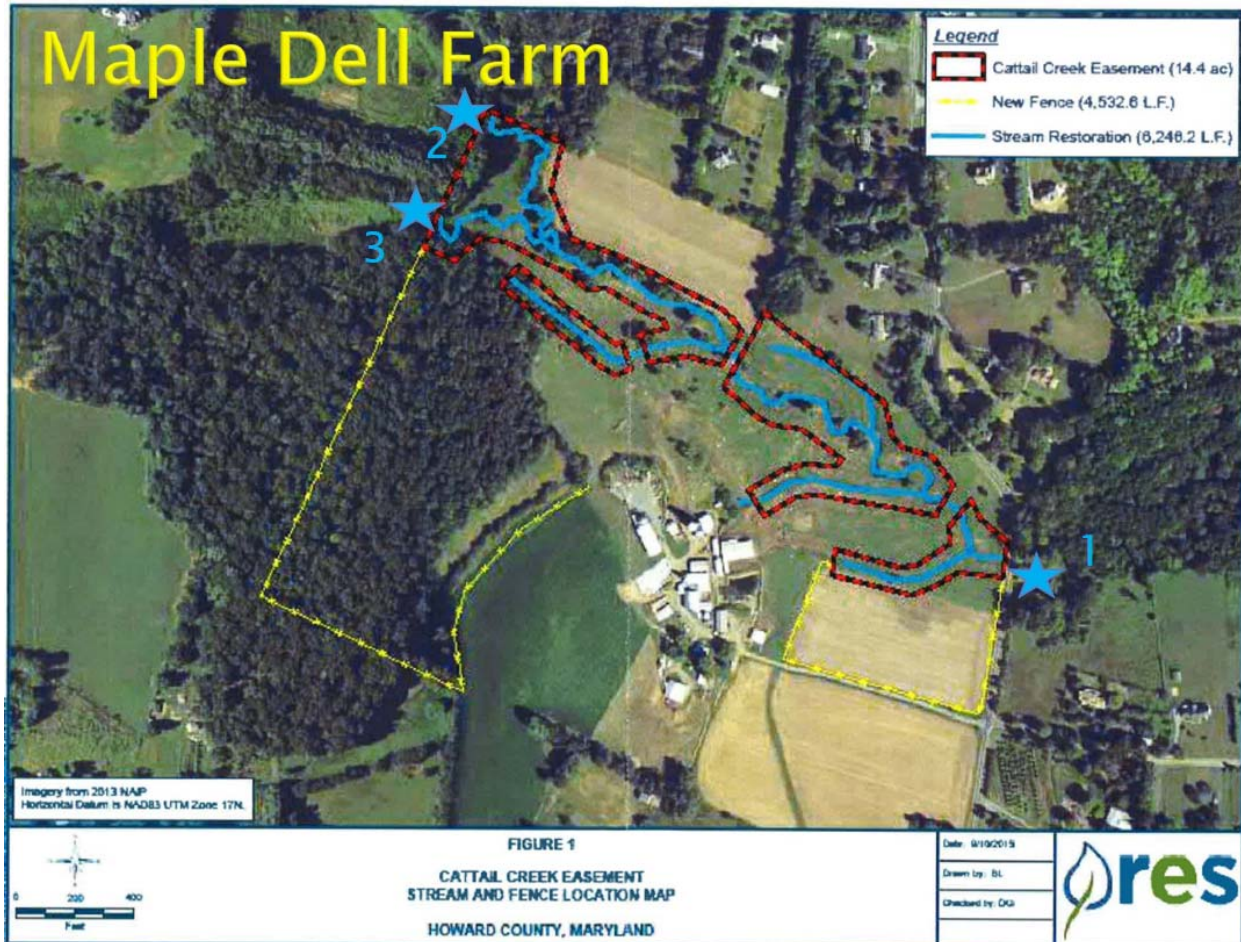


Figure 11. Cattail Creek Stream Restoration at Maple Dell Farm. Blue stars indicate monitoring stations.

Cherrytree Farms Residential Development

Stream Stabilization

A stream stabilization project in the Cherrytree Farms neighborhood in Howard County was in design during FY19 and will begin construction in January 2020. The project site is east of Wild Cherry Court in Laurel (Figure 12). This project will provide improved water quality for the stream system with the restoration of approximately 1,200 linear feet of an unnamed tributary to Rocky Gorge Reservoir.

The unnamed tributary to Rocky Gorge Reservoir is a second-order stream with a drainage area of 90 acres, that enters the project area from the north. It flows south from Scaggsville Road for approximately 1,100 feet to the start of the project reach. From there, 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 Rocky Gorge Reservoir. In addition to the mainstem, three tributaries enter the project area and are included as part of the project.

The project area and immediate vicinity consist of relatively steep 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 which is owned by WSSC Water. Multiple easements border or cross the project area, including several Howard County storm drain easements and one Colonial Pipeline Company right-of-way for an out-of-service oil 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.

Cherrytree Farms Pond/Outfall Repair Project

A pond repair project in the Cherrytree Farms neighborhood is currently under design and is anticipated to go into construction in March 2020. The project site is located east of Cherrystone Court in Laurel. The pond repair entails upgrading the corroded metal riser pipe to a concrete riser pipe. The facility will remain a dry pond because of site constraints that prohibit upgrading the facility with improved water quality treatment components.

Cherrytree Farms Pond Repair (Section 1, Area 2)

A second pond repair project is underway in the Cherrytree Farms neighborhood. This pond is adjacent to 8411 Sand Cherry Lane, in Laurel. 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. Additionally, a 300 linear foot segment of an unnamed tributary was identified for stabilization. The goal is to reduce erosion along the

channel bed and banks, while creating opportunities for ecological uplift and nutrient processing. The majority of the project site is on county open space, with the upstream end of the stream crossing two private properties and intersecting the corner of a third. The project site is mostly wooded with the remaining area vegetated with individual trees and turf. The project is currently in design and is scheduled for construction in FY21 or FY22.

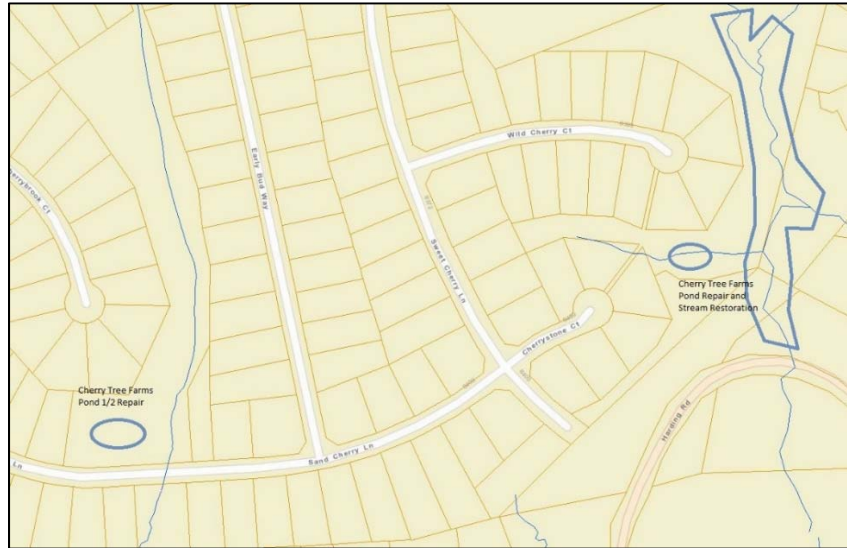


Figure 12. Cherry Tree Farm Projects in Howard County

Scottswood Court Pond Repair

The purpose of this project is to repair and restore an existing stormwater management pond located at 15036 Scottswood Court in Woodbine (also within the PRW). The goals are to restore the hydraulic properties intended with the original design of the facility and meet current embankment design criteria. The pond, which is currently a wet pond and is slated to remain the same, is located on two private properties. The project is currently at concept/30% design stage (Figure 13).

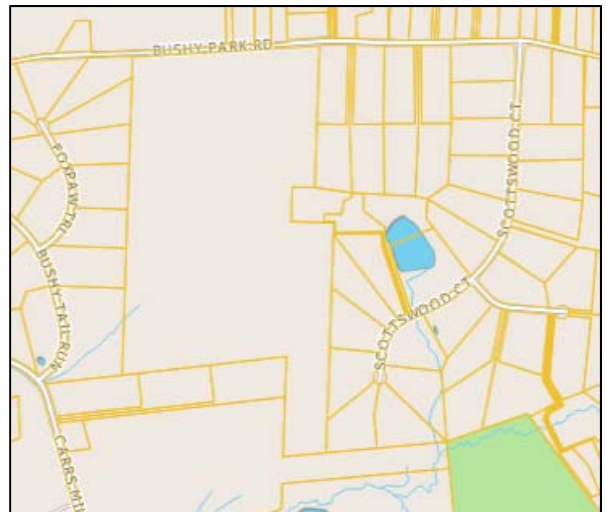


Figure 13. Scottswood Court Project in Howard County

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. Implementation items include open space and easement acquisition and increasing the implementation of agricultural BMPs.

Agricultural BMP Progress

A summary of the progress made with the implementation of agricultural BMPs during FY2019 by both the HSCD and the MSCD is provided in Table 6. 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, 2018 through June 30, 2019. Notable practices installed that are intended to protect stream valleys included 10 acres of riparian forest buffer, about 1.35 miles of streamside fencing, and 0.63 miles of streambank protection.

Table 6. Agricultural Progress for 2018-19 in the PRW

	BMP Code	Howard SCD	Montgomery SCD	Total
Current Conservation Plans (acres)	--	122 (8,141)	104 (5,516)	226 (13,658)
Best Management Practice				
Barnyard Clean Water Division	RI-16	--	2	2
Critical Area Planting (acres)	342	2 (0.2)	--	2 (0.2)
Fencing, non-streamside (feet)	382D	1 (1,131)	1 (4,278)	2 (5,409)
Grade Stabilization Structure	410	4	--	4
Grassed Waterway (acres)	412	1 (0.4)	--	1 (0.4)
Heavy Use Area Protection (acres)	561	5 (0.9)	--	5 (0.9)
Livestock Pipeline (feet)	516	9 (5,462)	--	9 (5,462)
Mulching (acres)	484	2 (0.2)	--	2 (0.2)
Prescribed Grazing	528	--	1 (7.9)	1 (7.9)
Riparian Forest Buffer (acres)	391	1 (10)	--	1 (10)
Roof Runoff Structure	558	1	--	1
Rotational Grazing (acres)	RI-15	--	1 (4.3)	1 (4.3)
Sediment Control Pond	378	2	--	2
Stream Crossing	578	3	--	3
Stream Habitat Improvement & Management (acres)	395	1 (10)	--	1 (10)
Streambank Protection (feet)	580A	2 (3,310)	--	2 (3,310)
Streamside Fencing (feet)	382 C	1 (7,109)	--	1 (7,109)
Underground Outlet (feet)	620	2 (945)	--	2 (945)
Watering Facility	614	7	--	7

Patuxent Reservoirs Watershed Agricultural Cost-Share Program

In 1998, the PRWPG created the *Patuxent Reservoir Protection Strategy Memorandum of Understanding* (MOU), which established the PRW 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 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, the MOU 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.

The HSCD received the remaining funds from Howard County for its two-thirds portion of the \$50,000 request for this program, WSSC Water having already contributed its one-third share. The MSCD spent its remaining funds in 2019 and will be requesting \$10,000 from WSSC Water in 2020 to match \$20,000 from Montgomery County that will be allocated to this program. The remaining funds in this cost-share program as of December 2019 are:

HSCD	\$61,308.34
MSCD	<u>0.00</u>
Total	\$61,308.34

Table 7 contains the BMPs constructed with assistance from both SCDs using this cost-share program during 2019.

Table 7. BMPs installed with PRW Agricultural Cost-Share Program funds in CY 2019

Description	Quantity	Unit	SCD
Heavy Use Area Protection	2,220	square feet	HSCD
Livestock stream crossing	3,000	square feet	MSCD

Public Awareness and Stewardship

The goal of this priority resource is to increase understanding and support for resource protection in watershed residents and resource users. The TAC agencies and other groups in the watershed continued to coordinate public outreach and involvement initiatives during 2019. Staff from WSSC Water'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 these counties.

Howard Soil Conservation District

Mid-Winter Ag Meeting (March 2019)

The HSCD, the MDA, University of Maryland Extension, and the NRCS sponsored the annual Howard County Mid-Winter Ag Meeting. Topics included optimal soil fertility recommendations; grazing impacts on soil physical properties, runoff, and sediment production; industrial Hemp in Maryland; and mobile apps for agriculture.

Farm Academy (April and October 2019)

The Farm Academy, an educational outreach program, provides the opportunity for residents to get an up-close and personal look at farm operations in Howard County. It has been very well received by participants, and has improved their understanding of agricultural issues. The Farm Academy provides a forum for elected officials, county staff, and citizens to talk directly with farmers about farming operations with the objective of helping address complaints and questions received from neighboring property owners about standard farm activities and practices.

A Farm Academy session was held in the Spring for Howard County employees and elected officials that occasionally get involved in the farm/neighbor dialogue. This session was held at Porch View Farm, a 22-acre farm, having unique examples of some of the new operations in the county. They raise heritage breeds of beef cattle, pigs, geese, rabbits, goats and sheep, as well as bees. They use what the land has to offer, managing it, along with the animals, to create a sustainable farming operation without chemical fertilizers and pesticides. A keyline system, a water conservation tool that also increases soil fertility, has been installed to manage the land using the available water. Intensive rotational grazing is used for the livestock.

A second Farm Academy session was held in the Fall for residents at Triadelphia Lake View (TLV) Tree Farm, the location of the very first Farm Academy 5 years ago. TLV has been in the Brown family for over a century, Jamie, the current owner, being the fifth generation. TLV Farm was originally a dairy operation, but in the late 1980s Jimmy and Linda Brown took a chance, selling the cows and planting Christmas trees. Today TLV Tree Farm provides not only Christmas trees

but farm raised meats, including turkeys, chicken, beef and pork, as well as pumpkins, strawberries and vegetables. They sell straight from the farm and participate in Howard County Farmer's Markets. TLV also has a Community Supported Agriculture program where people can buy shares of vegetables, meats and eggs. Through the years the family has installed numerous agricultural BMPs to protect natural resources.

Montgomery County Department of Parks

During 2019, 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, 443 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. A total of 61 person-hours was logged, for a total of 500 pounds of trash and 175 pounds of recyclables removed.

Montgomery Soil Conservation District

National Association of Soil Conservation District's Soil Health Champion Network (July 2019)

The National Association of Conservation Districts established the National Soil Health Champions Network to recognize ranchers, farmers and woodland owners from across the nation who practice good soil health management on their operations and promote the use of soil health management systems in their communities. Currently, this network consists of more than 240 farmers. The MSCD is very proud to have Doctor Mess recognized as Montgomery County's first Soil Health Champion. His induction into this exclusive network will help ensure that his legacy will encourage others to explore conservation options for their farm.

Mini Course for Science Technology, Engineering and Mathematics Teachers (August 2019)

On August 8th, the MSCD, the Montgomery Office of Agriculture and the Montgomery University of Maryland Extension participated in a Chesapeake Bay Foundation sponsored mini course for Montgomery County Science, Technology, Engineering, and Mathematics teachers. The Mini Course was entitled, "*Connecting Montgomery County to the Chesapeake Bay through Environmental Chemistry.*" This day long agricultural tour was a part of a five-day Mini Course. The MSCD, Office of Agriculture, and Extension conducted a day long bus tour of several Montgomery County farms and discussed the role farmers play in the Chesapeake Bay restoration effort.

Annual Cooperators Dinner (September 2019)

The MSCD-sponsored Cooperators Dinner is a very important event, as it allows the MSCD to promote and educate others about the importance of being good stewards of the land, to keep the community up to date on the changing environmental landscape, and to recognize the cooperators in the county and others who have made a commitment to conservation. The Cooperators Dinner for 2019 was held at the Farm of Doctor Mess in Olney.

Federal, State and Local Legislator Workshop (December 2019)

Montgomery County Farmers, in partnership with the MSCD, the Montgomery County Office of Agriculture, University of Maryland Extension and the Montgomery County Farm Bureau, hosted a legislative luncheon workshop at Seneca Ayr Farm in Laytonsville. The event was attended by 18 federal, state and local legislators and their representatives who interacted with our agricultural leaders as well as the representatives of the agencies that provide assistance to our farmers. After enjoying a delicious lunch, there were short presentations given by farmers who serve on the various agricultural committees, boards and agricultural support organizations. These presentations focused on how farmers provide guidance and leadership in advising local and state elected officials on all matters relating to agriculture, as well as the roles they perform in helping farmers in keeping agriculture viable in the County.



District Chairman Robert Butz Speaks to the Legislators about the Soil Conservation District and how the MSCD provides assistance to farmers

WSSC Water’s “Watershed” Property Surrounding the Reservoirs - Environmental Outreach



For the fourth year in a row, WSSC Water hosted over 400 third grade students to the reservoir recreation area at Supplee Lane as part of the *Sunfish and Students Program* through Prince George’s County Public Schools. During the field trip, students and their teachers not only released about 120 fish (Bluegill) that they raised in their classrooms 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.

WSSC Water’s also worked again with 6th grade students from Burleigh Manor Middle School, in Howard County. The students built more than 20 reef balls that were placed at the Greenbridge Recreation Area to provide fish habitat along the shoreline when Triadelphia Reservoir’s water level returns to normal. In June, 30 students visited Greenbridge to help anchor the balls, learn more about WSSC Water’s work to protect water quality in the Triadelphia and Rocky Gorge Reservoirs, and plant birch and willow trees along the old boat mooring area to assist with bank stabilization and fish habitat.



During the summer WSSC Water hosted three special groups to the reservoir properties. In July, 25 middle school students, participating in a weeklong *Water Works* camp



hosted by WSSC Water, visited the Brighton Dam Recreation area to learn about source water protection and water quality monitoring. WSSC Water staff also hosted two professional development sessions for teachers from Montgomery and Prince George’s County Public Schools. The Montgomery County session was part of a weeklong *Chesapeake Classroom Program* organized by the Chesapeake Bay Foundation and the Prince George’s County program was coordinated with Prince George’s County Public Schools’ Schmidt Outdoor Education Center. Participants in all programs learned about WSSC Water’s role in the community and the importance of keeping a forested buffer around waterways. During the teacher professional development sessions, WSSC Water’s environmental sciences team led groups through a demonstration of the work they do to monitor water quality in the reservoir.

During three days in December, over 30 community members came to Triadelphia Recreation Area to assist WSSC Water staff in removing protective tree tubes from 30 acres of trees that had been planted during various reforestation efforts.



Table 8. 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.				
Measure	Goal	Implementation Items	Time Line	Responsible Partner
Chlorophyll- <i>a</i> (chl- <i>a</i>)	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 Water
Dissolved oxygen (DO)	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 Water
Suite of water quality parameters in reservoir monitoring protocol	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 Water
Total organic carbon (TOC)	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 Water
Sediment	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 Water

Priority Resources: Goals & Performance Measures (continued)

Resource: Terrestrial Habitat (revised 2019)

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

Measure	Goal	Implementation Items	Time Line	Responsible Partner
Forest Cover	Maintain and increase forest cover	<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 • Measure forest cover every ten years for comparisons 	Ongoing	TAC
			Ongoing	TAC
			Ongoing	HC, MC, M-NCPPC
Forest Interior Habitat	Maintain and increase forest interior habitat (forest located 300 feet inside forest edge)	<ul style="list-style-type: none"> • Prioritize reforestation and forest conservation programs to maintain and increase forest interior habitat • Measure forest interior habitat every ten years for comparisons. 	Ongoing	TAC
			Ongoing	HC, MC, M-NCPPC
Forest Connectivity	Improve forest connectivity	<ul style="list-style-type: none"> • Target reforestation and forest conservation programs to connect forest tracts with forest corridors 	Ongoing	TAC
Forest Sustainability	Ensure forests are diverse, healthy and capable of long-term natural regeneration	<ul style="list-style-type: none"> • Encourage private property owners to develop and implement forest stewardship plans that ensure forest sustainability • Develop and implement forest stewardship plans for publicly owned forest that ensure forest sustainability • Implement deer management programs • Implement strategies for control of invasive plants 	Ongoing	TAC
			Ongoing	TAC
			Ongoing Ongoing	TAC TAC

Priority Resources: Goals & Performance Measures (continued)

Resource: Stream System (revised 2019)

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.

Measure	Goal	Implementation Items	Time Line	Responsible Partner
Stream buffer width and continuity	A minimum 35-foot riparian buffer (from each stream bank) on all streams on properties that were developed prior to current stream buffer requirements	<ul style="list-style-type: none"> • Establish and maintain minimum 100-foot riparian forest buffers (from each stream bank) on all publicly-owned land and residential land to the maximum extent possible • Establish and maintain minimum 35-foot riparian buffers (from each stream bank) on agricultural land to the maximum extent possible • Measure stream buffer coverage every ten years for comparison 	Ongoing	HC, MC, M-NCPPC, WSSC Water
			Ongoing	HC, HSCD, MC, MSCD, M-NCPPC, WSSC Water
			Ongoing	HC, MC, PGC, M-NCPPC
Stream bank and stream channel stability	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 • Address <u>significant</u> areas of stream bank and channel instability through stream restoration projects and storm water retrofits to the maximum extent possible • Measure stream bank erosion every ten years for comparison 	Ongoing	HSCD, MSCD
			Ongoing	HC, HSCD, M-NCPPC, MC
			Ongoing	HC, MC, M-NCPPC, PGC

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.

Measure	Goal	Implementation Items	Time Line	Responsible Partner
IBI - Index of Biological Integrity	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 	Ongoing	HC, HSCD, MC, MSCD, M-NCPPC
	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 	Ongoing	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.

Measure	Goal	Implementation Items	Time Line	Responsible Partner
Agricultural Preservation Enrollment <ul style="list-style-type: none"> Total acres enrolled Number of farms enrolled 	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 	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 	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 Water
Participation in agricultural conservation programs and percent of conservation plans that are implemented	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	Goal	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 	<p>Ongoing</p>	<p>WSSC Water, HC, MC, PGC, M-NCPPC</p>
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 	<p>Ongoing</p>	<p>TAC</p>
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>	<p>TAC</p>

Table 9. Expenditures for Current Fiscal Year

PATUXENT RESERVOIRS WATERSHED WORK PROGRAM FOR FY19				
PRIORITY RESOURCES PROTECTED	IMPLEMENTATION NEED	IMPLEMENTATION ITEM	AGENCY	FY 2019
Reservoir/Water Supply	Reservoir and tributary water chemistry and flow monitoring	Reservoir monitoring and lab analysis	WSSC Water	\$162,000 (in-kind)
		5 US Geological Survey stream flow gauging stations	WSSC Water	\$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 allocated to HSCD	HSCD, HC	\$33,333
ALL Priority Resources	Public outreach and involvement initiatives	<i>RainScapes Rewards</i> (rebates available to county residents for Low Impact Development projects)	MC	\$0
ALL Priority Resources	Public outreach and involvement initiatives	Earth Month, and other outreach activities	WSSC Water	\$140,000 (in-kind)
			Other TAC agencies	\$2,500 (in-kind)

PATUXENT RESERVOIRS WATERSHED WORK PROGRAM FOR FY19				
PRIORITY RESOURCES PROTECTED	IMPLEMENTATION NEED	IMPLEMENTATION ITEM	AGENCY	FY 2019
ALL Priority Resources	Complete Annual Report and Technical Supplement	Compilation and editing	WSSC Water Other TAC Agencies	\$10,000 (in-kind) In-kind
	Coordination and Collaboration	Provide administrative support & coordination among partners	WSSC Water	\$35,000
ALL Priority Resources	Stream restoration	Cattail Creek Stream Restoration Project at Maple Dell Farm <ul style="list-style-type: none"> Water quality monitoring (maintenance and lab analysis) 	WSSC Water	\$21,000 (in-kind)
Terrestrial Habitat	Increase forest cover, forest connectivity, forest interior habitat	Land acquisitions adjacent to Patuxent Reservoirs	WSSC Water	\$3,200,000
TOTAL FUNDING				\$3,828,833