

PATUXENT RESERVOIRS WATERSHED
PROTECTION GROUP



2020 ANNUAL REPORT
OF THE
TECHNICAL ADVISORY COMMITTEE

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Message from the Chair

I am pleased to present the 2020 Annual Report of the Technical Advisory Committee (TAC) to the Patuxent Reservoirs Watershed Protection Group. This past year has proven challenging, but through the perseverance and dedication of the TAC's members great progress was made to expand or advance several initiatives.

The TAC's recently formed Mapping Workgroup made great strides in building consistent mapping products across the Patuxent Reservoirs Watershed. Using a combination of Federal, State, and Local datasets, watershed wide maps can now be produced and analyzed. These maps can be used to support priority resources and help direct future work within the watershed.

In addition to mapping, the TMDL subcommittee working with the Mapping Workgroup is performing an analysis on the addition of riparian buffers to meet the Reservoirs' TMDLs. Using advanced mapping techniques, locations where the addition of riparian buffers is possible can be identified. These maps can then be used to determine land use, property ownership, or other relevant details that will guide plantings.

In large part due to the hard work of WSSC Water, data were presented showing that the Triadelphia Sediment TMDL has been achieved. Using empirical data generated by bathymetric surveys and recent excavation of sediment from the reservoir, the total sediment loads appear to be far below the TMDL. This work was provided to MDE with the hopes of having the Triadelphia TMDL vacated.

Other ongoing activities include reservoir water quality monitoring, agricultural best management practice implementation, tree plantings, forest management, salt monitoring, and public outreach.

It was my honor and pleasure to serve as the TAC chair this past year. The tireless efforts of our members in the face of adversity should be commended. Once again, Steve Nelson provided the leadership and support necessary to make 2020 a resounding success.

Sincerely,
Ken Mack
2020 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
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
lbs	Pounds
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)
µs/cm	microsiemens per centimeter
NRCS	Natural Resources Conservation Service
PGC	Prince George's County
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 that impound 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 600,000 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 2020:

1. With assistance from Prince George's County Department of the Environment, the TAC continued to develop a web-based, geographic information system (GIS) application tool that will enable the creation of maps and analyses to track data trends in the Patuxent Reservoirs watershed, as well as to support more detailed modeling. During 2020, the basic data layers were assembled, and some initial maps were created. The web-based platform is expected to be completed in 2021 and will be periodically updated and enhanced as new data become available and analyses are needed.
2. Using the new GIS tool, the TAC continued its analysis of the potential for stream buffer restoration, as this best management practice (BMP) was determined to offer the best combined cost-effectiveness and implementation potential to reduce pollutant loadings to the reservoirs. During 2020, most of the GIS data layers needed for the analysis were assembled and the basic analytic methodology worked out. Pollutant reduction factors for restored stream buffers were also compiled after consultation with MDE staff, along with estimated implementation costs per acre. The study is expected to be completed in 2021.
3. The TAC discovered that the analysis to determine the remaining gap in pollutant reductions needed to achieve the TMDLs for the Patuxent Reservoirs did not account for reductions of total phosphorus that pass downstream from Triadelphia Reservoir to Rocky Gorge Reservoir. As a result, an additional 4% of phosphorus load reductions have been achieved, decreasing the remaining gap from 43% to 39% for Rocky Gorge Reservoir.

4. The rationale for establishing the Sediment TMDL for Triadelphia Reservoir was reportedly due to excess sedimentation, and resultant loss of storage capacity for long-term water supply. Considering the recent project undertaken by WSSC Water (2017-2019) to excavate sediment from the upper portions of Triadelphia Reservoir and bathymetric survey results used to measure water storage capacity loss in the reservoirs, the TAC is investigating the possibility that the Sediment TMDL has been achieved.
5. It was reported in the 2019 Annual Report that Howard County Government had met its waste load (i.e., point source) allocation portion of the phosphorus TMDL for both the Rocky Gorge and Triadelphia Reservoirs. However, due to new guidance from the MDE and switching to the Chesapeake Assessment Scenario Tool (CAST) load estimation model, the original calculations were invalidated. The load allocation for Rocky Gorge Reservoir has yet to be achieved.
6. WSSC Water suspended much of its reservoir water quality monitoring during 2020 due to the pandemic. However, WSSC Water continued to monitor its public recreation areas at Rocky Gorge and Triadelphia Reservoirs for harmful algal blooms. One Water Contact Health Advisory was initiated for Triadelphia Reservoir beginning in September 2020, based on high concentrations of potentially toxic cyanobacteria or blue-green algae. During the advisory, traces of algal toxins were detected, but were well below advisory threshold values established by EPA guidance for recreational waters.
7. 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 55 agricultural BMPs on farms within the Patuxent Reservoirs Watershed. Many of these BMPs were installed to reduce soil loss from the farm and subsequent sedimentation into nearby streams.
8. The HSCD used \$5,550 of the Patuxent Reservoirs Watershed Agricultural Cost-Share Program to install two BMPs for horse farms. The remaining balance in this cost-share program at the HSCD is \$55,758.
9. Despite the pandemic, a variety of successful outreach events occurred once again during 2020 including: HSCD's *Mid-Winter Ag[ricultural] Meeting*; Montgomery County Department of Parks *Adopt-A-Road* trash clean-ups and *Weed Warrior* Programs; MSCD's pasture walk, and newly created videos on the subjects of horse manure management, wildlife habitat, and soil health.

Introduction

WSSC Water continues to provide potable water from the Patuxent Reservoirs system to about 600,000 customers, most of whom are located in eastern Montgomery County and northern 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 during 2020.

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 11). 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 12) 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 winter salt use within the watershed. This annual report presents the TAC’s efforts on addressing the TMDLs, road salt reduction and priority resources.

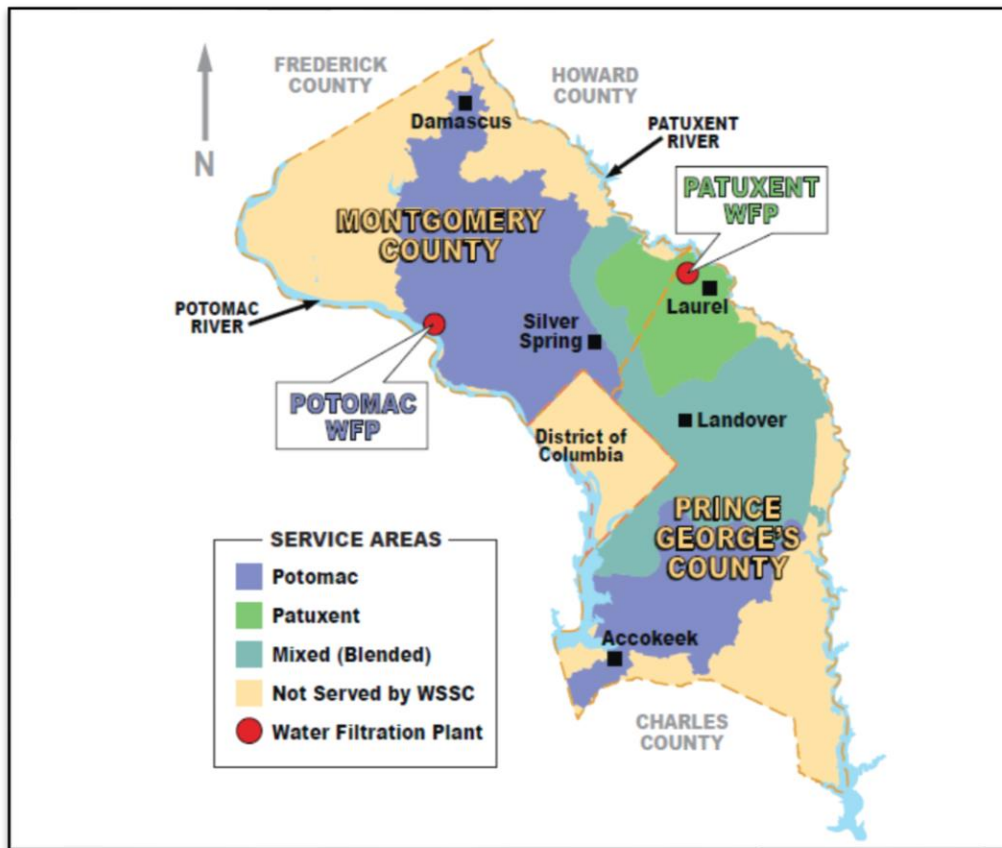


Figure 1. WSSC Water drinking water service area - Patuxent & Potomac sources (excludes wholesale service to Howard and Charles Counties).

Total Maximum Daily Load Implementation

In 1998, the Maryland Department of the Environment (MDE) identified both Patuxent reservoirs as impaired by nutrients (i.e., phosphorus) 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 Reservoirs.¹

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

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

TMDL Progress Evaluation

In 2019, the TAC received an addendum to the 2016 *Interim Progress* evaluation, which presented estimates of pollutant load reductions to the Patuxent Reservoirs over the 15-year period from 2000 (baseline year) to 2015. Deducting the progress from the TMDL pollutant reduction goals defined a “gap” for remaining load reductions required to meet the Patuxent Reservoirs TMDLs.

However, in 2020 the TAC noted that the addendum report did not account for load reductions of Total Phosphorus (TP) that pass downstream from Triadelphia Reservoir to Rocky Gorge Reservoir. MDE’s original modeling for the 2008 TMDL demonstrated that when load reductions are achieved in Triadelphia there is a proportional reduction credited to Rocky Gorge. The calculations behind the load reduction estimates in the 2019 addendum report were examined and an amendment was developed, using MDE’s methodology. As a result, an additional 4% of phosphorus load reduction has been achieved, decreasing the remaining gap from 43% to 39% for Rocky Gorge Reservoir. The findings of the amended Patuxent Reservoirs TMDL progress evaluation are shown in Table 3, with the revised findings shown in red.

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. Patuxent Reservoirs' TMDLs Progress - Amended findings.

	Phosphorus Rocky Gorge Reservoir	Phosphorus Triadelphia Reservoir	Sediment Triadelphia Reservoir
Load Reduction Needed To Meet TMDL	48%	58%	29%
Reduction Achieved (2015)	9%	16%	19%
Gap Remaining	39%	42%	10%

Sediment Removal in Triadelphia Reservoir

From 2017 to 2019, WSSC Water removed approximately 172,000 cubic yards of sediment from the headwaters of Triadelphia Reservoir. This volume corresponds to a restoration of 35 million gallons of storage capacity. Since the original rationale for establishing the sediment TMDL for Triadelphia Reservoir was reportedly due to excess sedimentation, and resultant loss of storage capacity for long-term water supply, the quantity of sediment removed recently may have partially or fully addressed MDE's concerns. To examine this proposition, an assessment of the reservoir headwaters areas (where most sediment from the watershed is deposited) was made, together with capacity loss estimates (i.e., sediment accumulation) based on successive bathymetric surveys of the entire reservoir.

Although the TMDL for sediment is expressed in terms of a load reduction rate in tons per year, the duration of sediment accumulation is known for the various headwaters areas, as well as for the bathymetric survey intervals. In addition, the reported volumes of sediment (expressed in terms of cubic yards) from the excavation project, as well as from the bathymetric surveys, can be expressed in mass terms of tons per cubic yard, using measured data for the sediment dry bulk density. The calculated sediment accumulation rates in tons per year are:

- 736 to 3,067 tons per year for the headwaters deposition areas that were excavated, representing a fraction of the reservoir but the main locations where sediment accumulates (values are for two different excavated areas).
- 18,360 to 22,370 tons per year for the entire reservoir from bathymetric surveys (values are for two successive bathymetric surveys).

The TMDL sediment loading rate goal is 22,820 tons per year. Therefore, the estimated loading rate from measured accumulations (i.e., most recent bathymetric survey being the highest value from four different calculations) is less than the TMDL, and it could be argued that the

sediment TMDL for Triadelphia Reservoir has been achieved. In addition, the restoration of 35 million gallons of water storage capacity from a sediment removal project in the upstream portions of the reservoir addresses MDE's concern over capacity loss. This is especially true if periodic, planned subsequent sediment removal projects and/or dredging can be undertaken to maintain the restored capacity. The TAC plans to present this information to MDE and request that Triadelphia Reservoir be delisted for a sediment impairment.

Stream Buffer Restoration Analysis

Based on best management practice (BMP) cost-effectiveness information and BMP implementation opportunities in the Patuxent Reservoirs watershed, it was determined that stream buffer restoration offered the highest potential for targeting efforts to reduce pollutant loadings to the reservoirs. The TAC is currently conducting a geographic information system (GIS)-based analysis on the potential for stream buffer restoration to meet the reservoirs' TMDLs. The study will evaluate different buffer widths and types (grassed and forested) on both private and public lands. The study will identify potential stream buffer restoration sites, evaluate different implementation scenarios and timeframes for pollutant reductions towards meeting the TMDLs, and will estimate BMP implementation costs.

To date, most of the GIS data layers needed for the analysis have been assembled, and the basic analytic methodology worked out. An accurate stream hydrology layer that minimizes the inclusion of ephemeral streams is under development. Pollutant reduction factors for restored stream buffers have been compiled after consultation with MDE staff, along with estimated implementation costs per acre. In addition, initial GIS queries for the analysis have been developed. The study is expected to be completed in 2021.

Municipal Separate Storm Sewer System National Pollutant Discharge Elimination System Permit Implementation Plans

According to the 2008 TMDLs for the reservoirs, one way to provide assurance that the TMDLs for the reservoirs will be implemented is through the Municipal Separate Storm Sewer System (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 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 Report Number 25 was submitted to MDE in December 2020. This document is available through the County government's [Stormwater Management website](#).

Both the new guidance from the MDE on how to calculate load reductions from the urban BMPs installed and the switch to the Chesapeake Assessment Scenario Tool (CAST) model for analysis have resulted in changes to the reported progress made towards achieving the 15% target reduction for the reservoir TMDLs. It was reported in last year's report that the Howard County Government had achieved its phosphorus TMDL goals for both reservoirs; however, based on the recent changes, the target reduction for Triadelphia Reservoir has yet to be achieved. The implemented BMPs have achieved 563 lbs. of phosphorus reduction (64%) of the target of 875 lbs.

The quantity and types of BMPs implemented within the PRW since 2014 to meet the 15% target reductions are listed in Table 4 and shown in Figure 3.

Table 4. Stormwater related BMPs installed within Howard County's portion of the PRW.

PROJECT TYPE	PROJECT NAME	WATERSHED	YEAR COMPLETED
Stream Restoration	Cherry Creek 1	Rocky Gorge	2006
Stream Restoration	Cherry Tree Farm	Rocky Gorge	2010
Outfall Stabilization	Bill Lilly Court	Rocky Gorge	2014
Stream Restoration	Maple Dell Farm	Triadelphia	2018

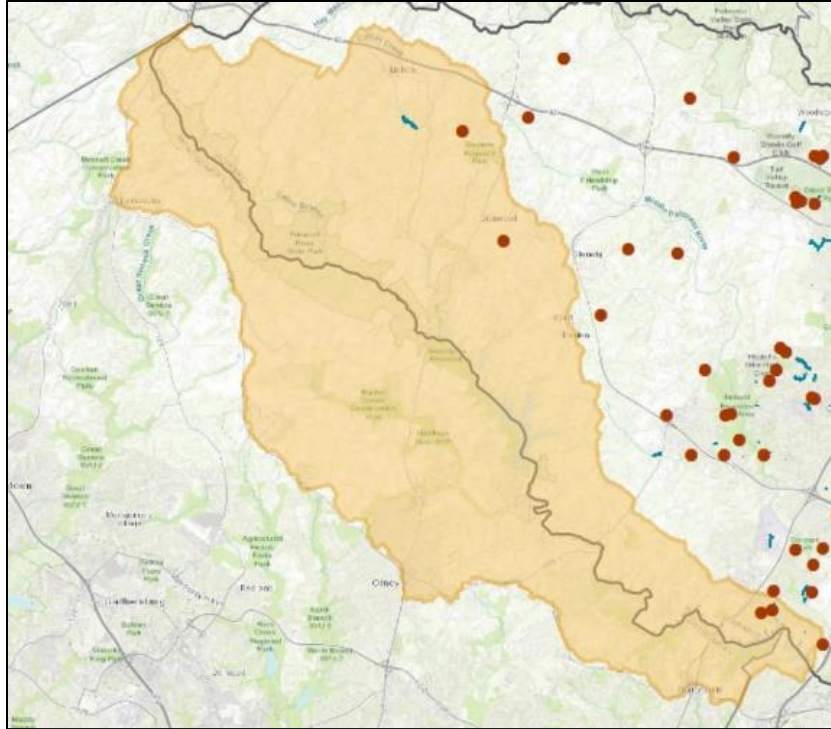


Figure 3. Stormwater project locations within Howard County’s portion of the PRW.

As of 2020, BMPs constructed within Howard County’s portion of the PRW resulted in pollutant load reductions, based on an MDE-approved calculation of CAST Phase 6 pollutant load removal efficiencies, as shown in Table 5. The target reduction shown in Table 5 is the waste load allocation portion of the TMDL, which represents 15% of the total load reduction needed to achieve the phosphorus TMDL for each reservoir.

Table 5. Phosphorus reductions to Patuxent Reservoirs from Howard County urban BMPs.

Reservoir	Target Reduction (15%)	Progress Reduction
Triadelphia	875 lbs.	563 lbs. (9.7%)
Rocky Gorge	230 lbs.	637 lbs. (41.5%)

GIS Mapping and Analysis Tool

The TAC is also developing a web-based GIS tool that will enable the TAC to create maps as needed, conduct analyses to track data trends in the watershed, and support more detailed modeling efforts similar to the ongoing Stream Buffer Restoration Analysis. The objective is to create a watershed-wide database and geographic analysis platform, which will support efforts to better understand the reservoirs and their contributing watershed, and aid in developing better management options and recommendations for the Policy Board for improving the overall health and long-term protection of the reservoirs and their watershed. To date, the basic data layers have been assembled and some initial maps created. The web-based platform is expected to be completed in 2021 and will be periodically updated and enhanced as new data become available and analyses are needed.

Winter Salt

At the 2018 Policy Board Meeting, the TAC made a presentation that summarized the winter 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 winter salt impacts, updated information on the sodium and chloride trends in both the Triadelphia and Rocky Gorge Reservoirs, economic reasons for better management of winter salt, local processes, planning and programs that address salt use and management, and the TAC recommendations for 2020. Most of the winter salt used in the watershed is for ice and snow removal on roads and parking lots. Most 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 winter salt use that will safeguard the water quality of the reservoirs watershed.

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

Sodium and chloride results from weekly samples collected at the Patuxent Water Filtration Plant for 30 years are presented in Figures 4 and 5. Annual and 5-year rolling averages were plotted to examine long-term trends in these data sets.

For chloride, annual rolling averages have mostly increased from 1990 until 2016, with a maximum of about 34 milligrams per liter (mg/L) in early 2016 (Figure 4). Annual averages have decreased since 2016. The 5-year rolling averages, much more resistant to seasonal increases, have also increased steadily since 1990, having reached a maximum of about 32 mg/L during 2018. The 5-year rolling average has also decreased slightly since 2018, due to the inherent lag in the analysis.

The rolling averages for sodium are different than for chloride. For sodium, annual rolling averages have mostly increased from 1990 until 2011, with a maximum of about 18 mg/L in early 2011 (Figure 5). Annual averages have mostly decreased since then. The 5-year rolling averages have also increased steadily since 1990, reaching a maximum of about 16 mg/L during 2012. The 5-year rolling averages have decreased since 2012. Currently, both the annual and 5-year rolling averages are trending below and further from the EPA's Drinking Water Health Advisory level of 20 mg/L for sodium. While recent trends in the rolling averages are looking favorable, some seasonal increases during the winter and spring months have exceeded this guideline regularly since 2008.

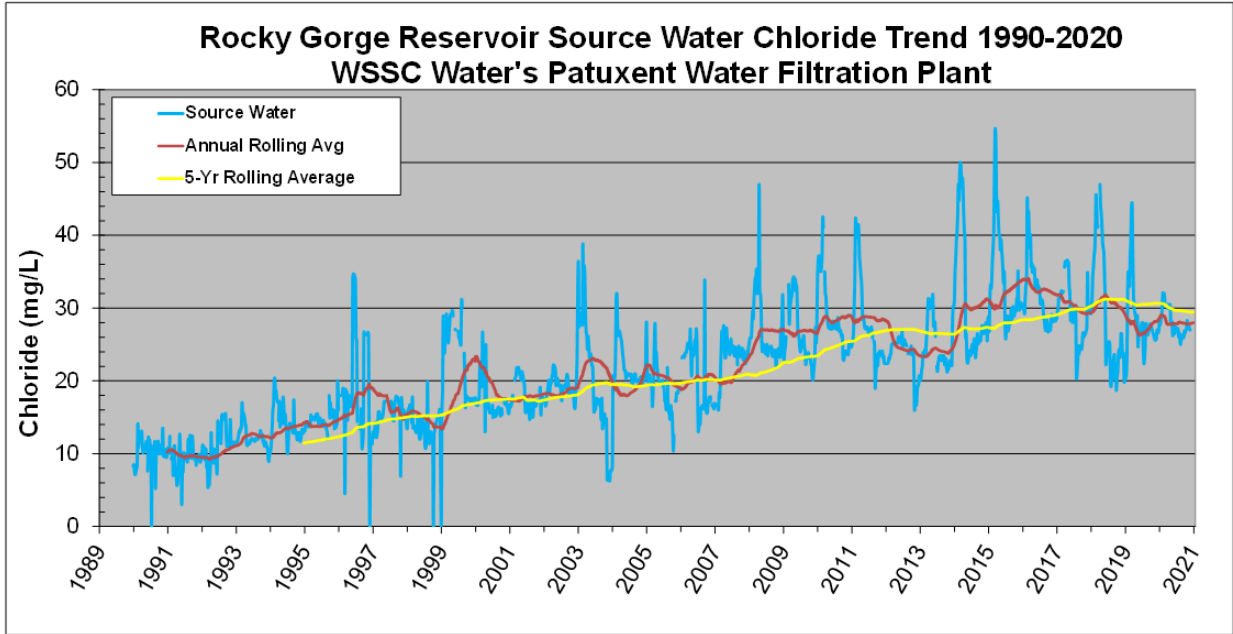


Figure 4. Long-term chloride trend at the Patuxent Water Filtration Plant.

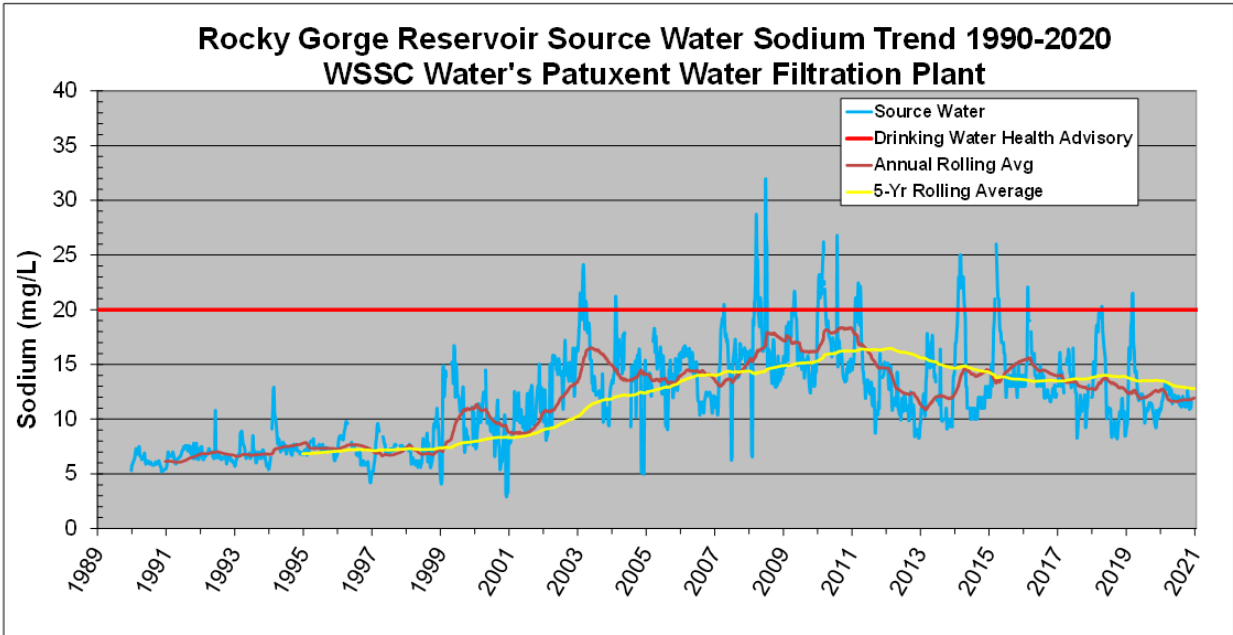


Figure 5. Long-term sodium trend at the Patuxent Water Filtration Plant.

TAC Implementation Actions

In 2020 the TAC continued to track progress on the winter salt issue in the PRW and sodium and chloride levels in the Patuxent Reservoirs. The Maryland State Highway Administration (SHA) and local jurisdictions, through their respective county departments, continue to develop and expand the use of road salt BMPs to reduce salt applications while maintaining safety. Brine preapplications continue to be the principal road salt BMP. There are still concerns, however, about the large number of residential road miles in the PRW that are maintained by local governments, that may not yet be suitable for brine applications because existing equipment is too wide for their narrow widths. Local jurisdictions are continuing to comply with the road salt application provisions of their MS4 Permits. These provisions include street sweeping, equipment calibration, employee training, and public outreach and education on proper use of salt as a deicer. WSSC Water also is continuing its public outreach and education program to help customers understand the connection between the use of salt as a deicer and the health of our drinking water reservoirs.

The TAC continues to recommend reducing the applications of salt by State and local jurisdictions, as well as by homeowners and businesses, while maintaining adequate safety. The TAC took note of and participated in the Salt Summit process initiated by WSSC Water in 2018 and recommends that this process be continued. The Policy Board at the 2020 Annual Meeting indicated an interest in continuing an interjurisdictional approach to coordinating efforts to protect the health and integrity of the PRW through reduced use of salt as a deicer on public and private roads and other impervious surfaces. The TAC recommended that the Policy Board advocate that: 1) local transportation departments prioritize the PRW for implementing BMPs (e.g., brine application), and 2) future salt applicator certifications include limited liability coverage.

Howard County Government Initiatives

As reported in Howard County's MS4 Stormwater Permit, Annual Report Number 25, the Department of Public Works, Bureau of Highways (BOH) continues to use and update automatic vehicle location and GIS technology 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.

According to BOH estimates, a total of 3,491 tons of salt and 22,285 gallons of salt brine were used for de-icing the county's roads during the 2019-20 winter season (Table 6), and reflects a distinct change in practices compared to past fiscal years (FY). The practice of using salt brine (a mixture of salt and water) to wet roads prior to a winter storm event results in less solid salt being applied.

Table 6. Howard County Bureau of Highways salt related product use (FY15-FY20).

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
FY20	3,491	0	22,285

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

Montgomery County Department of Transportation Initiatives

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

- Implementing a Road Salt Management Plan based on the *Maryland Statewide Salt Management Plan*³;
- 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 draft MS4 Stormwater Permits related to road salt management. These draft permit conditions will likely 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).

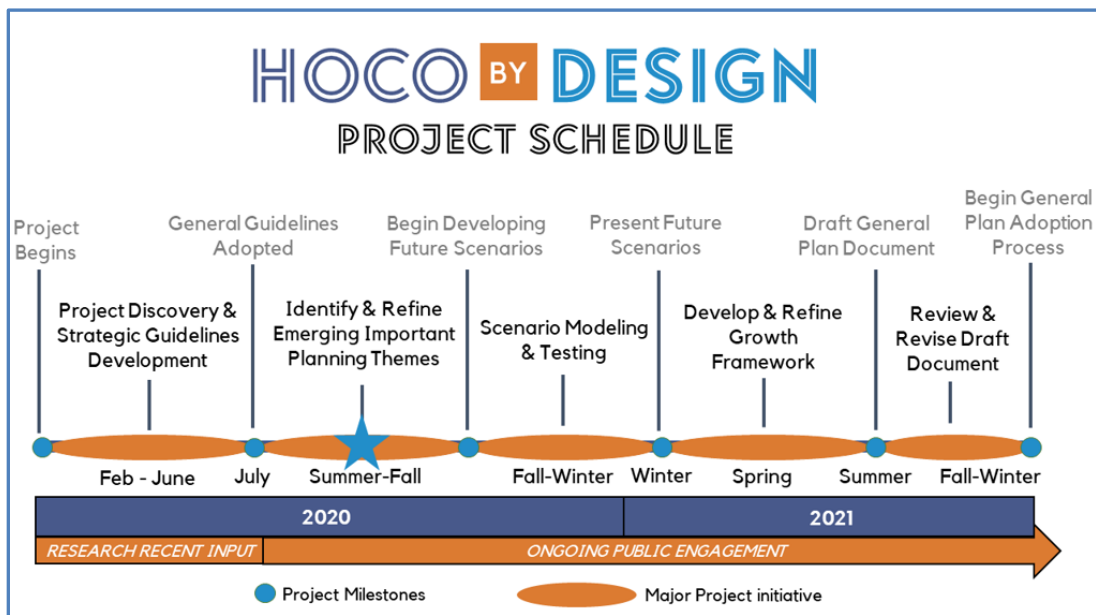
³ *Maryland Statewide Salt Management Plan*. 2018. Maryland Department of Transportation, State Highway Administration.

Comprehensive Planning Updates

Howard County

Howard County Government began its General Plan update in 2020. This new comprehensive planning effort called *HoCo By Design* will update the current general plan called *PlanHoward 2030*, adopted in 2012. A general or comprehensive plan is a long-range, visionary document that guides the County’s land use, growth and development decisions, that will in turn influence the quality of the Patuxent Reservoirs and their watershed.⁴ *HoCo By Design* will focus on five cross-cutting themes identified with input from the public and seven county-wide physical assessment reports (e.g., land use, agriculture, environment, and transportation).⁵

The HoCo By Design project schedule is shown in the graphic below, with the plan adoption process scheduled to begin at the end of 2021. During 2020, the General Plan Guidelines were adopted, and the physical assessment reports were released to the public.



⁴ Howard County Government. 2020. *Welcome to HoCo By Design!* <https://www.hocobydesign.com/>

⁵ Howard County Government. 2020. *Planning Themes* <https://www.hocobydesign.com/planning-themes>

Montgomery County

In 2019 the Montgomery County Planning Department began work on updating the County's General Plan. In 2019 the work centered on research, data collection, drafting issues and opportunities, developing education and outreach strategies, and the preliminary drafting of goals, policies and actions. In 2020 the work continued with a focus on drafting the Plan text and refining the goals, policies and actions. An important focus for the environmental recommendations centers on climate change issues, which have emerged since the last update of the Plan, as major drivers of environmental health and sustainability. A working draft Plan was completed, and a public hearing was held. The Plan is expected to be approved and adopted in 2021.

Annual Progress on Implementation Items for the Priority Resources

The TAC continued to update the Priority Resource charts during 2020, completing the update for the Aquatic Biota chart and nearly finishing the Rural Character and Landscape chart. Improvements made to the Aquatic Biota chart included (i) adding implementation items to assess the benthic macroinvertebrate community results for the entire PRW using one scoring criteria every 5-10 years beginning in 2021, and (ii) determining if correlations exist between biological results and specific conductance values that may indicate a water quality impairment. The remaining charts will be updated during 2021.

Reservoirs and Water Supply

Reservoir Water Quality Monitoring

WSSC Water began its 29th year of reservoir water quality monitoring for technical analysis and long-term trend evaluation to support protection of the reservoirs and drinking water supply. However, due to the novel coronavirus pandemic, the field sampling program was suspended in mid-March 2020 after just one round of sampling in Rocky Gorge Reservoir.

Several sites on each reservoir are *normally* monitored bi-weekly, except during winter months. *In situ* transparency and depth profile measurements include 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.

WSSC Water continues to operate a fixed vertical profiling system for monitoring water quality at each of the dams on both reservoirs. These systems operate autonomously, sending data from multiple vertical profile measurements recorded each day for the same suite of parameters as the field *in situ* monitoring to a server at WSSC Water's headquarters building. Automated plots and reports are distributed to operations staff.

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

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. MDE's two chl-*a* criteria for public water supply reservoirs, found in Code of Maryland Regulations [26.08.02.03-3](#), are:

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

Active chl-*a* results were used to better indicate living algal biomass rather than total chl-*a*. Weekly, active chl-*a* samples, collected from the Patuxent Water Filtration Plant's raw water source, are used to determine compliance with the first criterion. The thirty-day moving average did not exceed the 10 $\mu\text{g/L}$ threshold during the growing season (Figure 6). These results do not characterize water quality conditions throughout the reservoir, but only near Duckett Dam and the intake for the Patuxent Water Filtration Plant.

Due to the suspension of some of the monitoring activities during the growing season of 2020, a statistical comparison with the second criterion was not possible.

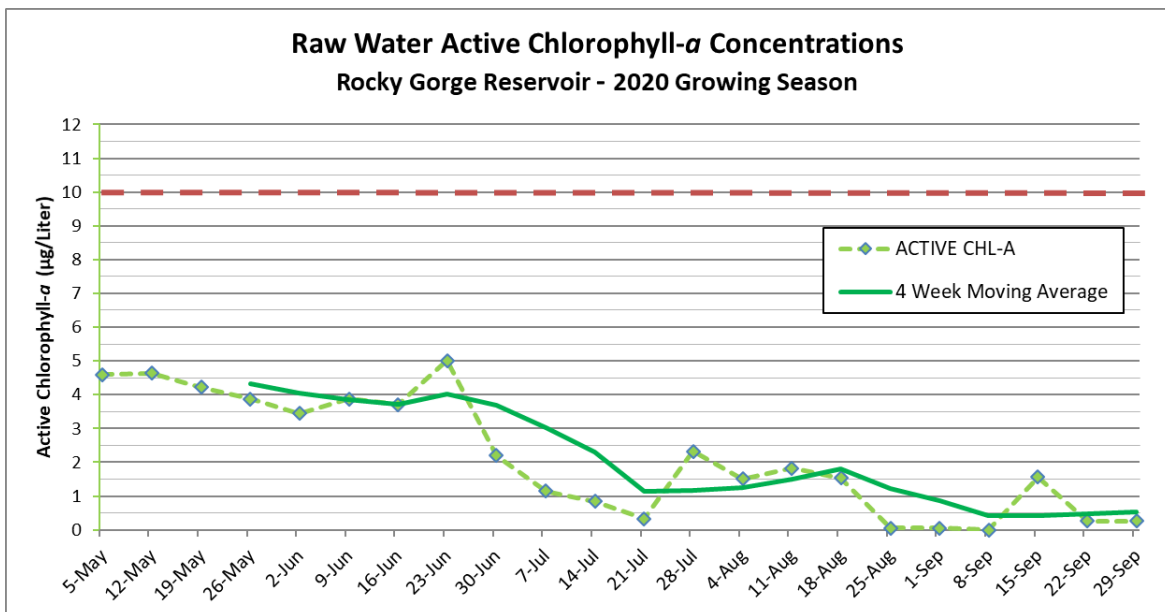


Figure 6. Active chlorophyll-*a* concentrations for 2020 growing season (May – September). Red, dashed line represents the thirty-day moving average threshold for public water supply reservoirs.

Harmful Algal Bloom 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 irritating skin reactions upon contact and potentially produce toxins.

WSSC Water continued to monitor its public access recreation areas at Rocky Gorge and Triadelphia Reservoirs for HABs during 2020. Recreation resumed at Triadelphia Reservoir after the completion of 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); and four public recreation areas at Triadelphia Reservoir; namely, Greenbridge and Triadelphia (both in Montgomery County), and Big Branch and Pigtail (both in Howard County).

WSSC Water initiated only one Water Contact Advisory during 2020. On September 17, 2020, WSSC Water initiated a Water Contact Advisory in Triadelphia Reservoir because potentially harmful algal cell concentrations exceeded a 100,000 cells/milliliter threshold established by the World Health Organization. To inform the public of the advisory, WSSC Water issued a press release, posted website updates and advisory signs at all recreation areas around the reservoir, and notified county and State of Maryland health and environmental agencies. During the advisory, traces of algal toxins were detected close to 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 Water Contact Advisory was lifted on October 5, 2020.

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

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 Tree Planting Programs

Howard County's Department of Recreation and Parks (DRP) manages both the *Stream ReLeaf* and the *Turf to Trees* tree planting programs for private property. In 2020 the DRP planted 130 trees on two properties in the Triadelphia Reservoir watershed through the Turf to Trees Program. Trees planted via the *Turf to Trees* Program can be planted anywhere on a property, while *Stream ReLeaf* trees are planted to establish stream buffers.

Montgomery County Department of Parks

During 2020, M-NCPPC stream valley buffer forest conservation efforts in the Patuxent watershed 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.

WSSC Water Land Acquisition for Source Water Protection

During 2020, a 30.08-acre property in Howard County, near Rocky Gorge Reservoir, was purchased by WSSC Water to add to its drinking water source protection buffer around the reservoir (Figure 7). The property on Hunterbrooke Lane is partially forested and contains about 1,500 feet of stream channel.

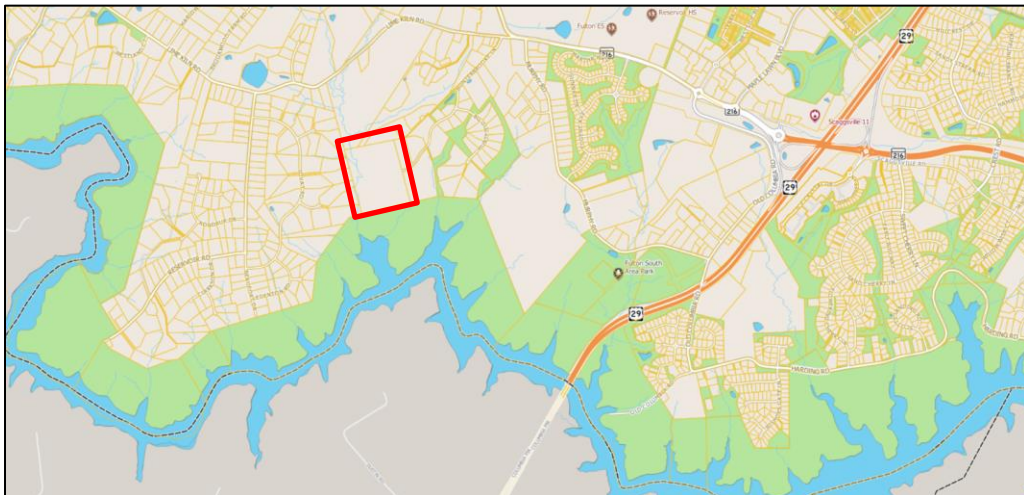


Figure 7. Location of WSSC Water's 2020 land purchase, Hunterbrooke Lane, Fulton, MD.

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 achieve 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 2020. 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.⁶

Howard County Deer Management Program

The Howard County DRP Deer Management Program includes annually scheduled bow and shotgun managed hunts and sharpshooting in county parks and open space. The managed hunts and sharpshooting are held 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. In 2020 there were no scheduled hunts in the Patuxent Reservoirs Watershed.

Montgomery County Department of Parks

During 2020, the 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 River Reservoirs Watershed, the program has centered on the Rachel Carson Park. During 2020, 33 deer were harvested from Rachel Carson Conservation Park. The program continues to be effective in reducing deer. Annual deer harvests have resulted in a continued declining deer population that fluctuates between 15-30 deer per square mile.

WSSC Water

The WSSC continued its managed hunting program focusing on selected areas surrounding both reservoirs. WSSC Water conducted two managed gun hunts on WSSC Water owned land surrounding Triadelphia Reservoir. A total of 76 deer were harvested during the 2019-20 hunting season. Sixteen deer were harvested in Montgomery County and 60 were harvested in Howard County.

⁶ The Montgomery County Deer Management Work Group. *Comprehensive Management Plan for White-tailed Deer in Montgomery County, MD*. Revised 2004.

Aquatic Biota

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

Montgomery County

Montgomery County's Department of Environmental Protection (DEP) uses a multi-metric Index of Biological Integrity (IBI) to develop narrative ratings of biological conditions in water bodies. A benthic IBI (BIBI) is calculated using benthic macroinvertebrates sampling results, while a fish IBI (FIBI) is calculated using fish sampling results. For the purposes of this report, a combined IBI for benthic macroinvertebrates and fish is used for stations having a drainage area greater than 350 acres. The combined IBI score is converted to a percentage with 100% the highest possible score. Biological conditions in the water body are then described as Excellent (88-100%), Good (64-87%), Fair (42-63%) and Poor (0-41%).

For stations with drainage areas less than 350 acres, unless otherwise noted, only the BIBI is converted to a percentage with 100 being the highest possible score. Only BIBIs are used in these smaller drainage areas because these small streams typically only support pioneering fish species due to limited habitat. In addition, pioneering species adapt well to changing habitat and flow conditions, making them unreliable indicators for rating impairments.

In 2020, 22 stations were monitored in the PRW. Stream conditions ranged from Fair (57) at station LPRG202 to Excellent (100) at stations LPRG111 & UPPR103. Smaller first order tributaries were predominately Excellent, while second order and larger streams were generally Good. The random station (LPPR104A) selected in 2020 rated Excellent (95). From 2015 to 2020 the Upper Patuxent and Lower Patuxent subwatersheds have remained in Good condition (Figures 8 and 9).

In both 2015 and 2020, 19 stations were sampled for benthic macroinvertebrates and/or fish (station UPHR201 was sampled for benthic macroinvertebrates only in 2015 and both groups in 2020, therefore it is not included here). Of these 19 stations, three (16%) showed a change in stream conditions between 2015 and 2020. Stream conditions declined at one (5%) station. The change from Excellent (90) to Good (84) was approximately 6% at LPRG103. Conditions improved at two (11%) stations. Improvement at UPPR301 was also marginal, approximately 7%, from Good (82) to Excellent (88). The most substantial change occurred at LPAT201 (Figure 9). Conditions increased 28%, from Fair (51.5) to Good (66). The increase was driven by an increased Fish IBI. In 2015 three tolerant species were found: Blacknose Dace, Creek Chub and

Green Sunfish. In contrast, nine species were found in 2020 including Yellow and Brown Bullheads, Largemouth Bass and Mummichog.

The Montgomery County Department of Parks protects and manages the terrestrial and aquatic natural resources including wildlife, plants, and habitats that occur on M-NCPPC parkland through its natural resources management and park stewardship plans and programs. The Department conducts annual stream habitat and biomonitoring on lands within the M-NCPPC park system, coordinating its monitoring work with the DEP’s Stream Monitoring program. The DEP includes the data collected by Department of Parks staff in the County’s comprehensive stream condition monitoring database.

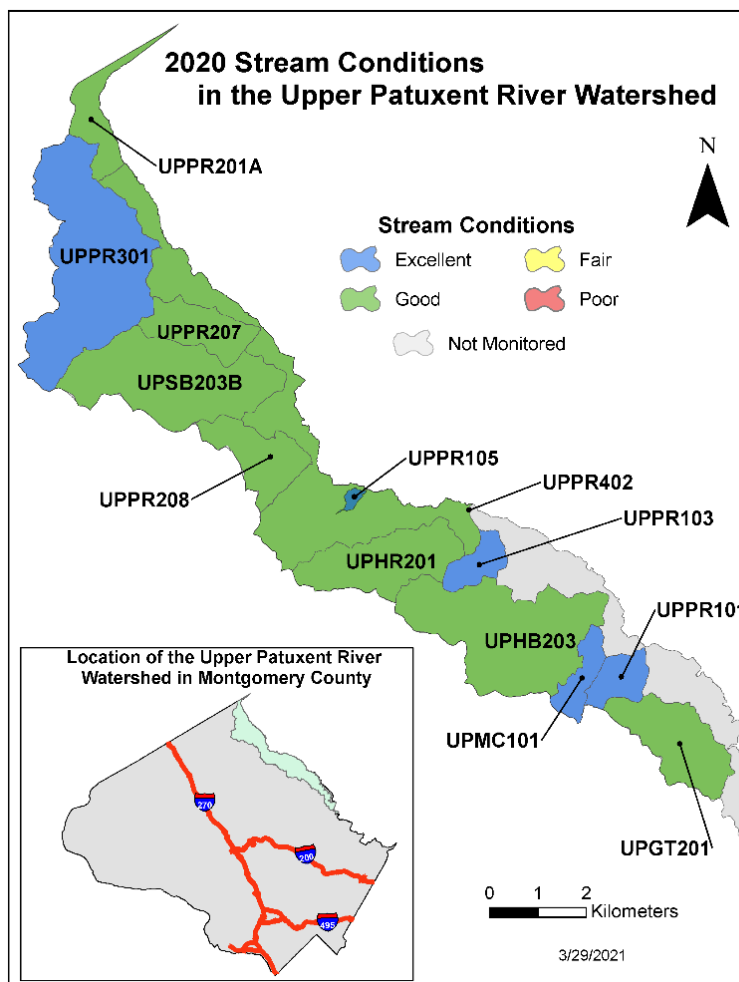


Figure 8. Biological stream conditions in the Upper Patuxent River Watershed.

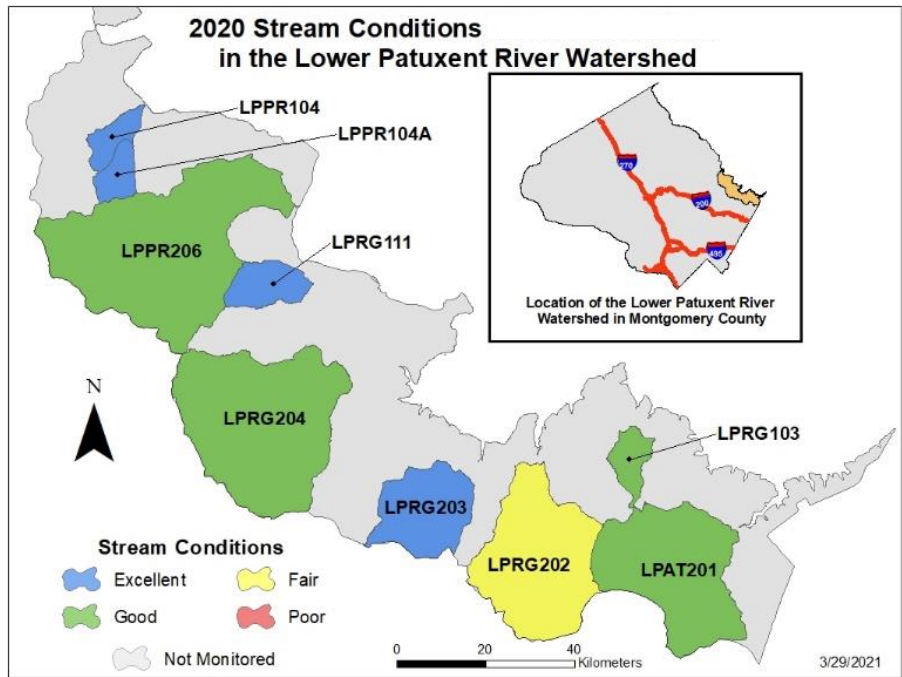


Figure 9. Biological stream conditions in the Lower Patuxent River Watershed.

Prince George’s County

The Prince George’s County’s Department of the Environment recently added five locations within the county’s portion of the PRW to their list of biomonitoring stations. All of these locations drain small watersheds that flow directly into Rocky Gorge Reservoir (Figure 10).

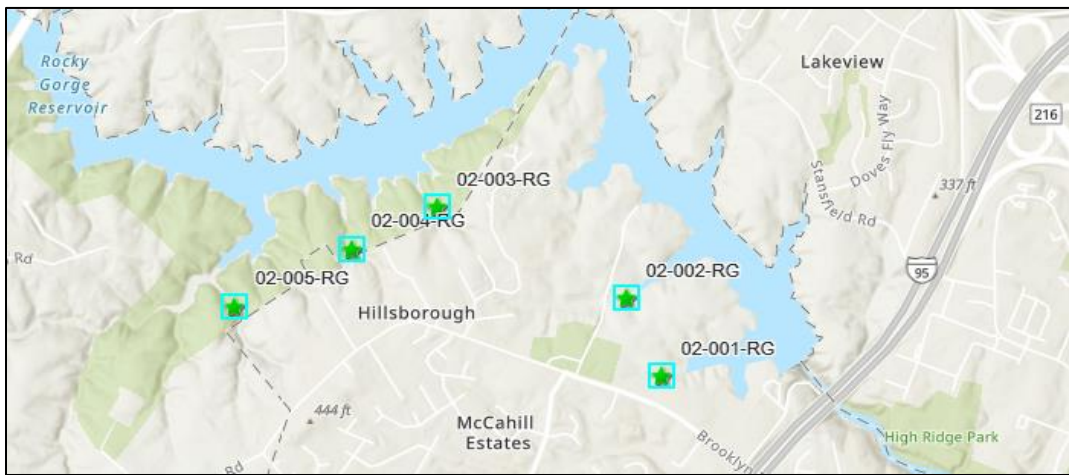


Figure 10. Prince George's County biomonitoring stations in the PRW.

The Maryland Biological Stream Survey (MBSS) protocols and scoring criteria were used to assess a stream’s benthic macroinvertebrate community using the BIBI, and its physical habitat using the Physical Habitat Index (PHI). The scoring ranges and the corresponding description of the stream conditions are contained in Table 7.

Table 7. MBSS BIBI and PHI scores and conditions.

BIBI Score	BIBI Rating	PHI Score	PHI Rating
4.0-5.0	Good	81-100	Good - minimally degraded
3.0-3.9	Fair	66-80	Fair - partially degraded
2.0-2.9	Poor	51-65	Poor - degraded
1.0-1.9	Very Poor	0-50	Very Poor – severely degraded

Results from these samples collected during March 2020 are summarized in Table 8. BIBI scores ranged from 2.71 (Poor) at site 02-001-RG to 4.14 (Good) at site 02-003-RG. The MBSS’s PHI scores were all very similar with a corresponding rating of good or minimally degraded stream habitat conditions. Stream conductivity values ranged from 126 microsiemens per centimeter ($\mu\text{S}/\text{cm}$) at site 02-003-RG to 269 $\mu\text{S}/\text{cm}$ at site 02-004-RG.

Table 8. Stream assessment results in Prince George’s County’s portion of the PRW.

Station ID	BIBI Score	BIBI Rating	PHI Score	PHI Rating	Stream Conductivity $\mu\text{S}/\text{cm}$
02-001-RG	2.71	Poor	85.6	Good-minimally degraded	223
02-002-RG	3.29	Fair	86.5	Good-minimally degraded	185
02-003-RG	4.14	Good	88.8	Good-minimally degraded	126
02-004-RG	3.57	Fair	86.8	Good-minimally degraded	269
02-005-RG	3.57	Fair	89.8	Good-minimally degraded	209

Results from these stations will eventually be combined with data from Howard and Montgomery counties to evaluate biological and habitat conditions throughout the PRW using a common evaluation method.

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 the only remaining dairy farm in Howard County. 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. 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 Government, the HSCD, the MD Department of Natural Resources, 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 livestock watering systems to exclude the dairy herd from the riparian easement area and restored streams. Three, armored stream crossings were also constructed to minimize disturbance to the stream channels from the dairy herd and farm equipment. Construction began in June 2018 and was substantially completed by December 2018.

With assistance provided by Howard County Government's Department of Public Works and Office of Community Sustainability, 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. The pre-restoration phase of the water quality monitoring project was completed in June 2018, spanning about 13 months.

During 2020, sample collection was suspended during the winter months because of freezing temperatures and from mid-March through mid-August because of pandemic-related restrictions at WSSC Water's lab. As a result, only 12 sets of bi-weekly samples were collected during the year.

Results from the limited data collected during 2020 were similar to results in 2019. So far in the first two years of post-restoration monitoring, 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.

Cherrytree Farms Projects

Stream Stabilization

A stream stabilization project in the Cherrytree Farms neighborhood in Howard County was completed in March 2020. The project site is east of Wild Cherry Court in Laurel. 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 the Rocky Gorge Reservoir.

The unnamed tributary 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 the reservoir. In addition to the mainstem, three tributaries enter the project area and are included as part of the project (Figure 11).

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 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.

Pond/Outfall Repair

A pond repair project in the Cherrytree Farms neighborhood was also in construction in FY20 (beginning March 2020). The project site is located east of Cherrystone Court in Laurel. The pond repair 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 outfall of this pond ties in to the Cherrytree Farms stream restoration project detailed above (Figure 11).

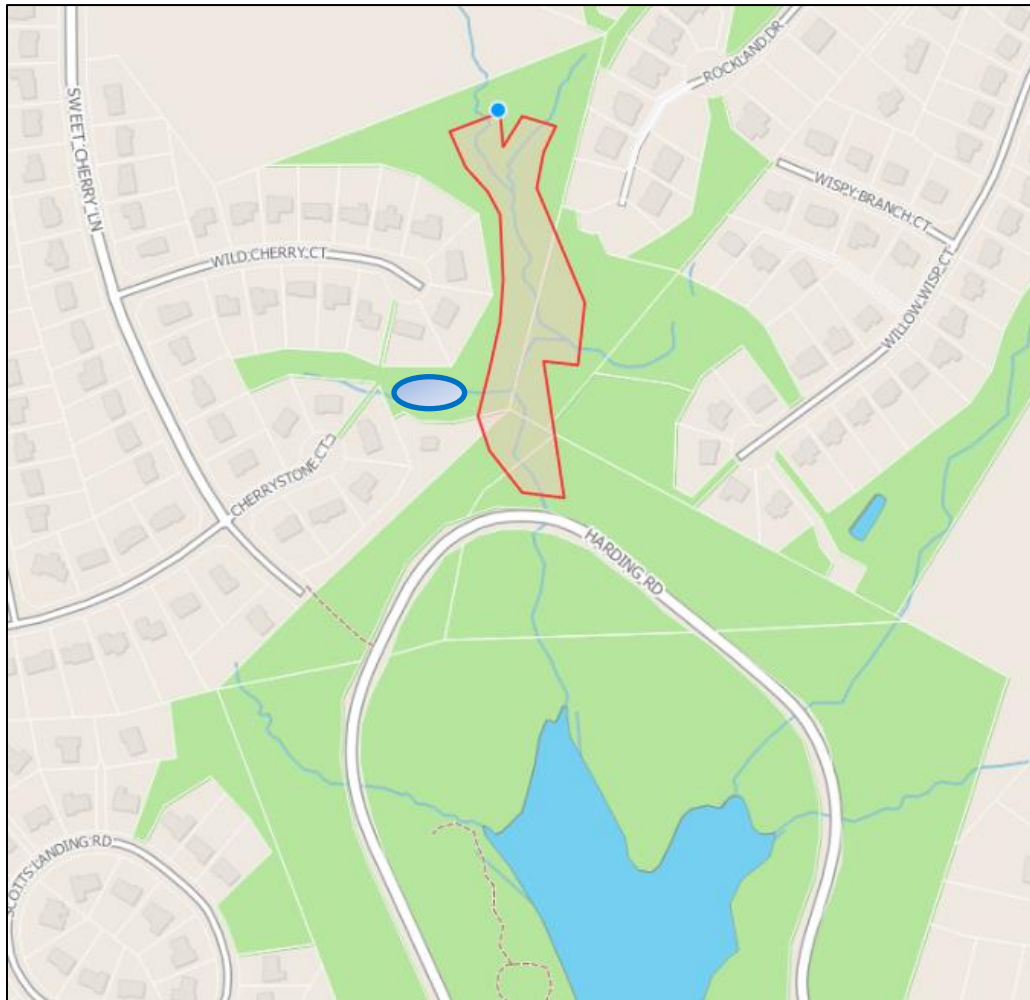


Figure 11. Cherry Tree Farm projects in Howard County adjacent to Rocky Gorge Reservoir.

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 FY20 by both the HSCD and the MSCD is presented in Table 9. The SCDs provide technical and financial assistance using funds from local, State and federal programs to support landowners with the installation of agricultural BMPs. Each cost-shared practice must be built according to US 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, 2019 through June 30, 2020.

Table 9. Agricultural progress for 2019-20 in the PRW.

	BMP Code	Howard SCD	Montgomery SCD	Total
Current Conservation Plans (acres)	--	118 (7,989)	99 (5,506)	217 (13,495)
Best Management Practice				
Access Road (feet)	560	--	1 (1,300)	1 (1,300)
Animal Trails and Walkways (feet)	575	3 (1,173)	1 (200)	4 (1,373)
Brush Management (acres)	314	--	1 (0.4)	1 (0.4)
Critical Area Planting (acres)	342	1 (1.0)	--	1 (1.0)
Critical Area Planting--Construction (acres)	342B	--	1 (0.65)	1 (0.65)
Dry Waste Storage	RI-01	--	1	1
Grade Stabilization Structure	410	2	--	2
Grassed Waterway (acres)	412	4 (1.85)	1 (0.65)	5 (2.5)
Heavy Use Area Protection (acres)	561	1 (0.01)	1 (0.25)	2 (0.26)
Hedgerow Planting (Trees) (feet)	422B	--	1 (320)	1 (320)
Herbaceous Weed Control (acres)	315	--	2 (30.7)	2 (30.7)
Lined Waterway or Outlet (feet)	468	--	1 (67)	1 (67)
Mulching (acres)	484	2 (1.1)	--	2 (1.1)
Pasture & Hay Planting (acres)	512	3 (5.9)	--	3 (5.9)
Prescribed Grazing (acres)	528	5 (44.3)	1 (35.1)	6 (79.4)
Seasonal High Tunnel System for Crops (sq. feet)	798	3 (6,570)	3 (7,080)	6 (13,650)
Sediment Control Pond	378	2	--	2
Stream Crossing	578	2	1	3
Subsurface Drain (feet)	606	1 (1,000)	1 (1,400)	2 (2,400)
Underground Outlet (feet)	620	1 (100)	1 (40)	2 (140)
Waste Recycling (acre)	633	--	1 (6.4)	1 (6.4)
Water Control Structure	RI-17	--	4	4
Waste Storage Facility	313	1	--	1
Watering Facility	614	1	--	1
TOTALS		32	23	55

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 focused on implementing BMPs that would benefit nearby stream systems. The MOU was subsequently amended in 2014 to expand coverage to a wider range of BMPs that will protect and improve water quality in the watershed. 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.

The HSCD used about \$5,550 from this cost-share program during 2020 to provide financial assistance for the installation of two BMPs on horse farms (Table 10). The MSCD spent its remaining funds in 2019 and may request additional funding from WSSC Water to match funds from Montgomery County that will be allocated to this program. The remaining funds in this cost-share program as of December 2020 are:

HSCD	\$55,758
MSCD	<u> \$0</u>
Total	\$55,758

Table 10. BMPs installed with PRW Agricultural Cost-Share Program funds in CY20.

Description	Quantity	Unit	SCD
Heavy Use Area Protection	1,800	square feet	HSCD
Livestock stream crossing	1	each	HSCD

Agricultural Land Preservation Easement enrollments

The Howard County Agricultural Land Preservation Program (ALPP) was closed to purchasing easements in 2018 and reopened in June 2019. However, the County then began revising the scoring system for easement purchases and no applications were accepted until the revised scoring system was adopted in July 2020. The ALPP did not complete any easement purchases in 2020, but did acquire an easement on a 21.1-acre dedicated parcel in the Triadelphia Reservoir watershed. Dedicated parcels are created through the cluster subdivision or density sending process, in accordance with the County's Zoning Regulations.

Commodity Cover Crop Program

The Montgomery Soil Conservation District's Commodity Cover Crop Program remains very popular and continues to fill the funding gap created when the State discontinued this part of their State-wide Cover Crop Program. For the 2019-2020 program year, the MSCD certified a total of 4,744 acres of commodity cover crops with a total payout to farmers totaling \$58,075.50. Of this number, about 1,331 acres (28%) were in the PRW.

For the 2020-2021 program year, the MSCD had a record number of farmers apply to the District's local program with a total of 3,800 acres certified as planted. This equates to about 1,064 acres of commodity cover crops enrolled by Patuxent Watershed Farmers. The actual planted acres won't be certified until the Spring of 2021.

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. Despite the pandemic, the TAC agencies and other groups in the watershed continued to coordinate limited public outreach and involvement initiatives during 2020.

Howard Soil Conservation District

Mid-Winter Ag Meeting (March 2020)

The HSCD, the MDA, University of Maryland Extension, and the NRCS sponsored the annual Howard County *Mid-Winter Ag[ricultural] Meeting*. Topics included nutrient cycling and storage, soil microbiology, perspectives on soil health and implications for agricultural soil assessment, effects of spraying and wind drift on sensitive crops and pollinators, and an update on the Nutrient Management Law from the MDA. More than 40 people were in attendance and were eligible to receive two continuing education credits for MDA's Nutrient Management Certification.

Legislative Initiatives

The HSCD also conducted a farm tour to inform elected officials on current issues facing the agricultural community.

Montgomery County Department of Parks

Under the Department of Parks' Weed Warrior Program, which coordinates volunteer efforts to remove invasive plants from natural areas, a total of 28.25 person-hours was logged within the Patuxent Reservoirs watershed. 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 Department of Parks also hosted three trash cleanups in the parks within the PRW. A total of eight person-hours was logged, for a total of 40 pounds of trash removed.

Montgomery Soil Conservation District

Equine Community Outreach

In February 2020, the District sponsored an equine outreach event at a local farm within the PRW. *Leap into Conservation* was a very well attended pasture walk by over 50 participants. There were presentations on rotational grazing and manure management, demonstrations on

how to use conservation equipment, and other important educational items, such as nutrient management and conservation planning.

Farm Stewardship Certification and Assessment Program (FSCAP)

The MSCD nominated David and Ellen Quirk for the MD Association of Soil Conservation Districts (MASCD) Farm Stewardship Certification and Assessment Program (FSCAP). The MASCD established the FSCAP to acknowledge those farmers who are good stewards of their natural resources and to encourage and reward farmers to put more conservation practices on the land. The program established the Agricultural Conservation Stewardship Certification Standard, which measures compliance with state requirements for the farm's Nutrient Management Plan, plus a level of conservation BMPs that prevent any significant sources of pollution from leaving the farm.

Through FSCAP, the MASCD will establish a collaborative process to recognize good stewardship by farmers that will be acknowledged and respected by both the environmental and agricultural communities. By “setting the bar,” it will encourage other farmers to achieve certification and participate in new conservation programs that will put more conservation on the land and reduce pollution to the Chesapeake Bay and its tributaries. When a farmer volunteers to be evaluated, FSCAP works through the SCDs to visit the farm to review the existing Nutrient Management Plan, Soil Conservation and Water Quality Plan, and other pertinent documents to determine if the farmer meets the Agricultural Conservation Stewardship Certification Standard.

MSCD Educational Videos

The District developed and produced a [video presentation](#) for a statewide Equine Manure Management Webinar featuring a Patuxent equine producer and highlighting how to properly compost horse manures. The District also produced two additional educational videos associated with the *Close Encounters with Agriculture Program* for 4th grade students in both public and private schools. While directed at schools across the County, many of the participating schools are in the PRW. The videos produced by the District were part of a larger virtual field trip necessitated by COVID 19. The two videos produced by the District entitled [Wildlife Habitat, the Key to a Healthy Ecosystem](#) and the [Earth Beneath Your Feet, Why Protecting Our Soils is So Important](#) are excellent resources students can access to learn about these two very important environmental concepts.

Legislative Initiatives

The MSCD partnered with the Montgomery Farm Bureau and Montgomery County Office of Agriculture to conduct a Legislative Webinar. More than 15 local, State and federal legislators participated as a panel and interacted with the County’s farm community (including many

Patuxent farmers and legislators) to discuss agricultural issues and the upcoming 2021 legislative session.

WSSC Water’s “Watershed” Property - Environmental Outreach

During 2020, WSSC Water began sponsoring a high school student group from Howard and Montgomery Counties that was looking for ways to give back to the community during the pandemic. This group, called the *Northgate Juniors*, began collecting trash at the Scotts Cove Recreation Area adjacent to Rocky Gorge Reservoir. Since August this group has cleaned up monthly at this heavily used recreation area and plans to continue through the winter while the recreation areas remain open to the public. WSSC Water provides the necessary equipment and training.



Figure 12. Northgate Juniors Volunteer Group at Scotts Cove Recreation Area

Table 11. 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 (revised 2020)

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 for agricultural BMPs, stream restoration, stormwater retrofit and deicing salt use reduction projects and programs to address factors contributing to degraded biological integrity Mitigate runoff impacts from land use changes with development regulations for sediment and erosion control, stormwater management and sensitive resource protection Determine if correlations exist between IBIs and specific conductivity that may indicate a potential water quality impairment Assess benthic IBIs every five to ten years to monitor progress beginning in 2021 	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 forest cover Assess benthic IBIs every five to ten years to monitor progress beginning in 2021 	Ongoing	HC, HSCD, MC, MSCD, M-NCPPC
			Ongoing	HC, MC, PGC M-NCPPC
			Ongoing	HC, MC, PGC M-NCPPC

Notes:

- 1) Index of Biological Integrity (IBI) is also referred to as Index of Biotic Integrity in Maryland Biological Stream Survey publications.
- 2) Montgomery County uses an assessment scale of Excellent, Good, Fair or Poor, while Howard County uses a scale of Good, Fair, Poor or Very Poor. **The difference in assessment scales must be addressed to produce a reservoirs watershed assessment.**

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 	2006 – 2009	TAC
			Ongoing	TAC
			2006 – 2008	MC, PGC, HC, M-NCPPC
			2006 – 2009	TAC
Schools participating in mentoring	<ul style="list-style-type: none"> • 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 Water, 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 	2006 – 2009	TAC
			2006 – 2008	

Table 12. Expenditures for the current fiscal year.

PATUXENT RESERVOIRS WATERSHED WORK PROGRAM FOR FY20				
PRIORITY RESOURCES PROTECTED	IMPLEMENTATION NEED	IMPLEMENTATION ITEM	AGENCY	COST
Reservoir/Water Supply	Reservoir and tributary water chemistry and flow monitoring	Reservoir monitoring and lab analysis	WSSC Water	\$72,000 (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)
ALL Priority Resources	Public outreach and involvement initiatives	RainScapes Rewards Program (rebates available to county residents for Low Impact Development projects)	MC	\$0
		CleanScapes Program (rebates available for county residents in homes built before 1993 for on-site stormwater management projects)	HC	\$0
		Septic Savers Program (\$100 rebate available for pumping septic system every three to five years)	HC	\$0
ALL Priority Resources	Public outreach and involvement initiatives	Earth Month and other outreach activities	WSSC Water	\$20,000 (in-kind)
			Other TAC agencies	\$2,500 (in-kind)

PATUXENT RESERVOIRS WATERSHED WORK PROGRAM FOR FY20				
PRIORITY RESOURCES PROTECTED	IMPLEMENTATION NEED	IMPLEMENTATION ITEM	AGENCY	COST
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 (in-kind)
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	\$600,000
TOTAL FUNDING				\$985,500