

EPA NEW ENGLAND'S TMDL REVIEW

TMDL: **Maine Statewide Bacteria TMDL**
HUC: Multiple, statewide
2008 303(d) list: recreational and shellfish harvesting use impairment; 2008-9 TMDL development.

STATUS: Draft

IMPAIRMENT/POLLUTANT: Recreational use and shellfish harvesting use impairments are based on bacteria criteria for freshwater Classes AA, A, B, C, GPA, and estuarine & marine Classes SA, SB, SC. Sources include both point and nonpoint sources. TMDLs are established in terms of concentrations and daily loads for Eschericia Coli (freshwaters), Enterococcus (saltwater beaches), and fecal coliform (shellfish harvesting areas), depending on resource type and waterbody classification.

BACKGROUND: The Maine Department of Environmental Protection (ME DEP) submitted a draft TMDL on May 29, 2009. A public comment period was held from May 29 to July 15, 2009. ME DEP submitted to EPA Region 1 the final *Maine Statewide Bacteria TMDL* with a transmittal letter dated September 1, 2009, with subsequent revisions on September 10 and September 24. In addition to the TMDL itself, the submittal included the following documents:

- *Freshwater Rivers & Streams* (site-specific data), Appendix I, TMDL report.
- *Marine & Estuarine Waters* (site-specific data), Appendix II, TMDL report.
- *TMDL Calculations & Graphs*, Appendix III, TMDL report.
- *Impaired Segments with TMDL Endpoints*, Appendix IV, TMDL report.
- *Public Comments & DEP Response*, Appendix V, TMDL report
- Extensive list of best management practices and educational resources for stormwater management and source-specific discharges, Section 6 TMDL report.

The following review explains how the TMDL submission meets the statutory and regulatory requirements of TMDLs in accordance with § 303(d) of the Clean Water Act and EPA's implementing regulations in 40 CFR Part 130.

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REVIEW ELEMENTS OF TMDLs

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. § 130 describe the statutory and regulatory requirements for approvable TMDLs. The following information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation.

1. Description of Waterbody, Pollutant of Concern, Pollutant Sources and Priority Ranking

The TMDL analytical document must identify the waterbody as it appears on the State/Tribe's 303(d) list, the pollutant of concern and the priority ranking of the waterbody. The TMDL submittal must include a description of the point and nonpoint sources of the pollutant of concern, including the magnitude and location of the sources. Where it is possible to separate natural background from nonpoint sources, a description of the natural background must be provided, including the magnitude and location of the source(s). Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation. The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as: (1) the assumed distribution of land use in the watershed; (2) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources; (3) present and future growth trends, if taken into consideration in preparing the TMDL; and, (4) explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable. Surrogate measures are parameters such as percent fines and turbidity for sediment impairments, or chlorophyll *a* and phosphorus loadings for excess algae.

A. Description of Waterbody, Priority Ranking, and Background Information

A total of 205 bacteria-impaired segments are listed in Maine's 2008 303(d) list, including 62 river and stream segments, and 143 estuarine and marine segments (page 11 TMDL report). These 205 segments are located in 13 of Maine's 21 major watersheds (8-digit hydrologic unit code basins). Section 2.0 of the TMDL document lists each of the 205 impaired water segment (organized by resource type), including each waterbody's assessment unit identifier, segment name and location, segment size, and classification, which determines the applicable water quality criteria.

State-wide maps as well as the lists of impaired waterbodies and locations are presented in the main body of the TMDL report, and site-specific maps and data are provided in Appendices I (*Freshwater Rivers & Streams*) and II (*Marine & Estuarine Waters*). The location of bacteria-impaired waterbodies generally corresponds with the more populated areas concentrated along the coastline and southern portion of Maine (page 11, TMDL report). The bacteria-impaired waterbodies' priority rankings for TMDL development were listed as 2008 and 2009.

B. Pollutant of Concern

The bacteria impairment listings are based on monitoring data for various indicator organisms, depending on the resource type, and classification of the waterbody. Freshwater rivers and streams are listed for the presence of *Escherichia Coli* (*E. coli*). Maine's bacteria criteria for the protection of primary contact recreation include bacteria of human and domestic origin. Estuarine and marine waters are listed for fecal coliform, in accordance with Maine's bacteria criteria for the protection of shellfish harvesting areas. No estuarine and marine waters are

currently listed for recreational use impairment, but the applicable indicator organism in Maine's water quality standards for future impairments is Enterococcus (see Section 2 below).

C. Pollutant Sources

Potential point sources of bacterial pollution include illicit discharges to stormwater systems, wastewater discharges and treatment facilities, overboard discharges, (which in Maine refer to small cluster developments where no municipal system is available and subsurface disposal is unsuitable), accidental and unspecified discharges, combined sewer overflows, and stormwater. Potential non-point sources of bacterial pollution include stormwater not regulated under the NPDES program, septic systems, pet waste, wildlife wastes, agriculture, and recreational uses (swimmers, boats, and marinas). For freshwater impaired segments, ME DEP also identifies potential sources in terms of land use distribution in the sub-watersheds (see Appendix I).

Actual sources of bacterial pollution are identified where known, including a map of active CSO locations in Section 2 (background and bacteria sources) and Section 6 (implementation plan) of the TMDL, and watershed/site-specific information in Appendices I (freshwater) and II (marine & estuarine waters). Specific NPDES permit numbers of point source discharges (including discharges from CSOs, municipal wastewater treatment facilities, and general-permitted municipal stormwater), and indications of point source/nonpoint source involvement are included for all impaired segments in Appendix IV.

Assessment: EPA Region 1 concludes that the TMDL document meets the requirements for describing the TMDL waterbody segments, pollutants of concern, identifying and characterizing sources of impairment, and priority ranking.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribe water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation. A numeric water quality target for the TMDL (a quantitative value used to measure whether or not the applicable water quality standard is attained) must be identified. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, usually site specific, must be developed from a narrative criterion and a description of the process used to derive the target must be included in the submittal.

The TMDL report defines the appropriate water quality criteria for reducing public health risk from waterborne disease-causing organisms, for protecting designated uses (including recreational and shellfish growing area), and for implementing the antidegradation policy (pages 19-20 TMDL report). Water quality classification and water quality standards of all surface waters of the State of Maine have been established by the Maine Legislature at Title 38 MRSA 464-469.

According to Maine's water classification program, bacteria-impaired waters are classified as AA, A, B, or C for freshwater rivers and streams and GPA for lakes; Escherichia coli (E. coli) is

the indicator organism. Marine and estuarine waters are classified as SA, SB, SC; Enterococcus is the indicator organism for recreational use; fecal coliform is the indicator organism for shellfish growing areas, following the standards developed under the National Shellfishing Sanitation Program by the United States Food and Drug Administration. Shellfish growing areas are designated by the Maine Division of Marine Resources according to the latest standard operating procedures (Maine DMR 2007). Maine Coastal Beaches Program also has criteria for estuarine and marine beaches (based on federal guidance) for Enterococcus levels. The MCBP criteria were not used for the development of these TMDLs because those criteria are less stringent than levels required by the Maine Legislature.

Water Quality Target – Bacteria Criteria

Maine's water quality criteria for bacteria are used as the numeric water quality targets for the bacteria TMDLs (pages 20-21 TMDL report). The numeric targets vary depending on the specific waterbody's use (either recreation, or shellfish harvesting), and waterbody classification. As described above, there are Class AA, A, B, C, GPA, SA, SB, and SC segments of Maine's surface waters addressed by these TMDLs. For future applicability, TMDL targets are set for lakes and ponds (E-coli) and saltwater beaches (Enterococcus), although none are currently listed as impaired.

Since Maine's water quality standards for recreational uses include criteria for both instantaneous bacteria counts and geometric means of bacteria data, TMDL targets are provided for both types of criteria. For shellfish harvesting areas, TMDL targets are provided for both the geometric mean and the 90th percentile statistical measure (variability standard).

Assessment: EPA concludes that Maine DEP has properly described and interpreted the applicable water quality standards (in Section 2.0 of the TMDL document) to set the TMDL targets (as indicated in Section 4.0 of the TMDL document). Maine DEP is directly applying the numeric criteria in its water quality standards to derive the TMDL targets.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

As described in EPA guidance, a TMDL identifies the loading capacity of a waterbody for a particular pollutant. EPA regulations define loading capacity as the greatest amount of loading that a water can receive without violating water quality standards (40 C.F.R. § 130.2(f)). The loadings are required to be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. § 130.2(i)). The TMDL submittal must identify the waterbody's loading capacity for the applicable pollutant and describe the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In most instances, this method will be a water quality model. Supporting documentation for the TMDL analysis must also be contained in the submittal, including the basis for assumptions, strengths and weaknesses in the analytical process, results from water quality modeling, etc. Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation.

In many circumstances, a critical condition must be described and related to physical conditions in the waterbody as part of the analysis of loading capacity (40 C.F.R. § 130.7(c)(1)). The critical condition can be thought of as the "worst case" scenario of environmental conditions in the waterbody in which the loading expressed in the TMDL for the pollutant of concern will continue to meet water quality standards. Critical conditions are the

combination of environmental factors (e.g., flow, temperature, etc.) that results in attaining and maintaining the water quality criterion and has an acceptably low frequency of occurrence. Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards.

Maine's bacteria TMDLs consist of two formats of targets for allowable levels of bacteria: (1) concentrations of bacteria (expressed as bacteria counts/100 ml of water), and (2) loads of bacteria (expressed as billions of bacteria/day) (pages 23-27 and appendix III TMDL report). Maine considers both formats to be daily targets because the targets apply on any given day whenever the water quality standards are in effect in order to assure achievement of bacteria water quality criteria. Both formats express targets designed to attain the designated uses of swimming and shellfishing, and to meet the associated criteria in Maine's water quality standards. Maine DEP considers the concentration-based TMDL targets to be most useful for guiding implementation of bacteria controls because those targets are easy to understand, and achievement of those targets is more readily assessed by groups with limited resources (page 4 TMDL report).

Maine's TMDLs for recreational use apply from May 15-September 30 because that is the period when Maine's water quality standards for bacteria are in effect [38 MRSA Ch.3 §464 & 465]. Critical conditions for recreational uses are limited to the warmer months when people are most likely to be swimming or boating, and thereby exposed to pathogens in the water. The TMDLs for shellfish harvesting areas apply year round [National Shellfish Sanitation Program Manual of Operations, Part I, Sanitation of Shellfish Growing Areas, USFDA] (page 20 TMDL report). Critical conditions for shellfish harvesting are present whenever there is a source of bacteria.

These TMDLs set a goal of meeting bacteria water quality criteria at the point of discharge for all sources in order to meet water quality standards throughout the waterbody. Achievement of the goal will be assessed by ambient water quality monitoring.

Assessment: There is nothing in EPA's regulations that forbids expression of a TMDL in terms of multiple TMDL targets. TMDLs can be expressed in various ways, including in terms of toxicity, which is a characteristic of one of more pollutants, or by some "other appropriate measure." 40 C.F.R. §130.2(i). The target loading capacities expressed in the TMDL document are set at levels which assure WQS will be met (criteria at point of discharge, and loading based on meeting ambient water quality criteria). The concentration loading capacity is based on the concentration criteria for each water body. If all sources of pathogens are at or below the water quality criteria, then it follows that the receiving water will meet the WQS for bacteria.

Both formats (concentration and load) express targets designed to attain the designated use of each waterbody segment based on a straightforward derivation of TMDL targets from the water quality criteria adopted by Maine. Both formats will achieve water quality criteria for both dry and wet weather and for all storm events whenever they occur (e.g., on any given day), whenever the bacteria criteria are in effect. These approaches have been used by states for TMDL development and approved by EPA in the past.

EPA's November 15, 2006 guidance entitled "Establishing TMDL 'Daily' Loads in Light of the

Decision by the U.S. Court of Appeals for the D.C. Circuit in Friends of the Earth, Inc. v. EPA, et al., No.05-5015, (April 25, 2006) and Implications for NPDES Permits,” recommends that TMDL submittals express allocations in terms of daily time increments. In this case, the daily maximum mass loads were calculated by multiplying the concentration criterion by stream flow or waterbody volume (lakes and estuaries) and are expressed in terms of billions of organisms per day.

In summary, the loading capacity targets (both concentration and load-based) are directly linked to Maine’s water quality standards’ bacteria criteria to achieve the designated uses of the waterbodies addressed by this TMDL report.

4. Load Allocations (LAs)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity allocated to existing and future nonpoint sources and to natural background (40 C.F.R. § 130.2(g)). Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. § 130.2(g)). Where it is possible to separate natural background from nonpoint sources, load allocations should be described separately for background and for nonpoint sources.

If the TMDL concludes that there are no nonpoint sources and/or natural background, or the TMDL recommends a zero load allocation, the LA must be expressed as zero. If the TMDL recommends a zero LA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero LA implies an allocation only to point sources will result in attainment of the applicable water quality standard, and all nonpoint and background sources will be removed.

The load allocation (LA) relates to existing and future nonpoint sources, natural background, and stormwater runoff not subject to NPDES permitting. LAs are allocated based on the criteria established by Maine’s water quality standards, or are set at zero for prohibited discharges (see Tables 4-1, 4-2, and 4-3) (pages 25-27 TMDL report). For example, LAs for non-MS4 stormwater are established “as naturally occurs” for Class AA and A waters; as 64/100 ml for the geometric mean of E. coli and 236/100 ml instantaneous for Class B waters; as 126/100 ml for geometric mean of E. coli and 236/100 ml instantaneous for Class C waters; as 29/100 ml geometric mean of E. coli and 194/100 ml instantaneous for lakes.

Assessment: As discussed in Section 3 of this document (under loading capacity), Maine DEP used the applicable numeric water quality criteria directly related to the use-impairment which the TMDL is designed to address. As discussed in Section 6 of this document (under margin of safety), Maine DEP set conservative targets based on meeting criteria at the point of source discharge; the aggregate mass load allocation is derived from the applicable criteria and flow. EPA concludes that the load allocations for bacteria are adequately specified in the TMDLs at levels necessary to attain and maintain water quality standards.

