Total Maximum Daily Load (TMDL) Report

for 3 Bacteria Impaired Waters in New Hampshire

Final Report

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1. INTRODUCTION

1.1 Overview of 303(d) List and TMDLs

Section 303(d) of the Federal Clean Water Act (CWA) and Federal Water Quality Planning and Management Regulations (40 CFR Part 130) require states to place certain waterbodies that do not meet established water quality standards (WQS) on a list of impaired waterbodies, commonly referred to as the 303(d) List. In New Hampshire, the Department of Environmental Services (DES) is responsible for the 303(d) listing process. The 303(d) List is updated, issued for public comment and submitted to the United States Environmental Protection Agency (USEPA) for approval every two years. The 303(d) List includes surface waters that (1) are impaired or threatened by one or more pollutants, (2) are not expected to meet water quality standards even after implementation of technology-based controls, and (3) require a Total Maximum Daily Load (TMDL) study for the pollutant(s) causing the impaired or threatened status.   In general, surface waters on the 303(d) list can only be removed if (1) a TMDL has been conducted and approved by the USEPA, (2) there is sufficient evidence showing the waterbody is meeting water quality standards, or (3) the reasons for listing the waterbody as impaired were found to be in error.

A TMDL establishes the allowable loadings for specific pollutants that a waterbody can receive without exceeding water quality standards. Water quality standards include numeric and narrative criteria that must be met to protect the uses of the surface water such as swimming, boating, aquatic life, and fish/ shellfish consumption. The TMDL process maps a course for states and watershed stakeholders to follow that should lead to restoration of the impaired water and its uses.

1.2 Purpose of this Report

On September 21, 2010, the DES received approval from the USEPA of a statewide total maximum daily load (TMDL) report for bacteria impaired waters[1] (the Statewide Bacteria TMDL).   Bacterial contamination can render surface waters[2] unsuitable for uses such as swimming and shellfish consumption and may result from a variety of sources including human waste, excrement from barnyard animals, pet feces, and agricultural applications of manure.

The purpose of the Statewide Bacteria TMDL was to:

> 1. Provide documentation of impairment in each impaired waterbody segment;

> 2. Determine the TMDLs that will achieve water quality standards; and,

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[1] Final Report New Hampshire Statewide Total Maximum Daily Load . Prepared by F.B. Environmental Associates, Inc. for the New Hampshire Department of Environmental Services.   September, 2010.   A copy may downloaded from
http://des.nh.gov/organization/divisions/water/wmb/tmdl/categories/publications.htm.

[2] Surface waters are defined in Env-Wq 1702.46. Examples of surface waters include rivers, streams, lakes, ponds, tidal waters and certain wetlands.

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       3. Provide an estimate of the reductions necessary to achieve the TMDLs.

The Statewide Bacteria TMDL specifically addressed 379 bacteria impaired surface water segments (called assessment units or AUs) that were on the 2008 303(d) List of impaired waters. Since then, the 2014 303(d) list has been prepared which includes additional AUs impaired by bacteria. The purpose of this document is to provide TMDLs for 3 bacteria impaired AUs on the 2014 303(d) list. A complete list of the 3 impaired AUs is provided in Table 2-1 of this report.

Table 1-1 and Figure 1-1 show the number of bacteria impaired surface waters in each HUC-8 (Hydrologic Unit Code 8) watershed. As shown, the 3 impaired AUIDs are located in 2 of the 16 HUC 8 watersheds in New Hampshire and all of them are impaired for Escherichia coli (*E. coli*).

Table 1-1: Number of Bacteria Impaired Assessment Units in New Hampshire by Watershed

HUC 8 Watershed ID Number	HUC 8 Watershed Name	Number of Impairments
01070002	Winnipesauke River	1
01070006	Merrimack River	2
TOTAL		**3**

Figure 1-1: Map of 2014 Bacteria Impaired Waters in New Hampshire, by HUC 8 Watershed.
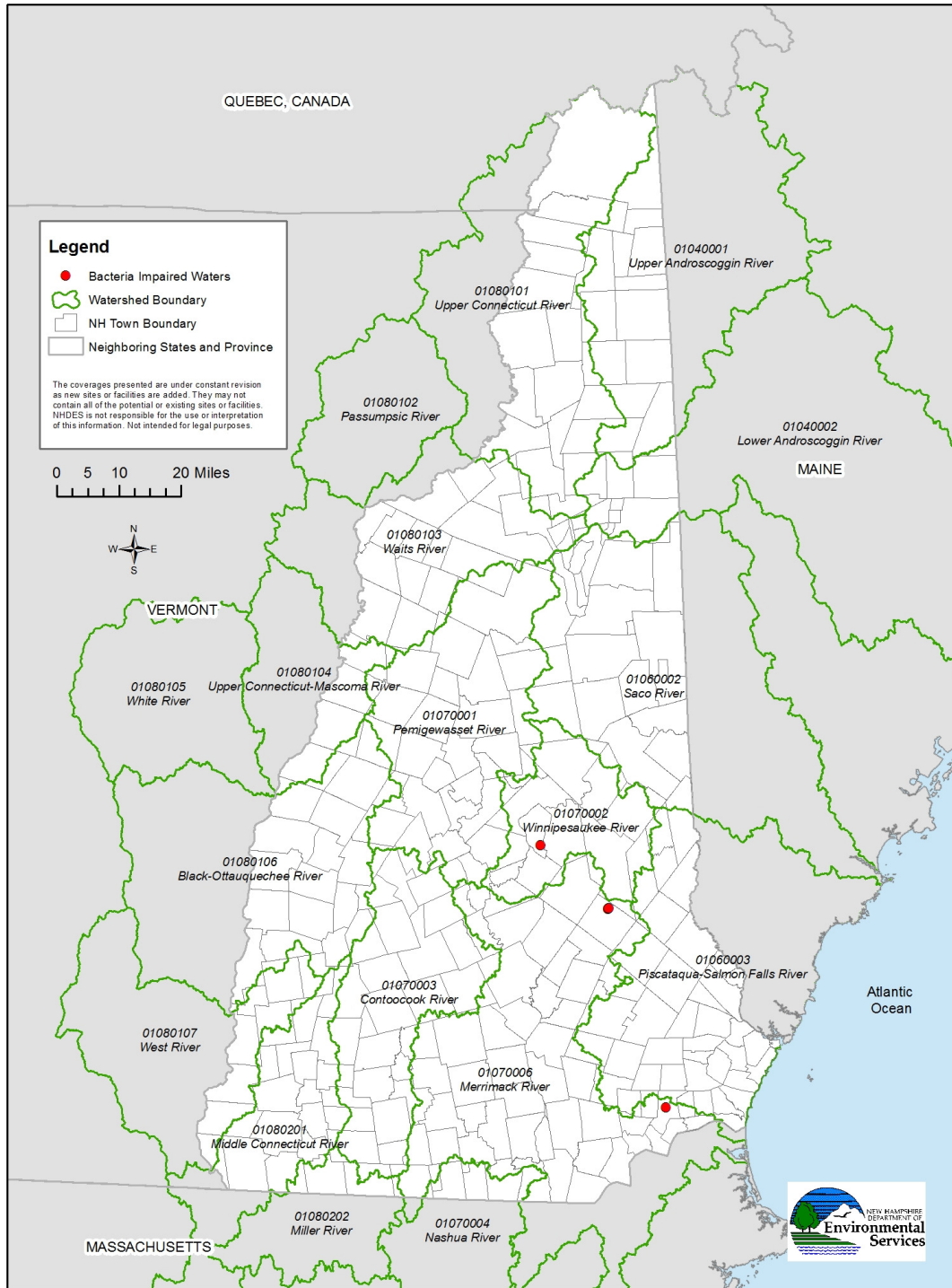
1.3 Where to Find TMDL Information for the 3 Impaired AUs

This report for 3 bacteria TMDLs serves as an extension of the approved Statewide Bacteria TMDL. As such it relies, in part, on portions of the Statewide Bacteria TMDL to satisfy federal TMDL requirements. A list of the various TMDL elements and where they are addressed is provided in Table 1-2.

Table 1-2: Where to Find Information for Each TMDL Element

TMDL Element	Where to find this information
Water Quality Standards for Bacteria **-** Includes an overview of potential pathogenic impacts of bacteria; the selection of indicator bacteria to assess pathogen levels in waterbodies; and; a brief summary of New Hampshire bacteria standards for surface waters.	Statewide Bacteria TMDL - section 2
Bacteria Pollution Sources– Defines point and non-point sources of bacteria pollution and provides examples of bacteria sources that affect New Hampshire's waterbodies	Statewide Bacteria TMDL - section 3
Bacteria Impaired Waters - Provides a brief introduction to all bacteria impaired waters in New Hampshire (based on the *2008 303(d) List*). This section also includes an overview of the 303(d) listing process; a summary of agencies that collect bacteria data in New Hampshire; and, a description of the TMDL prioritization process.	Statewide Bacteria TMDL - section 4
TMDL Development - Provides a description of the TMDL calculation process including the key required elements for TMDL development and includes concentration based TMDLs and associated wasteload and load allocations for freshwaters (primary contact recreation) and tidal waters (primary contact recreation and shellfish consumption).	Statewide Bacteria TMDL - section 5
Implementation Plan - Provides a description of the implementation process, including coordination with local stakeholders and development of watershed based plans, and a menu of mitigative actions (organized by type of source) to reduce bacteria loadings.	Statewide Bacteria TMDL - section 6. Additional site specific information on site investigations and recommended restoration measures can be found in Appendices A and B of this report.
Funding and Community Resources – Provides a description of funding sources available to address impaired waters in New Hampshire.	Statewide Bacteria TMDL - section 7
Watershed-Specific Bacteria Data Summaries and Reductions – For each HUC 8 watershed this section includes available bacteria data, reductions needed for each impaired segment, and GIS maps of HUC watersheds and land cover.	This document - section 2 and Appendices A and B
Public Participation – Includes a review of the process used to solicit public comment and DES' response to comments.	This document - section 3
TMDL Expressed as a Daily Load	This document - Appendix C
Examples of Detailed Implementation Plans to address bacteria impairment. One example is a Watershed-based Restoration Plan and the other is a Storm Drain Illicit Discharge Detention and Elimination Investigation.	Statewide Bacteria TMDL - section 9 and Appendices Q and R.

2.   WATERSHED-SPECIFIC BACTERIA DATA SUMMARIES AND REDUCTION ESTIMATES

2.1 Overview

As discussed in section 1.3 and as shown in Table 1-2, this TMDL document relies on many sections in the Statewide Bacteria TMDL approved in 2010 to address many of the federally required TMDL elements. However, specific bacteria information, including recommended restoration measures for each of the 3 impaired AUs are provided herein in Appendices A and B. Also included in this document is a description of the methodology used to estimate load reductions (see section 2.2), a summary of the estimated load reductions in each impaired AU (see Table 2-1), and an expression of the TMDL in terms of a daily Load (see Appendix C).

The bacteria data in Appendices A and B are organized by watershed with each appendix representing the HUC 8 watershed where the impaired water is located. In specific Appendix A includes the Winnipesauke River Watershed and Appendix B represents the Merrimack River Watershed.

Each watershed-specific appendix contains:

1. A description of the HUC 8 watershed (size, location, and major features).

2. A watershed map, showing the locations of the impaired segments within the HUC 8 watershed.

3. A land cover map, showing land cover types within the HUC 8 watershed.

4. Data tables with recent (within 10 years) bacteria data for each impaired segment (when available) and estimates of reductions needed to meet water quality standards.

2.2 Estimated Load Reductions for each Impaired AU

TMDL reductions necessary to meet water quality standards were calculated to provide a rough approximation of the level of pollution abatement effort needed. The estimate of percent (%) reduction needed is based on the difference between measured ambient bacteria data and the water quality criteria for bacteria. In a few cases, where segments were listed based on the presence of known sources rather than monitoring data, percent reductions were calculated based on presumed concentrations associated with the known sources. For each segment in Table 2-1, the basis for the calculation of the percent reduction (along with available monitoring data) is explained in the applicable appendix.

For segments impaired by *E. coli*, the necessary % reduction was calculated based on both single sample and geometric mean water quality standards. A more detailed description of the process used to estimate the % reduction necessary to achieve the water quality standard in each impaired segment is provided below:

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For E. coli impaired segments: Select highest concentration level of <u>single sample</u> indicator bacteria among all current samples (both dry and wet conditions) taken within an impaired segment. For the highest concentration of bacteria for the impaired segment, calculate the % reduction in bacteria levels needed to meet the appropriate single sample water quality criteria. For example, if the highest single sample value from a Class B impaired tidal segment is 1,000 enterococci/100mL, the % reduction needed to meet the single sample criterion is [(1000 – 104)/1000] x 100 = 89.6% reduction).

For all impaired segments: Select highest <u>geometric mean</u> value, based on a rolling average of at least 3 independent samples within an impaired segment collected within 60 consecutive days, or at least 3 samples collected at the same location within the impaired segment provided at least 2 of the samples are separated by a period of at least one day[3]. For the highest geometric mean value, calculate the % reduction in bacteria levels needed to meet the appropriate geometric mean water quality criteria.

While both single sample and geometric mean % reductions are presented, it is recommended that the reductions needed to attain the geometric mean be used (when available) for implementation planning purposes in most cases. Bacteria sampling results can be highly variable and the geometric mean helps to reduce undue influence of any one data point.

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[3] For more information on geometric mean calculation refer to the 2014 New Hampshire Consolidated Assessment and Listing Methodology report at:
http://des.nh.gov/organization/divisions/water/wmb/swqa/documents/2014calm.pdf.)

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

Watershed Name	Assessment Unit #	TMDL Priority	Waterbody Name	Primary Town	Impairment	% Reduction Needed to meet the TMDL for the Geometric Mean	% Reduction Needed to meet the TMDL for the Single Sample	Report Appendix #
Winnipesaukee River	NHRIV700020201-16	High	Jewett Brook	Laconia	Escherichia coli	57%	54%	App A, Section A1
Merrimack River	NHIMP700060402-02-05	High	Colony Beach, Locke Lake	Barnstead	Escherichia coli	42%	78%	App B, Section B1
Merrimack River	NHLAK700061403-06-05	High	Park Association Beach, Great Pond	Kingston	Escherichia coli	67%	70%	App B, Section B2

3. PUBLIC PARTICIPATION

EPA regulations [40 CFR 130.7 (c) (ii)] require that calculations to establish TMDLs be subject to public review. The Draft Report was released for public review and comment on August 6, 2015 and written comments were accepted through 4pm on September 7, 2015. The Draft Report and public notice announcing the availability of the draft report for public comment was posted on the DES TMDL website at: http://des.nh.gov/organization/divisions/water/wmb/tmdl/index.htm. The following were notified directly by phone, email and/or mail:

- Scott McPhies, City of Laconia Planning Department (and Volunteer Lake Sampler)
- City Clerk, City Council, City Manager, City of Laconia
- John Ayer, Town of Gilford Planning and Land Use Director
- Town Clerk and Town Administrator, Town of Gilford
- Glen Greenwood, Town of Kingston Planning Department/Conservation Commission
- Town Clerk, Selectmen, Town of Kingston
- Richard Coleman, Great Pond Park Association Beach, Town of Kingston
- Teresa Bailey, Locke Lake Colony Association Community Manager, Center Barnstead
- Town Clerk, Planning Board, Town of Barnstead
- EPA Region 1, Boston, MA

A copy of the public notice is provided at the end of this section (Figure 3-1 below).

Comments Received and DES Responses:

DES received an email from the City of Laconia asking if the report was provided to the Town of Gilford. DES responded that Town officials in Gilford were provided the public notice and draft report.

No substantive changes were made to the Final Report. Only minor editing changes were made.

Figure 3-1: Public Notice

Date: August 6, 2015

Subject: **PUBLIC NOTICE–New Hampshire Statewide Total Maximum Daily Load (TMDL) Report for 3 Bacteria Impaired Waters Available for Public Comment**

PUBLIC COMMENTS WILL BE ACCEPTED UNTIL 4 PM ON September 7, 2015

Dear Interested Party or Stakeholder:

Draft Total Maximum Daily Load (TMDL) reports for the following three bacteria impaired surface waters are now available for public comment:

> Jewett Brook in Laconia
> Colony Beach on Locke Lake in Barnstead
> Park Association Beach on Great Pond in Kingston

Copies of the reports are available on the New Hampshire Department of Environmental Services (DES) website at http://des.nh.gov/organization/divisions/water/wmb/tmdl/categories/publications.htm.

High levels of bacteria can indicate the presence of waterborne disease organisms, known as pathogens, which can pose a public health risk and render a surface water unsuitable for uses such as swimming and shellfishing (in tidal waters). Surface waters include rivers, streams, lakes, ponds, wetlands and tidal waters. Examples of bacteria sources include improperly treated human waste and storm water runoff that has come in contact with feces from domesticated animals (pets, barnyard animals, etc.) and wildlife.

The purpose of a TMDL is to calculate the amount of pollutant (such as bacteria) that a surface water can assimilate without exceeding State surface water quality standards. The allowable pollutant load is then allocated to specific sources. Another important goal of the TMDL process is to promote, encourage, and inform local community action for water quality improvement and protection of public health by addressing sources of bacterial contamination. To this end this report also provides valuable information to help communities, watershed groups and stakeholders to implement the TMDL in a phased, community-based approach that will ultimately result in attainment of water quality standards.

A summary of the bacteria data and estimates of the approximate percent reduction needed to meet water quality standards for bacteria in each impaired waterbody are provided. Recommended restoration measures are also provided.

Comments will be accepted until 4 pm on September 7, 2015. Only written comments will be accepted. All comments must include the name of the TMDL, the date and contact information (your name, address, phone, e-mail, and organization). If you require additional time, information about the project or background data/materials to facilitate your review and prepare and submit your comments please contact Margaret Foss, NHDES TMDL Coordinator at (603) 271-5448 or via email at margaret.foss@des.nh.gov.

Comments can be mailed to:	TMDL Program, NHDES Watershed Management Bureau, 29 Hazen Drive, P.O. Box Concord, NH 03302, Attention Margaret P. Foss, TMDL Coordinator
or emailed to:	TMDL@des.nh.gov

For convenience, a public comment cover sheet for submitting comments is available at http://des.nh.gov/organization/divisions/water/wmb/tmdl/documents/commentform.pdf. Use of the cover sheet is optional.