

Maryland Water Monitoring Council

“You’re Getting Warmer: Taking the Temperature of Maryland's Waters”

On April 15, 2026, the Maryland Water Monitoring Council’s Monitoring and Assessment subcommittee hosted a hybrid workshop, “You’re Getting Warmer: Taking the Temperature of Maryland's Waters” at the USGS Water Science Center in Catonsville, Maryland, which included 45 attendees in person and an additional 124 participating online. This workshop focused on discussing current and historic observations of cold-water resources and cold-water species within the state of Maryland, shared various case studies examining the fate and transport of thermal energy and impacts within urban and rural areas, and expanded awareness to the current status of the aquatic life assessment of Maryland’s cold-water resources.

Emerging contaminants in surface and tidal waters, such as temperature, are a known constraint on biotic function. Section 502(6) of the Clean Water Act considers heat as a pollutant, and temperature impairments continue to be a focus of the category 5 listings within the Maryland Department of Environment’s (MDE) Water Quality Assessment Report-Integrated Report.

Talks throughout the temperature workshop were given by multiple agencies, including Federal, State, and local government, private consultants, academia, and community scientists. Presentations focused on historical trends of surface and tidal water temperature, the threats and drivers to these warming waters, and an aquatic life assessment of Maryland’s cold-water resources was discussed by representatives from MDE. The second half of the workshop focused on various case studies and innovative restoration practices studying the fate and transport from urban and rural impacts and how it thermally impacts Maryland’s waters.



Key Takeaways:

1. Within the Chesapeake Bay Mainstem, remote sensing analysis has indicated that the surface marine heatwaves are increasing in both frequency and duration.
2. Maryland hosts the southernmost population of Brook Trout within the Piedmont physiographic province.
3. Brook trout densities in the Piedmont region are currently in a cyclical low period, and Piedmont brook trout occupy < 50% of historic range.
4. In Maryland, the strongest current population of Brook Trout is found within the Savage River Watershed, however, recent data within this watershed has shown warming temperature trends.
5. Rising stream temperatures have been observed in locations where Brook Trout populations have recently been extirpated.
6. Hazardous Algal Bloom (HAB) species may show variable response to increased temperatures, with the potential for increased toxins.
7. The Maryland Biological Stream Survey (MBSS) program found that the Benthic Index of Biotic Integrity (IBI) scores for Mayflies (Ephemeroptera) decline with higher average daily mean temperatures and higher minimum temperatures.
8. Total Maximum Daily Loads (TMDLs) in Use-III streams are currently being developed for temperature by Maryland Department of the Environment (MDE).
9. The effect of runoff (pipe or overland flow) on stream temperature depends on the size of the storm and the position in the landscape. BMPs do not



appear to have a significant warming impact on streams, and pipes draining roads have the greatest impact on stream temperature.

10. BMP discharges during runoff events generally did not warm the stream. The presence of a BMP resulted in lower event discharges than if it were not present.
11. Higher frequency data collection (i.e., less than 10 minutes) using instream data loggers is recommended to fully capture the effects of stormwater runoff in smaller and more urbanized watersheds.
12. Within stormwater wet ponds, a paired watershed study illustrated that modifying and encasing the dewatering pipe with a gravel lens produced significantly lower discharge temperatures at the outfall than the control, a traditional bottom release wet pond.
13. Mitigating small headwater ponds in Use-III Watersheds could result in a significant reduction in pond outflow temperatures without affecting the water level of the pond.
14. Changes in mainstem Bay temperatures are largely driven by atmosphere; there are some impacts from the ocean that may grow in 21st century.
15. Underlying Karst topography promotes thermal resiliency in headwater streams.
16. Engineered oxygenation is becoming more widely considered as a short-term solution to the issue of oxygen depletion and can rapidly increase oxygen concentrations to address eutrophication. However, engineered aeration may also enhance greenhouse gas fluxes, animal response to bubbles is unknown, potential mobilization of contaminated sediments, as well as increased warming of deep waters with downwelling, and even over-oxygenation.



17. Trained volunteers from watershed organizations are also monitoring water temperature in Maryland. These data can be leveraged by jurisdictions and other programs to expand the scope of knowledge about temperature regimes in our streams.

