



MONOCACY RIVER REPORT FREDERICK COUNTY MARYLAND

2023

THE RIVER CALLED *Monocacy*

The name "Monocacy" comes from the Shawnee name for the river Monnockkesey, which translates to

"river with many bends." The Monocacy River's headwaters—its beginnings—are located near Gettysburg, Pennsylvania. These multiple headwater streams drain into Marsh Creek and Rock Creek, which then converge at the Mason-Dixon Line and form the Monocacy River. Flowing through rural and urban landscapes for 58 miles, the Monocacy River reaches the Potomac River in Dickerson, Maryland within the C&O Canal National Historical Park. The Monocacy is the largest Maryland tributary to the Potomac, which ultimately flows into the Chesapeake Bay. The Monocacy forms the boundary between Frederick County and Carroll County in its northern reaches.

The meandering Monocacy River and its surrounding watershed of 970 square miles supports forests and wetlands, and the plants and animals that inhabit these places. It is a critical water supply to farms, towns, cities, and communities in Frederick County. The River also serves as a regional center for kayaking, paddling, floating, fishing, birding, and other recreational pursuits. Its natural beauty, ecological importance, and aesthetic and recreational values were recognized by the State of Maryland in 1974, when it was designated by the State as a Scenic River, affording it additional protection.

THE SIGNIFICANCE AND VALUE OF THE MONOCACY RIVER

The Monocacy River is one of nine Wild and Scenic Rivers in Maryland. Wild and Scenic Rivers are designated by the Maryland General Assembly when they "possess outstanding scenic, geologic, ecologic, historic, recreational, agricultural, fish, wildlife, cultural and other similar resources values."

The Monocacy Scenic River provides many important benefits to watershed residents including:

- Water and Wastewater Treatment Resource: The Monocacy Scenic River is a source of public water for the City of Frederick and the U.S. Army Garrison at Fort Detrick. The mainstem of the Monocacy River receives treated effluent from wastewater treatment plants in Frederick City, Frederick County, and Fort Detrick. Additionally, tributaries of the Monocacy Scenic River receive treated wastewater from the towns of Emmitsburg, Thurmont, and Woodsboro, plus other wastewater plants in Carroll County, Maryland and Adams County, Pennsylvania. Wastewater treatment plant discharges into streams and rivers must meet State and federal standards for nutrient and pollutant removal.

- Recreational Resource: The Monocacy Scenic River is a recreational resource. There are ten public water access points along the Monocacy Scenic River to accommodate non-motorized boats, such as kayaks and canoes. The river's gentle gradient of approximately three feet per mile results in an average floating speed of two miles an hour. The Monocacy Scenic River offers year-round fishing opportunities, with bass being the most abundant sportfish; a diverse array of waterfowl, birds of prey, and songbird species; and a home for rare, threatened, or endangered species.
- Cultural History: The Monocacy Scenic River has an important cultural history. Native Americans inhabited the Monocacy River valley. Prehistoric sites have been located along the forested river dating back to 12,000 BC. The river was an important resource for Native Americans prior to European settlement. During the time period of 1000 BC to 1600 AD people joined together to form communities along the Monocacy River's riverbanks and nearby valleys. These groups hunted wildlife, engaged in agriculture, and traded with other communities. Archeological artifacts from these groups have been found along the river and in nearby areas. Historic Native American tribes in the Monocacy Scenic River area included the Susquehannock, the Piscataway, and the Tuscarora.



The Monocacy Scenic River was also the site of a July 1864 Civil War battle which delayed a Confederate advance on Washington, D.C., allowing Union reinforcements to arrive, and some say saving the Union Capitol. The battle site is located just south of the City of Frederick and is a park site operated by the National Park Service (Monocacy National Battlefield).

- Ecological Resource: The Monocacy Scenic River and its surrounding floodplain, forests, and wetlands are ecological resources that support a range of plant and animal life. The flood plains, forest, grasslands, and wetlands provide critical and primary sites that filter rainwater and runoff from farms, developments, highways, and construction. Modification or damage to these areas interferes with their value in a sustainable ecosystem. These surroundings have many areas important for supporting biodiversity and conservation efforts. The area also has large grasslands designated as an Important Bird Area (IBA) by the National Audubon Society. The area is home to a large and diverse assemblage of grassland birds, including high numbers of three at-risk bird species: Red-headed Woodpecker, Grasshopper Sparrow, and Dickcissel.







THE IMPORTANCE OF THE MONOCACY WATERSHED

All water is part of a connected system known as a watershed. A watershed is an area of land that drains into a single body of water such as a river, pond, lake, or ocean. The water in a river came from somewhere "upstream" and will flow "downstream" to somewhere else.

Streams, rivers, and lakes are surface waters, but groundwater is also an important part of a watershed. Groundwater is absorbed from the surface and fills the spaces between soil particles and rocks deep underground, the same way water fills a sponge. Human activities affect the quality of the groundwater and the surface water, thus affecting the overall health of the watershed.

Together with its 14 major tributaries, the Monocacy Scenic River forms a 970-square-mile watershed covering parts of Frederick, Carroll, and Montgomery Counties in Maryland and Adams County in Pennsylvania. The Monocacy Scenic River drains into the Potomac River which drains into the Chesapeake Bay. Reducing pollution and engaging in restoration and conservation activities in the Monocacy Scenic River watershed and in its streams and creeks will help to improve water quality in the Chesapeake Bay.

THREATS TO THE MONOCACY SCENIC RIVER AND WATERSHED

Human activities including, but not limited to, land and highway development and some agricultural practices threaten the health and resilience of the Monocacy Scenic River and its watershed. Society's settlement and development of the landscape create impervious surfaces and have adverse effects on water quality, stream flow, and overall watershed conditions. Hardscapes, like roads, rooftops, and parking lots, create stormwater runoff and do not allow water to naturally percolate into the ground. Land management activities across all uses and activities—even lawns, pastures, and farm fields—determine the degree and extent of water quality impacts and watershed degradation.

Human activity on the land can have negative impacts on rivers, streams, and watersheds such as:

- Causing flooding, especially during intense rainfall events. Grading for development and constructing impervious surface disrupts the natural flow of water. Intense rainfall can overwhelm the capacity of storm drain systems. Clearing native plants and grasses removes deep root systems that naturally collect rain water and slowly release it into the ground after a storm. Removing trees, especially from critical areas next to waterways, can cause erosion of riverbanks and creek beds.
- Interrupting the water cycle by reducing the amount of water soaking into the ground where it falls. This means aquifers are slower to replace underground water supplies. It also reduces the amount of surface water flowing in streams, creeks, and rivers.
- Increasing pollution. When it rains, water "runs off" impervious surface like roads and parking lots and picks up contaminants like topsoil, engine oil, heavy metals, and gasoline. Impervious surfaces accelerate runoff, increasing the rate at which water transports contaminants from the watershed to its streams. Poorly managed lands can carry topsoil, sediment, fertilizer, pesticides, herbicides, and manure (including pet waste) directly to waterways. Pollution also comes from septic systems particularly ones that are older, failing, or have deferred maintenance. Finally, humans also contribute to water and ground pollution by littering and illegal dumping.

Climate change is another threat to water resources. Rivers and oceans are getting warmer, threatening the survival of coldwater organisms like brook trout. Changing weather patterns bring storms that are more frequent and more intense causing more frequent and more severe flooding and erosion. Water scarcity is also exacerbated by climate change, with droughts expected to become more frequent and severe as climate change worsens. Less water flowing in rivers can have serious implications for fish survival, as well as human needs if withdrawals are reduced or temporarily halted. Although likely not a threat to the Monocacy Scenic River, in coastal areas drinking supplies from groundwater are threatened by saltwater intrusion.

MONOCACY WATERSHED MANAGEMENT

There are federal, state, and local laws and partnerships to address and resolve threats to watershed health. Some of the most significant are the following.

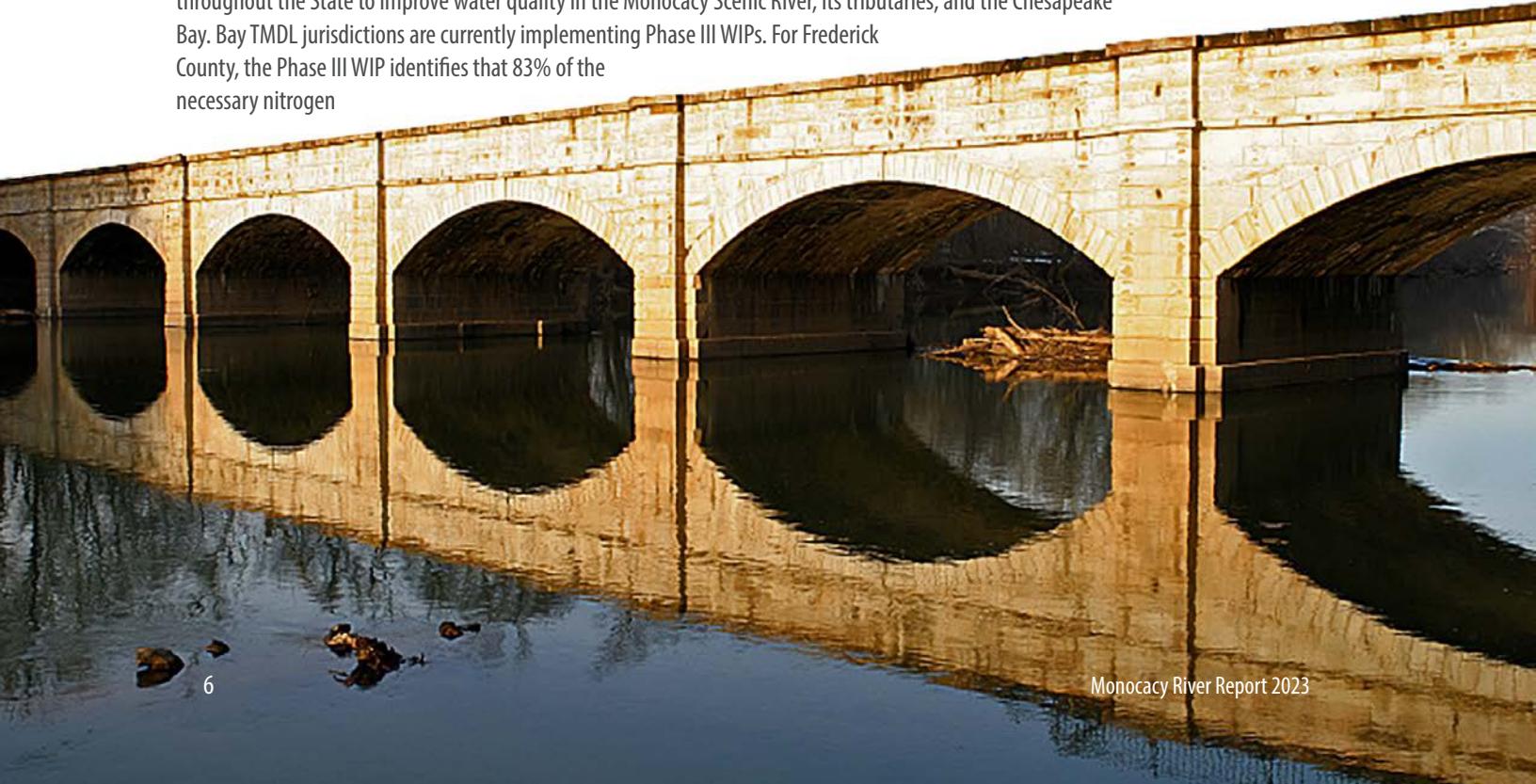
FEDERAL: The federal Clean Water Act requires states to establish water quality standards and makes it illegal to discharge pollutants into surface waters without a permit. The law addresses pollution from a single identifiable source known as point source pollution, like a wastewater treatment plant pipe emptying into a river.

REGIONAL: The Chesapeake Bay Watershed Agreement is a voluntary regional partnership created in 1983. The partnership recognizes that since watersheds cover multiple state and local jurisdictions, so must efforts to improve water quality in the Chesapeake Bay and its watershed. Currently seven jurisdictions are members (Maryland, Virginia, Pennsylvania, Washington, D.C., New York, West Virginia, and Delaware) as well as federal agencies.

STATE OF MARYLAND: The Maryland Department of the Environment implements the Clean Water Act's Water Quality Standards requirement. Every surface water has a designated use which is how the water is meant to be used by humans and animals. Water quality criteria determine if the water is safe for that use. An antidegradation policy aims to ensure water sources will continue to meet the minimum standards for a designated use into the future. If a water body fails to meet standards a "pollution budget" may be established which restricts the amount of a specific pollutant that can be discharged into the water. This is called a Total Maximum Daily Load (TMDL).

Decades of measured water quality declines in the Chesapeake Bay led to the creation of a Chesapeake Bay TMDL in 2010, designed to achieve a substantial reduction in the four main pollution source sectors by 2025: land development, septic systems, agriculture, and wastewater treatment plants. The Chesapeake Assessment Scenario Tool, or CAST, model is used to estimate the amount of pollution originating from these sectors as well as track pollution reduction efforts over time. For example, the 2019 model estimates 4.5 million pounds of nitrogen reached the Chesapeake Bay from Frederick County. Agricultural sector contributions were estimated at 2.8 million pounds. The next largest contributor was stormwater at 800,000 pounds. For more information about the CAST model visit cast.chesapeakebay.net

Jurisdictions engaged in the Bay TMDL (like Maryland) establish phased plans to lay out actions to achieve the pollution reduction goals. Although the plans are prepared by jurisdictions for approval by the federal Environmental Protection Agency (EPA), there is significant coordination and cooperation in creating plans between federal, state, county, and municipal partners. Because watersheds are connected and due to the complexity of the Bay TMDL, formal Watershed Implementation Plans (WIPs) were developed by the State of Maryland and many community partners to guide the required nutrient and pollution reductions needed throughout the State to improve water quality in the Monocacy Scenic River, its tributaries, and the Chesapeake Bay. Bay TMDL jurisdictions are currently implementing Phase III WIPs. For Frederick County, the Phase III WIP identifies that 83% of the necessary nitrogen



reduction will come from the agricultural sector, 11% from wastewater, and the remainder from stormwater and natural sources. The full Phase III WIP for Maryland can be accessed at mde.maryland.gov/programs/water/TMDL/TMDLImplementation/Pages/Phase3WIP.aspx. The current report card remains poor but it does show an improvement over a long period.

FREDERICK COUNTY: Stormwater runoff has a major impact on water quality in local streams, rivers, and the Chesapeake Bay. Frederick County ordinances implement stormwater best management practices (BMPs). The goals of BMPs are to reduce and remove pollutants from runoff, control the amount and speed of water being discharged after a storm, and preserve a site's natural features and function after development as much as possible. Methods include constructing channels to carry water to retention areas and natural infiltration means like rain gardens.

The Clean Water Act requires Frederick County to obtain a permit for its stormwater system. This is the Municipal Separate Storm Sewer System permit, or MS4. The MS4 program aims to reduce and eliminate pollution as a result of rainfall runoff. The permit connects Frederick County stormwater to Chesapeake Bay water quality improvement efforts by requiring water quality and nutrient monitoring to ensure runoff does not exceed the TMDL pollution budget levels. The permit also requires environmental restoration efforts, public outreach activities, and annual compliance reporting.

Frederick County implements a Stormwater Restoration Plan that addresses TMDLs for the Monocacy Watershed. The Plan uses a multi-purpose approach to reduce the TMDLs and improve the watershed. The approach includes watershed studies and assessments, bioretention and pond retrofits, riparian buffer planting and stream restoration, and educational outreach. The Plan demonstrates that the County is currently on track to meet the restoration efforts required under the current MS4 permit. Should more impairments of the Monocacy Watershed be identified by the State of Maryland, due to development or climatic impacts, for example, additional resources may be necessary to design and complete needed restoration projects to stay on track.

STATUS OF THE MONOCACY WATERSHED

There have been many studies conducted by local and state regulatory agencies as well as nonprofit and educational institutions about the water health of the Monocacy River and its tributaries. Some of the more recent reports are listed and summarized here. These reports are important to understand the current state of the river and to ensure all our waters are fishable and swimmable for us and future generations.

Maryland 2020-2022 Integrated Report of Surface Water Quality

The Maryland Department of the Environment (MDE) establishes water quality standards and monitors surface water as required by the federal Clean Water Act. Water quality is examined for individual water bodies and the entire watershed. The most recent analysis is the 2020-2022 Integrated Report of Surface Water Quality. A description of common water contaminants is below, followed by a summary of the status of the Monocacy Watershed from the MDE report. The Monocacy Watershed is a massive drainage area that will require a sustained long-term effort of improvements to restore the watershed to its near natural state. Details on the Integrated Report can be found here: https://mde.maryland.gov/programs/water/TMDL/Integrated303dReports/Pages/Combined_2020_2022IR.aspx

Sediment comes from sources like topsoil runoff caused by construction activities, stream erosion, certain agricultural practices, and stormwater. Too much sediment makes the water murky where less sunlight reaches underwater plants and animals. The sediment itself can cause biological harm to underwater life. Sediment increases the cost of making water safe to drink. Sediment can also accumulate to where it must be physically removed by dredging to restore the normal function and flow of the water – such as at Lake Linganore.

Nutrients come from sources like wastewater treatment plants, septic systems, and agricultural and residential fertilizers. There are many nutrients measured for water quality but the most common are nitrogen and phosphorous. Nutrients are a concern because they spur plant and bacteria growth by altering the normal balance of an ecosystem. This negatively impacts other plants and animals, including humans. So called “algae blooms” often indicate excess nutrients.

Pathogens are microorganisms like viruses or bacteria. Not all microorganisms are bad but those that cause disease are pathogens. Many different kinds of pathogens can exist in water. It is difficult and expensive to test for them all. However, certain bacteria groups like fecal coliform or *E. coli* are easier to detect. These pathogens come from human and animal waste and enter the water through wastewater treatment plants, septic systems, runoff from livestock, and pet waste entering waterways.

MDE identified water quality problems related to sediment, bacteria (*E. coli*), and the nutrient phosphorous for the Lower Monocacy, Upper Monocacy, and Double Pipe watersheds. These impairments have pollution budgets called a Total Maximum Daily Load (TMDL) which limits

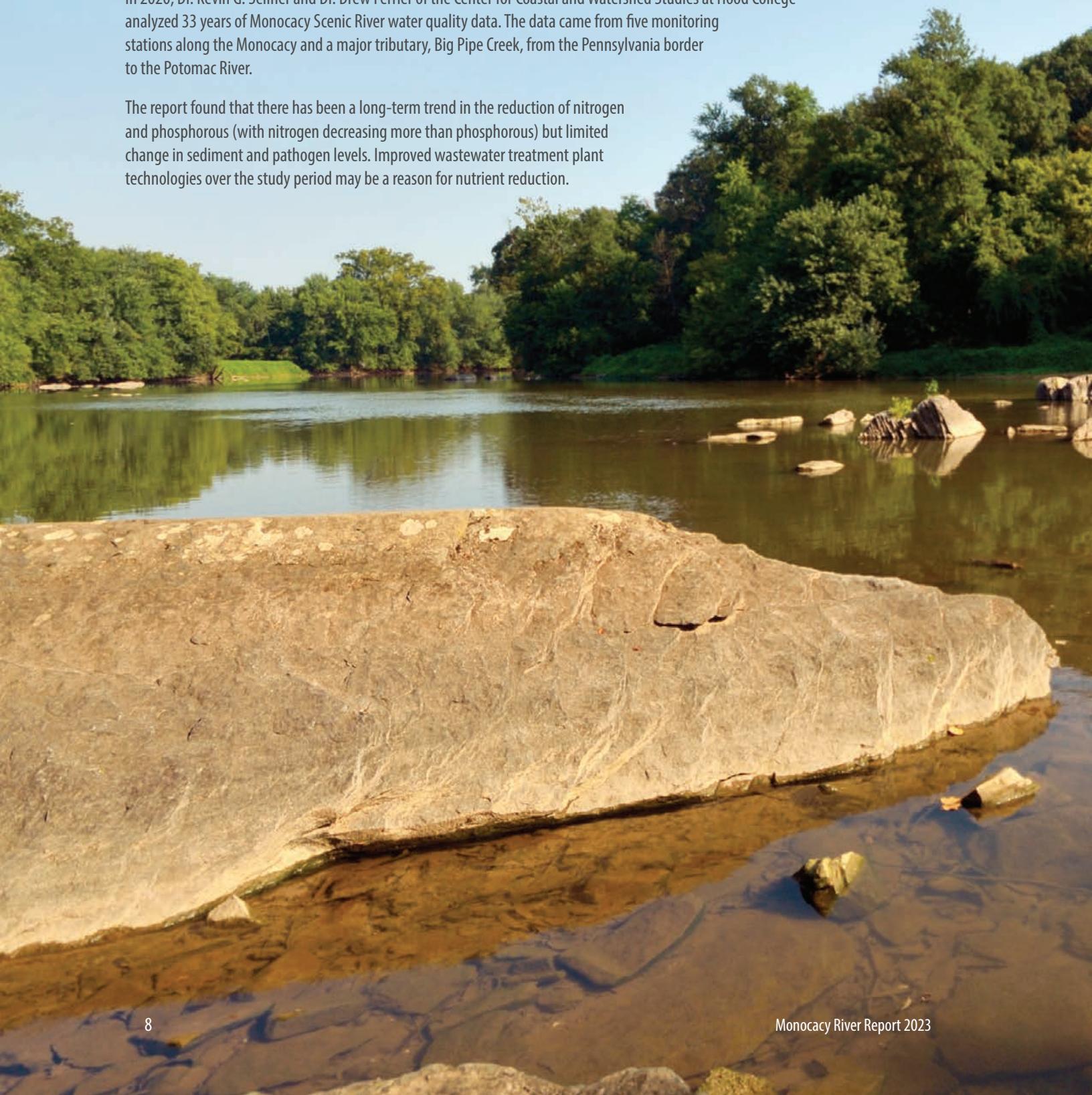
how much of a contaminant can be released into the water in an effort to improve water quality. Lake Linganore (part of the Lower Monocacy River Watershed) has its own pollution limits established for sediment and phosphorous.

Some water quality issues identified by MDE are not subject to a TMDL. The 2020-2022 Integrated Report noted water temperature impairments at creeks in both the Lower and Upper Monocacy watersheds. This means coldwater organisms like the brook trout and stream insects, called benthic macroinvertebrates, find it difficult to survive or may no longer be present. Overall, the Lower Monocacy Watershed also lacks a sufficient riparian buffer which means there are not enough trees and shrubs along streams and riverbanks. Riparian buffers prevent erosion, shade and keep waters cool, provide habitat, and filter runoff.

Hood College 2020 Water Quality Assessment of the Monocacy River

In 2020, Dr. Kevin G. Sellner and Dr. Drew Ferrier of the Center for Coastal and Watershed Studies at Hood College analyzed 33 years of Monocacy Scenic River water quality data. The data came from five monitoring stations along the Monocacy and a major tributary, Big Pipe Creek, from the Pennsylvania border to the Potomac River.

The report found that there has been a long-term trend in the reduction of nitrogen and phosphorous (with nitrogen decreasing more than phosphorous) but limited change in sediment and pathogen levels. Improved wastewater treatment plant technologies over the study period may be a reason for nutrient reduction.







Pollutant levels varied throughout the year with known high and low flow events. This suggests that climate change will impact water quality as the area experiences more droughts and floods.

Frederick County Stream Survey

The Frederick County Stream Survey (FCSS) is a program designed to monitor and assess the status and health of County streams in terms of water quality and biological and habitat conditions. Since its inception in 2008, the FCSS has sampled over 500 stream locations. Data were collected and analyzed on water quality (nutrients), physical habitat (stream bank erosion, riparian forest), and biological communities (benthic macroinvertebrates) at each of the stream sites. Detailed results can be found on the Division of Energy and Environment web page: <https://www.frederickcountymd.gov/8134/Program-Reports>

Potomac River Report Card

In 2022, the University of Maryland Center for Environmental Science (UMCES)-Integration and Application Network initiated work on a Potomac River Report Card, with a focus area on the Monocacy River Watershed in Frederick County. This project merges a report card grading process with social network analyses and an environmental systems dynamics model to analyze the efficiency of management decisions in light of a rapidly changing climate. Read more about the beginning of this project at the following web page: <https://ian.umces.edu/blog/imagining-a-participative-potomac-a-meeting-at-hood-college/>

FREDERICK COUNTY EFFORTS IN THE MONOCACY WATERSHED

There are many regional and local nonprofits, citizen groups, and individuals who are vested in and care for the Monocacy Scenic River and its resources. Improving water quality requires these vital partners and their dedication. This section summarizes a few key local government plans and restoration efforts specific to the Monocacy Scenic River and its watershed. Some of these programs are implemented by the County or other government agencies, but the success of these water stewardship efforts often depends upon these community partners and concerned individuals.

2019 Monocacy Scenic River Management Plan

The 2019 Monocacy Scenic River Management Plan provides recommendations to “advocate for sustainable land uses, best management practices, and activities that respect and protect the River, its corridor, and watershed.” The recommendations encompass history and cultural resources, ecological environment, land use, agriculture, recreational park and open space, and water quality. The plan was developed to replace the 1990 Monocacy River Study and Management Plan.

Sustainable Monocacy Commission

The Sustainable Monocacy Commission is an appointed board within Frederick County government created by the County Council in 2020. Its purpose is “improving water quality, maintaining and restoring the ecological health of the River and its tributaries, conserving and protecting wildlife habitat and the natural, cultural, and scenic qualities of the Monocacy Scenic River and its tributaries flowing in and through Frederick County.” The Commission typically meets once a month and meetings are open to the public.

Catoctin/Frederick Soil Conservation District and Agricultural Stewardship

The Catoctin/Frederick Soil Conservation District, part of the state-wide Maryland Association of Soil Conservation Districts, promotes and implements a range of local, state and federal programs for soil and water conservation and develops soil conservation and water quality plans and provides assistance to landowners to install best management practices. Support for agricultural practices and measures that advance conservation goals and promote water quality – like stream bank fencing, cover crops, nutrient management plans, and no till farming practices – is also provided through State conservation programs, the Natural Resource Conservation Service (NRCS), and the Farm Service Administration (FSA). Through partnership with these entities and the significant and widespread implementation of these practices, Frederick County agriculture has maintained its long-standing commitment to the health and improvement of the Monocacy River and its watershed.¹

1) Agriculture comprises significant acreage in Frederick County and has been a foundational part of the County since it was established in 1748. Agriculture has contributed to a local, reliable supply of food and enhanced the high quality of life enjoyed by County residents by maintaining open space; however, loss of agricultural land to development as the County population grows remains a growing concern. Additionally, in recent years economic changes associated with reduced demand for dairy have negatively impacted Frederick County agriculture.



Water Quality Improvement Efforts

Governments work with landowners to preserve ecological resources through mandatory and incentive programs.

Agricultural preservation occurs through voluntary programs at all levels of government (county, state, and federal). These programs permanently preserve land for agricultural use and prevent more intensive development. This benefits the environment by not increasing impervious surface or further changing a site's topography, although agricultural best management practices are still necessary to maintain and improve watershed health. As noted above, the Maryland Department of Agriculture connects farmers with access to technical assistance and financial resources to implement these practices.

Forest preservation, reforestation, and afforestation protect existing forest, mitigate the amount of forest lost during development, and create new forest. The primary mechanism is the County's Forest Resource Ordinance, or FRO, which is the local implementation of Maryland's 1991 Forest Conservation Act. The FRO is mandatory and applies to any development over 40,000 square feet (0.97 acres) and prioritizes the protection of "hydrologically sensitive" areas like rivers, streams, and wetlands by retaining existing forest or planting new forest in order to maintain and improve water quality.

Frederick County also runs the voluntary Creek ReLeaf program. In exchange for a permanent conservation easement on a landowner's private property, the County plants trees, maintains them for five years, and compensates the landowner for the easement. Creek ReLeaf prioritizes plantings in stream areas.

HOW EACH OF US MAY HELP

- Pick up after pets. Pet waste contributes nutrients like nitrogen and phosphorous (as well as pathogens) when carried by runoff.
- Do not litter or illegally dump trash.
- Report illegal dumping of trash or debris on the ground and in waterways to the local Health Department or Code Enforcement Office. In Frederick County, Maryland: 301-600-2313 or 301-600-1719 (after hours: 301-600-0312). In Carroll County, Maryland: 800-966-3877 or 410-848-2261
- Do not pour chemicals or contaminants down storm drains.
- If you have a septic system make sure it is working properly and pump it every 2-5 years. Consider installing a nitrogen removal septic system to reduce the amount of nitrogen entering groundwater from the septic system.
- Have your soil tested in the fall before applying fertilizer. The soil test will determine the correct amount to apply which helps reduce fertilizer runoff. It's also better for your lawn as this maximizes nutrient uptake.
- If you live along a creek, don't mow to the bank's edge. Leave a buffer of streamside trees, grass, or other plants.
- Plant species native to our area. You can find many informational resources from the Maryland Department of the Environment, University of Maryland Extension, and other private and non-profit sources. This not only reduces the amount of water and fertilizer needed, but provides habitat for native birds, animals, and insects.
- Reduce the amount of stormwater and runoff on your property by installing rain barrels and/or rain gardens. Rain barrels capture water coming off the roof, which can be used to water lawns and non-edible plants or wash cars. Rain gardens collect and filter water through plants and grasses.
- Experience the Monocacy Scenic River by kayaking, fishing, or just enjoying nature. Most land along the riverbank is private property. Access the river at marked public places, be respectful, and avoid trespassing.
- Follow the activities of the Potomac Riverkeeper Network, whose mission is to protect the public's right to clean water in the Potomac and Shenandoah Rivers, and their tributaries: <https://www.potomacriverkeepernetwork.org>
- Report fish kills in rivers and streams to State environmental agencies. In Maryland:

Maryland Department of the Environment

MDE Emergency Contact	866-633-4686
Fish Kills and Algae Blooms	800-285-8195
Hazardous Material & Oil Spills	866-633-4686
Mining	410-537-3557
Public Sewer Leaks/Overflows	410-537-3510
Public Water Supply Problems	410-537-3706
Sediment, Wetland	410-537-3510
Underground Tank Leaks	410-537-3442





Monocacy River Report

**Frederick County, Maryland
2023**

Prepared by:

The Frederick County
Sustainable Monocacy Commission

and

The Livable Frederick
Planning and Design Office

Division of Planning and Permitting
Frederick County Government