



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

MAY 21 2019

Mr. Matthew Rowe, Assistant Director
Water and Science Administration
Maryland Department of the Environment
1800 Washington Boulevard., Suite 540
Baltimore, Maryland 21230-1718

Dear Mr. Rowe:

The U.S. Environmental Protection Agency (EPA), Region III, is pleased to approve the fecal coliform total maximum daily loads (TMDL) for the Restricted Shellfish Harvesting Areas of Battle Creek, Buzzard Island Creek and Hog Neck Creek. The Maryland Department of the Environment (MDE) submitted the report, *Total Maximum Daily Loads of Fecal Coliform in the Restricted Shellfish Harvesting Areas of Battle Creek, Buzzard Island Creek and Hog Neck Creek in the Lower Patuxent River in Calvert and St. Mary's Counties, Maryland* (April 2019), to EPA for review and action on April 23, 2019. The TMDLs were established to address impairments of water quality as identified on Maryland's Section 303(d) List.

The TMDLs were established and submitted in accordance with Section 303(d)(1)(c) and 303(d)(2) of the Clean Water Act. Our review indicates that the load and wasteload allocations in the TMDLs have been established at levels necessary that, when fully implemented, will lead to the attainment of the water quality standard addressed by these TMDLs. A copy of EPA's rationale for approval is enclosed. As you are aware, any new or revised National Pollutant Discharge Elimination System permits must be consistent with the assumptions and requirements of applicable TMDL wasteload allocations pursuant to 40 CFR §122.44(d)(1)(vii)(B). Please continue to submit all such permits to EPA for review per EPA's letters dated October 1, 1998.

If you have any questions regarding the TMDLs, please contact Ms. Jillian Adair, Maryland TMDL Coordinator, at 215-814-5713 or adair.jillian@epa.gov.

Sincerely,

A handwritten signature in cursive script that reads "Catherine B. McManus for".

Catherine A. Libertz, Director
Water Division

Enclosure

cc : Melissa Chatham, MDE-WSA



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Decision Rationale
**Total Maximum Daily Load of Fecal Coliform in the
Restricted Shellfish Harvesting Areas of Battle Creek,
Buzzard Island Creek and Hog Neck Creek in the Lower
Patuxent River in Calvert and St. Mary's Counties,
Maryland**

Catherine A. Libertz

Catherine A. Libertz, Director
Water Division

Date: _____

5/21/2019



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Decision Rationale
**Total Maximum Daily Loads for the Restricted Shellfish Harvesting Areas of
Battle Creek, Buzzard Island Creek and Hog Neck Creek in the Lower
Patuxent River in Calvert and St. Mary's Counties, Maryland**

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those waterbodies identified as impaired by a state where technology-based effluent limits and other pollution controls do not provide for the attainment of water quality standards. A TMDL establishes a target for the total load of a particular pollutant that a water body can assimilate and divides that load into wasteload allocations (WLA), given to point sources, load allocations (LAs), given to nonpoint sources and natural background, and a margin of safety (MOS), which takes into account any uncertainty. Mathematically, a TMDL is commonly expressed as an equation, shown below.

$$TMDL = \sum WLA_s + \sum LA_s + MOS$$

This document sets forth the U.S. Environmental Protection Agency, Region III's (EPA's) rationale for approving the TMDL for fecal coliform for the restricted shellfish harvesting areas of Battle Creek, Buzzard Island Creek and Hog Neck Creek. The TMDL was developed to address impairments of water quality standards as identified on Maryland's Section 303(d) list of water quality-limited segments. The Maryland Department of the Environment (MDE) submitted the report, *Total Maximum Daily Loads of Fecal Coliform in the Restricted Shellfish Harvesting Areas of Battle Creek, Buzzard Island Creek and Hog Neck Creek in the Lower Patuxent River in Calvert and St. Mary's Counties, Maryland*, (April 2019) (hereinafter referred to as the "TMDL report"), to EPA on April 23, 2019. EPA's decision is based upon its administrative record, which includes the TMDL report and information in supporting files provided to EPA by MDE. EPA has reviewed and determined that the TMDL meets the requirements of Section 303(d) of the Clean Water Act and its implementing regulations at 40 CFR Part 130 including but not limited to:

1. TMDLs are designed to implement applicable water quality standards.
2. TMDLs include wasteload allocations and load allocations.
3. TMDLs consider natural background sources.
4. TMDLs consider critical conditions.
5. TMDLs consider seasonal variations.
6. TMDLs include a margin of safety.
7. TMDLs have been subject to public participation.

In addition, EPA has considered and finds acceptable the reasonable assurances set forth in the TMDL Report.

From this point forward, all references in this rationale can be found in Maryland's TMDL Report, *Total Maximum Daily Loads of Fecal Coliform in the Restricted Shellfish*

Harvesting Areas of Battle Creek, Buzzard Island Creek and Hog Neck Creek in the Lower Patuxent River in Calvert and St. Mary's Counties, Maryland, unless otherwise noted.

II. Section 303(d) Listing Information

MDE has established fecal coliform TMDLs for the restricted shellfish harvesting areas of Battle Creek, Buzzard Island Creek and Hog Neck Creek. Table 1 presents the assessment units and parameters from MDE's 303(d) list of impaired waters that are addressed by this TMDL.

Table 1: Waterbodies and Impairments Addressed by the TMDL

Assessment Unit	Waterbody Name	Parameter Addressed
MD-PAXMH-Battle_Creek-2	upstream portion of BATTLE CREEK	FECAL COLIFORM
MD-PAXMH-Battle_Creek-3	upstream portion of BATTLE CREEK	FECAL COLIFORM
MD-PAXMH-BUZZARD_ISLAND_CREEK	BUZZARD ISLAND CREEK	FECAL COLIFORM
MD-PAXMH-HogNeck_Creek	Hog Neck Creek	FECAL COLIFORM

Battle Creek, Buzzard Island Creek and Hog Neck Creek drain to the Lower Patuxent River, which drains directly to the Chesapeake Bay and is located on Maryland's western shore. Battle Creek and Buzzard Island Creek are located on the eastern shoreline of the Lower Patuxent River, while Hog Neck Creek is located along the western shoreline. The land-use of all three watersheds is dominated by forest followed by agriculture or urban.

The two segments in Battle Creek were listed as impaired for fecal coliform in Maryland's Integrated Report in 2010 and 2014, while Buzzard Island Creek and Hog Neck Creek were listed in 2012 and 2014, respectively. MDE evaluates whether a waterbody is restricted for shellfish harvesting based on both the median fecal coliform concentration of 14 Most Probable Number (MPN)/100ml and 90th percentile fecal coliform concentration of 49 MPN/100ml of at least 30 samples taken over a three-year period. The overall objective of the fecal coliform TMDLs is to meet these criteria, ensuring that the "shellfish harvest" designated use, which is protective of estuarine and marine aquatic life and of human health related to the consumption of shellfish, is supported.

The TMDLs established herein by MDE address the fecal coliform listings for the restricted shellfish harvesting areas of Battle Creek, Buzzard Island Creek and Hog Neck Creek as identified in MDE's 2018 Integrated Report. For more information regarding the water quality characterization of the watersheds, please refer to Section 2.2 of the TMDL report.

III. TMDL Overview

MDE has established fecal coliform TMDLs for the restricted shellfish harvesting areas of Battle Creek, Buzzard Island Creek and Hog Neck Creek, which are presented as counts/day in Section 4.6 of the TMDL report.

Section 2.3 discusses the fecal coliform source assessments. MDE conducted scat and water column sampling over a one-year period in the shellfish harvesting areas of Lower Patuxent River watershed and used bacteria source tracking (BST) to identify sources of fecal coliform. The nonpoint source assessment was conducted by analyzing BST results to quantify source loadings from humans, livestock, pets, and wildlife. In the Lower Patuxent River basin, wildlife contributions, both mammalian and avian, are considered natural conditions and may represent a background level of bacterial loading. Livestock contributions, such as those from mammalian and avian livestock, mainly result from surface runoff. Pet contributions usually occur through runoff from streets and land. Human sources mainly result from failure of septic systems. There are no National Pollutant Discharge Elimination System (NPDES)-regulated municipal wastewater treatment plants (WWTPs), industrial process water facilities or regulated stormwater discharges under Phase I or Phase II of the NPDES stormwater program within the drainage areas of any of the restricted shellfish harvesting areas. Therefore, there are no point source allocations for fecal coliform loads from the drainage areas of Battle Creek, Buzzard Island Creek and Hog Neck Creek.

Computational Procedures

Section 4.2 discusses the analysis framework and TMDL model. Concentrations of pollutants in tidal waters are heavily influenced by the flow of water into and out of the embayment through tidal exchange. The tide and amount of freshwater discharge into the embayment are the dominant influences on the transport of fecal coliform. The methodology used assumes that freshwater input, tidal range, and the first-order decay of fecal coliform are all constant. The TMDL is calculated based on the steady state tidal prism model. Compared to the volumetric method (EPA Shellfish Workshop 2002), the steady state tidal prism model provides improvements incorporating the influences of tidal induced transport, freshwater, and decay of fecal coliform in the embayment. A detailed description of the model is presented in Appendix A.

The most recent three-year (June 2014 to June 2017) median and 90th percentile fecal coliform concentrations in each restricted shellfish harvesting area were used to characterize the current (baseline) conditions. TMDL scenarios were run to estimate the maximum allowable loads the restricted shellfish harvesting areas could receive from the responding drainage areas in order to assure that the fecal coliform concentrations within the embayments would not exceed the criteria. The load reductions needed for the attainment of the criteria for median and 90th percentile scenarios were determined by subtracting the allowable loads from the current loads. Source reductions were assigned by first managing controllable sources (human, livestock and pets) and were based on the source distribution determined using the BST analysis. If the total required reduction was not achieved after fully reducing controllable sources, wildlife was assigned reductions.

EPA has determined that the TMDL is consistent with statutory and regulatory requirements and EPA's policy and guidance. EPA's rationale for approving the TMDL is set forth according to the regulatory requirements listed below.

IV. Discussion of Regulatory Requirements

1) TMDLs are designed to meet the applicable water quality standards.

EPA regulations at 40 CFR 130.7(c)(1) state that TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numeric water quality standards. Water quality standards are state regulations that define the water quality goals of a waterbody. Water quality standards are comprised of three components: (1) designated uses, (2) criteria (numeric or narrative) necessary to protect those uses, and (3) antidegradation provisions that prevent the degradation of water quality.

The designated use of the restricted shellfish harvesting areas of Battle Creek, Buzzard Island Creek and Hog Neck Creek is *Use II – Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting* (COMAR 2017b). MDE's Shellfish Certification Program is responsible for classifying shellfish harvesting waters to ensure oysters and clams are safe for human consumption. MDE conducts shoreline surveys and collects routine bacteria water quality samples in the shellfish waters of Maryland to assure that Maryland's shellfish waters are properly classified.

The fecal coliform criteria applicable to *Use II shellfish harvesting waters* in Maryland are listed below. These criteria are more stringent than those bacteria criteria designed to protect water contact recreation.

- (a) The median fecal coliform MPN of at least 30 water sample results taken over a 3-year period to incorporate inter-annual variability does not exceed 14 per 100 milliliters; and:
 - (i) In areas affected by point source discharges, not more than 10 percent of the samples exceed an MPN of 43 per 100 milliliters for a five tube decimal dilution test or 49 MPN per 100 milliliters for a three tube decimal dilution test; or
 - (ii) In other areas, the 90th percentile of water sample results does not exceed an MPN of 43 per 100 milliliters for a five tube decimal dilution test or 49 MPN per 100 milliliters for a three tube decimal dilution test (COMAR 2017d).

TMDL scenarios were run to estimate the maximum allowable loads the restricted shellfish harvesting areas could receive from the responding drainage areas in order to assure that the fecal coliform concentrations within the embayments would not exceed the criteria. When comparing the median and the 90th percentile scenario results, the scenario that required greater load reductions was chosen for the final TMDL. For all three restricted areas, the 90th percentile scenarios required greater percent reductions to meet the criterion, therefore, the 90th percentile scenario results were chosen as the final TMDLs and were used for source allocations. Based on the foregoing, EPA finds the TMDL is designed to meet the applicable water quality standards.

2) TMDLs include wasteload allocations and load allocations.

EPA regulations at 40 CFR §130.2(i) define TMDL as the sum of the WLAs for point sources and LAs for nonpoint sources and natural background. The development of the WLAs and LAs is further discussed below.

Wasteload Allocations

According to Federal regulations at 40 CFR §130.2(h), a WLA is the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. As described in Section 2.3.2., there are no NPDES-regulated municipal WWTPs, industrial process water facilities or regulated stormwater discharges under Phase I or Phase II of the NPDES stormwater program within the drainage areas of any of the restricted shellfish harvesting areas. Therefore, there are no point source allocations for fecal coliform loads from the drainage areas of Battle Creek, Buzzard Island Creek and Hog Neck Creek and the WLAs are 0¹. Based on the foregoing, EPA finds that the WLA included in the TMDL satisfy the regulations at 40 CFR Part 130.

MDE is authorized to administer the National Pollutant Discharge Elimination System (NPDES) Program, which, among other duties, includes issuing NPDES permits to existing or future point sources subject to the NPDES program. The effluent limitations in any new or revised NPDES permits must be consistent with "the assumptions and requirements of any available [WLA]" in an approved TMDL pursuant to 40 CFR §122.44 (d)(1)(vii)(B). EPA has authority to object to the issuance of an NPDES permit that is inconsistent with the assumptions and requirements of WLAs established for that point source. It is expected that MDE will require periodic monitoring of any point source(s), through the NPDES permit process, in order to monitor and determine compliance with the TMDL's WLAs.

Load Allocations

According to Federal regulations at 40 CFR §130.2(g), a LA is the portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. Load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. As described in Section 2.3.1, LAs were assigned to fecal coliform sources from humans, livestock, pets, and wildlife². Source reductions were assigned by first managing controllable sources (human, livestock and pets). If the total required reduction was not achieved, then wildlife was reduced.

¹ The fact that the TMDL does not assign WLAs to any sources in the watershed should not be construed as a determination by either EPA or MDE that there are no sources in the watershed that are subject to the NPDES program.

² EPA's approval of this TMDL does not mean that EPA has determined there are no point sources within the land use categories that are assigned load allocations in the TMDL. EPA's review and approval of this TMDL does not represent a determination whether some of the sources discussed in the TMDL, under appropriate conditions, might be subject to the NPDES program.

It is expected that the best management practices applied to controllable sources may also result in reduction of some wildlife sources.

Table 12 of the TMDL Report provides daily LAs per source category for each of the restricted shellfish harvesting areas of Battle Creek, Buzzard Island Creek and Hog Neck Creek. It is also important to note that compliance with the allocations in the TMDLs presented herein should be determined using a three-year averaging period with a minimum of 30 samples collected consistent with the water quality standard. Based on the foregoing, EPA finds that daily LAs included in the TMDL satisfy the regulations at 40 CFR Part 130.

3) TMDLs consider natural background sources.

According to Federal regulations at 40 CFR §130.2(g & i), natural background sources of pollutants are part of the LA and, wherever possible, natural and nonpoint source loads should be distinguished. In the Lower Patuxent River basin, wildlife contributions, both mammalian and avian, are considered natural conditions and may represent a background level of bacterial loading. Wildlife represents the dominant source of fecal coliform in each of the restricted shellfish harvesting areas. Based on the foregoing, EPA finds the TMDL accounts for natural background sources consistent with the regulations at 40 CFR §130.2(g & i).

4) TMDLs consider critical conditions.

EPA regulations at 40 CFR §130.7(c)(1) require TMDLs to account for critical conditions for stream flow, loading, and water quality parameters. Critical conditions are discussed in Section 4.3 of the TMDL report. The 90th percentile criteria concentration, which is dictated in the Code of Maryland Regulations (COMAR), Surface Water Quality Criteria 26.08.02.03-3.C(2), is the concentration exceeded only 10 percent of the time. Data used to calculate the 90th percentile were collected over the most recent three-year period and included over 30 samples per TMDL area incorporating a range of conditions; therefore, the critical condition is implicitly included in the value of the 90th percentile. Based on the foregoing, EPA finds that the TMDL accounts for critical conditions consistent with the regulations at 40 CFR §130.7(c)(1).

5) TMDLs consider seasonal variations.

EPA regulations at 40 CFR §130.7(c)(1) require TMDLs to consider seasonal variations. Seasonal variations are discussed in Section 4.3 of the TMDL report. Seasonality is also implicitly included in the analysis due to the averaging required in the water quality standards, which incorporates three years of data over all seasons. The MDE shellfish-monitoring program uses a systematic random sampling design that was developed to cover inter-annual variability. The monitoring design and the statistical analysis used to evaluate water quality attainment therefore implicitly includes the effect of seasonality. Based on the foregoing, EPA finds the TMDL has been established at levels necessary to attain and maintain the applicable water quality standards with seasonal variations consistent with the regulations at 40 CFR §130.7(c)(1).

6) TMDLs include a margin of safety.

EPA regulations at 40 CFR §130.7(c)(1) require TMDLs to include a margin of safety (MOS). The MOS is an accounting of uncertainty about the relationship between pollutant loads and receiving water quality. It can be provided implicitly through analytical assumptions or

explicitly by reserving a portion of loading capacity. The MOS is discussed in Section 4.5 of the TMDL report. Based on previous analysis (VIMS 2004), it was determined that the most sensitive parameter is the decay rate. The value of the decay rate varies from 0.7 to 3.0 per day in salt water (Mancini 1978; Thomann and Mueller 1987). A decay rate of 0.7 per day was used as a conservative estimate in the TMDL calculation. Therefore, the MOS is implicitly included in the calculation. Based on the foregoing, EPA finds that MDE has incorporated a MOS into the TMDL consistent with the regulations at 40 CFR §130.7(c)(1).

7) TMDLs have been subject to public participation.

EPA regulations at 40 CFR §130.7(c)(1)(ii) require that TMDLs be subject to public review and that the State implement a process for involving the public in development of TMDLs. MDE provided an opportunity for public review and comment on the TMDL from January 16, 2019 through February 14, 2019. MDE received no comments. Based on the foregoing, EPA finds that the TMDL has been subject to MDE's public participation process.

In addition, in reaching our conclusions on approving the fecal coliform TMDLs for the restricted shellfish harvesting areas of Battle Creek, Buzzard Island Creek and Hog Neck Creek, EPA appropriately considered information on the endangered and threatened species and their critical habitat in Maryland's waters identified by the National Marine Fisheries Service and the U.S. Fish and Wildlife Service.

V. Discussion of Reasonable Assurance

The CWA section 303(d) requires that a TMDL be "established at a level necessary to implement the applicable water quality standard." Documenting adequate reasonable assurance increases the probability that regulatory and voluntary mechanisms will be applied such that the pollution reduction levels specified in the TMDL are achieved and, therefore, applicable water quality standards are attained.

Where a TMDL is developed for waters impaired by both point and nonpoint sources, in EPA's best professional judgment, determinations of reasonable assurance that the TMDL's LAs will be achieved could include whether practices capable of reducing the specified pollutant load: (1) exist; (2) are technically feasible at a level required to meet allocations; and (3) are likely to be implemented. Where there is a demonstration that nonpoint source load reductions can and will be achieved, a TMDL writer can determine that reasonable assurance exists and, on the basis of that reasonable assurance, allocate greater loadings to point sources.

Reasonable assurance is discussed in Section 5.0 of the TMDL Report. Based on the foregoing, EPA finds acceptable the reasonable assurances set forth in the TMDL Report.

