EPA NEW ENGLAND'S TMDL REVIEW

TMDL: Total Maximum Daily Load (TMDL) Report for 3 Bacteria Impaired Waters in New Hampshire

STATUS: Final

IMPAIRMENT/POLLUTANT: These three (3) water body segments are not meeting criteria for indicator bacteria and are not supporting the designated uses of Primary Contact Recreation Use. They are impaired for *Escherichia coli* (*E. coli*).

NH Waterbody Segments on the State of New Hampshire's 2014 List of New Hampshire Water Bodies Not Meeting Water Quality Standards (Section 303(d) of the Federal Clean Water Act):

Jewett Brook (Laconia): NHRIV700020201-16

Colony Beach, Locke Lake (Barnstead): NHIMP700060402-02-05

Park Association Beach, Great Pond (Kingston): NHLAK700061403-06-05

BACKGROUND:

On September 21, 2010 EPA approved the *New Hampshire Statewide Bacteria TMDL*. These TMDLs covered 394 bacteria impairments in New Hampshire freshwaters and tidal waters that were listed on the 2008 303(d) list. This document provides TMDL implementation information to stakeholders as well as the framework for future TMDLs. On September 24, 2015 the New Hampshire Department of Environmental Services (NHDES) submitted to EPA New England a document titled "Total Maximum Daily Load Report for 3 Impaired Waters in New Hampshire" for waterbodies that are listed on the 2014 303(d) list. This document follows the model of the 2010 statewide bacteria TMDL. In accordance with EPA regulations [40 CFR 130.7 (c) (ii)], NHDES conducted a public comment period from August 6, 2015 to September 7, 2015 and notified interested parties and stakeholders. Along with the main TMDL document the submission consisted of the following documents submitted electronically:

- Letter of Transmission
- TMDL Report Appendices A & B, Watershed Reports (site-specific bacteria data)
- TMDL Report Appendix C, *TMDL expressed as Daily Load*

The following review explains how the TMDL submission meets the statutory and regulatory requirements of TMDLs in accordance with Section 303(d) of the Clean Water Act, and [40 CFR Part 130].

Reviewer: Toby Stover (617-918-1604) stover.toby@epa.gov

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 that 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.

These TMDLs are for impaired waters (Table 2-1, page 9, main TMDL document) in the Winnipesauke and Merrimack River HUC 8 watersheds. The 3 New Hampshire waterbody segments that are covered in these TMDLs are listed on the 2014 List of New Hampshire Waterbodies Not Meeting Water Quality Standards as impaired for recreational uses due to exceedances of the state water quality standards for *Escherichia coli* (*E. coli*). The impaired recreational uses include swimming, wading, boating, fishing, water skiing, aesthetic enjoyment and others. Under Section 303(d) of the Clean Water Act, states are required to compile a list of impaired waterbodies in their biennial water quality report to Congress and to develop TMDLs for these waters so that they will achieve water quality standards.

Potential sources of bacteria that are causing exceedances of the criteria are from both point and nonpoint sources which are summarized in Section 3 of the Statewide Bacteria Document which was approved in 2010. Potential point sources include: wastewater from municipal treatment facilities, NPDES regulated stormwater (including stormwater discharges authorized by MS4 permits, the construction general permit and the multi-sector general permit), accidental and illicit discharges, combined sewer overflows, and discharges from boats. Potential non-point sources include: stormwater not regulated by the NPDES program, septic systems, pet waste, wildlife waste, agriculture and recreational uses (swimmers). The Priority Ranking for the 3 impaired segments has been labeled "high" by NHDES (Table 2-1, page 9, main TMDL document). Priority ranking is based on when the segment was listed as impaired and the resources available on an annual basis (See NHDES' Consolidated Assessment and Listing Methodology (CALM) document) to develop TMDLs for impaired waterbodies.

Assessment:

EPA New England concludes that the TMDL document meets the requirements for describing waterbody segments, pollutants of concern, identifying and characterizing sources of impairment, and priority ranking. These TMDLs are supported by the Statewide Bacteria Document which was approved in 2010 and are the most recent listings for bacteria impairment in waterbodies that do not currently meet NH water quality standards as identified on the 2014 NH 303(d) list. The site specific information provided in this submission, in conjunction with the Statewide Bacteria Document, satisfy the requirements for TMDL submission.

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 anti-degradation policy. Such information is necessary for EPA's review of the load and wasteload allocations that 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.

Water quality standards and classification for all surface waters have been established by the New Hampshire Legislature at RSA 485-A:8, I, II and V and in the New Hampshire surface water regulations (ENV-Wq1700). These standards provide numeric targets to reduce human health risk for indicator bacteria for all recreational waters based upon waterbody Class (either Class A or Class B, with most waters categorized as Class B) and whether the waterbody is classified as saltwater or freshwater. The numeric targets provide for both a geometric mean and single sample maximum criteria. *Escherichia coli (E. coli)* is the indicator for freshwater, *Enterococcus* is the indicator for saltwater and fecal coliform is the indicator for shellfish harvesting. These criteria can be found on pages 14-19 of the 2010 Statewide Bacteria TMDL document.

This TMDL document also provides waterbody specific reduction targets for both the geometric mean and the single sample maximum criteria when applicable (Table 2-1) for the purposes of implementation and education. These particular waterbodies exceed criteria for both the geometric mean and the single sample maximum criteria. The percent reductions are calculated in order to meet standards based on the highest value for a single sample and in the case of the geometric mean, the highest rolling value calculated for three samples within a sixty day period (or at least three samples separated by at least one day between sampling events).

Assessment:

EPA concludes that NHDES has properly presented and interpreted its numeric WQS for bacteria (Section 2, Statewide Bacteria Document) to set the appropriate load reduction targets. NHDES 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 that 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 result in attaining and maintaining the water quality criterion and have 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.

The loading capacity for each waterbody, or TMDL, is set equal to the water quality standard for bacteria for each waterbody classification (Appendix C). The loading capacity is expressed as both a concentration (bacteria count/100mL) and as a daily load in terms of mass per unit time (billions of bacteria per day as a function of flow for rivers/streams and as a function of daily replacement volume (flushing rate) for lakes/ponds/coastal embayments). NHDES provides both load targets because the Clean Water Act requires pollutant loads to be expressed as daily loads while the concentration load target is more practical for implementation, monitoring, compliance and public outreach. The load expressed as a concentration must be met at the end of pipe or as the ambient concentration in the waterbody and as such is conservative because it does not account for dilution in the waterbody or die off of bacteria within the waterbody. NH water quality standards require that standards for bacteria apply on a year round basis at all times; which combined with targets set equal to the water quality standards, provides protection for waterbodies under all conditions and during all seasons.

A TMDL is the sum of the Waste Load Allocation (WLA) and the Load Allocation (LA), plus a Margin of Safety (MOS) for a particular waterbody segment. The Margin of Safety is implicit for the concentration based load target and is explicit for the daily load target by assigning 10% of the total load as the Margin of Safety, leaving 90% of the load to be accounted for by current and future sources.

Table 2-1: Summary of Estimated Percent Reductions to Meet the TMDL for Bacteria in the Impaired Segments.

Watershed	Assessment Unit #	Waterbody Name	Primary Town	Impairment	% Reduction to meet TMDL	
					Geometric Mean	Single Sample
Winnepesaukee River	NHRIV700020201-16	JEWETT BROOK	LACONIA	Escherichia coli	57%	54%
Merrimack River	NHIMP700060402-02-05	COLONY BEACH, LOCKE LAKE	BARNSTEAD	Escherichia coli	42%	78%
Merrimack River	NHRIV700010404-01	PARK ASSOCIATION BEACH, GREAT POND	KINGSTON	Escherichia coli	67%	70%

Assessment:

NHDES has set the bacterial loading capacities of the impaired waterbodies equal to the water quality standards for bacteria for each particular class of waterbody. The loading capacities are expressed as daily loads in mass per unit of time (billions of colonies per day) which is required under the Clean Water Act, and as a concentration load (bacteria count/100mL) which is used for implementation and educational purposes. By setting the loading capacity equal to the water quality standard at the end of pipe, or as the ambient concentration in the waterbody (for the concentration method) and by reserving 10% of the load for present and future loads (for the mass per day method); NHDES has set the loading capacities and load reductions at conservative levels that will ensure the attainment of water quality standards. The direct link between water quality standards and loading capacity, combined with a conservative Margin of Safety, ensures that these waterbodies will meet designated uses of the immediate receiving water, as well as provide for protection of downstream uses under all circumstances (wet and dry weather conditions) on a daily basis throughout the year.

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 New Hampshire's water quality standards, or are set at zero for prohibited discharges (see sections 3.1.3 and 5.2 of the Statewide Bacteria TMDL document). For example, LAs for non-MS4 stormwater bacterial sources are established for Class A and B waters at designated beaches at 47/100 mL for the geometric mean of *E. coli* and 88/100 mL instantaneous, or "as naturally occurs" if the only source is wildlife. Possible sources of bacteria resulting from nonpoint sources are discussed in the Statewide Bacteria Document (see section 3.2 Non-point Sources of Pollution) which was approved in 2010.

Assessment:

EPA concludes that the TMDL document sufficiently addresses the calculation of the load allocations and identifies the possible sources of bacterial impairment.

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to existing and future point sources (40 C.F.R. § 130.2(h)). If no point sources are present or if the TMDL recommends a zero WLA for point sources, the WLA must be expressed as zero. If the TMDL recommends a zero WLA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero WLA implies an allocation only to nonpoint sources and background will result in attainment of the applicable water quality standard, and all point sources will be removed.

In preparing the wasteload allocations, it is not necessary that each individual point source be assigned a portion of the allocation of pollutant loading capacity. When the source is a minor discharger of the pollutant of concern or if the source is contained within an aggregated general permit, an aggregated WLA can be assigned to the group of facilities. But it is necessary to allocate the loading capacity among individual point sources as necessary to meet the water quality standard.

The TMDL submittal should also discuss whether a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur. In such cases, the State/Tribe will need to demonstrate reasonable assurance that the nonpoint source reductions will occur within a reasonable time.

Waste Load Allocations (WLAs) for waterbody classes are summarized in Tables 5-1, 5-2 and 5-3 (Statewide Bacteria Document) and are calculated in section 5.2 of the Statewide Bacteria Document. The methodology for calculating daily loads expressed as mass per unit time (billions of bacteria per day) is presented in Appendix C of the 3 NH Bacteria TMDLs Document.

Assessment:

EPA concludes that the TMDL document sufficiently addresses the calculation of the Waste Load Allocations.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA § 303(d)(1)(C), 40 C.F.R. § 130.7(c)(1)). EPA guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

The 3 NH bacteria TMDLs calculate loads both as a daily load (mass per unit time) and also as a concentration (bacterial colonies per mL) which results in an explicit Margin of Safety for the daily load calculation and an implicit Margin of Safety for the concentration calculation (pages 37-38 Statewide Bacteria Document). The Margin of Safety for the daily load calculation is 10% which leaves 90% of the calculated load for existing and future sources of bacterial inputs. The 10% Margin of Safety is reserved to account for uncertainty due to fluctuations in flow in rivers and waterbody volume in lakes or estuaries. The concentration based calculation has an implicit Margin of Safety due to the conservative application of the water quality standard for bacteria set as the allowable concentration in the waterbody, or as the allowable concentration at the end of pipe discharge to a receiving water. Typically once bacteria enter a waterbody they are subjected to in-stream processes such as dilution, settling and die-off resulting in lower concentrations of bacteria than the water quality standard.

Assessment:

EPA concludes that the approach used in setting the concentration based load provides an adequate implicit Margin of Safety to protect water quality in the receiving waterbody. The approach used in setting the daily load also provides an adequate margin of safety by providing for uncertainty in measuring flow and calculating waterbody volume.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The method chosen for including seasonal variations in the TMDL must be described (CWA § 303(d)(1)(C), 40 C.F.R. § 130.7(c)(1)).

The water quality standards for bacteria apply throughout the entire year and are not dependent upon wet weather events or dry weather conditions. The bacterial loads set in these TMDLs therefore apply year-round, under all conditions and are protective of water quality under any circumstance.

Assessment:

EPA concludes that the TMDLs are protective of water quality under all conditions during all seasons throughout the year.

8. Monitoring Plan

EPA's 1991 document, Guidance for Water Quality-Based Decisions: The TMDL Process (EPA 440/4-91-001), and EPA's 2006 guidance, Clarification Regarding "Phased" Total Maximum Daily Loads, recommend a monitoring plan when a TMDL is developed using the phased approach. The guidance indicates that a State may use the phased approach for situations where TMDLs need to be developed despite significant data uncertainty and where the State expects that the loading capacity and allocation scheme will be revised in the near future. EPA's guidance provides that a TMDL developed under the phased approach should include, in addition to the other TMDL elements, a monitoring plan that describes the additional data to be collected and a scheduled timeframe for revision of the TMDL.

The 3 NH bacteria TMDLs were not developed using a phased approach, and as such do not require a monitoring plan requiring EPA approval. However, NHDES provides the details of the monitoring plan and approaches that are used to monitor and assess NH waters for bacteria. The monitoring plan includes continued monitoring of NH's rivers through the Ambient Monitoring Program and continued testing of beaches through the Beach Inspection Program to ensure that swimming beaches are safe for the public. The NHDES Shellfish Program will continue to monitor year-round to make sure that shellfish areas receive the proper classification based on bacterial sampling. NHDES will continue to investigate complaints and inspect potential sources of bacterial contamination through the various state and volunteer monitoring programs to ensure compliance with water quality standards.

Assessment:

EPA concludes that the continued monitoring by NHDES and volunteers is sufficient to evaluate the adequacy of the TMDLs and attainment of Water Quality Standards, although not a required element for TMDL approval.

9. Implementation Plans

On August 8, 1997, Bob Perciasepe (EPA Assistant Administrator for the Office of Water) issued a memorandum, "New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)," that directs Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired solely or primarily by nonpoint sources. To this end, the memorandum asks that Regions assist States/Tribes in developing implementation plans that include reasonable assurances that the nonpoint source load allocations established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. The memorandum also includes a discussion of renewed focus on the public participation process and recognition of other relevant watershed management processes used in the TMDL process. Although implementation plans are not approved by EPA, they help establish the basis for EPA's approval of TMDLs.

NHDES addresses the implementation of these TMDLs in section 6 (pages 43-81) of the Statewide Bacteria Document. The document provides a framework to implement TMDLs on a watershed scale through the use of Best Management Practices (BMPs), stormwater controls, illicit discharge detection and elimination, Combined Sewer Overflow (CSO) controls, septic system management, effective nonpoint source watershed management and NPDES stormwater and point source management/permitting. The implementation plan also includes resources that stakeholders can utilize to develop management plans to identify and eliminate sources of bacterial pollution in their particular watershed.

Assessment:

NHDES has addressed the implementation plan, although it is not required. EPA is taking no action on the implementation plan.

10. Reasonable Assurances

EPA guidance calls for reasonable assurances when TMDLs are developed for waters impaired by both point and nonpoint sources. In a water impaired by both point and nonpoint sources, where a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur, reasonable assurance that the nonpoint source reductions will happen must be explained in order for the TMDL to be approvable. This information is necessary for EPA to determine that the load and wasteload allocations will achieve water quality standards.

In a waterbody impaired solely by nonpoint sources, reasonable assurances that load reductions will be achieved are not required in order for a TMDL to be approvable. However, for such nonpoint source-only waters, States/Tribes are strongly encouraged to provide reasonable assurances regarding achievement of load allocations in the implementation plans described in section 9, above. As described in the August 8, 1997 Perciasepe memorandum, such reasonable assurances should be included in State/Tribe implementation plans and "may be non-regulatory, regulatory, or incentive-based, consistent with applicable laws and programs."

The 3 NH bacteria TMDLs contain a combination of point and non-point sources of bacterial pollution. In all of these cases none of the point sources have been assigned lower load reductions based on any projected non-point source reductions, which eliminates the requirement for reasonable assurance in order for these TMDLs to be approvable by EPA. Even though

reasonable assurance is not required, NHDES does provide reasonable assurance through several programs including enforcement, technical assistance and water quality standards management programs.

Assessment:

Reasonable assurance is not necessary for this TMDL to be approvable, since the point sources are not given less stringent wasteload allocations based on projected nonpoint source load reductions. NHDES has provided reasonable assurance that Water Quality Standards will be met.

11. Public Participation

EPA policy is that there must be full and meaningful public participation in the TMDL development process. Each State/Tribe must, therefore, provide for public participation consistent with its own continuing planning process and public participation requirements (40 C.F.R. § 130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval must describe the State/Tribe's public participation process, including a summary of significant comments and the State/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment (40 C.F.R. § 130.7(d)(2)).

Inadequate public participation could be a basis for disapproving a TMDL; however, where EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for either by the State/Tribe or by EPA.

The draft TMDL report was released for public comment on August 6, 2015 and written comments were accepted until September 7, 2015. The draft report was posted to NHDES' website and the following groups were notified by phone, email and/or mail: the cities/towns with impaired waterbodies subject to the TMDLs, Lake or Watershed Associations associated with impaired waterbodies and EPA Region 1. NHDES received one comment from the City of Laconia asking if the Town of Gilford had been notified, to which NHDES responded that the Town of Gilford had in fact been notified.

Assessment:

EPA concludes that NHDES has involved the public during the development of the TMDLs and has provided adequate opportunities for the public to comment on the TMDLs.

12. Submittal Letter

A submittal letter should be included with the TMDL analytical document, and should specify whether the TMDL is being submitted for a technical review or is a final submittal. Each final TMDL submitted to EPA must be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State/Tribe's intent to

submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final submittal, should contain such information as the name and location of the waterbody, the pollutant(s) of concern, and the priority ranking of the waterbody.

The letter of submission accompanying the *Total Maximum Daily Load (TMDL) Report for 3 Bacteria Impaired Waters in New Hampshire* is dated September 24, 2015. NHDES clearly states that the Final TMDL document has been submitted to EPA for approval in accordance with Section 303(d) of the Clean Water Act. The submittal letter along with the appendices and public notice provide all of the required documentation necessary for approval of the 3 NH Bacteria TMDLs.

Assessment:

NHDES's letter of September 24, 2015 states that the TMDL is being formally submitted for EPA review and approval.