PATUXENT RESERVOIRS WATERSHED PROTECTION GROUP



2021 ANNUAL REPORT OF THE TECHNICAL ADVISORY COMMITTEE -FINAL-

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A Message from the Chair

The year 2021 marks 25 years since the agreement establishing the Patuxent Reservoirs Watershed Protection Group (PRWPG) was signed. This agreement demonstrates two facets of drinking water source protection: first, it often takes a long time for incremental progress to produce measurable effects at the watershed scale; and second, watershed protection is commonly a voluntary activity, not compelled by statutory or regulatory mandates, that needs a stakeholder/partnership approach to function effectively.

I want to recognize and thank my colleagues on the PRWPG's Technical Advisory Committee (TAC), who for these many years have met and shared news of the activities that their agencies are doing, as well as the not inconsiderable costs entailed, to maintain and improve water quality and watershed conditions. While we operate as a partnership guided by the priority resources framework, in reality the annual budgets reported by the TAC are often a compilation of in-kind agency work programs with specified water quality and environmental benefits. Reporting the progress in the TAC annual reports serves as a validation of the hard work that each agency and its staff does, as well as the financial commitments made by the agencies.

The PRWPG partnership has taken major actions this year that will promote further progress towards the PRWPG's watershed protection and drinking water quality improvement goals. A watershed Geographic Information System (GIS) platform for the entire watershed has been developed, which assembled disparate information and layers from each of the three Counties. It is intended for this GIS tool to be hosted on a WSSC Water server, from where TAC members can conduct analyses. Ongoing activities included assessing measures to reduce adverse effects of road salt on water quality; progress towards meeting the Total Maximum Daily Loads (TMDLs); and updates for the Priority Resources. Finally, the mid-year briefing for the Policy Board was an innovation that is intended to maintain good lines of communication and engagement.

I want to acknowledge and thank my colleague Steve Nelson, who serves as the administrative coordinator of the TAC and handles most of the meeting preparations and documentation tasks. Unlike past years, when in-person meetings could be held, the past two years' meetings have been held online, and were still highly productive while sparing members from time normally spent driving.

Martin Chandler, WSSC Water 2021 Chair, Technical Advisory Committee

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Acronyms

Abbreviation	Definition
aka	Also Known As
BMP	Best Management Practice
вон	(Howard County) Bureau of Highways
CAST	Chesapeake Assessment Scenario Tool
chl-a	Chlorophyll-a
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
НАВ	Harmful Algal Bloom
НС	Howard County
HSCD	Howard Soil Conservation District
MC	Montgomery County
MDA	Maryland Department of Agriculture
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
M-NCPPC	Maryland-National Capital Park and Planning Commission
MS4	Municipal Separate Storm Sewer System
MSCD	Montgomery Soil Conservation District
mg/L	Milligrams per Liter (equivalent to part per million)
μg/L	Micrograms per Liter (equivalent to part per billion)
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PGC	Prince George's County
NPDES	National Pollutant Discharge Elimination System
PRW	Patuxent Reservoirs Watershed
PRWPG	Patuxent Reservoirs Watershed Protection Group
SCD	Soil Conservation District
TAC	Technical Advisory Committee
TMDL	Total Maximum Daily Load
ТОС	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 also 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 (TMDLs) for both reservoirs in November 2008. A phosphorus TMDL was established for each reservoir, and a sediment TMDL was also established for Triadelphia Reservoir.

The following are highlights from the Technical Advisory Committee (TAC) activities in 2021:

 With assistance from Prince George's County Department of the Environment, the TAC continued to develop a web-based 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 2021, the main task of merging the land use data for the three counties, then classifying it by property owner, was accomplished.

WSSC Water has agreed to host the published web-mapping applications on their servers and provide technical support at the server and web-map hosting level. Charles Braese (Prince George's County Department of Environment) will continue to work on developing the web map application with the TAC users in mind, using available Esri web-application configuration tools.

2. 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 continued to investigate the possibility that the sediment TMDL has been achieved. The TAC met with MDE representatives in May 2021 and presented the information. The MDE expressed interest in the results and indicated that if the TAC would present the findings in a formal written technical memorandum, then the sediment TMDL for Triadelphia Reservoir could be

reconsidered during the next Integrated Report for 2022-2024, effectively delisting the reservoir from an impaired status for sediment. A draft of the Technical Memorandum is in progress and expected to be completed during 2022.

- 3. WSSC Water continued its reservoir water quality monitoring during 2021, including monitoring the public recreation areas at both reservoirs for harmful algal blooms. No Water Contact Health Advisories were initiated during 2021 due to harmful algal blooms.
- 4. Howard (HSCD) and Montgomery (MSCD) Soil Conservation Districts used funding from local, State and federal programs to provide technical and financial assistance to landowners for the installation of 28 agricultural best management practices (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.
- 5. The HSCD used \$4,014 of the Patuxent Reservoirs Watershed Agricultural Cost-Share Program to install a BMP to exclude livestock from a nearby stream channel. The remaining balance in this cost-share program at the HSCD is \$51,744.
- 6. Using federal, State and local funding sources and land development regulations, about 512 acres of land were preserved in agricultural and conservation easements during 2021. In addition, the Montgomery County Department of Parks purchased five parcels in the Hawlings River subwatershed, totaling 73 acres of new parkland.
- 7. Despite the pandemic, a variety of successful outreach events occurred once again during 2021 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 *Farmside Chats* with elected officials to educate them on current issues and challenges facing the agricultural community; and WSSC Water's *Patuxent Watershed Protector* outreach effort for families, youth and corporate groups at public recreation areas surrounding the reservoirs.

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 in 2021.

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 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)

Patuxent Reservoirs Watershed Protection Group Technical Advisory Committee 2021 Annual Report



Figure 2. Patuxent Reservoirs Watershed

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, the 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).

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%		

Table 1. TMDLs for the Patuxent Reservoirs¹

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

^BLA 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.

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%		

Table 2. Sources for modeled baseline pollutant loadings to the Patuxent Reservoirs²

TMDL Progress – Related Activities

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. In 2020 this gap was adjusted to account for load reductions in total phosphorus in Triadelphia Reservoir that subsequently reduce loads to Rocky Gorge Reservoir. 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.

Stream Buffer Restoration Analysis

Based on 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 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.

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.

To date, except for stream hydrology all 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 2022.

Sediment TMDL for Triadelphia Reservoir

Since the original rationale for establishing the sediment TMDL for Triadelphia Reservoir was reportedly due to excess sedimentation, and resultant loss of capacity for long-term water supply, the TAC undertook an analysis of sediment loading rates to compare against the TMDL goal.

One analysis addressed the sediment removed from the Triadelphia Reservoir headwaters areas in 2017-2019 while water levels were held substantially below normal. The volumes of sediment were measured and/or estimated, and since the duration of sediment accumulation was known, a volumetric sedimentation rate for the headwaters area was calculated.

A second analysis was based on bathymetric surveys from 2004 and 2015, which are significantly more accurate than the 1995 survey cited in the TMDL document. Storage capacity loss from these more recent surveys corresponds to sediment accumulation, and because the periods of accumulation since original impoundment in 1942 were known, estimates of the volumetric sedimentation rate for the entire reservoir were calculated.

Although the TMDL for sediment is expressed in terms of a load reduction rate in tons per year, data from two bathymetric surveys included sediment bulk density determinations from many samples. These bulk density values can be expressed in mass units of tons per cubic yard, which enables the volumetric sedimentation rates to be converted to sedimentation mass rates. The calculated sediment accumulation rates in tons per year are:

- > 736 to 1,888 tons per year for the headwaters deposition areas that were excavated
- > 18,428 to 22,388 tons per year for the entire reservoir from bathymetric surveys

The TMDL sediment loading rate goal is 22,820 tons per year. Therefore, the estimated loading rate from measured accumulations is less than the TMDL, and it can 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 the excavation project addresses MDE's concern over capacity loss, especially if periodic, planned subsequent sediment removal projects and/or dredging can be undertaken to maintain the restored capacity.

The TAC met with MDE representatives in May 2021 and presented the sedimentation rate data. MDE expressed interest in the results and indicated that, if the TAC would present the findings in a formal written Technical Memorandum, the sediment TMDL for Triadelphia

Reservoir could be reconsidered during the next Integrated Report for 2022-2024, as a potential change of Category from 4a to 2, effectively delisting the reservoir from an impaired status for sediment. A draft of the Technical Memorandum is in progress and expected to be completed in early 2022.

Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System (NPDES) 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 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 and elimination programs; restoration plans; watershed assessments; TMDLs; assessment of controls and monitoring; program funding; and special programmatic conditions). Annual Report Number 26 was submitted to MDE in December 2021. This document is available through the County government's Stormwater Management website (howardcountymd.gov/Departments/Public-Works/Bureau-of-Environmental-Services/Stormwater-Management/Regulations-Permits).

As of 2021, the BMPs constructed within the Howard County portion of the PRW resulted in the pollutant load reductions shown in Table 3, based on a spreadsheet-based calculator (the TMDL Implementation Progress Planning, or TIPP tool), which is an MDE-approved calculation of Chesapeake Assessment Scenario Tool (CAST) Phase 6 pollutant load removal efficiencies, as presented in Annual Report Number 26. In previous years, Howard County used the Maryland Assessment Scenario Tool (MAST) as required by the MDE to calculate pollutant load reductions. More recently the MDE switched to the Chesapeake Assessment Scenario Tool and most recently switched to the TIPP tool. All three models estimate pollutant load reductions differently. For the PRW, load reductions using the MAST model were greater than reductions using the CAST model.

The target reduction shown in Table 3 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. An additional 80 pounds of phosphorus was reduced in the Rocky Gorge Reservoir watershed during 2021 that now represents 300% of the targeted reduction goal.

County Urban BMPs		
Reservoir	Target Reduction	Progress Reduction
Triadelphia	978 lbs.	512 lbs. (52%)
Rocky Gorge	239 lbs.	717 lbs. (300%)

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

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 to 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 2022 and will be periodically updated and enhanced as new data become available and analyses are needed.

In 2021 the main task was to merge the Chesapeake Bay Program's Land Use data for Howard, Montgomery and Prince George's Counties, within the PRW boundary. Once these data were merged, it was further subdivided and classified by property owner (e.g., WSSC Water, M-NCPPC, county, private), Forest Conservation Easement, public park, and Agricultural Easement.

Data layers for the watersheds, easements, park land, public property, and WSSC Water property within the PRW were then compiled into a geodatabase for the purpose of publishing web mapping applications. A first draft of the web mapping application was published on Prince George's County GIS servers to present at the 2021 meeting of the Patuxent Reservoirs Watershed Protection Group. WSSC Water has agreed to host the published web mapping applications on their servers and provide technical support at the server and web map hosting level. Charles Braese, from Prince George's County, will continue to work on developing the web map application with the TAC users in mind, using available Esri web application configuration tools.

Winter Salt

At the 2018 Policy Board Meeting, the TAC made a presentation that summarized the saltrelated 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 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

Sodium and chloride results from weekly samples continue to be collected at the Patuxent Water Filtration Plant and are presented in Figures 3 and 4. Annual and five-year rolling averages were plotted to examine long-term trends in these data sets.

Considering the 31-year period of record shown in Figures 3 and 4, a seasonal pattern in the data is evident, attributed to the salt loading within the watershed during the winter months when deicing material is applied to roads, parking lots and other surfaces within the PRW. A sharp increase in sodium and chloride reservoir concentrations is typically observed during the winter and spring months, followed by decreasing values for the remainder of the year.

The winter of 2020-2021 was no exception to this seasonal pattern observed in the data. A large increase in chloride concentrations occurred during the winter of 2020-2021 with the greatest concentration measured since 1990 occurring in mid-March 2021 (60 mg/L). Chloride concentrations then decreased rapidly during the rest of 2021, reaching the five-year rolling average concentration of about 30 mg/L. A corresponding increase in the annual rolling average was also observed (red line, Figure 3), reaching a new maximum of 36 mg/L.



Figure 3. Long-term chloride trends at the Patuxent Water Filtration Plant

A similar, but less prominent spike in sodium concentrations occurred during the winter of 2020-2021, with the maximum concentration (31 mg/L) also observed in mid-March 2021 (Figure 4).

While remaining a source water protection concern for the reservoirs and their tributary streams, for context, the EPA advisory level for sodium in drinking water is 20 mg/L developed for people on a sodium-restricted diet. Drinking water containing 30-60 mg/L of sodium would represent about 2.5%-5% of the daily recommended intake when consuming two liters/day of tap water at this sodium concentration.³

The EPA's ambient, aquatic life, water quality criteria for chloride is 230 mg/L; however, impacts to fresh water fishes have been observed in streams with chloride concentrations of

³ U.S. Environmental Protection Agency. February 2003. Drinking Water Advisory: Consumer Acceptability Advice and Health Effects Analysis on Sodium. EPA 822-R-03-006.

33-108 mg/L.⁴ Aquatic insects can also be affected by the change in stream chemistry caused by elevated chloride concentrations when concentrations reach 50-90 mg/L.⁵

The annual rolling average increased during 2021 and approached the health advisory for sodium by the end of 2021 (Figure 4). Currently, the annual and five-year rolling averages for sodium are trending below the EPA's Drinking Water Health Advisory level for those on sodium-restricted diets.



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

TAC Implementation Actions (2021)

During 2021, 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, continued to develop and expand the use of BMPs to reduce road salt applications while

⁴ Morgan et. al. 2012. *Stream Conductivity: Relationships to Land Use, Chloride, and Fishes in Maryland Streams,* North American Journal of Fisheries Management, 32:5, 941-952, DOI: 10.1080/02755947.2012.703159.

⁵ Wallace, Angela & Biastoch, Raymond. 2016. *Detecting changes in the benthic invertebrate community in response to increasing chloride in streams in Toronto, Canada*. Freshwater Science. 35. 000-000. 10.1086/685297.

maintaining safety. Salt brine pre-applications continue to be an important road de-icing 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 road widths. Local jurisdictions are continuing to comply with the winter 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.

Additional winter salt application provisions will be part of the next version of the MS4 permits. One of those provisions will be developing a salt management plan based on the *Statewide Salt Management Plan* developed by the SHA.

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 improved use of salt as a deicer on public and private roads and other impervious surfaces. The TAC continues to recommend that the Policy Board advocate that 1) local transportation departments prioritize the PRW for implementing BMPs, and 2) future salt applicator certifications include limited liability coverage.

Howard County Bureau of Highways

As reported in Howard County's MS4 Permit, Annual Report Number 26, 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 22,731 tons of salt (sodium chloride) and 127,515 gallons of salt brine were used for de-icing the county's roads during the 2020-21 winter season (Table 4). 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. The BOH greatly increased their use of salt brine compared with prior years. Howard County received 10.9 inches of snowfall during the 2020-21 winter season.

Fiscal Year	Salt (NaCl) (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
FY21	22,731	0	127,515

Table 4. Howard County Bureau of Highways Salt Related Product Use (FY15-FY21)

Montgomery County Department of Transportation

The Montgomery County Department of Transportation (DOT) 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*⁶;
- Using, on a trial basis, rubber-tipped snowplow blades to begin plowing earlier during an event and to reduce road damage and salt use;
- Calibrating contractor salt-spreading equipment to reduce salt use;
- Requiring contractors to clean up excess salt; and
- Expanding the use of salt brine.

Information from Table 5 is taken from the FY21 MS4 Annual Report to the MDE. County-wide results reported by the DOT for FY21 show the second greatest amount of salt brine applied to roads (485,000 gallons) since these records have been reported. About 68,800 tons of salt and 485,000 gallons of salt brine were applied to county roads to manage 11 winter storm events during the 2020-2021 winter season.

⁶ Maryland Statewide Salt Management Plan. 2018. Maryland Department of Transportation, State Highway Administration.

Fiscal Year	Winter Storms (no.)	Snow (inches)	Salt (NaCl) (tons)	Sand (tons)	Salt Brine (gallons)
FY11	NR^1	13 ²	85,600	21,400	NR
FY12	NR	4 ²	15,200	3,800	122,031
FY13	NR	13 ²	31,309	0	93,005
FY14	NR	53 ²	111,787	10,000	121,787
FY15	28	37 ²	87,900	0	36,400
FY16	5	40	133,517	0	43,000
FY17	9	6	20,408	0	147,122
FY18	15	16	53,479	0	168,000
FY19	13	28	57,692	0	500,000
FY20	11	3	6,410	0	97,097
FY21	11	18	68,818	0	485,000

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Table 5. Wontgomery Count	y DOT winter-weather Deicin	g iviateriai Usage (FY11-FY21)

¹ NR – not reported

² NOAA Local Climatological Data, Washington, D.C., Washington Dulles International Airport

There are more than 5,000 miles of roads in Montgomery County, which has about twice the number of miles in the PRW than Howard County.

Comprehensive Planning Updates

Howard County

Howard County Government began its General Plan update process in 2020. This new comprehensive plan, called *HoCo By Design*, will be an update of 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.⁷ *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).⁸

HoCo by Design is not expected to have a significant land use impact in the PRW, because the selected growth scenario does not include any significant expansion of the Planned Service Area for public water and sewerage into the Rural West. The plan will contain policies and actions addressing natural resource management, including drinking water source protection, as part of the required Water Resources and Sensitive Areas elements.

Montgomery County

The Thrive Montgomery 2050 plan is an update to Montgomery County's leading planning policy document, the General Plan. The last time this plan was updated was in 1993.⁹ This general plan update targets compact urban redevelopment and in-fill development located in areas outside of the PRW. There is no planned expansion of the water and sewer envelope into the PRW.

⁷ Howard County Government. 2020. *Welcome to HoCo By Design! <u>https://www.hocobydesign.com/</u>*

⁸ Howard County Government. 2020. *Planning Themes <u>https://www.hocobydesign.com/planning-themes</u>*

⁹ Montgomery County Government 2022. *Thrive Montgomery 2050* <u>https://montgomeryplanning.org/planning/master-plan-list/general-plans/thrive-montgomery-2050/</u>

Annual Progress on Implementation Items for the Priority Resources

The TAC continued to update the Priority Resource charts during 2021, completing the update for the Rural Character & Landscape and Public Awareness & Stewardship charts. Improvements made to the Rural Character & Landscape chart include adding quantifiable implementation measures to be reported on a five-year cycle. Significant improvements were made to the Public Awareness & Stewardship chart such as: targeting outreach to community groups within the PRW that reflect TAC priorities, sharing relevant event information among TAC agencies, and promoting 'change-making' activities like tree plantings.

Reservoirs and Water Supply

Reservoir Water Quality Monitoring

WSSC Water conducted its 30th 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 monitored bi-weekly, except during winter months. *In situ* water clarity measurements and depth profile measurements are collected that include: chlorophyll-*a*, conductivity, dissolved oxygen, dissolved organic matter, oxidation-reduction potential, pH, phycocyanin (an indicator of cyanobacteria or blue-green algae), temperature and turbidity. In addition, samples are collected monthly near the water surface and bottom at several locations 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.

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

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

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

Patuxent Reservoirs Watershed Protection Group 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 <u>26.08.02.03-3</u>, are:

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

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 μ g/L threshold during the growing season (Figure 5). These results do not characterize water quality conditions throughout the reservoir, but only near the T. Howard Duckett Dam and the intake for the Patuxent Water Filtration Plant.



Figure 5. Active chlorophyll-*a* concentrations for 2021 growing season (May – September). Red, dashed line represents the 30-day moving average threshold for public water supply reservoirs.

For the second criterion, six sets of chl-*a* samples were collected from Rocky Gorge Reservoir and five sets were collected from Triadelphia Reservoir during the 2021 growing season (May-September). The 90th percentile threshold was not exceeded in either reservoir during 2021 (Figure 6).

Patuxent Reservoirs Watershed Protection Group



Figure 6. Annual variations (2011-2021) in active chl-a concentrations for (A) Rocky Gorge Reservoir and (B) Triadelphia Reservior. Growing season data (May-Sept) and 90th percentile (\diamond) for comparison with dashed line at 30 µg/L representing the 90th percentile threshold for public water supply reservoirs.

Harmful Algal Bloom Monitoring at WSSC Water's Public Recreation Areas

In reservoirs, a class of phytoplankton (free-floating aquatic plants) 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 (or HAB) because high concentrations of cyanobacteria can cause irritating skin reactions upon contact and potentially produce toxins.

WSSC Water continued to monitor for HABs at its public access recreation areas at Rocky Gorge and Triadelphia Reservoirs during 2021. 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). This recreational HAB monitoring effort is separate from WSSC Water's other algal toxin monitoring efforts for drinking water purposes. Algal density values in 2021 did not reach levels warranting the issuance of any Water Contact Advisories.

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 Programs, which plant trees on private property. 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. In 2021 the DRP planted 187 trees on one property in the Rocky Gorge Reservoir watershed and planted 1,066 trees on five properties in the Triadelphia Reservoir watershed through the Turf to Trees Program. In 2021 the DRP planted 300 trees in 620 feet of stream buffer on one property in the Triadelphia Reservoir watershed through the Stream ReLeaf Program.

Montgomery County Department of Parks

During 2021, Montgomery County stream valley buffer reforestation efforts in the PRW included a one-acre tree planting project and ongoing management of about 16.5 additional

reforested acres in the Hawlings River Watershed. In addition, about 68 reforested acres at the Oaks Landfill site continue to be managed.

The Montgomery County Department of Parks also purchased five parcels in the Hawlings River subwatershed totaling 73 acres of new parkland (Figure 7). Those parcels were acquired mainly in the Upper Hawlings River subwatershed (70 acres) with the remaining three acres acquired in the Reddy Branch subwatershed.



Figure 7. Park land acquistions in Montgomery County

White-tailed Deer Management

One of the TAC's goals for the terrestrial habitat priority resource is to ensure forests are selfsustaining 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 (MDNR), the Montgomery County Department of Parks (M-NCPPC), the Howard County DRP, and the WSSC Water continued to implement deer hunting programs in 2021. 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.¹⁰

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. 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 2021 there were two scheduled hunts in Schooley Mill Park in the Rocky Gorge Reservoir Watershed in November and December, and four deer were harvested.

Montgomery County Department of Parks

During 2021, 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 Reservoirs Watershed, the program has centered on the Rachel Carson Park. During 2021, 28 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

Based on data from the MDNR, a total of 60 deer were harvested from WSSC Water owned land during the 2020-21 bow hunting season. WSSC Water continued its managed hunting program focusing on selected areas surrounding both reservoirs. Two managed gun hunts were held on WSSC Water owned land surrounding Triadelphia Reservoir where an additional 13 deer were harvested.

¹⁰ 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 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 a livestock watering system to exclude the dairy herd from the riparian easement area and restored stream. Three armored stream crossings were also provided. Construction began in June 2018 and was substantially completed by December 2018. Reforestation within the 15-acre riparian easement was completed by December 2019.

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.

A total of 21 sets of flow-weighted composite samples were collected in dry and wet weather during 2021. Sample collection was again suspended during the winter months due to freezing temperatures making sample collection difficult. Results from the data collected during 2021 were similar to results during the post-restoration period (2019-2020). For the first three years of post-restoration monitoring, little to no improvements have been observed when comparing pre- and post-restoration nutrient and sediment concentrations and loads; 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.

From June through August of 2021, additional dry-weather, grab samples were collected from a small tributary originating on the farm that receives much of the runoff from the farming operation. This effort was conducted to compare loads, where appropriate, with the monitoring station just downstream of the farm as a possible explanation for the lack of improvement in pollutant load reductions observed thus far. Based on results from seven, mostly dry-weather sampling events, streamflow from this tributary represents a very small percentage of the streamflow in Lisbon's Little Creek leaving the farm, yet the pollutant loads from this tributary represents a large percentage of the loads leaving the farm for total organic carbon, total Kjeldahl nitrogen, total phosphorus and total nitrogen. Table 6 contains a summary of the results for all parameters measured.

Table 6. Percent of Pollutant Load Contribution from small tributary on Maple Dell farm				
Pollutant	Average load Contribution (%)	Minimum load contribution (%)	Maximum load contribution (%)	
Total Organic Carbon	57	31	94	
Total Kjeldahl Nitrogen	51	37	66	
Total Phosphorus	30	14	45	
Total Nitrogen	26	13	49	
Total Suspended Solids	3	1	11	
Nitrate+Nitrite-Nitrogen	2	0	7	

Additional BMPs to address the farming activities that would reduce pollutant loads have yet to be planned or implemented.

Cherrytree Farms Projects

A pond repair project is underway in the Cherrytree Farms neighborhood in Howard County (Figure 8). 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. Much 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 on

mostly wooded, with the remaining area vegetated with individual trees and turf. The project is currently in design and is scheduled for construction in FY22.



Scottswood Court Pond Repair

The purpose of this project is to repair and restore an existing stormwater management pond located in Woodbine within the Cattail Creek watershed of Howard County (Figure 9). 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 65% design stage.



Figure 9. Scottswood Court Project

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 FY2021 by both the HSCD and the MSCD is presented in Table 7. 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, 2020 through June 30, 2021.

Patuxent Reservoirs Watershed Protection Group

	BMP Code	Howard SCD	Montgomery SCD	Total
Current Conservation Plans (acres)		130 (8,403)	94 (5,506)	224 (13,593)
Best Management Practice				
Brush Management (acres)	314		1 (0.1)	1 (0.1)
Critical Area Planting (acres)	342	4 (9.85)		4 (9.85)
Grade Stabilization Structure	410	3		3
Grassed Waterway (acres)	412	5 (5.85)		5 (5.85)
Heavy Use Area Protection (acres)	561	1 (0.1)		1 (0.1)
Livestock Pipeline (feet)	516	1 (312)		1 (312)
Pasture & Hay Planting (acres)	512	1 (42.5)		1 (42.5)
Prescribed Grazing (acres)	528	3 (5.9)		3 (5.9)
Sediment Control Pond	378	1		1
Stream Crossing	578	1	1	2
Streamside Fence (10-34' buffer) (feet)	382A	1 (1,160)		1 (1,160)
Subsurface Drain (feet)	606	3 (4,312)		3 (4,312)
Water Well	642		1	1
Watering Facility	614	1		1

Table 7. Agricultural Progress for July 2020-June 2021 in the PRW

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 costshare 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 \$4,000 from this cost-share program during 2021 to provide financial assistance for the installation of 1,130 feet (0.21 miles) of stream fencing to exclude livestock from a stream, as shown in the photo. The MSCD spent its remaining funds in 2019 and continues to evaluate options to best use its funding for BMP implementation before requesting additional funding from this source.

The remaining funds in this cost-share program as of December 2021 are:

HSCD	\$51,744	
MSCD	<u>\$</u>	0
Total	\$51,744	

Agricultural Land Preservation Easement enrollments

Howard County Agricultural Land Preservation Program

The Howard County Agricultural Land Preservation Program completed an easement purchase on a 24-acre farm and acquired an easement on a 21-acre farm as a dedicated parcel, both 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.

Montgomery County Agricultural Easement Program

The County acquired an easement on a 60-acre farm that will allow the family to expand their orchard operation. This farm is within ½ mile of the Agriculture Reserve zone border.

Maryland Agricultural Land Preservation Foundation

The State acquired easements on two farms in Montgomery County totaling 217 acres. One of these farms, the Suddath Farm, is a 111-acre commodity grain farm located within the PRW.

Montgomery County Rural Legacy Program

The County acquired easements on two farms totaling 296 acres within the PRW. These easements protect over 3,000 feet of tributaries to the Hawlings River and 47 acres of woodland.

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 2021.

Howard Soil Conservation District

Mid-Winter Ag Meeting (March 2021)

The HSCD, Maryland Department of Agriculture (MDA), University of Maryland Extension, and USDA Natural Resources Conservation Service sponsored the annual Howard County *Mid-Winter Ag*[ricultural] Meeting. Topics included Grazing Management Strategies to Maximize Forage Quality and Yield; An Introduction to Soil Water Holding, Storage, and Movement; Sulfur on Soybeans: Learning the When and the Why; and Measuring and Managing Soil Acidity in the Mid-Atlantic, as well as an update on the Nutrient Management Law from the MDA. The virtual meeting was well attended with 42 participants. Attendees were eligible to receive 2.5 continuing education credits for Maryland'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 144.5 person-hours was logged within the PRW. 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.

Montgomery Soil Conservation District

Agricultural Experience Summer Camp Program for Montgomery County Middle School Students

The MSCD, in partnership with the Montgomery Office of Agriculture (OAG) and University of Maryland Extension coordinated an Agricultural Experience Summer Camp Program for Montgomery County Middle School Students. Through this two-day summer camp experience, students explored various aspects of agriculture in Montgomery County, ranging from protection of the environment, food production and livestock management. This in-person field trip immersed middle school students in Montgomery County's agriculture.

Students visited Bella Vita Farm where they learned about growing food in a controlled environment and Butler's Orchard where they learned about horticulture and local food production . On the second day, students visited Pleasant Valley Farm where they learned how farmers use conservation tillage methods to help protect the soil, how integrated pest management is an important tool to reduce pesticide use, and the differences between sweet corn and field corn, which is grown primarily for animal feed and raising beef steers. In the afternoon, students visited Rock Hill Orchard where they learned about dairy farming and got to see firsthand, the robotic milking parlor in action. Students also got the opportunity to interact with young dairy cows as part of their immersion experience. This summer camp experience was so well received by teachers and students, they have already begun discussions on expanding this program next summer.

Montgomery County Science, Technology, Engineering and Mathematics (STEM) Teachers Tour Montgomery County Farms

Also, this past summer, the MSCD, the OAG and University of Maryland Extension-Montgomery County participated in a Chesapeake Bay Foundation (CBF) sponsored mini course for Montgomery County STEM teachers. The mini course was entitled *"Connecting Montgomery County to the Chesapeake Bay through Environmental Chemistry"*. This day long agricultural tour was part of a five-day continuing education event sponsored by the CBF. The Agricultural component of the mini course was entitled, "Ag Today is not the Ag of Your Grandfather." Teachers toured four Montgomery County farms and interacted with farmers and State and County agricultural resource professionals where they discussed the role farmers play in the Chesapeake Bay restoration effort.

Teachers were treated to the rich diversity of Montgomery County agriculture as they toured Ruppert Nurseries and learned about horticulture production and Sunny Ridge Farm where they learned about no-till agriculture, nutrient management, cover crops and agri-chemical handling facilities. They also toured Waredaca Brewery to better understand how on-farm breweries that utilize locally sourced agricultural products are emerging and growing in popularity. Finally, they visited Laytonsville Landscaping to discuss how turf farming has evolved over time and how these farms do their part in conserving our soil resources.

The day long tour provided an opportunity for teachers to learn about how farmers are helping to clean up the Chesapeake Bay through the implementation of Soil Conservation and Water Quality Plans, nutrient management planning and other agricultural BMPs that reduce nutrients and sediments entering our waterways.

Legislative Initiatives

This past summer, the MSCD, Montgomery County OAG, and the U of MD extension, partnered with the Montgomery County Farm Bureau to deliver a series of Farmside Chats, covering a variety of subjects important to Montgomery County farmers to discuss with legislators. The Farmside Chat series was intended to be held in a very informal setting where a small group of farmers could have direct discussions with legislators on a variety of agricultural issues and topics, as well as providing an opportunity to follow up on legislative issues after the 2021 legislative session.

The MSCD viewed this series as an opportunity to get legislators on the farm and have an opportunity to meet farmers that they've never interacted with before and to hear of the challenges facing Montgomery County agriculture. The Farmside Chat series occurred during the summer and autumn with topics including:

- Food Resiliency (Potomac Watershed)
- Livestock Processing & Grain Farming (Patuxent Watershed)
- Deer Damage (Potomac Watershed)
- Forest Banking (Potomac Watershed)
- Ag Reserve Solar (Patuxent Watershed)

WSSC Water's Environmental Stewardship and Outreach Programs

While the COVID-19 pandemic kept WSSC Water staff from hosting school children for field trips, we continued to provide watershed focused education resources to schools in our service area. WSSC Water also worked with staff from Montgomery County Public Schools (MCPS) and the Audubon Naturalist Society to develop teaching materials related to the impact of winter salting on water quality. This was part of an effort to revamp a road salt unit that is part of the MCPS biology curriculum. As part of this program, WSSC Water's environmental outreach coordinator assisted with summer professional development sessions for over 150 educators to help them learn the basics of water filtration and the impacts of salt on sources of drinking water so they could be prepared to teach the information to their students.

Salt Summit Outreach Committee

As part of WSSC Water's ongoing commitment to the topic of reducing winter salting, a Salt Outreach committee was created, consisting of outreach professionals from agencies that participated in WSSC Water's Salt Summits. The goal of the committee is to develop a shared language and resources that can be used to educate residents about actions they can take to reduce the amount of salt entering local waterways.

Patuxent Watershed Protectors program

The Patuxent Watershed Protectors program <u>https://www.wsscwater.com/protectors</u> has been finalized and provides an opportunity for families, youth and corporate groups to get outside and take action to protect the land and



water resources of the Patuxent Reservoirs and the Chesapeake Bay watersheds.

Participation in this program requires the group to select one recreation area to maintain for a



calendar year and to complete at least one cleanup a month at that location. WSSC Water provides materials including safety vests, trash bags, grabbers and gloves. During the 2021 calendar year, there were groups committed to cleanups at Supplee, Scotts Cove and Triadelphia recreation areas.

Other Outreach Activities

WSSC Water's Outreach team hosted 8th grade students from Charles E. Smith Jewish Day School for two days of service on May 14 and October 13. In total over 50 students assisted with cleanups at Greenbridge, Triadelphia and Browns Bridge recreation areas. During the

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cleanups they not only saw the negative impact that trash can have on the environment, they also learned about WSSC Water, where their drinking water comes from and steps they can take to reduce their impact on local sources of water.



On November 19, members of WSSC Water's senior leadership team, including General Manager and CEO Carla Reid, assisted with cleaning up an often-neglected area of the Rocky Gorge Reservoir (also known as T. Howard Duckett Reservoir), under the Route 29 bridge. This area is prone to illegal dumping, as well as trash being washed off the road during rain events. The senior leadership team enjoyed the experience so much they have committed to cleaning up this area on a quarterly basis!



Priority Resource Charts

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-a (chl-a)	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	 Perform reservoir monitoring for chl-a, 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	• 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	 Develop and begin implementation of a plan to reduce nutrients, based on model/TMDL requirements 	Ongoing	TAC
		Update trend analysis for reservoir water quality parameters on a 5-year cycle	Next Update in 2021	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	• 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	• Perform bathymetric survey of reservoirs at 10 year intervals or less	Next Survey in 2025	WSSC Water

	Priority Resou	urces: Goals & Performance Measures (cont	inued)	
Resource: Terrest	rial Habitat (revised 2019)			
Issue: Preservation	of forests provides water quality l	penefits by reducing sediment and nutrient loading of	streams from surro	ounding land uses.
Measure	Goal	Implementation Items	Time Line	Responsible Partner
Forest Cover	Maintain and increase forest cover	 Encourage private property owners to participate in tree planting programs Ensure publicly owned parkland and open space is forested to the maximum extent 	Ongoing Ongoing	TAC TAC
		 Measure forest cover every ten years for comparisons 	Ongoing	HC, MC, M-NCPPC
Forest Interior Habitat	Maintain and increase forest interior habitat (forest located 300 feet inside forest edge)	• Prioritize reforestation and forest conservation programs to maintain and increase forest interior habitat	Ongoing	TAC
		 Measure forest interior habitat every ten years for comparisons. 	Ongoing	HC, MC, M-NCPPC
Forest Connectivity	Improve forest connectivity	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-	Encourage private property owners to develop and implement forest stewardship plans that	Ongoing	TAC
	term natural regeneration	 Develop and implement forest stewardship plans for publicly owned forest that ensure forest sustainability 	Ongoing	TAC
		 Implement deer management programs Implement strategies for control of invasive plants 	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	A minimum 35-foot riparian	Establish and maintain minimum 100-foot	Ongoing	HC, MC, M-NCPPC,
and continuity	buffer (from each stream bank)	riparian forest buffers (from each stream bank)		WSSC Water
	on all streams on properties	on all publicly-owned land and residential land		
	that were developed prior to	to the maximum extent possible		HC, HSCD, MC,
	current stream buffer	 Establish and maintain minimum 35-foot 	Ongoing	MSCD, M-NCPPC,
	requirements	riparian buffers (from each stream bank) on		WSSC Water
		agricultural land to the maximum extent		
		possible		HC, MC, PGC,
		 Measure stream buffer coverage every ten 	Ongoing	M-NCPPC
		years for comparison		
Stream bank and	No areas of "severe" or "very	Establish and maintain streamside fencing	Ongoing	HSCD, MSCD
stream channel	severe" stream bank erosion	programs to keep all livestock out of streams		
stability	based on the Stream Corridor	to the maximum extent possible		
	Assessments and other locally	 Address <u>significant</u> areas of stream bank and 	Ongoing	HC, HSCD,
	collected data	channel instability through stream restoration		M-NCPPC, MC
		projects and storm water retrofits to the		
		maximum extent possible		
		Measure stream bank erosion every ten years	Ongoing	HC, MC, M-NCPPC,
		for comparison		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	 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 	Ongoing	HC, HSCD, MC, MSCD, M-NCPPC
		 Mitigate runoff impacts from land use changes with development regulations for sediment and erosion control, stormwater management and sensitive resource protection 	Ongoing	HC, MC, M-NCPPC
		 Determine if correlations exist between IBIs and specific conductivity that may indicate a potential water quality impairment 	Ongoing	HC, MC, PGC, M-NCPPC
		 Assess benthic IBIs every five to ten years to monitor progress beginning in 2021 	Ongoing	HC, MC, PGC, M-NCPPC
	Preserve conditions in subwatersheds with "excellent" and "good" benthic IBIs	 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 	Ongoing	HC, HSCD, MC, MSCD, M-NCPPC
		 Assess benthic IBIs every five to ten years to monitor progress beginning in 2021 	Ongoing	HC, MC, PGC, M-NCPPC

Notes:

1) Index of <u>Biological</u> Integrity (IBI) is also referred to as Index of <u>Biotic</u> 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 (revised 2021)						
Issue: Preserving open spaces and	maintaining an economically via	ble and environmentally protective agricultural co	mmunity.	1			
Measure	Goal	Implementation Items	Time Line	Responsible Partner			
Agricultural Land Preservation Enrollment	Increase the total number of acres and farms enrolled in preservation programs	 Continue easement acquisition through agricultural land preservation programs Measure and map Agricultural Land Preservation easement acquisitions every 5 years 	All Ongoing	HC, MC TAC			
Agricultural Demographics	Increase the acres of agricultural land, the market value of agricultural production, the size of farms and the types of farms	 Continue zoning and land use policies in the watershed to maintain rural character Continue agricultural economic development programs Determine number of acres assessed for agricultural use to detect trends every 5 years 	All Ongoing	HC, M-NCPPC HC, MC, MDA TAC			
Open Space and Parkland	Increase the acres of open space land preserved by non- agricultural easements and acquisitions, and ensure these lands are managed to benefit water quality	 Continue open space acquisition and other non-agricultural easement acquisition programs Utilize effective open space land management practices that are beneficial to water quality Measure and map land and easement acquisitions every 5 years 	All Ongoing	HC, M-NCPPC, WSSC Water HC, M-NCPPC, WSSC Water TAC			
Agricultural BMPs - Financial Measures • Local, State and Federal Cost- Share Programs	 Increase agricultural acres enrolled in conservation programs and the percent of conservation plans that are implemented 	 Encourage preparation and implementation of Soil Conservation and Water Quality Plans Encourage enrollment in federal and state nutrient management and stream protection programs 	All Ongoing	HSCD, MSCD HSCD, MSCD			

Agric Meas	ultural BMPs - Technical sures	•	Increase BMP implementation by	•	Increase cost share assistance for practices that protect riparian areas, especially for		TAC
 So Q N P 	oil Conservation and Water Quality Plans Iutrient Management rogram	•	farmers and landowners of rented lands Increase BMP implementation by commercial and private equine operations	•	rented land Continue to fully fund the Patuxent Cost- share Program to meet demands Promote greater use of the Patuxent Cost- share Program to supplement federal and state agricultural programs		HC, MC, WSSC Water TAC
		•	Increase compliance with Nutrient Management Law to 100% for both Agricultural and Turfgrass sources	•	Annually, attend local working group meetings (where Federally-funded resource concerns are prioritized) to advocate that local (District) priorities coincide with Patuxent Reservoirs Watershed priorities Continue to use Conservation Tracker to track BMP implementation at the 8-digit	All Ongoing	NRCS, HSCD, MSCD, WSSC Water TAC, MDA
				•	watersned scale Conduct Education/Outreach events to landowners renting land to farmers Monitor compliance with Nutrient Management Law at County and watershed levels		HSCD, MSCD, MDA TAC

PRIORITY RESOURCES: GOALS & PERFORMANCE MEASURES (continued)				
Resource: Public Av	wareness and Stewardship (rev	vised 2021)		
Issue: Awareness and	d support by residents and resour	rce users		
Measure	Goal	Implementation Items	Time Line	Responsible Partner
Educational opportunities	Provide educational opportunities for a diverse audience throughout the watershed	 Continue to provide presentations to organizations upon request (e.g., winter salt management) Target outreach to community groups or areas within the Watershed to reflect TAC priorities Explore new ways to connect with people and target outreach accordingly (which topic means the most to them – environment, saving money, etc.) Continue relationships with school systems Create multi-lingual outreach materials Target outreach to minority groups and communities Provide assistance to other TAC Subcommittees as needed 	All Ongoing	All TAC
Change making activities (on-the- ground implementation,	Provide opportunities and assistance for watershed residents to participate in on-the-	 Assist groups looking to make a difference in the watershed through on-the-ground activities (help with finding sites, providing trees, partnering on grants, etc.) 	Ongoing	TAC
such as tree plantings, BMP installs, etc.)	 ground events Engage watershed residents in changing behaviors / taking actions at home 	 Continue local BMP programs (Rain Scapes, Clean Scapes, etc.) Increase social media engagement Update WSSC Water's Source Water Protection page to direct stakeholders to partner agency websites to learn more about specific programs and topics. 	Ongoing Ongoing 2022	HC, MC TAC TAC

Media Coverage	Promote media coverage of events and efforts	•	Maintain relationships with media outlets Establish a Microsoft SharePoint site for sharing	Ongoing 2022	TAC WSSC Water
		•	Promote local BMP campaigns and efforts Apply for awards and recognitions where appropriate for successful projects and efforts	Ongoing Ongoing	TAC TAC

Work Program and Expenditures FY21

Table 9. Expenditures for Current Fiscal Year

PATUXENT RESERVOIRS WATERSHED WORK PROGRAM FOR FY21						
PRIORITY RESOURCES PROTECTED	IMPLEMENTATION NEED	IMPLEMENTATION ITEM	AGENCY	FY 2021		
Reservoir/Water Supply	Reservoir and tributary water chemistry and flow	Reservoir monitoring and lab analysis	WSSC Water	\$162,000 (in-kind)		
	monitoring	5 US Geological Survey stream flow gauging stations	WSSC Water	\$60,000		
ALL Priority Resources	Management of	Program oversight for voluntary implementation of	HSCD,	\$165,000		
	agricultural cost-share initiatives	agricultural BMPs through existing local, State of Maryland, and Federal programs	MSCD	(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		
		<i>CleanScapes Program</i> (rebates available for county residents in homes built before 1993 for on-site stormwater management projects)	НС	\$0		
		<i>Septic Savers Program</i> (\$100 rebate available for pumping septic system every three to five years)	HC	\$0		
ALL Priority Resources	Public outreach and	Earth Month and other outreach activities	WSSC	\$20,000		
	involvement initiatives		Water	(in-kind)		
			Other TAC	\$2,500		
			agencies	(in-kind)		

PATUXENT RESERVOIRS WATERSHED WORK PROGRAM FOR FY21						
PRIORITY RESOURCES PROTECTED	IMPLEMENTATION NEED	IMPLEMENTATION ITEM	AGENCY	FY 2021		
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 Water quality monitoring (maintenance and lab analysis) 	WSSC Water	\$21,000 (in-kind)		
Stream Systems, Reservoir/Water Supply	Estimate salt loading to the reservoirs and their tributaries	Initial purchase of two conductivity data loggers for installation in two of the main tributaries to the reservoirs; includes data management and maintenance costs	MC	\$5,200 (in-kind)		
	·	τοτ	AL FUNDING	\$480,700		