



# down to earth

Environmental Restoration Quarterly • Spring 2019

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### Preventing Stormwater Pollution at Home

By: Jo Reznik, NPDES Compliance Specialist

Stormwater is water that originates from a precipitation event, such as rain or snow. Some of this water soaks into the ground. What the ground cannot absorb when the rain falls is called stormwater runoff. In Carroll County and its municipalities, water that flows into storm drains does not get treated at a wastewater treatment plant. Some storm drains lead directly to streams and waterways, while other storm drains direct water to a stormwater management facility that treats or filters the stormwater before it is released into a stream. For this reason, it is important for all residents to do their part to protect water resources. Nearly half of Carroll's land area drains into drinking water reservoirs. These reservoirs supply drinking water to many Carroll County residents, as well as residents in Baltimore City and region. Fishing and swimming in our local streams and waterways is a popular pastime and preventing pollution from reaching streams helps protect habitats and the plants and animals that live within them.

Common sources of pollution include:

- Fertilizers, pesticides, and herbicides applied to lawns and gardens
- Fluids, such as motor oil and anti-freeze, that leak from vehicles onto the driveway or street
- Harmful bacteria in pet waste, such as e-coli
- Pool and spa chemicals, such as chlorine
- De-icing materials and chemicals
- Yard waste that lands on pavement or near waterways
- Uncovered dirt or mulch in the yard
- Debris and trash on our sidewalks and driveways

Actions you can take include:

- Use a commercial car wash or wash your car on a grassy area
- Clean up spilled fluids with an absorbent material that can then be properly disposed of
- Use pesticides and fertilizers sparingly
- Mow high and leave mulched grass clippings on the grass
- Clean paint brushes and properly dispose of rinse water
- Do not discharge plumbing and sanitary drains to gutters, streams or storm drains
- Pick up pet waste in your yard
- Properly store chemicals including pesticides, herbicides, fertilizers, and other chemicals used around and outside the home
- Don't overuse de-icing materials
- Maintain and repair your septic system routinely

When taken collectively, homeowners have an opportunity to have a great impact on the reduction of stormwater runoff and pollution. Together, these efforts help support your County's and municipalities' combined efforts to accomplish their goals. Assisting our State in doing its part to restore the Chesapeake Bay helps to provide a healthy resource for all Marylanders to enjoy and to support a strong economy.

If you are concerned about the release of pollutants or possible illegal dumping (chemicals, motor oil, paint, sewage, etc.) into a storm drain system, please contact the non-emergency Carroll County Stormwater Pollution Phone Line (410) 386-2210. Non-emergency response will occur Monday through Friday from 8 a.m. to 3 p.m.



Department of Land and Resource Management (LRM) • Bureau of Resource Management (BRM)  
225 N. Center St., Westminster, MD 21157 • 410.386.2712 • [ccgovernment.carr.org/ccg/resmgmt](http://ccgovernment.carr.org/ccg/resmgmt)

*Protecting and managing Carroll County's natural resources for the pleasure and enjoyment of its citizens.*

# Piney Run Water Quality

By: Rob Flora-Nakoski, Water Resource Specialist

When I think about the Piney Run Reservoir, I primarily think about all of the hiking and kayaking I have enjoyed over many years; I think about the Klondike Derbies, the picnics, fishing, and visiting the nature center as a child. Most Carroll County residents probably have a similar vision of the reservoir and the surrounding park. While recreation is currently the primary role of the reservoir, the original intent upon completion of the earthen dam in 1974 was to serve as a water supply for the growing Freedom area in southeastern Carroll County.

At present, no drinking water has been withdrawn from the reservoir. In the past, it has always been more economical to upgrade the Freedom Water Treatment Plant which withdraws water from Liberty Reservoir. This most recently occurred in 2009 when the plant was expanded to provide an average of 4.2 million gallons per day to the Freedom Area. Due to this, the appropriation permit for Piney Run Reservoir expired in 2014.

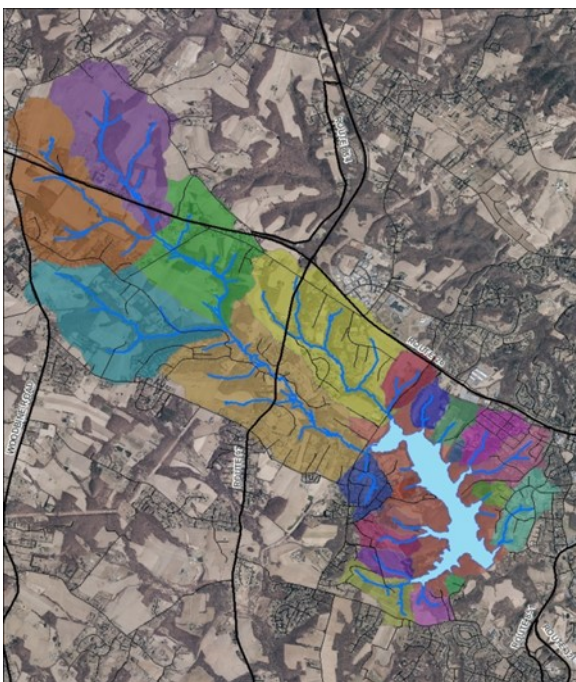
The 300 acre Piney Run Reservoir lies within a watershed of roughly 6,500 acres, shown in the picture below. It has a total volume of roughly 1.7 billion gallons and a maximum depth is 55 feet, though the median depth is 16 feet. The reservoir itself and the eastern portion of its watershed lie within the Freedom Area. The watershed is dominated by agricultural land uses, but with a growing amount of impervious area. The vast majority of inflow is provided by the reservoir's namesake, Piney Run, along with a secondary unnamed tributary. In total there are 32 miles of streams that contribute to the reservoir.

To support development of the reservoir for use as a water supply and its current recreational use, a water monitoring program was established in the early 90's. The objectives for the program include identifying any potential water quality concerns that may affect treatment costs, establishing baseline or calibration data needed for long term trends and predictive models, characterizing the lake's response to weather events, and providing information to aid management of Piney Run's fishery resource. To accomplish this, a monitoring plan was developed. The primary component has always been routine reservoir sampling whereby water samples are taken and analyzed at multiple locations and depths. The secondary components include inflow sampling during both baseflow and storm conditions, special sampling such as plankton, and bacteriological and macrophyte (aquatic plant) synoptic surveys.

In the late 90's and early 00's a new congruent driver for the monitoring plan was added. In 1998, the reservoir was added to the 303(d) list meaning that the state considered the reservoir as "impaired" by nutrients and sediments. With the reservoir being at the threshold of impairment and being located within an area of "rapid" development, the County was allowed to defer the potential TMDL with several conditions. Foremost, the County had to develop a watershed protection plan including an implementation plan and a requirement that nutrient loadings do not increase and water quality does not degrade further.

So what makes a reservoir "impaired" and how do nutrients end up in the reservoir? Nutrients in this case are nitrogen and phosphorus. Potential pathways for nutrients to enter tributaries to Piney Run could include point sources, such as a wastewater treatment plant, and non-point sources such as improperly functioning septic systems, fertilizer usage, and erosion. Nutrients are essential for biological growth in a marine system, but, as with anything else, too much of a good thing can be bad. The reservoir is designated as use class III-P, which signifies its intended use as a public water supply, fishing, and recreation. The water quality parameters that are used to assess compliance of this include E. coli (bacteria), dissolved oxygen, temperature, pH, and turbidity; all measurable parameters that respond to increased nutrient loadings. In lakes and reservoirs, elevated nutrient loadings allow for an increase in biological growth. If this occurs too rapidly or too often, dissolved oxygen can be depleted, pH can be thrown off balance, and water can become increasingly turbid, leading to an unhealthy environment for aquatic life and potential drinking water that is much more difficult and expensive to treat. In scientific terminology, the general descriptive term for this is eutrophication.

Is Piney Run eutrophic? It is a complex question and is the principal reason why Bureau of Resource Management staff monitors the reservoir itself. There are several parameters that are measured to determine if a lake or reservoir is eutrophic. These are nutrients (phosphorus and nitrogen), dissolved oxygen, chlorophyll (algae), and turbidity. The more nutrients a lake has available, the more biological life it can

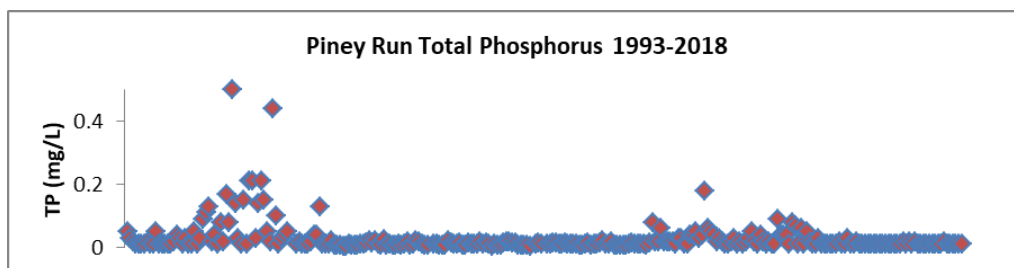
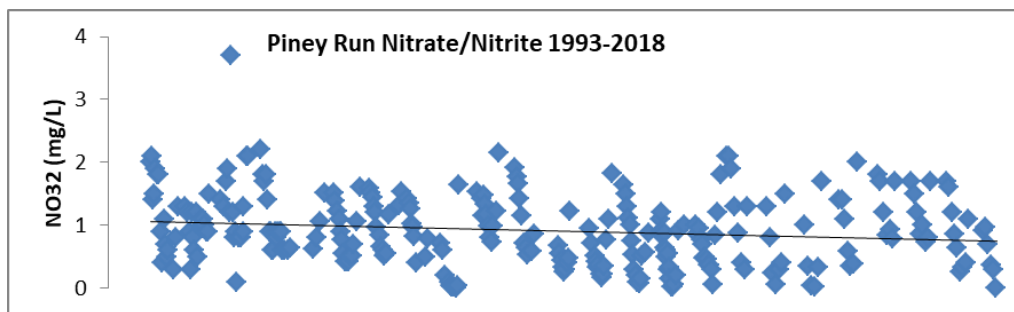


## Piney Run Water Quality, continued

support, particularly primary producers such as plankton/algae. This algae eventually dies and de-composition takes over consuming much of the oxygen needed for fish, etc. Piney Run is a dimictic lake, meaning that thermal stratification occurs during summer and winter and then mixes during spring and autumn. A low oxygen zone spreads from the bottom up during summer and remains devoid of oxygen until the lake mixes again in autumn. Turbid, or cloudy water is typically caused by either elevated biovolume (algae) or suspended sediments from erosion. This can affect benthic and fish feeding rates and survival behaviors, smother organisms and eggs, and reduce light to aquatic vegetation. Algae are measured by both chlorophyll, the green plant pigment in algae necessary for photosynthesis, and direct genus identification under microscope.

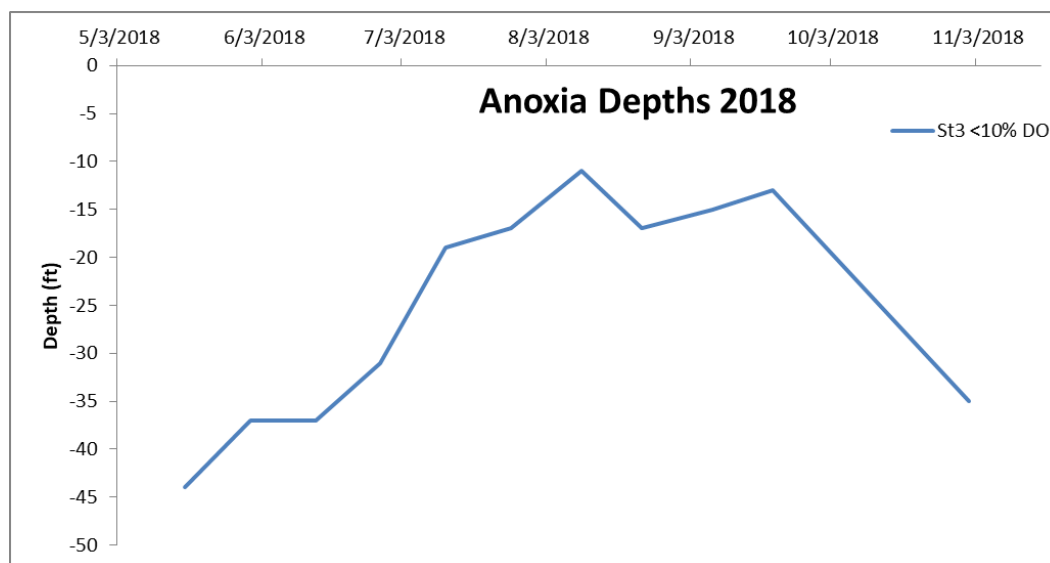
Overall, there is good news. Since the late 90's, phosphorus and nitrogen concentrations have both remained low. The average nitrate/nitrite concentration is about 0.2mg/L lower today than the 1990's while the total phosphorus concentrations in the reservoir are 0.05mg/L lower today than the 1990's. These long term trends are shown in the graphs to the right. 0.5mg/L doesn't sound like much, but that is a difference of 700 pounds within 1.7 billion gallons. Although there has been an evident reduction in nutrients, periods of low dissolved oxygen, high turbidity, and nuisance algae blooms sometimes remain, as shown in the pictures on page 2.

For instance, the anoxic (low oxygen) zone in Piney Run extended up to 11 feet in 2018, as shown in the graph to the right, despite consistently low concentrations of nutrients throughout the year. Additionally, turbidity remained elevated for most of the growing season. Phytoplankton (algae) is the major culprit for poor water quality most years. The reservoir maintained a prolific algae bloom for the better part of 2018. The frequency of storm events kept them fed and mixed them throughout the water column making the bloom less obvious. Blooms such as these are a nuisance for both treating water and for the health of other aquatic species. Could this be only because of the record precipitation the previous year? Unfortunately not.



Certain groups and species of algae can actually fix nitrogen from the air and store phosphorus for future use. These are the blue-green algae, or cyanobacteria; the bad boys of the plankton community. This means that they essentially have a non-rainy day fund and dominate during dry periods leading to large nuisance blooms. Many of these species, such as the genus *Anabaena*, *Aphanizomenon*, and *Microcystin* within Piney Run, also can potentially release cyanotoxins. If you notice a brown, red, green, or teal scum on the surface or smell a significant odor, it's best to avoid contact; don't forget about our furry friends, too.

Fortunately, Piney Run Reservoir remains a mesotrophic (borderline) lake. Nuisance algae blooms, anoxia, and high turbidity are not a perpetual problem. In most years, these conditions mostly occur in persistent wet, dry, sunny, or hot periods or directly after autumn mixing when nutrients stuck at the bottom of the water column are mixed back in. The reservoir itself is still a good source for drinking water, an excellent fishery, and well suited for recreational purposes.





# Stormwater Update

By: Janet O'Meara, Watershed Management Coordinator

Construction is underway in Eldersburg on the retrofit of several existing stormwater management facilities located off of Monroe Avenue. The Elderwood SWM Basin #2/Oklahoma Phase IV Stormwater Management Facility retrofit will combine the facilities to create two sand filter facilities adjacent to one another. Kibler Construction began working in November with the installation of erosion and sediment control measures. Over the last several weeks they have been working to haul excess soil offsite. This project received partial grant funding from Maryland State Highway Administration's Transportation Alternatives Program. Once complete, this project will provide stormwater management treatment for over 130 acres of drainage area, of which 82 acres are impervious.

The retrofit of the Merridale stormwater management facility in Mount Airy is being completed by Conewago Enterprises, Inc. Construction has been moving along with the installation of the new sewer line, retaining wall, weir wall, and several new storm drain structures. Currently the construction site is on shut-down due to the existing wet soil conditions which will not allow for final grading of the site. Once weather conditions improve, the contractor will continue with the installation of the filter media, along with final grading and stabilization of the construction site. This project received partial grant funding through the DNR Chesapeake and Atlantic Coastal Bay Trust Fund.



Excavation and hauling of excess material.



The clean water diversion being installed at the Oklahoma Phase IV facility.



Merridale



Look for our booth here:

**Saturday, May 11th  
10:00 a.m. to 4:00 p.m.**

**Westminster Flower  
and Jazz Festival  
Downtown Westminster**