



Bacteria Sampling in Non-Beach Areas of Maryland

What You Need to Know

Development and Purpose of the *Enterococcus spp.* and *E. Coli* Indicators in Recreational Water (assessing risk of accidental ingestion/head immersion)

The criteria were designed to protect human health in locations where people are swimming and recreating. The 1986 and 2012 Criteria were developed by EPA and used by Maryland for primary contact recreation, which typically includes activities where immersion and ingestion are likely and there is a high degree of bodily contact with the water, such as swimming, bathing, surfing, water skiing, tubing, skin diving, water play by children, or similar water-contact activities (EPA, 820-F-12-058, p. 3).

Source and Relative Risk

The source of the bacteria matters. Microbial Risk Assessment studies have shown that the potential human health risks from feces could be different due to the nature of the source (human versus wildlife), the type (different kinds of harmful pathogens), and number of pathogens from any given source (EPA, 820-F-12-058, p. 51). Because of this, finding out the sources of bacteria pollution is critical. Source surveys are a component of Maryland's Beaches and Shellfish Program so that any human sources of pollution can be stopped as soon as possible. Fecal indicator bacteria sample results are most useful when used in combination with other source data such as pollution source surveys. Without pollution source data, bacteria data only tell resource managers a small part of the story.

Sample Depth

EPA recommends that samples be collected from at least knee depth, unless it is unsafe to go that deep in the water. There is evidence that under specific conditions, fecal indicator organisms can colonize and multiply in ambient waters and associated sand and sediment (EPA, 4305T, p. 14). Although fecal indicator organisms can indicate pollution, they may at times simply be from stirred up sediments. If samples are collected from very shallow water, re-suspended indicators may not indicate fresh fecal pollution, and therefore samples with a high number of re-suspended organisms might not provide a good means to assess water quality (EPA, EPA-823-B-14-001, p. 53). The criteria were developed in studies where there was a correlation between illness and indicator concentrations for samples collected at knee depth. Application of the criteria in other conditions may not be as meaningful.

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Seasonality

Bacteria sampling is most useful in warmer months. Both the 1986 and 2012 criteria were developed for the swimming season, when primary contact recreation activities were occurring (EPA, EPA440/5-84-002 and 820-F-12-058). The datasets do not include cold weather data as it is unlikely to find many people swimming. Although a bacteria sample collected during cold weather months may indicate the presence of pathogens, there have not been primary contact recreational studies to understand the impacts to human health.

Sampling Frequency

Bacteria sampling should occur at least weekly. Bacteria concentrations are naturally variable in the water column, regardless of the pollution source. Typically, a larger dataset will more accurately characterize the water quality in a waterbody over time, which may result in more meaningful attainment determinations. EPA also recommends frequent sampling to adequately evaluate the geometric mean and statistical threshold value of the criteria (EPA, 820-F-12-058, p. 42).

Bacteria Data for use in the Integrated Report

Bacteria data submitted for use in the Integrated Report of Surface Water Quality should be sampled weekly during the summer swimming season for locations where many people are recreating and/or there is a high risk to human health. Since the studies for the development of the criteria were conducted at beaches, during the summer swimming season, where many people were recreating, and where there were known human pollution sources, MDE will use best professional judgement and apply the bacteria criteria to the sampling data as appropriate.

References

- EPA, Office of Water. EPA440/5-84-002, Ambient Water Quality Criteria for Bacteria – 1986, January 1986, Washington D.C.
- EPA, Office of Water. 4305T, Assessment of the Extra-Enteric Behavior of Fecal Indicator Organisms in Ambient Waters, December 2010.
- EPA. 2010. Sampling and Consideration of Variability (Temporal and Spatial) for Monitoring of Recreational Waters. EPA-823-R-10-005. U.S. Environmental Protection Agency, Office of Water, Washington, DC.
- EPA, Office of Water. 820-F-12-058, Recreational Water Quality Criteria, 2012.
- EPA. EPA-823-B-14-001, National Beach Guidance and Required Performance Criteria for Grants, July 2014.