State of Maine

Department of Environmental Protection

Babel Brook, Ebeemee TWP

2016 Integrated Water Quality Monitoring and Assessment Report

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
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CHAPTER 1 PREFACE

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This document, which may be referenced as the 'Integrated Report', 'Report', or 'IR', is being submitted to fulfill biennial reporting requirements on both federal and state levels. The federal requirement arises from the Clean Water Act (CWA), particularly § 305(b) (state reports on water quality), § 303(d) (list of impaired waters), and § 314 (Clean Lakes Program). The state requirement arises from 38 Maine Revised Statutes (M.R.S.) § 464(3)(A) (report on the quality of the State's waters to the Maine Legislature). The Maine Department of Environmental Protection (The Department or DEP) assembles these reports with input from many sources, and recognizes that the § 305(b) Report and § 303(d) List are important ways of regularly communicating information on the health, current status and trends of the State's waters.

For the 2016 Integrated Report the Department has updated tabular summaries of water quality status (Appendices; Chapter 4 and Chapter 8) that appeared in the 2014 Integrated Report. Updates were primarily based on monitoring data collected in 2013 and 2014 although more recent data was consulted where appropriate.

Over the 2012 and 2014 reporting cycles, Maine DEP has fallen behind on timely submittals for the IR. In order to catch up, the Department compiled an abbreviated 2016 Report, in which only assessments for lakes/ponds and wetlands were updated based on two years' worth of data; for rivers/streams and estuarine/marine waters, assessments were updated for only a few select waterbodies[1], also based on 2013-14 data. Most of the remaining portions of the 2016 IR show the content of the 2014 Report unaltered, with the exception of the following:

- The Public Participation section in Chapter 2 was updated to reflect 2016 IR information.
- Table 2-1 and summary tables in Chapters 4 and 8 were updated as appropriate.
- A section describing the EPA's '303(d) Vision' was inserted in Chapter 3. Assessments for all waters that are part of Maine's Vision were reviewed and updated as necessary.
- Many river/stream segments, predominantly in Categories 1 and 2, were reviewed for accuracy. As a result of the review, several segments were newly mapped, their mapping was corrected, or they were split into new segments. Those changes are noted in Appendix II.
- Staff contacts were updated as appropriate, even if the information presented was not updated.

In the 2018 IR, all content will be updated based on either two years' worth of data (2015-16), or four years' worth (2013-16), as appropriate. The Department intends to complete the 2018 Report on time, i.e. by April 1, 2018.

In the Integrated Report, Maine waterbodies are assigned to one of five categories (or sub-categories) that describe water quality status (see Chapter 2, Executive Summary, and Chapters 4 and 5). Those waters that are currently listed under Category 5 represent "impaired waters" for purposes of the CWA § 303(d) list, and

[1] Waters for which DEP received new outside data and those for which the 2014 IR indicated that an update would be provided in the 2016 cycle.

require development and submission of a Total Maximum Daily Load (TMDL) report to the United States Environmental Protection Agency (EPA).

The 2016 Integrated Report provides:

- Delineation of water quality assessment units (AUs), identified by their 10-digit Hydrologic Unit Code (HUC) followed by a waterbody-specific code (Appendices II-IV) for rivers/streams, lakes/ponds and wetlands. Marine/estuarine waterbodies (Appendix V) are identified by a Waterbody ID, supplemented by the relevant Department of Marine Resources (DMR) Pollution Area code where necessary. River/stream AUs can be viewed using this ArcGIS Online Project (in development): http://arcg.is/Pf4K8;

  Note that the United States Geological Survey (USGS) has replaced the HUC system with the Watershed Boundary Dataset (WBD) system. Because of this conversion, a mismatch now exists between some HUCs used in the IR and current WBDs (former HUCs). DEP did not update the HUC part of any AU ID to conform to the new WBD system and is retaining the term 'HUC' to indicate continued usage of the older system.
- Water quality attainment status for river/stream, lake/pond, wetland and marine/estuarine AUs (Appendices II-V);
- Basis for the water quality standard attainment determinations for river/stream, lake/pond and marine/estuarine AUs (Chapter 4 and Appendices) and for wetland AUs (Chapter 5 and Appendix IV);
- Schedules for additional monitoring planned for certain AUs (Appendices II-IV);
- Identification of AUs requiring TMDL determinations and a schedule (priority) for those waters (Chapter 8, Tables 8-13 to 8-16, and Appendices II-V);
- Identification of waters that are part of Maine's implementation of EPA's '303(d) Vision'.

The 2016 Integrated Report presents State of Maine water quality assessment summaries for rivers/streams, lakes/ponds and wetlands that have been generated by the Assessment Database (ADB). The ADB is public domain software developed by EPA to improve states' ability to track and document water quality assessment results. While marine/estuarine assessment data are not currently stored in Maine's ADB, assessment results are reported in the Appendices to this Report. The Department plans to incorporate marine/estuarine waterbodies in the ADB over the next two years.

DATA SOURCES AND ACKNOWLEDGEMENTS

Outside Data Request

On September 29, 2016, the Department e-mailed approximately 160 interested parties (e.g. towns, governmental and non-governmental organizations, tribes, academia) a request to submit water quality data for inclusion in the 2016 Integrated Report. The text of that request follows and is italicized in order to differentiate it from other text contained in this Report.

Dear water quality data providers,

I am writing to notify you that The Maine Department of Environmental Protection is now receiving data that has been compiled under an approved Quality Assurance

Project Plan for inclusion in the 2016 biennial Integrated Water Quality Monitoring and Assessment Report to Congress [the 305(b)/303(d) water quality assessment report].

The Integrated Report provides an assessment of water quality for rivers and streams, lakes and ponds, wetlands, and marine and estuarine resources in Maine, as well as extensive information on the status of Maine's groundwater resources. The 2014 Report can be viewed at: www.maine.gov/dep/water/monitoring/305b/.

Attached please find a letter that provides background information for this invitation to submit data, and guidelines and required fields for data submission (ME_2016IR_DataRequestLetter.doc). An optional Data Submittal Form is available on request.

***Submissions should be sent to my attention by October 28, 2016**. Please do not hesitate to contact me if you have any questions about submissions for the 2016 Integrated Report.*

Thank you for your water quality interests and activities.

Susanne

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Integrated Water Quality Reports www.maine.gov/dep/water/monitoring/305b/
Water Quality Standards www.maine.gov/dep/water/wqs/

Sources of River and Stream Assessment Data

The Department generates much of the data for the assessment through the various monitoring programs it conducts, notably the Biological Monitoring Program, Surface Water Ambient Toxics (SWAT) Monitoring Program, the Atlantic Salmon Recovery Plan, and water quality studies of specific rivers and streams that inform waste load allocation and TMDLs. Additionally, data are provided from a variety of professional and volunteer monitoring groups. These include other Maine state agencies and resources [Department of Inland Fisheries and Wildlife (DIF&W), Atlantic Salmon Commission, Department of Health and Human Services (DHHS), University of Maine System], federal agencies (EPA, USGS, National Park Service), other governmental agencies (Saco River Corridor Commission, St. Croix International Waterway Commission), tribes (Penobscot Indian Nation, Houlton Band of Maliseet Indians) and a number of volunteer watershed groups and conservation organizations that are working cooperatively with Department staff under the Maine Volunteer River Monitoring Program (VRMP) and that follow an EPA approved Quality Assurance Project Plan (QAPP), or that follow monitoring practices specifically approved by DEP (watershed councils of the Dennys, East Machias, Machias, Pleasant, Narraguagus, Ducktrap and Sheepscot Rivers, Presumpscot River Watch, Royal River Conservation Trust, The Nature Conservancy, Friends of Merrymeeting Bay).

Sources of Lake Assessment Data

The Department's Lake Assessment Section manages much of the data collected from lakes within the state. A strong partnership with the Maine Volunteer Lakes Monitoring Program (VLMP, Inc.) assures the quality and comparability of the data collected through numerous regional entities and local lake associations. Regional entities include Cobbossee Watershed District, Lakes Environmental Association, St. Croix International Waterway Commission, Allagash Wilderness Waterway, Passamaquoddy Tribe at Indian Township, Penobscot Indian Nation, Portland Water District, Auburn Water District, Acadia National Park, and Rangeley Lakes Heritage Trust. Data has also been acquired from private consultants (such as Lake and Watershed Resource Management Assoc., FB Environmental, Biodiversity Research Institute, Florida Power and Light - as part of regulatory requirements) and water utilities that belong to the Maine Water Utility Association. Additional data is acquired through the DIF&W and through cooperative projects with the University of Maine System, Colby College, Unity College, Soil and Water Conservation Districts and similar entities. Data collected under probability-based studies conducted within EPA Region I and as part of the National Lake Assessment Study being conducted by EPA Headquarters is also considered.

Sources of Wetlands Assessment Data

The Department generates most of its assessment data for wetlands through the Biological Monitoring Program (see Chapter 5 for additional information). Wetland biomonitoring is coordinated with the State's river and stream Biological Monitoring Program using a 5-year rotating basin schedule. At present, annual wetland monitoring is primarily focused on lacustrine and riverine fringe wetlands. Under Maine's Water Classification Program, wetlands are classified with associated surface waters. Wetlands that are part of great ponds or natural lakes and ponds less than 10 acres in size are considered GPA waters. All freshwater wetlands not classified as GPA waters are classified under §§ 467 and 468 (Classification of Major River Basins and Classification of Minor Drainages) according to the drainage basin in which they occur and the classification of associated water bodies. The 2016 Integrated Report includes class attainment determinations for monitored wetlands based on DEP biologists' expert evaluation of macroinvertebrate community structure and function and statutory narrative aquatic life use criteria (38 M.R.S. § 465). Data for permitted wetland gains and losses is provided through the DEP Wetland Loss Tracking System maintained by the Division of Land Resources.

Sources of Marine Assessment Data

The Department has utilized data for marine assessments from its own environmental and toxics monitoring programs, the Marine Environmental Monitoring Program and SWAT program, as well as the Gulfwatch project operated by the Gulf of Maine Council on the Marine Environment, and a variety of governmental agencies, academic institutions, non-profit organizations and municipalities, including the following: Maine Healthy Beaches program, DMR, New Hampshire Department of Environmental Services, University of Maine, Bowdoin College, BioDiversity Research Institute, Casco Bay Estuary Partnership, Kennebec Estuary Land Trust,

Marine Environmental Research Institute, Mount Desert Island Biological Laboratory, Town of Rockport Conservation Commission, and the Wells National Estuarine Research Reserve. Additionally, a number of volunteer monitoring groups survey Maine's estuarine and coastal waters, including the Maine Coastal Observing Alliance, Friends of Casco Bay, Kennebec Estuary Land Trust, Mousam and Kennebunk Rivers Alliance, Midcoast Conservancy (formerly Sheepscot Valley Conservation Association), and Spruce Creek Association. The Department currently accepts data from organizations with approved QAPPs whose monitoring programs and analytical labs enable collection and processing of quality data, and from selected organizations with Department-approved sampling plans.

CHAPTER 2 EXECUTIVE SUMMARY, PUBLIC PARTICIPATION AND RESPONSE TO COMMENTS

EXECUTIVE SUMMARY

Surface Waters

Updates to water quality assessments for the 2016 Integrated Report were primarily based on monitoring data collected in 2013 and 2014, although more recent data was consulted where appropriate. For rivers/streams and estuarine/marine waters, assessments were updated for only a few select waterbodies[1], also based on 2013-14 data. The report continues to base assessments of rivers/streams, lakes/ponds, wetlands and marine/estuarine waters on the five main listing categories that were initially established for these waters in the 2002 report. These five main assessment categories are as follows:

Category 1: Attaining all designated uses and water quality standards, and no use is threatened.

Category 2: Attains some of the designated uses; no use is threatened; and insufficient data or no data and information is available to determine if the remaining uses are attained or threatened (with presumption that all uses are attained).

Category 3: Insufficient data and information to determine if designated uses are attained (with presumption that one or more uses may be impaired).

Category 4: Impaired or threatened for one or more designated uses, but does not require development of a TMDL (Total Maximum Daily Load) report.

Category 5: Waters impaired or threatened for one or more designated uses by a pollutant(s), and a TMDL report is required.

Section 4-1 on Assessment Methodology contains more detailed information on the listing categories and sub-categories.

SUMMARY OF CHANGES

The size and percentage results from the 2014 and 2016 Integrated Reports (Table 2-1) are not exactly comparable due to changes in assessment and mapping technology over the years and correction of errors, but they provide an approximation of changes in the total amount of waters in each category. For rivers and streams, the mapping technique that is used includes in listed segments any non-riverine portions of a river or stream, such as where it flows through a lake. This leads to an overestimate of the total river/stream length in any category.

For rivers and streams, there were increases in terms of mileage in Categories 1, 2 and 4, and decreases in Categories 3 and 5. For Categories 1 and 2, the increases were entirely due to new mapping of several AUs using higher resolution mapping technology. Category 3 decreased by 7 miles as five waters were removed and the mapping was updated for three waters. Category 4 increased by 119 miles as 21 waters were added and one was removed. Category 5 decreased by 115 miles as three waters were added and 21 were removed.

[1] Waters for which DEP received new outside data and those for which the 2014 IR indicated that an update would be provided in the 2016 cycle.

Table 2-1 reveals that the lakes and ponds of Maine were stable (as a percentage of total assessed waters) with respect to their listing categories over the period from 2014 to 2016 as no lakes were moved among the attainment Categories.

For wetlands, there were increases in all categories. The increases in Category 1 and 2 were due to new waters being added; one segment in Category 1 totaling 15 acres, and two segments in Category 2 totaling 290 acres. The remaining increase in Category 2 is the result of previously included waters being entered into the ADB and thus newly included in the summations presented in Table 2-1. Category 3 increased by 672 acres, as three waters were added, 1 water was removed, and the size of one water was corrected. Category 4 increased as two waters were added (one water each to 4-A and 4-C). Category 5 remained the same in number of waters, but increased by 8 acres due to the use of higher resolution mapping technology.

For marine waters, there were no changes made to Categories 1, 2, 3, 4-A(a), 4-A(b), 4-B-1, 5-B-1(c), or 5-D. Updates were made to the impairments comments for Categories 4-C and 5-A, but did not affect the segment sizes. Five segments in Category 5-B-1(a) that were approved for shellfish harvest as of 2012 were accidentally omitted from the 2014 report, and have been included for the current report. Category 5-B-1(b) was updated with revised Waterbody IDs for two segments in Bar Harbor whose 2014 report Waterbody IDs did not distinguish between identical bacteria listings.

Table 2-1 Summary of Changes to Surface Water Assessment Categories – 2014 to 2016

Note: These figures do not include waters listed under Category 4-A for atmospheric deposition of mercury. 'n/a' means 'not applicable'.

Rivers and Streams						
32,109 = Total Miles Assessed in 2014						
35,029 = Total Miles Assessed in 2016						
	2014 Miles in Category [1]	**% of Total 2014 Assessed Miles**	**2016 Miles in Category [2]**	**% of Total 2016 Assessed Miles**	**% Change '14 - '16**	**Change in Miles '14 - '16**
Category 1	4,832	15.0	5,958	17.0	2	1,126
Category 2	25,543	79.5	27,343	78.1	-1.4	1,800
Category 3	370	1.2	361	1.1	-0.1	-9
Category 4	298	0.9	417	1.3	0.4	119
Category 5	1,066	3.3	951	2.9	-0.4	-115
Lakes						
986,952 = Total Acres Assessed in 2014						
986,952 = Total Acres Assessed in 2016						
	2014 Acres in Category	**% of Total 2014 Assessed Acres**	**2016 Acres in Category**	**% of Total 2016 Assessed Acres**	**% Change '14 – '16**	**Change in Acres '14 - '16**
Category 1	295,443	29.9	295,443	29.9	0	0
Category 2	606,945	61.5	606,945	61.5	0	0
Category 3	0	0	0	0	0	0
Category 4	75,915	7.7	75,915	7.7	0	0
Category 5	8,649	0.9	8,649	0.9	0	0

Table 2-1 Summary of Changes to Surface Water Assessment Categories – 2014 to 2016 (continued)

Wetlands						
4,166 = Total Acres Assessed in 2014						
6,445 = Total Acres Assessed in 2016						
	2014 Acres in Category [1]	**% of Total 2014 Assessed Acres**	**2016 Acres in Category [2]**	**% of Total 2016 Assessed Acres**	**% Change '14 – '16**	**Change in Acres '14 - '16**
Category 1	0.00	0.0	15	0.2	0.2	15
Category 2	2,496	60.0	3,870	60.0	0.0	1,374
Category 3	1,110	26.6	1,782	27.6	1.0	672
Category 4	206	4.8	416	6.5	1.7	210
Category 5	354	8.5	362	5.6	-2.9	8
Marine Waters						
1,840,147 = Total Acres Assessed in 2014						
1,840,147 [3] = Total Acres Assessed in 2016						
	2014 Acres in Category	**% of Total 2014 Assessed Acres**	**2016 Acres in Category**	**% of Total 2016 Assessed Acres**	**% Change '14 - '16**	**Change in Acres '14 - '16**
Category 1	0.00	0.00	0.00	0.00	0.00	0.00
Category 2	10,953[4]	n/a	10,953[4]	n/a	n/a	0.00
Category 3	2,232	<0.01	2,232	<0.01	0.00	0.00
Category 4 [6]	2,767	<0.01	2,767	<0.01	0.00	0.00
Category 5 [7]	251,837[7]	13.69	272,246 [7]	14.79	1.1	20,409

[1] Single-Category Reporting miles as generated by final 2014 cycle ADB.

[2] Single-Category Reporting miles as generated by final 2016 cycle ADB.

[3] This value was carried forward from 2014 instead of updating it to a summation of 2016 Categories 2-5. Such a summation would have resulted in a significant underestimate of total acres assessed due to the significant underestimate of Category 2 waters (see footnote 5).

[4] This acreage is the sum of the only 2 (out of 21) AUs that have thus far been quantified; it is therefore a significant underestimate. For that reason, the remaining three fields in this table have been populated with 'n/a' for this category.

[5] Variable additional miles due to Combined Sewer Overflow waters.

[6] All estuarine and marine waters capable of naturally supporting lobster propagation are affected by a shellfish (lobster tomalley) consumption advisory due to the presence of PCBs and dioxins. A statewide marine consumption advisory for several saltwater finfish and shellfish species is also in effect based on elevated mercury, PCB and dioxins. Category 5 acreage does not include marine waters under these statewide consumption advisories.

[7] 2016 acreage is an overestimate due to the possible overlap in segment areas between Category 5-B-1 (a), (b) and (c).

All freshwaters in Maine are listed for an impaired Fish Consumption Use caused by mercury from sources beyond the region; river and stream miles affected by this statewide listing are not recorded in Table 2-1. These waters were listed in Sub-Category 5-C in the 2006 Integrated Report. On December 20, 2007, EPA approved a Regional Mercury TMDL, which allowed these waters to be moved to Category 4-A in the 2008 cycle. The New England States and New York developed the Regional Mercury TMDL to address mercury impairments caused by sources outside the Region. The State of Maine has already taken aggressive action to reduce sources of mercury within the State's jurisdiction. Further action will be required from sources outside the State's boundaries to provide the desired reduction of mercury in Maine's waters. Category 5-D, Legacy Pollutants, includes many mainstem river segments that are listed for non-attainment of the Fish Consumption Use due to PCBs in fish tissue.

WETLANDS

In 1998, Maine DEP began development of a biological monitoring and assessment program for freshwater wetlands as part of the Biological Monitoring Program. The Program provides water quality information for a wide array of programs, and includes ambient monitoring, evaluation of water quality classification attainment, and assessment of risks and impacts.

The wetlands initiative currently focuses on aquatic macroinvertebrates as indicators of wetland ecological integrity, and is engaged in building capacity to assess multiple biological assemblages including algae and plant communities. Since 2010, the Biological Monitoring Program has included provisional aquatic life use attainment determinations for wetlands in this report.

GROUNDWATER

The Groundwater Program is described in Chapter 6. Responsibility for groundwater resource assessment and protection is shared among the DEP, the Department of Health and Human Services' (DHHS) Division of Environmental Health, the Maine Geological Survey (MGS) in the Department of Agriculture, Conservation, and Forestry (DAFC)), and the U. S. Geological Survey (USGS). Other agencies, such as the Department of Transportation (DOT) may investigate groundwater contamination problems in certain areas. DOT also contributes to groundwater protection through management practices that are designed to reduce the risk of harm to groundwater quality.

A significant portion of Maine's groundwater may be threatened by contamination, particularly in unforested areas, which comprise approximately 11% of the State. Drinking water quality is an issue that carries significant public concern for both private and public well supplies. Public interest in groundwater is primarily focused on its use as a drinking water supply (groundwater provides 60% of all human demand and 75% of livestock demand statewide) and on its use as a source of process water for industry. Water from numerous wells in Maine has been rendered unpotable by pollution from specific point sources as well as from nonpoint source pollution. Important sources of groundwater contamination in Maine include disposal activities such as septic systems and landfills, leaking storage facilities, agriculture, spilled hazardous materials, winter salt applications, or previously unregulated activities.

Monitoring of groundwater in Maine is either site-specific or generalized. Monitoring at a particular site is typically done to gather data on water quality impacts of particular activities, and may or may not be research-related. Most of the groundwater data collected in Maine is the result of permit conditions, enforcement agreements or impact assessments. With the advent of the Environmental and Geographic Analysis Database (EGAD) at DEP, many of these data which are potentially useful for research purposes have been made public in report or map form. This effort enhances the ability of DEP to communicate and report groundwater and other data to EPA and other state or federal agencies, and to share information with the general public.

Ambient monitoring refers to large-area, long-term monitoring conducted to obtain trend information on groundwater quality or quantity. MGS and USGS carry out these types of monitoring projects under several cooperative agreements. MGS and USGS

maintain a statewide network of groundwater observation wells to track changes in water quality and quantity. For the purpose of this report, data derived from the DHHS Public Water Supply Monitoring Program are used as ambient groundwater quality data. The samples tested are from single-source untreated public water supply wells.

Major impediments to effective groundwater protection in Maine include a lack of data to quantify the impact of some nonpoint pollution sources, and general public unfamiliarity with key groundwater concepts and issues. Public misconception about groundwater is probably the major factor contributing to degradation of this resource. The development of a comprehensive and accessible database for water data (Environmental and Geographic Analysis Database, EGAD) has increased the accessibility of the wide variety of data collected on water quality by various state agencies. Continuing use of this database will improve operations at the agencies responsible for groundwater protection and assessment, and allow access to data on which to base educational efforts to increase the public's awareness of groundwater issues. Relative to groundwater protection, the principal uses of this database are to (1) help design clean-up strategies in areas of known contamination; (2) plan future development that provides for better protection of public health and safety; (3) assist in prioritizing protection of sensitive groundwater and surface water bodies, wetlands, and other resources; (4) enhance understanding of the spatial relationships between water resources and population as they relate to potential or known pollution sources; and (5) assess the flow and transport interrelationships between ground- and surface water, in order to evaluate groundwater impacts on surface water bodies and on groundwater-dependent habitat.

PUBLIC PARTICIPATION

Process to Solicit Public Comments

The following subsections detail the actions taken by the Department to promote the public's knowledge of the existence and availability of the draft version of the 2016 Integrated Water Quality Monitoring and Assessment Report' [Integrated Report or Report, formerly known as the 305(b) Report] and to solicit comments from the public on the contents and conclusions of the draft report. The official period of time that the draft Report was available for public comment was from May 15 to the close of business on June 14, 2017.

In addition to the public comment process outlined below, the draft Report was reviewed internally by Department staff and by EPA staff.

REPORT POSTING ON THE DEPARTMENT'S WEBSITE

On May 15, 2017, the Department posted the draft 2016 Integrated Report as two digital files in the Adobe® Portable Document Format (PDF) on the public comments section of the Department's website: www.maine.gov/dep/comment/. The text that accompanied the website posting follows and is italicized in order to differentiate it from other text contained in this Report.

Opportunity for Comment

Draft 2016 Integrated Water Quality Monitoring and Assessment Report

The Maine Department of Environmental Protection has prepared the draft "2016 Integrated Water Quality Monitoring and Assessment Report" for submission to the U.S. Environmental Protection Agency (EPA) as required by §§ 303(d) and 305(b) of the Clean Water Act, and in fulfillment of the reporting requirements of 38 M.R.S. § 464(3)(A) of the State of Maine's Water Classification Program. This report is available for public comment until 5:00 PM, June 14, 2017. Reviewers of the document should pay particular attention to the listing methods required by the EPA for surface water assessments in this report. These methods are described in Chapter 4 of the document. Specific waterbody attainment and impairment assignments can be found in the Appendices.

Comments become part of the public record and are published in the final version of the Report. All comments should be sent to:

By email: IRcomments.DEP@maine.gov
By fax: 207-287-7826

Susanne Meidel
Maine Department of Environmental Protection
State House Station 17
Augusta, ME 04333-0017

www.maine.gov/dep/comment/

The Department offers subscription services for a variety of DEP publications and announcement. The public comment notice for the draft 2016 Integrated Report was e-mailed to subscribers to public comment opportunities and to rulemaking changes. Hard copies of the draft report were made available to the public on request.

MAILING TO INTERESTED PARTIES

During the week of May 15, 2017, approximately 180 interested parties (e.g. towns, non-governmental organizations, tribes) received notice of the draft Report availability directly via e-mail. The text of that notice follows and is italicized in order to differentiate it from other text contained in this Report.

Maine's DRAFT 2016 Integrated Water Quality Monitoring and Assessment Report

Available for Public Comment until June 14, 2017

The Department of Environmental Protection has prepared the draft "2016 Integrated Water Quality Monitoring and Assessment Report" for submission to the U.S. Environmental Protection Agency (EPA) as required by §§ 305(b) and 303(d) of the Clean Water Act, and in fulfillment of the reporting requirements of 38 M.R.S. § 464(3)(A) of the State of Maine's Water Classification Program.

This report is available for public comment until June 14, 2017. Reviewers of the document should pay particular attention to the categories and listing methods required by the EPA for the surface water assessments in this report. These methods are described in Chapter 4. Specific surface waterbody attainment and impairment assignments can be found in the Appendices (a separate file). The appendices are broken into four waterbody types: rivers/streams, lakes, wetlands and estuarine/marine waters. Categories 1-3 are for waters that are not impaired, categories 4 and 5 are for waters or water segments that are impaired for one or more uses.

The draft documents (two .pdf files) can be found on the Department's website at: www.maine.gov/dep/comment/

We encourage you to review the document and provide comment on this year's report. Comments become part of the public record and are published in the final version of the Report. Comments should be sent to:

By email: IRcomments.DEP@maine.gov
By fax: 207-287-7826

Susanne Meidel
Maine Department of Environmental Protection
State House Station 17
Augusta, ME 04333-0017
Susanne.K.Meidel@maine.gov

LEGAL NOTICE

During the week of May 15, 2017, the Department published a legal notice in four daily newspapers around the state. Those newspapers (and approximate current weekday circulations) were as follows: Bangor Daily News (33,700), Kennebec Journal (8,500), Lewiston Sun Journal (42,000), and Portland Press Herald (39,200). The text of the legal notice follows and is italicized in order to differentiate it from other text contained in this Report.

Legal Notice

Maine Department of Environmental Protection

Notice of Public Comment Opportunity for the Draft "2016 Integrated Water Quality Monitoring and Assessment Report"

The Department of Environmental Protection has prepared the draft "2016 Integrated Water Quality Monitoring and Assessment Report" for submission to the U.S. Environmental Protection Agency (EPA) as required by §§ 303(d) and 305(b) of the Clean Water Act, and in fulfillment of the reporting requirements of 38 M.R.S. § 464(3)(A) of the State of Maine's Water Classification Program. This report is available for public comment until 5:00 PM, June 14, 2017. Reviewers of the document should pay particular attention to the listing methods required by EPA for surface water assessments in this report. These methods are

described in Chapter 4 of the document. Specific waterbody attainment and impairment assignments can be found in the Appendices.

The report (two .pdf files) may be found on the Department's website at: www.maine.gov/dep/comment/

Comments become part of the public record and are published in the final version of the Report. All comments should be sent to:

By email: IRcomments.DEP@maine.gov
By fax: 207-287-7826

Contact:
Susanne Meidel
Maine Department of Environmental Protection
State House Station 17
Augusta, ME 04333-0017

Summary of Public Comments and Responses

The Department received one comment letter during the official public comment period and wishes to thank the submitter for their input. The comments we received are paraphrased and presented in italic typeface below, followed by the DEP response.

CATEGORY 4-C LISTINGS

Comment from:

- Landis Hudson, Maine Rivers

Maine Rivers has an interest in restoring river segments where diadromous fish populations have been extirpated. As such we would like the Department to consider a list of 17 river and stream segments as candidates for inclusion in the list of impaired waters in "Category 4-C: Impairment is not caused by a pollutant. Waters impaired by habitat modification (e.g. a dam) that is a result of human activity.". We believe that these river or stream sections do not support the aquatic life standards of Title 38 MRSA § 465 since one or more indigenous fish species are not supported and the segments are therefore in nonattainment.

MDEP Response:

Inclusion of waters in any impairment category requires careful analysis of available data. Listing waters for fish passage impairment additionally requires consultation with outside agencies such as the Maine Department of Marine Resources. In response to this comment, the Department will review the submitted list of river and stream segments for potential inclusion in Category 4-C in the 2018 Integrated Report.

LISTING GUIDANCE FOR CATEGORY 4-C

Comment from:

- Landis Hudson, Maine Rivers

We ask that the Department provide better listing guidance for Category 4-C.

MDEP Response:

The current definition of a Category 4-C water ["Impairment is not caused by a pollutant. Waters impaired by habitat modification (e.g. a dam) that is a result of human activity"] has been used since the 2004 Integrated Report. For the 2016 Integrated Report, EPA provided updated guidance on Category 4-C listings, largely to address the effects of climate change and extreme weather events and also the effects hydrologic or habitat alteration. Because the Department compiled an abbreviated 2016 Report (see page 5 above), the listing language for Category 4-C waters was not updated based on new EPA guidance for two primary reasons. First, a substantive change in the listing language could have caused a discrepancy between the 4-C listings that were carried over unchanged from the 2014 report, which was based on the 2014 listing language, and the updated 2016 language. Second, a substantive change in the listing language for any category would require a review of all existing listings to determine whether the updated language would affect them in any way, and a consideration of other waterbodies that might now fall into the updated category. Such an approach would have been incompatible with an abbreviated report. The Category 4-C listing language will be updated for the 2018 Integrated Report.

CHAPTER 3 BACKGROUND

STATE ATLAS

Contact: Vicki Schmidt, DEP, BWQ, DEA

Tel: (207) 485-1482 email: Vicki.L.Schmidt@maine.gov

The State of Maine has a total surface area of over 35,000 square miles, the most in New England, with terrestrial land occupying almost 31,000 square miles and the larger surface waters occupying nearly 4,500 square miles. With a population of approximately 1.3 million people, Maine also is the least densely populated state in New England. The majority of Maine's population is concentrated in the southern and coastal portions of the State, and along both sides of Interstate 95 south of Bangor. Due to these geographical characteristics, regional population densities vary considerably from the state's average population density.

The 5,780 lakes and ponds that are tracked in Maine's ADB cover 986,952 acres, an area that is larger than the State of Rhode Island. There are over 7,000 perennial brooks, streams and rivers in Maine, ranging in length from less than two miles to nearly 200 miles, with an estimated total length of almost 31,000 miles.

Since 2009 Maine has been developing hydrography and GIS-related water programs utilizing the National Hydrography Dataset (NHD). NHD has significantly increased the accuracy of efforts to measure and categorize Maine's coastline, rivers, streams, lakes and ponds. Additionally, access to modern and updated high-resolution aerial photography has improved Maine's ability to determine land use and both human-caused and naturally-occurring changes to our state's terrestrial conditions.

The State Atlas section of the 2012 Report included statistical results from the 2007 Census of Agriculture. The 2014 State Atlas section includes results for agriculture from the 2012 Census of Agriculture conducted and compiled by the U.S. Department of Agriculture (USDA) Economic Research Service (complete report available at: www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_1_State_Level/Maine/).

Maine's survey reports for all types of agriculture in 2012 include a total of 2,272 square miles of land in agricultural production. This is approximately 6.9% of the total land area of the State of Maine. Of these 2,272 square miles, 32.8% are in croplands, 53.2% in forested woodland and pastureland, 5.6% in pasture land, and 8.3% in buildings, roads, and wasteland.

Table 3-1 The 2012 Integrated Report State of Maine Atlas

Population or Natural Resource Category	Value Reported for 2014[1]	Percent	Value Reported for 2012[2]
State Population 2010 National Census Data	**1,328,361**	**100.0%**	**1,328,361**
Rural 552, 638 Urban 775,723			
Total State Area (square miles) [3]	**35,236.4**	**100.0%**	**35,236.4**
Total Fields (square miles) [3]	**1,546.5**	**4.4%**	**1,546.5**
Blueberry Fields	100.9	0.3%	100.9
Grassland / Herbaceous	57.9	0.2%	57.9
Pastureland / Hayland	644.8	1.8%	644.8
Cultivated Crops	742.9	2.1%	742.9
Total Land in Agricultural Production (square miles) [4]	2,105		2,105
Farmland in conservation wetland or reserve programs	19.7		19.7
Organic Certified crops, pasture, & rangeland	76.5		76.5
Total Forest (square miles) [3]	**24,666.9**	**70.0%**	**24,666.9**
Recent Clearcut	163.6	0.5%	163.6
Regenerating Forest (Post 1995)	720.3	2.0%	720.3
Light Partial Cut (Post 1995)	2,285.1	6.5%	2,285.1
Heavy Partial Cut (Post 1995)	1,199.9	3.4%	1,199.9
Deciduous Forest	4,745.5	13.5%	4,745.5
Mixed Forest	8,899.4	25.3%	8,899.4
Evergreen Forest	6,653.0	18.9%	6,653.0
Total Scrub-Shrub (square miles) [3]	**1,186.4**	**3.4%**	**1,186.4**
Total Wetlands (square miles) [3]	**2,376.9**	**6.7%**	**2,376.9**
Wetlands	816.1	2.3%	816.1
Forested Wetland	1,560.8	4.4%	1,560.8
Total Open Water Surface Area (square miles) [3]	**4,210.7**	**11.9%**	**4,210.7**
Total Saltwater Surface Area (square miles)	not reported	n/a	not reported
Total Unconsolidated Earth-Material Shorelines (square miles) [3]	**225.3**	**0.6%**	**225.3**
Total Developed Lands and Paved Ways (square miles) [3]	**972.0**	**2.8%**	**972.0**
Developed - Open Space	175.1	0.5%	175.1
Developed - Low Intensity	169.1	0.5%	169.1
Developed - Med Intensity	95.4	0.3%	95.4
Developed - High Intensity	98.5	0.3%	98.5
Road / Runway	433.9	1.2%	433.9
Total Alpine / Tundra (square miles) [3]	**10.3**	**0.0%**	**10.3**
Total Bare Ground (square miles) [3]	**41.5**	**0.1%**	**41.5**
Total Miles of Coastline (including tidal rivers & shorelines of islands) [5]	**2,756.6**	**100%**	**2,756.6**
Total Miles of Border Coast, Lakes & Rivers Shared with CN and NH [6]	**338.9**	**100%**	**338.9**
Maine – Canadian Border (coastal water miles out to the "3 mile" limit)	39.4	12%	39.4
Maine – Canadian Border (lake miles)	33.0	10%	33.0
Maine – Canadian Border (river miles)	206.2	61%	206.2

Maine – Canadian Border (total water miles) [6]	**278.6**	**82%**	**278.6**
Maine – Canadian Border (total land and water miles)	*608.7*	*N/A*	*608.7*
Maine – New Hampshire Border (coastal water miles out to the "3-mile" limit)	17.3	5%	17.3
Maine – New Hampshire Border (lake miles)	17.7	5%	17.7
Maine – New Hampshire Border (river miles)	25.4	7%	25.4
Maine – New Hampshire Border (total water miles) [6]	**60.3**	**18%**	**60.3**
Maine – New Hampshire Border (total land and water miles)	*188.8*	*N/A*	*188.8*
Total Miles of Rivers and Streams in Maine [5]	**54,995**	**100%**	**54,995**
Miles of perennial rivers and streams (subset)	30,894	56%	30,894
Miles of intermittent [non-perennial] rivers and streams (subset)	16,375	30%	16,375
Miles of rivers (subset)	7,726	14%	7,726
Miles of Rivers and Streams by Water Class [6]	**Miles**	**Percent**	**Miles**
Water Class Streams (% of Stream Miles) Rivers (% of River Miles)	*Class Totals*	*n/a*	*Class Totals*
Class AA 1,345 3.6% 1,093 20%	2,439	5.5%	2,439
Class A 17,403 45% 2,192 40%	19,594	44.6%	19,594
Class B 19,612 51% 1,728 32%	21,339	48.6%	21,339
Class C 138 0.4% 419 8%	558	1.3%	558
Totals 38,498 100% 5,432 100%	***43,930***	***100%***	***43,930***
Number & Area of Lakes, Ponds and Reservoirs (each line is a subset of the line above)	**Number Square Miles Acres**	**Percent**	**Number Square Miles Acres**
Total Lake, Pond & Reservoir Features in Maine DEP's GIS Datalayer [5]	**32,257 1,603 mi^2 1,025,949 ac**	**100% 100% 100%**	**32,257 1,603 mi^2 1,025,949 ac**
Lakes, Ponds & Reservoirs assigned a Midas Number in DEP's GIS [6]	6,186 1,544 mi^2 988,508 ac	19% 96% 96%	6,186 1,544 mi^2 988,508 ac
Lakes, Ponds & Reservoirs assigned a Midas Number tracked in ADB [7]	5780 1,542 mi^2 986,952 ac	18% 96% 96%	5780 1,542 mi^2 986,952 ac
Significant Publicly Owned Lakes, Ponds & Reservoirs [6]	2,314 1,477 mi^2 945,506 ac	7% 92% 92%	2,314 1,477 mi^2 945,506 ac
Area of Nearshore Waters and Tidal Rivers [5]	**Square Miles Acres**	**Percent**	**Square Miles Acres**
Total Nearshore Waters and Tidal Rivers	**2,846 mi^2 1,821,474 ac**	**100%**	**2,846 mi^2 1,821,474 ac**
Total Area of Bays, Estuaries and Harbors	2,717 mi^2 1,739,051 ac	95%	2,717 mi^2 1,739,051 ac
Total Area of Tidal Rivers	129 mi^2 82,423 ac	5%	129 mi^2 82,423 ac
Total Area of Nearshore Waters and Tidal Rivers by Water Class [6]	**Square Miles Acres**	**Percent**	**Square Miles Acres**
Class SA	227 mi^2 145,421 ac	8%	227 mi^2 145,421 ac
Class SB	2,590 mi^2 1,657,455 ac	91%	2,590 mi^2 1,657,455 ac
Class SC	29 mi^2 18,417 ac	1%	29 mi^2 18,417 ac

Total Area of Wetlands [8]	**5,196**	**3,325,418**	**5,196**
Total Area of Saltwater Wetlands [8]	**381.3**	**244,095**	**381.3**
Estuarine	271.9	174,046	271.9
Marine	109.4	70,049	109.4
Total Area of Freshwater Wetlands [8]	**4,814.6**	**3,081,323**	**4,814.6**
Lacustrine	1,486.6	951,408	1,486.6
Palustrine	3,172.6	2,030,484	3,172.6
Riverine	155.4	99,430	155.4
Total Area of Mapped Sand and Gravel Aquifers [6]	**1,281.0**	**794,624.0**	**1,281.0**

1 These figures were the most current that were available to DEP in 2012 and are from the 2007 USDA Census of Agriculture.
2. These figures are the most current available and represent no change since 2010.
3. Derived from the 2004 MeLCD (Maine LandCover Dataset) which has a 25 square meter (5m X 5m) spatial resolution.
4. United States Department of Agriculture www.ers.usda.gov/data-products/state-fact-sheets/state-data.aspx?StateFIPS=23&StateName=Maine
5. Derived from the National Hydrography Dataset [Source: U.S. Geological Survey (USGS) and the U.S. Environmental Protection Agency (EPA)] 24K High Resolution NHD, 2007 nhd.usgs.gov/index.html .
6. Derived from DEP's GIS hydrography, geology and state boundary datasets (Source: Digitized 1:24,000 USGS 7.5" Quadrangles and Digital Raster Graphics). Significant Lakes are defined as publicly owned, have bathymetric/morphometric surveys, vulnerability modeling was performed or some trophic data has been gathered.
7. Only Lakes, Ponds and Reservoirs with a MIDAS number are tracked in the ADB.
8. Derived from the U.S Fish and Wildlife Service National Wetland Inventory (NWI) dataset – updated 5/22/2009.

WATER QUALITY STANDARDS PROGRAM

Contact: Susanne Meidel, DEP, BWQ, DEA

Tel: (207) 441-3612 email: Susanne.K.Meidel@maine.gov

Related Website: www.maine.gov/dep/water/monitoring/classification/index.htm

The quality of Maine's water is described in terms of physical, chemical and biological characteristics defined under the state's water classification program. As established in Maine statute (38 M.R.S. §§ 464-470), the classification program consists of designated uses (e.g. drinking water supply, recreation in and on the water, habitat for fish and other aquatic life), criteria [e.g. bacteria, dissolved oxygen (DO) and biological criteria], and an anti-degradation statement (e.g. natural, free flowing) which together specify levels of water quality necessary to maintain the designated uses. All State waters have a classification assignment (lakes: GPA; rivers and streams: AA, A, B, C; marine and estuarine waters: SA, SB, SC). Wetlands are classified the same as associated surface waters, i.e. wetlands that are part of great ponds or natural lakes and ponds less than 10 acres in size are GPA waters; all freshwater wetlands not classified as GPA waters are class AA, A, B or C under §§ 467 and 468 according to the watershed in which they occur. Coastal wetlands are classified SA, SB or SC according to the provisions of § 469 (Classification of Estuarine and Marine Waters). Groundwater is classified GW-A according to provisions of 38 M.R.S. § 470.

Maine law requires that once every three years, the Department review the classification system and related standards and make recommendations to the Board of Environmental Protection for any needed changes in the water quality classifications assigned to specific waterbodies. In 2011, the classification of one waterbody was changed and in 2012, ambient water quality criteria (human health criteria for inorganic arsenic, acrolein and phenol; aquatic life criteria for acrolein, diazanon, nonylphenol) as included in *Surface Water Quality Criteria for Toxic Pollutants*, 06-096 C.M.R. ch. 584 (effective date July 29, 2012) were revised or expanded.

303(d) VISION

The CWA § 303(d) Program provides a mechanism to integrate and implement water quality efforts for the restoration and protection of the nation's aquatic resources. This program systematically assesses waters and prioritizes restoration objectives that reduce pollutants through TMDL assessments, prescriptive permits, and implementing alternative approaches to achieve water quality goals. In 2013, EPA announced a new program framework to identify and prioritize water bodies for restoration and protection, entitled A Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program (the Vision). The new Vision will be addressed in stages from 2016 to 2022 and includes the following elements: prioritization, assessment, protection, alternatives, engagement, and integration. The Vision recommends that each State identify priority waters for restoration and/or protection plans by 2016, with the goal of completing those plans by 2022.

In December 2015, Maine DEP published a draft document that presented Maine's approach to achieve the Vision's prioritization goal and a list of waters that are high

priority for water quality planning efforts (Table 3-2). Following a public comment opportunity and further internal review, DEP accepted the document as final in May 2016 (Appendix VI). This list of priority waters may be periodically revised as plans progress and new information emerges. In the relevant tables in Chapter 8 and in Appendices II-V, Vision waters are indicated in italics.

Table 3-2 Priority Waters Included in Maine's Vision

Assessment Unit ID	Segment Name	Location	Impairment Cause
ME0106000304_625R01	Adams Brook	Berwick	Benthic-Macroinvertebrate Bioassessments
ME0106000103_607R01	Black Brook	Windham	Oxygen, Dissolved
ME0103000308_325R02	Brackett Brook	Palmyra	Oxygen, Dissolved
ME0102000510_224R01	Burnham Brook	Garland	Oxygen, Dissolved
ME0105000305_528R06	Carlton Brook	Whitefield	Oxygen, Dissolved
ME0105000305_528R08_01	Chamberlain Brook	Whitefield	Oxygen, Dissolved
ME0106000102_603R02	Chandler River	Pownal	Oxygen, Dissolved
ME0105000305_528R07	Choate Brook	Windsor	Oxygen, Dissolved
ME0106000103_607R03	Colley Wright Brook	Windham	Oxygen, Dissolved
ME0101000413_146R02	Coloney Brook	Fort Fairfield	Benthic-Macroinvertebrate Bioassessments
ME0101000413_146R02	Coloney Brook	Fort Fairfield	Periphyton (Aufwuchs) Indicator Bioassessments
ME0102000510_224R07	Crooked Brook	Corinth	Periphyton (Aufwuchs) Indicator Bioassessments
ME0105000305_528R03	Dyer River	Newcastle	Oxygen, Dissolved
ME0101000412_143R01	Everett Brook	Fort Fairfield	Oxygen, Dissolved
ME0106000103_607R06	Hobbs Brook	Cumberland	Oxygen, Dissolved
ME0106000103_607R07	Inkhorn Brook	Westbrook	Oxygen, Dissolved
ME0103000311_334R03	Jock Stream	Wales	Oxygen, Dissolved
ME0103000311_334R03	Jock Stream	Wales	Nutrient/Eutrophication Biological Indicators
ME0105000305_528R05	Meadow Brook	Whitefield	Oxygen, Dissolved
ME0101000412_143R02	Merritt Brook	Presque Isle	Benthic-Macroinvertebrate Bioassessments
ME0101000412_143R02	Merritt Brook	Presque Isle	Periphyton (Aufwuchs) Indicator Bioassessments
ME0103000309_327R01	Mill Stream	Albion	Oxygen, Dissolved
ME0106000103_607R08	Mosher Brook	Gorham	Oxygen, Dissolved
ME0103000308_325R03	Mulligan Stream	St. Albans	Oxygen, Dissolved
ME0104000210_418R02	No Name Brook	Lewiston	Oxygen, Dissolved
ME0106000103_607R09	Otter Brook	Windham	Oxygen, Dissolved

Assessment Unit ID	Segment Name	Location	Impairment Cause
ME0104000210_413R02	Penley Brook	Auburn	Oxygen, Dissolved
ME0106000103_607R12	Pleasant River	Windham	Oxygen, Dissolved
ME0104000208_413R03	Stetson Brook	Lewiston	Oxygen, Dissolved
ME0106000103_607R10	Thayer Brook	Gray	Oxygen, Dissolved
ME0105000305_528R04	Trout Brook	Alna	Oxygen, Dissolved
ME0105000218_521R01	Warren Brook	Belfast	Oxygen, Dissolved
ME0106000304_625R03	West Brook	North Berwick	Oxygen, Dissolved
ME0102000510_224R03	French Stream	Exeter	Benthic-Macroinvertebrate Bioassessments
ME0102000510_224R03	French Stream	Exeter	Periphyton (Aufwuchs) Indicator Bioassessments
ME0106000106_602R03	Concord Gully Brook	Freeport	Escherichia coli
ME0102000513_226R03	Penjajawoc Stream/ Meadow Brook	Bangor	Benthic-Macroinvertebrate Bioassessments
ME0102000513_226R03	Penjajawoc Stream/ Meadow Brook	Bangor	Habitat Assessment
ME0102000513_226R03	Penjajawoc Stream/ Meadow Brook	Bangor	Oxygen, Dissolved
ME0102000402_219R01	Piscataquis River	Dover-Foxcroft	Oxygen, Dissolved
ME0103000305_319R_02	Sandy River	Farmington	Benthic-Macroinvertebrate Bioassessments
ME0103000305_319R_02	Sandy River	Farmington	Oxygen, Dissolved
ME0106000211_616R	Wales Pond Brook	Hollis	Benthic-Macroinvertebrate Bioassessments
ME0103000311_3814L	Cochnewagon Pond	Monmouth	Total Phosphorus
ME0103000311_3814L	Cochnewagon Pond	Monmouth	Secchi Disk Transparency
ME0103000310_5274L	Great Pond	Belgrade	Total Phosphorus
ME0103000310_5274L	Great Pond	Belgrade	Secchi Disk Transparency
811-9	Mousam River Estuary	Kennebunk	Oxygen, Dissolved
802-25	Royal River Estuary	Yarmouth	Oxygen, Dissolved

HIGHLIGHTS FOR POINT SOURCE POLLUTION CONTROL PROGRAMS

Contact: Brian Kavanah, DEP, BWQ, Division of Water Quality Management (DWQM)

Tel: (207) 287-7700 email: Brian.W.Kavanah@maine.gov

Related Website: www.maine.gov/dep/water/wd/index.html

Maine uses multiple approaches to ensure that point source discharges of wastewater receive adequate treatment prior to their release to waters of the State including: licensing, compliance inspections coupled with technical assistance in operations and maintenance, and enforcement where necessary. A number of financial assistance programs support new facility construction, elimination of discharges, and upgrades or additions to existing facilities. Highlights for 2011- 2012 for these programs are summarized below or referenced by links to other documents.

Technical Assistance / Pollution Prevention Program

Contact: Sterling Pierce, DEP, BWQ, DWQM

Tel: (207) 287-4868 email: Sterling.Pierce@maine.gov

Related Website: www.maine.gov/dep/water/wwtreatment/

Department staff participate in both industrial- and municipal-based technical assistance and pollution prevention projects.

HIGHLIGHTS FOR 2011-2012

Technical assistance was provided to the operators of over 98 POTWs (Publicly Owned Treatment Works) and industrial direct dischargers by the staff of the Compliance & Technical Assistance Section of the DWQM. Technical assistance focused on improving compliance with Maine Pollutant Discharge Elimination System (MEPDES) permit requirements and maximizing the effectiveness of treatment. In addition to direct assistance at facilities, staff from the Compliance & Technical Assistance Section provided training at 31 formal classroom events for various organizations at locations across the state. Staff from the section continued to oversee the electronic Discharge Monitoring Report (DMR) system, which helps assure that effluent compliance data are reported in an accurate and timely manner to the Department and EPA.

Construction of Wastewater Treatment Facilities

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Related Website: www.maine.gov/dep/water/grants/srfparag.html

CLEAN WATER STATE REVOLVING FUND AND MAINE CONSTRUCTION GRANTS PROGRAMS

Funds from the Clean Water State Revolving Fund (CWSRF) program are used to provide low-interest loans (2% below market rates) to municipalities and districts to upgrade wastewater treatment infrastructure and to fund private nonpoint source (NPS) low interest loan programs for the repair/replacement of residential septic systems, implementation of agricultural best management practices, and the

purchase of environmentally friendly silviculture equipment. The program depends on a yearly Federal Capitalization Grant which must be matched with 20% state funds. The Maine Construction Grants Program helps fund wastewater projects in communities that otherwise could not afford to do their project.

Between January 1, 2011 and December 31, 2012, the Construction Grants Program provided grants for five wastewater projects and the CWSRF provided loans for 34 wastewater projects, some with assistance from the U. S. Department of Agriculture (USDA) Rural Development program and the U.S. Department of Housing and Urban Development Community Development Block Grant program. These projects included: wastewater treatment facilities upgrades, sewer system improvements, abatement of combined sewer overflows, and refinancing of existing wastewater loans. In addition, the CWSRF program provided assistance for 22 NPS projects for the repair/replacement of septic systems and the purchase of silviculture equipment. A total of $5,322,932 in State grants and $72,027,153 in CWSRF loans were used to fund the wastewater projects; and $3,898,811 in CWSRF loans was used to fund the NPS projects. $8,753,381 of the CWSRF loan amount was awarded as additional subsidy in the form of loan principal forgiveness.

Maine Combined Sewer Overflow Program

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Related Website: www.maine.gov/dep/water/cso/index.html

Thirty-two Maine communities are served by combined sewer systems, which convey a combination of sanitary and storm water flows to wastewater treatment facilities. During dry weather, all of the sewage in a combined system is conveyed to the treatment plant. However, during rainstorms or snow-melt periods, storm water mixes with the sanitary sewage, causing flows that may exceed the capacity of the sewer system. This results in combined sewer overflows (CSOs), which vary extensively in pollutant types, concentrations and loads, as well as in volume of overflow and severity of impact to the receiving water bodies. Maine has established an aggressive program, coordinated with EPA's CSO program, to assist communities in evaluating the design, condition, activity, and effects of combined sewer systems and overflows.

HIGHLIGHTS FOR 2011 - 2012

There were no changes in the number of Maine CSO communities since the last integrated report. Table 3-3 below lists changes in selected CSO parameters.

Table 3-3 CSO Program Summary Statistics

Parameter	End of Report Year 2010	End of Report Year 2012	Increase/ (Decrease)
Number of CSO Communities	32	32	(0) or (0%)
Number of CSO Discharge Points	164	158	(6) or (3.7%)
Total of Annual Discharge Days for Communities	606	547	(59) or (9.7%)
Total Annual Volume of CSOs (Billion Gallons)	2.0	1.23	(0.77) or (38.5%)
Weighted Yearly Precipitation (Inches)	49.8	48	(1.8) or (3.6%)
Million Gallons Discharged per Inch of Yearly Precipitation (MG/Inch)	40	26	(14) or (35%)

Small Community Facilities Program

Contact: Tim MacMillan, DEP, BWQ, DWQM

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Related Website: www.maine.gov/dep/water/grants/scgpara2.html

Since its inception in 1982, the Small Community Grant Program (SCGP) has disbursed 26.3 million dollars in grant monies, and is estimated to have eliminated discharges totaling over 1.3 million gallons of untreated wastewater per day.

While state bond issues usually fund this grant program, in the past it has also received some funding directly from state appropriations. These funds have been used to assist municipalities with the construction of individual or cluster-type wastewater treatment systems designed to eliminate heavily polluted discharges from either malfunctioning systems or non-existing systems ("straight pipes"). This amount of funding has allowed the construction of new wastewater treatment facilities in over 300 communities throughout the state. The total estimated value of the facilities built with SCGP funds is approximately 31.7 million dollars.

Currently, requests for assistance outweigh available funding. Between 2012 and 2013, the SCGP disbursed grants totaling approximately 0.35 million dollars to 34 communities to replace 42 systems as detailed below.

HIGHLIGHTS FOR 2012 - 2013

In 2012, 20 systems were replaced, removing 5,400 gallons per day of untreated discharges. In 2013, 22 systems were replaced removing 5,940 gallons per day of untreated discharges. Table 3-4 provides a summary of information about the program on a year-by-year basis.

Table 3-4 Yearly Summary of SCGP Activities

Year-by-Year Summary				
Year	**Grant Amount Disbursed**	**Total Facility Value**	**Systems Installed**	**Wastewater Treated (Gal/Day)***
1998	$1,145,088	$1,379,624	187	50,490
1999	$769,086	$926,610	122	32,940
2000	$1,370,528	$1,651,238	251	67,770
2001	$1,142,009	$1,375,914	167	45,090
2002	$1,354,130	$1,631,482	208	56,160
2003	$1,086,265	$1,308,753	183	49,410
2004	$795,327	$958,225	136	36,720
2005	$399,078	$480,817	64	17,280
2006	$587,517	$707,852	72	19,440
2007	$547,262	$637,039	66	17,820
2008	$293,961	$356,577	36	9,720
2009	$583,333	$718,440	61	16,470
2010	$321,913	$350,702	40	10,800
2011	$376,206	$531,140	52	14,040

Year-by-Year Summary				
Year	**Grant Amount Disbursed**	**Total Facility Value**	**Systems Installed**	**Wastewater Treated (Gal/Day)***
2012	$129,859	$159,907	20	5,400
2013	$216,627	$250,233	22	5,940
Totals:	**$26,321,643**	**$31,741,968**	**4,972**	**1,342,440**

Please see page 32 of the 2006 Integrated Report for further discussion of the SCGP and yearly summaries for years 1982-1997.

www.maine.gov/dep/water/monitoring/305b/2006/2006_Final_305b_Report.pdf

Licensing of Wastewater Discharges

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Related Website: www.maine.gov/dep/water/wd/index.html

The DWQM is responsible for the licensing and re-licensing of all surface wastewater discharges, whether industrial, commercial, municipal or residential. In Maine, the vast majority of wastewater discharge sources have previously been licensed. Therefore, the licensing program is focused largely upon renewal of existing licenses, rather than development of new licenses (Table 3-5).

Please see pages 32-33 of the 2006 Integrated Report for further discussion of the Water Discharge Licensing Program.

www.maine.gov/dep/water/monitoring/305b/2006/2006_Final_305b_Report.pdf

Table 3-5 Permitting/licensing by the DWQM

Year	**2011**	**2012**
Permit Renewals	71 (34 POTWs[1] + 37 non-POTWs)	52 (38 POTWs + 24 non-POTWs)
>2,000 gpd[2] OBD renewals as MEPDES permits	6	5
New permits	4	69
Minor Revisions/Modifications	45	174
<2,000 gpd OBDs	101	120
Total permitting actions	**227**	**420**

[1] Publicly Owned Treatment Works
[2] Gallons per day

Overboard Discharge Grant Program

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As of December 31, 2013 Maine has 1,118 licensed overboard discharges (OBDs). OBDs are discharges of wastewater from individual homeowners or businesses to surface waters (typically marine waters) where existing lots are unsuitable for subsurface disposal and no municipal system is available. OBDs contribute to closures of shellfish growing and harvesting areas.

In 1989 an OBD Removal Grant Program was established. The priorities of the grant program are to eliminate discharges that either cause the closure of shell fishing areas or that create a public nuisance. Since the beginning of the program, approximately seven million dollars have been spent to remove 596 systems. The total acreage opened to shellfish harvesting since the start of the OBD Grant Program is over 18,000 acres. According to DMR, opening and fully utilizing this much shellfish harvesting area has the potential to generate an annual harvest with a retail value of over 4.4 million dollars.

HIGHLIGHTS FOR 2012 - 2013

A total of 133 OBD systems were removed in 2012-2013. Please see pages 33-34 of the 2006 Integrated Report for further discussion of the OBD Grant Program.

www.maine.gov/dep/water/monitoring/305b/2006/2006_Final_305b_Report.pdf

Compliance Evaluation

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Related Website: www.maine.gov/dep/water/wd/municipal_industrial/index.html

The Department uses a three-part program to evaluate the compliance of wastewater treatment facilities. The compliance evaluation program involves on-site inspections of wastewater treatment facilities, occasional selective sampling of effluent quality, and monthly evaluation of the licensees' self-monitoring reports. Discharge licenses also require immediate reporting of any major malfunctions, bypasses or exceedances of license limits to DEP inspectors.

HIGHLIGHTS FOR 2011 – 2012

During this two-year period, inspectors from the Compliance & Technical Assistance Section conducted 973 inspections at facilities located throughout the state. These inspections were conducted to verify that the treatment plants were operating in accordance with all requirements of their MEPDES permits. Inspectors evaluate such aspects as laboratory analyses, data quality control, process control, operations and maintenance, collection systems operations and maintenance, and overall plant maintenance. These inspections provide oversight and evaluation of the licensees' compliance with the license, and routinely uncover areas where training, assistance, or equipment upgrades could resolve an issue. DEP compliance inspectors provide assistance as appropriate and can also direct a licensee to other forms of technical assistance available from other DEP staff, other wastewater-related agencies, or private consulting firms. All of these efforts in concert, combined with the efforts of the treatment plant management and operations staff, serve to preserve and protect the quality of Maine's waterways.

Enforcement of Water Quality Laws

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Related Website: www.maine.gov/dep/enforcement/

The general philosophy of the DEP's BWQ is to gain compliance and resolve problems at the least formal level that is appropriate, and to maximize the spirit of cooperation between DEP and the regulated community. By encouraging voluntary compliance with Maine's water pollution control laws, the overall effectiveness of the enforcement program is maximized and unnecessary litigation is avoided. Formal enforcement actions are fact-dependent, but generally become necessary only when violations of environmental laws are severe enough to warrant action regardless of the remediation effort, or when the violator is not responsive in preventing violations or refuses to cooperate with DEP.

HIGHLIGHTS FOR 2011 - 2012

A total of 12 formal water discharge enforcement cases were settled in 2011 and 2012. The penalties collected act as a deterrent to future violations of water quality laws and neutralize any economic benefit that may have been gained by the violator. The enforcement actions also specified a variety of corrective actions that will improve water quality, such as upgrades to wastewater treatment facilities, elimination of discharges, and Supplemental Environmental Projects.

THE MAINE NPS WATER POLLUTION CONTROL PROGRAM

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Related Website: www.maine.gov/dep/land/watershed/nps/index.html

Maine's Nonpoint Source (NPS) Water Pollution Management Program (38 M.R.S. § 410-I) helps restore and protect water resources from NPS pollution. The basic objective of the NPS program is to promote the use of state agency-defined "best management practice guidelines" (BMPs) to prevent water pollution. DEP uses a combination of statewide programs and targeted watershed projects to make progress towards restoring and protecting water quality.

Silt-laden runoff from a camp road

DEP administers the program in coordination with EPA and other federal, state, and local governmental agencies, and non-governmental organizations. Five Maine agencies share responsibility for implementing NPS programs: DEP, the Department of Agriculture, Conservation and Forestry (DACF), DOT, DHHS Division of Environmental Health; and DMR. State agencies conduct programs that promote voluntary use of BMPs and implement State laws or rules which require that projects meet performance standards to protect water quality. Maine's NPS agencies have working arrangements with other State and federal agencies, municipalities, non-governmental organizations, and

business sector associations to help control or prevent NPS water pollution.

HIGHLIGHTS FOR 2011 – 2012

The restoration of Duckpuddle Pond, a 242-acre pond in Nobleboro and Waldoboro, was highlighted on EPA's NPS Program Success Stories website www.epa.gov/owow/nps/Success319. Historically, the pond experienced periodic severe nuisance algal blooms as a result of excessive phosphorus runoff and sediment erosion from nearby roads and a dairy farm. In 1990, DEP placed Duckpuddle on the state list of impaired waters. Between 1999 and 2010, with the help of NPS grants, the Knox-Lincoln County Soil and Water Conservation District and DEP helped implement BMPs on the farm and town roads. These efforts significantly reduced erosion and polluted runoff, which improved water quality in the pond. In 2011, DEP concluded that the pond attained Class GPA water quality standards.

During 2011 and 2012, 33 projects funded through the NPS Grants Program in previous years were successfully brought to completion. These projects helped local communities identify water pollution sources in watersheds and take action to restore or protect water quality. DEP provided technical assistance and granted $1,559,286 of Federal CWA funds for these projects. Grantees, partners, and landowners contributed matching funds or services valued at $1,628,239. NPS projects reduced pollutant loading to waters of the State by 1,408 pounds of phosphorus and 1,447 tons of sediment per year - equivalent to about 125 dump truck loads.

More information on NPS watershed projects and DEP's NPS program can be found in the NPS Management Program Annual Reports for 2011 and 2012, available at: www.maine.gov/dep/water/grants/319-documents/reports/ . For more information on State of Maine NPS programs refer to the Maine Nonpoint Source Management Program Plan 2015 – 2019: www.maine.gov/dep/land/watershed/nps-program-plan.html.

STORMWATER PROGRAMS

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Related Website: www.maine.gov/dep/land/stormwater/index.html

Multisector General Permit

Maine's Multi-Sector General Permit regulates the direct discharge of stormwater associated with industrial activity to waters of the State other than groundwater. For more information, including a copy of the Multi-Sector Industrial Stormwater General Permit, see the related web site:

www.maine.gov/dep/land/stormwater/multisector.html

Stormwater Standards for Post-Construction Discharges

Long Creek watershed. On October 28, 2009, EPA issued a final residual designation determination for the Long Creek watershed in the municipalities of South Portland, Portland, Westbrook, and Scarborough. The designation requires that stormwater discharges from impervious areas equal to or greater than one acre in the Long Creek watershed be authorized by a permit under the federal CWA because those discharges contribute to a violation of water quality standards in Long Creek. The Department issued a general permit for stormwater discharges in the Long Creek watershed on November 6, 2009. To obtain coverage under the general permit, a discharger must participate in the implementation of the Long Creek Watershed Management Plan (approved by DEP and EPA in 2009). Participation entails signing a contract with the Long Creek Watershed Management District. The contract requires an annual payment to the district based on the amount of impervious area that is contributing a discharge of stormwater to Long Creek. The payments are being utilized to carry out restoration activities described in the watershed management plan. Landowner participation in the general permit exceeds 95%. Several landowners have opted to apply for individual permits and several have not yet obtained permit coverage and are subject to enforcement action, which is on-going. A technical committee has been organized by the district to monitor progress on the implementation of the plan, including monitoring of water quality in Long Creek.

Stormwater Standards for Municipal Separate Storm Sewer Systems (MS4s) and Industrial Stormwater Discharges

DEP reissued its MS4 general permit in July 2008 for 28 municipalities and 10 non-municipal entities which include state or federal facilities, Maine DOT, and the Maine Turnpike Authority within the Urbanized Area as determined by the 2000 census (Table 3-6). This reissuance regulates two additional non-municipal MS4s in the Greater Bangor Area, and has increased requirements for Urban Impaired Stream Watersheds.

Table 3-6 Maine's Regulated MS4s

MS4 Municipalities by Geographic Cluster
Kittery; Eliot; South Berwick; Berwick
Biddeford; Saco; Old Orchard Beach; Scarborough; Cape Elizabeth; South Portland; Portland; Westbrook; Gorham; Windham; Falmouth; Cumberland; Yarmouth; Freeport
Auburn; Lewiston; Sabattus
Hampden; Brewer; Bangor; Veazie; Orono; Old Town; Milford
Non-traditional or "Nested" MS4s
Transportation: Maine DOT; Maine Turnpike Authority
State or Federal Entities: Portsmouth Naval Ship Yard (Kittery); Southern Maine Community College (S. Portland); University of Southern Maine (Gorham Campus); Eastern Maine Community College (Bangor); Dorothea Dix Psychiatric Center (Bangor); Bangor Air National Guard (Bangor); University College of Bangor (Bangor); University of Maine (Orono)

Industrial Stormwater Discharges

DEP issued its latest multi-sector general permit for industrial stormwater discharges in April 2011. Maine's general permit largely mirrors the previous EPA general permit with respect to requirements for Stormwater Pollution Prevention Plans at the site of regulated activities. As of December 2012, approximately 690 facilities had filed for multisector permit coverage, and another 486 had certified that they have "no exposure" of pollutants to stormwater.

LAND USE AND GROWTH MANAGEMENT

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Related Websites: Site Law: www.maine.gov/dep/land/sitelaw/index.html

NRPA: www.maine.gov/dep/land/nrpa/index.html

Shoreland Zoning Act: www.maine.gov/dep/land/slz/index.html

It has long been recognized that land use practices have direct impacts on water quality. The State of Maine has several programs in place to regulate land use activities that have potentially adverse environmental effects. The Site Location of Development Law (Site Law) requires developers of large projects to obtain permits from DEP before beginning construction. Under the Natural Resources Protection Act (NRPA), a permit from DEP is required for any activity in, on or adjacent to a protected natural resource, including rivers, streams, brooks, great ponds, coastal wetlands, freshwater wetlands, sand dunes and fragile mountain areas. The Mandatory Shoreland Zoning Act requires towns to control building sites, land uses, and placement of structures within their shoreland areas in order to protect water quality, habitat and fishing industries, and to conserve shore cover, public access, natural beauty and open space. Also important to environmental protection is the Growth Management Act, which was enacted in 1988. The foundations of this Act are based on comprehensive planning and greater cooperation between state and local governments.

Please see page 41 of the 2006 Integrated Report for other information on the Shoreland Zoning Act, Site Law, and the NRPA.

www.maine.gov/dep/water/monitoring/305b/2006/2006_Final_305b_Report.pdf.

EDUCATION AND OUTREACH

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DEP understands that engaging and empowering the public in natural resources stewardship through effective education and outreach efforts will only further our own mission of environmental protection. The Department has a responsibility to create and maintain public understanding and support for departmental objectives, programs, regulatory requirements and best practices. To accomplish this, the

Department works to help to foster and encourage greater stewardship through education and outreach initiatives strategically directed at a variety of audiences.

Target Audiences

Youth and Teachers- DEP sponsors and organizes Water Festivals for up to 700 students and their teachers in the southern part of the state each year and in northern Maine every other year. The events provide a day of fun and interactive learning about clean water, wetland ecosystems and the importance of stewarding Maine's most rapidly renewable resource and are connected to more comprehensive classroom learning units. Department staff also educate Maine students on environmental issues through other forums as requested and as available, including Envirothon, Bug Mania and Earth Science Day (the latter two with about 2,000 students each); and judging various state science fairs.

General Public- The DEP divides the public into categories based on the message of the campaign: homeowners for yard care practices, businesses for pollution prevention practices, etc. For example, the MS4 communities are conducting pilot projects to encourage targeted BMPs (e.g. yard care, roof runoff infiltration) in targeted neighborhoods with evaluation as part of their permits.

Contractors, Municipal Officials, and Other Targeted Groups- Through the NPS Training Center within the Department's Office of Communications & Education, DEP reaches out to contractors, landscapers, foresters and code enforcement officers to provide technical assistance, certification and new training. Maine law requires that starting January 1, 2013 contractors doing excavation in the Shoreland Zone must be certified in erosion control. The number of certified contractors has reached 1,630 as of December 2012, up from 854 in December of 2010. In the 15 years that the contractor certification program has been in place, only two certified individuals have ever been involved in an enforcement action because of violation of Maine's erosion and sediment control law. Two certified individuals have also won the "Contractor of the Year" award from the International Erosion Control Association. DEP staff also train wastewater treatment plant operators, planning boards, realtors, code enforcement personnel and other audiences.

Assessment

Thanks to increased use of press releases, our website, social media, and other existing and emerging communication tools, DEP is reaching more Mainers each year. The effectiveness of the Department's education and outreach efforts continues to improve as better tools are developed to monitor impressions and measure effectiveness.

The Environmental Impact and Economic & Social Costs/Benefits of Effective Water Quality Programs

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Assessment of the many costs and benefits associated with water quality changes is a difficult task. While it is usually possible to determine that an improvement in water

quality has occurred and to qualitatively describe those benefits, often there is no easy way to directly quantify this information in terms of the monetary value of benefits to human health or the environment.

The economic tools that would be useful in estimating the costs and benefits of improvement in water quality have not yet been fully developed. As future environmental problems grow in complexity and cost, and as public budgets tighten, demonstrating the benefits of water-quality-related programs will be necessary to maintain support for continued investment in the improvement of water resources. Continued development of sophisticated economic tools for measuring the benefits of environmental projects and methods is essential.

The following sections contain brief summaries of selected water quality programs.

Nonpoint Source Management

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Related Website: www.maine.gov/dep/water/grants/319.html

Table 3-7 summarizes costs for NPS pollution programs supported by EPA's annual grant to DEP under § 319(h) of the CWA and non-federal matching funds for federal fiscal years (FFY) 2003 to 2012.

Table 3-7 § 319(h) Clean Water Act Grant Awards to Maine

Grant Year (FFY)	Federal 319 Award	Base	Incremental	Non-Federal Match	Total
2003	$2,740,732	$1,572,554	$1,168,178	$1,827,155	$4,567,887
2004	$2,670,204	$1,502,081	$1,168,123	$1,780,890	$4,451,094
2005	$2,318,844	$1,151,519	$1,167,325	$1,546,669	$3,856,513
2006	$2,303,829	$1,136,597	$1,167,232	$1,545,896	$3,849,725
2007	$2,256,543	$1,077,063	$1,167,066	$1,504,362	$3,760,905
2008	$2,247,537	$1,082,056	$1,165,481	$1,934,529	$4,182,066
2009	$2,244,129	$1,084,415	$1,159,714	$1,496,086	$3,740,315
2010	$2,247,620	$1,089,500	$1,158,120	$1,499,163	$3,746,783
2011	$1,950,566	$795,000	$1,155,566	$1,300,377	$3,250,943
2012	$1,822,337	$663,000	$1,159,337	$1,508,972	3,331,309

Pollution Prevention Initiatives

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Related Website: www.maine.gov/dep/assistance/index.html

The pollution prevention initiatives and methods developed and promoted by the Office of Innovation and Assistance are based on the practical notion that it is far more protective of the environment and cost effective to eliminate or reduce pollution at its source than to clean up pollution that has already been released into an ecosystem. Office staff works with businesses and DEP technical staff to provide compliance tools for minimizing pollution from sources such as stormwater and wastewater discharges and to improve BMPs.

Office staff engages in a proactive approach that utilizes the common ideals of increased efficiency, conservation of resources, reduction of waste and costs to identify those points in a process that generate pollution. Once these points have been identified, staff shares effective tactics with the regulated community, such as forming good habits, purchasing environmentally preferable products, and implementing new technologies to analyze, focus on, and help improve areas of the process to minimize or prevent pollution.

The Office's methods include developing tools and outreach materials, conducting trainings/meetings, site visits, individual phone calls and emails, and presenting at conferences. Office staff uses some or all of these tools to reduce or eliminate sources of pollution.

Table 3-8 Office of Innovation and Assistance – Technical Assistance Efforts January 2, 2011 to December 30, 2012*

Method of Assistance Provided	Total Assists
1) Site Visits	118
2) Phone calls Made and Received	5,624
3) E-mails Made and Received	13,476
4) Permit Assistance	338
5) Walk-ins	15
6) Mailings, Newsletters or Publications Distributed to a Business or the Public	8 events
7) Workshops and Seminars	85 events
Total Assistance Provided	**19,571**

* Includes State Small Business Stationary Source: air, water, land, hazardous and solid waste technical assistance

CHAPTER 4 SURFACE WATER MONITORING & ASSESSMENTS

ASSESSMENT METHODOLOGY

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Listing Methodology for the 2016 305(b)/303(d) Integrated Report List

Determination of water quality attainment is based on a waterbody meeting all standards including the criteria established for its assigned classification (38 M.R.S. §§ 465, 465-A, 465-B). Waters are listed in Appendices II-V by AU ID and/or waterbody segment in one of five categories of attainment (see category descriptions below). For the 2016 report, water quality attainment decisions were primarily based on monitoring data collected in 2013 and 2014 although more recent data was consulted where appropriate. As explained in Chapter 1, the 2016 IR presents comprehensive water quality attainment decisions based on two years' worth of data only for lakes/ponds and wetlands. For rivers/streams and estuarine/marine waters, assessments for only a few select waterbodies[1] were updated, and these updates were based on 2013-14 data.

All freshwaters in Maine are subject to a statewide fish consumption advisory due to "impairment caused by atmospheric deposition of mercury". On December 20, 2007, EPA approved a Regional Mercury TMDL that moved all Maine freshwaters into Category 4-A ("TMDL is completed"). Other category listings are established independently from the statewide mercury advisory listing, thus all waters are listed in Category 4-A for mercury and in at least one other category. All marine waters are listed by narrative in Category 5-D "Legacy Pollutants" as well as in one other category[2]. Each listing in Appendices II-V provides the AU (Rivers and Streams and Wetlands) or HUC (Lakes) or Waterbody ID (Estuarine and Marine waters), Name, Location (Rivers and Streams and Wetlands only), Size, Classification (excluding Lakes, which are all Class GPA), and depending on assessment determination, monitored date, information on impairment, notes on previous listings, or other information. Note that the USGS has replaced the HUC system with the Watershed Boundary Dataset (WBD) system. Because of this conversion, a mismatch now exists between some HUCs used in the IR and current WBDs (former HUCs). DEP did not update the HUC part of any AU ID to conform to the new WBD system and is retaining the term 'HUC' to indicate continued usage of the older system.

[1] Waters for which DEP received new outside data and those for which the 2014 IR indicated that an update would be provided in the 2016 cycle.

[2] All estuarine and marine waters in Maine have an advisory for the consumption of shellfish (lobster tomalley) due to the presence of PCBs and dioxins presumed to be from atmospheric deposition or historical sources. The advisory is based on probability data that shellfish (lobster tomalley) inhabiting estuarine or marine waters may exceed the advisory action level for these substances. This Integrated Water Quality Monitoring and Assessment Report does not consider this statewide advisory in establishing other category listing.

LISTING CATEGORIES (1-5)

Category 1: Attaining all designated uses and water quality standards, and no use is threatened.

Highest level of attainment - waters in the AU attain all applicable standards. Assessment is based on combined evaluation of the following information.

1. Current data (collected within five years) indicates attainment, with no trend toward expected non-attainment within the listing period.

2. Old data (greater than five years) indicates attainment and no change in any associated conditions.

3. Water quality models predict attainment under current loading, with no projected change in loading that would predict non-attainment.

4. Qualitative data or information from professional sources indicating attainment of standards and showing no identifiable sources (e.g. detectable points of entry of either licensed or unlicensed wastes) of pollution, low impact land use (e.g. intact riparian buffers, >90% forested watershed, little impervious surface), watershed within state or federal reserve land, park, wilderness area or similar conservation protection, essentially unaltered habitat, and absence of other potential stressors.

5. Determination that the direct drainage area has a human population of <0.1 (0 for lakes) per square mile according to U.S. Census data obtained in 2000 and watershed conditions as described in item 4, above. For lakes, determinations are based on census data at the town level and consider all towns in the direct drainage of larger (referred to in previous Integrated Reports as “Significant”) lakes. Populations for the remaining lakes (generally less than ten acres) are determined for the town listed as the point-of-record for the water according to the DIF&W Lake Index database.

Category 2: Attains some of the designated uses; no use is threatened; and insufficient data or no data and information is available to determine if the remaining uses are attained or threatened (with presumption that all uses are attained).

Assessment is based on combined evaluation of the following information.

1. Current data (collected within five years) for some standards indicating attainment, with no trend toward expected non-attainment within the listing period, or an inadequate density of data to evaluate a trend.

2. Old data (greater than five years) for some standards indicating attainment, and no change in associated conditions.

3. Water quality models that predict attainment for some standards under current loading, with no projected change in loading that would predict non-attainment.

4. Probabilistic-based monitoring for lakes indicates a high expectation of use attainment for certain classes of waters based on random monitoring of that class of waters.

5. Insufficient data for some standards, but qualitative data/information from professional sources indicate a low likelihood of impairment from any potential sources (e.g. high dilution, intermittent/seasonal effects, low intensity land use).

Category 3: Insufficient data and information to determine if designated uses are attained (with presumption that one or more uses may be impaired).

Assessment is based on combined evaluation of the following information. Monitoring schedules are assigned to these waters.

1. Insufficient or conflicting data that does not confirm either attainment or non-attainment of designated uses.

2. Qualitative data or information from professional sources showing the potential presence of stressors that may cause impairment of one or more uses; however, no quantitative water quality information confirms the presence of impairment-causing stressors.

3. Old data, with:

   a. low reliability, no repeat measurements (e.g. one-time synoptic data);

   b. a change of conditions without subsequent re-measurement; or

   c. no evidence of human causes or sources of pollution to account for observed water quality condition [natural conditions that do not attain water quality standards are allowed by 38 M.R.S. § 464(4)(C)].

4. Current data for a lake indicates a return to (or a trend towards) attainment standards over the past few years but requires confirmation; or conversely, that trophic or dissolved oxygen profile evaluation suggests deteriorating conditions requiring further study and verification. (Since lakes respond over a longer period of time and can be highly influenced by weather attributes, it is appropriate to recommend additional monitoring before a determination of attainment is made.)

Category 4: Impaired or threatened for one or more designated uses, but does not require development of a TMDL.

A waterbody is listed in Category 4 when impairment is not caused by a pollutant, or when impairment is caused by a pollutant but a TMDL has already been completed or other enforceable controls are in place. An impaired waterbody listed in Category 4 will also be listed in Category 5 if both a pollutant and a non-pollutant are involved that would independently cause an impaired or threatened condition. Waters are listed in one of the following Category 4 sub-lists when:

1. Current or old data for a standard indicates either impaired use or a trend toward expected non-attainment within the listing period, but where enforceable management changes are expected to correct the condition;

2. Water quality models that predicted impaired use for some standard under current loading also predict attainment when required controls are in place; or,

3. Quantitative or qualitative data/information from professional sources indicates that an impaired use is not caused by a pollutant(s) (e.g. habitat modification).

4-A: TMDL is completed. A TMDL is complete but insufficient new data exists to determine that attainment has been achieved.

> Note: As of the 2008 cycle, Category 4-A includes all freshwaters in Maine that were listed in previous cycles in a narrative Category 5-C “Impairment caused by atmospheric deposition of mercury” based on the Statewide fish consumption advisory due to mercury. On December 20, 2007, EPA approved a Regional Mercury TMDL for the Northeast.

4-B: Other pollution control requirements are reasonably expected to result in attainment of standards in the near future. Waterbodies where enforceable controls have a reasonable expectation of attaining standards, but where no new data are available to determine whether attainment has been achieved. (Enforceable controls may include new wastewater discharge licenses issued without preparation of a TMDL, contracts for nonpoint source implementation projects, regulatory orders or contracts for hazardous waste remediation projects, and other regulatory orders).

4-C: Impairment is not caused by a pollutant. Waters impaired by habitat modification (e.g. a dam) that is a result of human activity.

Note: Natural conditions that do not attain water quality standards and criteria are allowed by 38 M.R.S. § 464(4)(C). Waters that show impairment due to natural phenomena are listed in Categories 1 through 3.

Category 5: Waters impaired or threatened for one or more designated uses by a pollutant(s) and a TMDL is required.

Waters are listed in one of the Category 5 sub-lists when:

1. Current data (collected within five years) for a standard indicates either impaired use or a trend toward expected impairment within the listing period, and quantitative or qualitative data/information from professional sources indicates that the cause of impaired use is from a pollutant(s);

2. Water quality models predict impaired use for a standard under current loading, and quantitative or qualitative data/information from professional sources indicates that the cause of impaired use is from a pollutant(s); or,

3. Waters that were previously listed on the State's 303(d) list of impaired waters, based on current or old data that indicated the involvement of a pollutant(s), and where there has been no change in management or conditions that would indicate attainment of use.

5-A: Impairment caused by pollutants (other than those listed in 5-B through 5-D). A Total Maximum Daily Load is required and will be conducted by the State of Maine. TMDL schedules are assigned based on the value of a particular water (considering size, public use, proximity to population centers, and level of public interest for water quality improvement), the nature of the impairment and the source(s) of the problem, available information to complete the TMDL, and availability of staff and contractual resources to acquire information and complete the TMDL study. Projected schedules for TMDL completion are included in Chapter 8 (Tables 8-13 to 8-16) as well as in the Appendices.

5-B: Impairment is caused solely by bacteria contamination. A TMDL is required. Certain waters impaired only by bacteria contamination may be high priority resources, such as shellfish areas, but a low priority for TMDL development if other actions are already in progress that will correct the problem in advance of TMDL development (e.g. better compliance). Certain small streams that are impaired solely by bacteria contamination but where recreation (swimming) is impractical because of their small size are listed in 5-B. A projected schedule of TMDL completion is included where applicable. Waterbodies impaired only by CSOs, where current CSO Master Plans (Long-Term Control Plan) are in place, will be monitored to demonstrate that water quality standards are attained and that provisions are in place for both funding and compliance timetables.

5-C: Impairment caused by atmospheric deposition of mercury. A regional TMDL is required. Due to EPA approval of a regional TMDL for the control of mercury, all of Maine's Category 5-C waters were administratively moved to Category 4-A in the 2008 cycle.

5-D: Impairment caused by a "legacy" pollutant. This sub-category includes:

1. Waters impaired only by PCBs, dioxins, DDT, or other substances already banned from production or use, including waters impaired by contaminated sediments where there is no additional extrinsic load occurring. This is a low priority for TMDL development since there is no controllable load.

2. Coastal waters that have a consumption advisory for the tomalley (hepatopancreas organ) of lobsters due to the presence of persistent bioaccumulating toxins found in that organ. This is a low priority for TMDL development since there is no identifiable and controllable load.

DELISTING FROM AN IMPAIRED TO AN UNIMPAIRED CATEGORY.

Because there are a number of listing options available in the integrated list, some waterbodies may be removed from the previous "impaired waters" list, i.e. 303(d) list, under certain circumstances. The State must provide new information, to EPA's satisfaction, as a basis for not listing specific waters that had been previously included on a 303(d) list. Acceptable reasons for not listing previously listed waters as provided in 40 C.F.R. 130.7(b) may include situations where:

- The assessment and interpretation of more recent, more accurate or paleolimnological data demonstrates that the applicable water quality standard(s) is being met (list in Category 1, 2).
- The results of more refined water quality modeling demonstrate that the applicable water quality standard(s) is being met (list in Category 1 or 2).
- It can be demonstrated that errors or insufficiencies in the original data and information led to the water being incorrectly listed (list in Category 1 or 2).
- It can be documented that there are changes in the conditions or criteria that originally caused the water to be impaired and therefore originally led to the listing. For example, new control equipment has been installed, a discharge has been eliminated, or new criteria adopted (list in Category 1, 2, or 4-B).
- The State has demonstrated pursuant to 40 C.F.R. 130.7(b)(1)(ii) that there are effluent limitations required by State or local authority which are more stringent than technology-based effluent limitations, required by the CWA, and that these more stringent effluent limitations will result in the attainment of water quality standards for the pollutant causing the impairment within a reasonable time (list in Category 4-B).
- The State has demonstrated pursuant to 40 C.F.R. 130.7(b)(1)(iii) that there are other pollution control requirements required by State, local, or federal authority that will result in attainment of water quality standards for a specific pollutant(s) within a reasonable time (list in Category 4-B).
- The State included on a previous § 303(d) list some Water Quality Limited Segments beyond those that are required by EPA regulations, e.g. waters where there is no pollutant associated with the impairment (list in Category 4-C).

- A TMDL has been approved or established by EPA since the last 303(d) list (list in Category 4-A).

Chapter 8 Tables 8-5 to 8-8 show waters that have been delisted from Maine's 2014 303(d) list. For waters that were delisted for reasons other than TMDL approval, delisting information is presented in Chapter 8 in the section New Delistings.

ASSESSMENT CRITERIA

Tables 4-1 through 4-3 provide the designated use categories and the criteria (with references) used to assess a water's attainment of the use. A determination of non-attainment is only made when there is documented, quality assured, evidence (e.g. monitoring data) indicating that one or more criteria are not attained. Such data are also weighed against evidence that there are plausible natural factors that may contribute to the non-attainment of criteria [38 M.R.S. § 464(4)(C)].

A special case is made for wetlands assessments with respect to documented evidence of impairment. For Category 3-5 wetlands that are located in a river/stream or lake/pond (e.g. a wetland that occurs in a slow-flowing section of a stream), any impairments, for example to the fish consumption use, that are listed for the related river/stream or lake/pond AU are also assigned to the wetland AU even if no wetland-specific data for such an impairment exist. For Category 3-5 wetlands that are not located in a river/stream or lake/pond, DEP biologists will decide on a case-by-case basis whether impairments listed for adjacent waters should apply to associated wetlands.

Table 4-1 Maine Designated Uses and Attainment Criteria for Rivers and Streams[1]

Designated Use	Criteria for Attainment
Drinking water supply after disinfection / treatment	• Ambient Water Quality Criteria (DEP Rule Chapters 530 and 584) • General provisions: floating/settleable solids, pH, radioactive substances [38 M.R.S. § 464(4)(A)] • Maine CDC's Maximum Exposure Guidelines (MEGs)
Aquatic life use support[2]	• Biomonitoring - lotic benthic macroinvertebrates: numeric biocriteria (DEP Rule Chapter 579) • Biomonitoring - lotic algae: narrative aquatic life use criteria (38 M.R.S. § 465) and expert judgment evaluation of structure and function of the resident biological community • Biomonitoring - wetland macroinvertebrates: narrative aquatic life use criteria (38 M.R.S. § 465) and expert judgment evaluation of structure and function of the resident biological community • Habitat suitability [38 M.R.S. § 464(13), 465(1-4)] • Dissolved oxygen [38 M.R.S. § 464(13), 465(1-4)] • Ambient Water Quality Criteria (DEP Rule Chapters 530 and 584) • Support of indigenous species • Wetted habitat (DEP Rule Chapter 581) • General provisions: floating/settleable solids, pH, radioactive substances (38 M.R.S. § 464.4.A)
Fishing/Fish Consumption	• Support of indigenous fish species • Absence of fish consumption advisory (instituted by Maine CDC) • General provisions: floating/settleable solids, pH, radioactive substances [38 M.R.S. § 464(4)(A)]
Recreation in and on the water[2]	• *E. coli* bacteria (38 M.R.S. § 465, geometric mean) • Water color (38 M.R.S. § 414-C) • General provisions: floating/settleable solids, pH, radioactive substances [38 M.R.S. § 464(4)(A)]

Designated Use	Criteria for Attainment
Navigation, hydropower, agriculture/industrial supply	• General provisions: floating/settleable solids, pH, radioactive substances [38 M.R.S. § 464(4)(A)]

[1] Fringing wetlands are listed in Appendix IV, Maine Wetlands Assessments.
[2] DEP is revising draft nutrient criteria for fresh surface waters (Draft Chapter 583) that relate to existing designated uses for aquatic life and recreation. For more information, please see www.maine.gov/dep/water/nutrient-criteria/

Table 4-2 Maine Designated Uses and Attainment Criteria for Lakes and Ponds[1]

Designated Use	Criteria for Attainment
Drinking water supply after disinfection / treatment	• Ambient Water Quality Criteria (DEP Rule Chapters 530 and 584) • General provisions: floating/settleable solids, pH, radioactive substances [38 M.R.S. § 464(4)(A)]
Aquatic life use support[2]	• Trophic state (38 M.R.S. § 465-A, DEP Chapter 581) • Ambient Water Quality Criteria (DEP Chapters 530 and 584) • Aquatic life [38 M.R.S. §§ 465-A, 464(9)] • Biomonitoring (wetland habitats) - wetland macroinvertebrates: narrative aquatic life use criteria (38 M.R.S. § 465) and expert judgment evaluation of structure and function of the resident biological community • General provisions: floating/settleable solids, pH, radioactive substances [38 M.R.S. § 464(4)(A)] • Hydropower GPA impoundments [38 M.R.S. § 464(9)]
Fishing	• Support of indigenous fish species • No fish consumption advisory (instituted by Maine CDC) • General provisions: floating/settleable solids, pH, radioactive substances [38 M.R.S. § 464(4)(A)]
Recreation in and on the water[2]	• *E. coli* bacteria (38 M.R.S. § 465-A, geometric mean) • Trophic state (38 M.R.S. § 465-A, DEP Rule Chapter 581) • General provisions: floating/settleable solids, pH, radioactive substances, [38 M.R.S. § 464(4)(A)]
Navigation, hydropower, agriculture / industrial supply	• General provisions: floating/settleable solids, pH, radioactive substances [38 M.R.S. § 464(4)(A)]

[1] Fringing wetlands are listed in Appendix IV, Maine Wetlands Assessments.
[2] DEP is revising draft nutrient criteria for fresh surface waters (Draft Chapter 583) that relate to existing designated uses for aquatic life and recreation. For more information, please see www.maine.gov/dep/water/nutrient-criteria/

Table 4-3 Maine Designated Uses and Attainment Criteria for Estuarine and Marine Waters

Designated Use	Criteria for Attainment
Marine life use support	• Ambient Water Quality Criteria (DEP Chapters 530 and 584) • Dissolved oxygen (38 M.R.S. § 465-B) • Narrative biological standards (38 M.R.S. § 465-B) • General provisions: floating/settleable solids, pH, radioactive substances [38 M.R.S. § 464(4)(A)]
Shellfish propagation and harvest [1]	• National Shellfish Sanitation Program (as assessed by DMR) • No shellfish consumption advisory (instituted by Maine CDC) • General provisions: floating/settleable solids, pH, radioactive substances [38 M.R.S. § 464(4)(A)]
Aquaculture	• General provisions: floating/settleable solids, pH, radioactive substances [38 M.R.S. § 464(4)(A)]
Fishing/Fish Consumption	• Support of indigenous fish species • No fish consumption advisory (instituted by Maine CDC) • General provisions: floating/settleable solids, pH, radioactive substances [38 M.R.S. § 464(4)(A)]

Designated Use	Criteria for Attainment
Recreation in and on the water	• Enterococcus bacteria (38 M.R.S. § 465-B, geometric mean) • General provisions: floating/settleable solids, pH, radioactive substances [38 M.R.S. § 464(4)(A)]
Navigation, hydropower, industrial supply	• General provisions: floating/settleable solids, pH, radioactive substances [38 M.R.S. § 464(4)(A)]

[1] Applies to estuarine/marine waters with high enough salinity to naturally support shellfish propagation and harvest

Data Interpretation

It is not common to have complete and consistent water quality data; therefore, some interpretation of data is required in making a final assessment. Data from unique events such as a spill, an accident, a short-duration license exceedance, or a drought or flood are not used in an assessment determination. The following general principles for each criteria type are used in making an assessment:

Biological Criteria: River, stream, and wetland benthic macroinvertebrate and algal samples are collected in accordance with the Biological Monitoring Program Quality Assurance Project Plan. Stream macroinvertebrate assessments are based on a statistical model that predicts attainment of tiered aquatic life uses (Classes AA/A, Class B, and Class C). The stream macroinvertebrate model is described in Maine *Classification Attainment Evaluation Using Biological Criteria for Rivers and Streams, 06-096 C.M.R. ch. 579* (effective date May 27, 2003). For streams and rivers, aquatic life criteria are deemed to be attained when the applicable biocriterion is met with a probability equal to or greater than 0.60 if there are no other data indicating non-attainment. Final determination of attainment may in some cases be made by professional judgment, applied in accordance with the procedures described in *06-096 C.M.R. ch.* 579 and elsewhere in Department statutes and rules.

The Biological Monitoring Program recently completed an algal bioassessment model applicable to wadeable streams and rivers with rocky substrates. The Program also recently completed a provisional macroinvertebrate bioassessment model for freshwater emergent and aquatic bed wetlands, including fringing wetlands associated with rivers, streams, lakes and ponds. These two new models have not yet been implemented. For the 2014 Integrated Report, Department biologists used expert judgment to evaluate structure and function of the stream algal and wetland macroinvertebrate communities to assess attainment of narrative aquatic life criteria (38 M.R.S. § 465). *06-096 C.M.R. ch.* 579 will be amended to include the stream algal and wetland macroinvertebrate models, following standard public review protocols, after they have been adequately tested. Ambient water quality criteria, whole effluent toxicity (WET) testing, and other biological sampling are also used to determine if other components of the biological community, such as fish, meet the aquatic life uses.

Lake Trophic State: Assessment is based on measures of transparency, chlorophyll a, total phosphorus and color (Table 4-4). When lakes lack this information, a trophic determination made by DIF&W is used, if available. Their determination is more subjective and generally applies to the lake system as a whole including adjacent wetlands and fisheries productivity. Trophic determination is tracked by source (DEP or DIF&W) in the ADB.

Table 4-4 Lake Trophic State Parameters and Guidelines

Numerical Guidelines for Evaluation of Trophic Status in Maine			
(Note: Dystrophy is not often evaluated as a trophic category separately from categories below.)			
	Trophic Status		
Parameter[1]	**Oligotrophic**	**Mesotrophic[2]**	**Eutrophic**
SDT[3]	> 8 meters	4-8 meters	< 4 meters
CHL a	< 1.5 ppb	1.5 – 7 ppb	> 7 ppb
Total Phosphorus[3]	< 4.5 ppb	4.5 – 20 ppb	>20 ppb
TSI[3, 4]	0-25	25-60	>60 and/or repeated algal blooms

[1] Secchi Disk Transparency (SDT), Chlorophyll a (CHL a), and Total Phosphorus based on long-term means.
[2] No chronic nuisance algal blooms.
[3] If color is > 30 Standard Platinum Units (SPU) or not known, CHL a concentration, dissolved oxygen and best professional judgment are used to assign trophic category.
[4] TSI = Trophic State Indices are calculated when adequate data exists and color is at or below 30 SPU.

Support of Indigenous Species: Assessment based on the known absence of a species previously documented as indigenous to a waterbody in historical records collected by state or federal agencies or through published scientific literature; or based on non-attainment of water quality criteria, absence of critical habitat necessary to support indigenous species, or presence of conditions known to prevent support of indigenous species.

Dissolved Oxygen: Assessment of dissolved oxygen (DO) is based on the results of repeated measurements, collected over time. Single excursions of the criterion or excursions within the range of sampling or instrument error (as established in a Quality Assurance Project Plan) may not be used in every case unless there is corroborating evidence of reasonable potential for impairment of a use. Factors to be taken into account when considering corroborating evidence include, but are not limited to: time of data collection, in-stream characteristics, site characteristics (e.g. land use, velocity, canopy cover), water temperature, extent of excursion, algal community, and measurement method. Assessment may also be based on the use of water quality models (e.g. WASP) based on present or expected loadings. Statute [38 M.R.S. § 464(13)] provides that DO in certain deeper waters of a riverine impoundment may not be used for measurement of water quality attainment.

Ambient Water Quality Criteria: Assessment is based on measured exceedance of Statewide Water Quality Criteria as established by Chapter 584: *Surface Water Quality Criteria for Toxic Pollutants* (effective July 29, 2012) (or Site-specific criteria where they may exist), or reasonable potential to exceed the criteria following EPA's Principle of Independent Applicability and Technical Support Document for Water Quality-Based Toxics Control. Single excursions of the criterion or excursions within the range of sampling or instrument error (as established in a QAPP) may not be used in every case unless there is corroborating evidence of reasonable potential for impairment of a use. Factors to be taken into account when considering corroborating evidence include, but are not limited to: in-stream characteristics; land use; extent of excursion; analysis method; hardness; pH, temperature or dissolved organic carbon. Assessment may also be based on the use of water quality models (e.g. dilution models) based on present or expected loadings.

Nutrient/Eutrophication Biological Indicators: Excessive nutrient enrichment (eutrophication) can cause negative environmental impacts to surface waters, such as blooms of algae or bacteria in the water or on the substrate, low DO concentrations, fish kills, generation of cyanotoxins, and alteration of community

structure. In 2012, the Department prepared a new draft of Chapter 583: *Nutrient Criteria for Surface Waters* in preparation for a rulemaking process. EPA indicated their support of the new version of the draft rule. Chapter 583 focused on freshwater systems and described how the Department would use total phosphorus (TP) concentrations and environmental response indicator measurements in a decision framework to determine attainment of designated uses (e.g. recreation, aquatic life support). The proposed rule also described how the Department would use the attainment determinations for the establishment of nutrient discharge limits in National Pollutant Discharge Elimination System permits.

Chapter 583 will eventually include nutrient criteria for marine waters, which will include thresholds for total nitrogen (TN) as well as environmental response indicators to determine attainment of designated uses in estuarine and coastal waters. Marine nitrogen criteria are currently under development. For more information on both freshwater and marine nutrient criteria, please visit the following website: www.maine.gov/dep/water/nutrient-criteria/index.html.

Non-numeric listing criteria for this cause of Aquatic Life Use (ALU) impairment consist of documentation of abnormal biological findings that indicate nutrient enrichment in rivers and streams as well as marine waters. Excess nutrients impair ALU through alteration of habitat, creation of diurnal DO sags caused by excessive plant and algae growth, abundant epiphytic growth resulting in decreased light availability to submerged vegetation, and alteration of benthic macroinvertebrate assemblage structure.

Bacteria: Assessment is based on repeated measurements (generally at least six) to establish an annual geometric mean. Single sample measures are highly variable and not a reliable indicator of impairment or attainment, but the instantaneous criterion provides a benchmark for use in interpreting of Maine's water quality standards. Impairment determinations are made using diagnostic procedures that indicate the probability of a human or domestic animal source of bacteria. Bacteria of wildlife origin do not violate Maine's water quality standards (38 M.R.S. §§ 465, 465-A, 465-B).

Water Color: Assessment based on repeated measurements of discharge performance data (pulp and paper discharges only). In lakes and ponds, color may mitigate high phosphorus concentrations and potential algal blooms.

General Provisions: pH based on repeated measurements (between 6.0 and 8.5 for freshwaters, 7.0 and 8.5 for marine waters), however, certain naturally occurring waterbody types (e.g. bogs, aquifer lakes, high elevation lakes) or events may have naturally low pH and affect downstream waters. Use impairment from solids is subjectively determined. Radioactivity in surface water is not presently monitored.

INTEGRATED REPORT LISTS OF CATEGORIES 1 THROUGH 5

Table 4-5 presents a summary of state waters (rivers/streams, lakes/ponds, wetlands, and estuarine/marine waters) which are attaining or not attaining standards. Tables 4-6 through 4-19 present three different types of information for those same types of state waters; the three types are: 1) Individual designated use support summary (4-6 through 4-9); 2) Total sizes of Category 4 and 5 impaired waters by listing cause/stressor type (4-10 through 4-14); 3) Total sizes of Category 4 and 5 impaired waters by source category (4-15 through 4-19).

Table 4-5 Summary of State Waters Attaining and Not Attaining Standards

Waterbody Type	Total Assessed for Attaining of WQ Standards – Assessed for Designated Uses	Total Attaining All WQ Standards - Supporting All Designated Uses (Category 1)	Total Attaining At Least One Standard – Supporting at Least One Use, But Not All Standards Assessed (Category 2)	Total with Insufficient Data for Assessment – Not Assessed for Any Designated Uses (Category 3)	Total Not Attaining One or More WQ Standards – Not Supporting One or More Uses – But Not Needing a TMDL (Category 4)	Total Not Attaining One or More WQ Standards – Not Supporting One or More Uses – and TMDL is Needed (Category 5)
River & Stream Miles[1]	35,029	5,958	27,343	361	417[2]	951
Number of Lakes/Ponds	5,780[3]	2,857	2,894[3]	0	27	2
Lake & Pond Acres	986,952[3]	295,443	606,945[3]	0	75,915	8,649
Freshwater Wetland Stations[4]	130	1	94	14	15	6
Freshwater Wetland Acres[5]	6,445	15	3,870	1,782	416	362
Estuarine/Marine Acres	1,840,147[6]	0	10,953[2, 7]	2,232	2,767	272,246[8]
Tidal Wetland Acres	Not assessed					

[1] River and Stream mile summaries for each reporting category were generated by the ADB.

[2] These figures do not include waters listed under Category 4-A for atmospheric deposition of mercury.

[3] Includes 6 Category 2 lakes (22 acres) on coastal islands, which are not assigned to mainland HUCs.

[4] The number of wetland stations provided is the actual number of stations assessed, which may be greater than the number of AUs in a particular category because some AUs include more than one station. Furthermore, Category 2 and 4 counts include some stations in AUs that are also listed in Category 5.

[5] Wetland acreage summaries are included for only those AUs currently included in the ADB. Category 2 is a significant underestimate since only 21 out of 94 AUs have been quantified.

[6] This value is the same as in 2014; it was not updated to a summation of 2016 Categories 2-5 because such a summation would have resulted in a significant underestimate due to the significant underestimate of Category 2 waters (see footnote 7).

[7] The acreage of estuarine/marine waters in Category 2 has only been quantified for 2 out of 21 AUs; therefore the value provided here is a significant underestimate.

[8] All estuarine and marine waters capable of naturally supporting lobster propagation are affected by a shellfish (lobster tomalley) consumption advisory due to the presence of PCBs and dioxins. A statewide marine consumption advisory for several saltwater finfish and shellfish species is also in effect based on elevated mercury, PCB and dioxin levels. These Category 5 totals do not include marine waters under these statewide consumption advisories.

Table 4-6 Individual Designated Use Support Summary for Maine Rivers and Streams

USE	Total Size (Miles[1])	Size Assessed (Miles[1])	Size Fully Supporting (Miles[1])	Size Fully Supporting and Threatened (Miles[1])	Size Not Supporting (Miles[1])	Size with Insufficient Info (Miles[1])
Agricultural Supply	35,029	9,130	9,130	0	0	25,900
Drinking Water Supply After Disinfection	22,915	6,012	6,012	0	0	16,903
Drinking Water Supply After Treatment	12,114	1,391	1,388	0	3	10,723
Fish and Other Aquatic Life	35,029	34,531	33,785	0	745	499
Fish Consumption[2]	35,029	7,309	6,563	0	745	27,720
Fishing	35,029	7,403	7,403	0	0	27,626
Hydroelectric Power Generation	23,642	2,667	2,667	0	0	20,975
Industrial Process and Cooling Water Supply	23,642	2,667	2,667	0	0	20,975
Navigation	35,029	7,403	7,403	0	0	27,626
Primary Contact Recreation	35,029	7,401	7,212	0	189	27,628
Secondary Contact Recreation	35,029	7,390	7,209	0	181	27,639

[1] River and stream mile summaries were generated by the Maine ADB.
[2] All freshwaters are listed for a fish consumption advisory due to mercury (Category 4-A - EPA approved Regional Mercury TMDL). The Fish Consumption listing is for additional consumption advisories beyond that caused by mercury (these waters also have a mercury advisory).

Table 4-7 Individual Designated Use Support Summary for Maine Lakes

CWA Goals	Designated Use	Size Fully Supporting – Attaining WQ Standards (Acres)	Size Not Supporting – Not Attaining WQ Standards (Acres)	Size Not Attainable – UAA Performed
Protect & Enhance Ecosystems	Aquatic Life Support	893,228[1]	84,564	9,160[2]
Protect & Enhance Public Health	Fish Consumption (Hg)	0	986,952	0
	Swimming	962,887	24,065	0
	Secondary Contact	986,952	0	0
	Drinking Water Source Water	986,952	0	0
Social & Economic	Agricultural	986,952	0	0
	Fishing	986,952	0	0
	Industrial	986,952	0	0
	Cultural or Ceremonial	986,952	0	0
	State Defined: Hydropower	986,952	0	0
	State Defined: Navigation	986,952	0	0

[1] Includes Fully Supporting (Cat. 1:295,443 acres) and Insufficient Information but assumed to be Fully Supporting (Cat. 2: 596,474 acres) less UAA acreage.
[2] Includes acreages of Ragged (2,712 acres) and Seboomook (6,448 acres) Lakes.

Table 4-8 Individual Designated Use Support Summary for Maine Wetlands

USE	Total Size (Acres[1])	Size Assessed (Acres[1])	Size Fully Supporting (Acres[1])	Size Fully Supporting and Threatened (Acres[1])	Size Not Supporting (Acres[1])	Size with Insufficient Info (Acres[1])
Agricultural Supply	6417	3415	3415	0	0	3001
Drinking Water Supply After Disinfection	4480	192	192	0	0	4288
Drinking Water Supply After Treatment	1937	287	287	0	0	1650
Fish and Other Aquatic Life	6417	4635	4097	0	538	1782
Fish Consumption	6417	616	267	0	349	5801
Fishing	6417	479	479	0	0	5938
Hydroelectric Power Generation	4657	479	479	0	0	4178
Industrial Process and Cooling Water Supply	4657	479	479	0	0	4178
Navigation	6417	479	479	0	0	5938
Primary Contact Recreation	6417	473	473	0	0	5944
Secondary Contact Recreation	6417	473	473	0	0	5944

[1] Wetland acreage summaries were generated by the Maine ADB.
[2] All freshwaters are listed for a fish consumption advisory due to mercury (Category 4A-EPA approved Regional Mercury TMDL). The fish consumption (other) listing is for additional consumption advisories beyond than that caused by mercury (these waters also have a mercury advisory).

Table 4-9 Individual Designated Use Support Summary for Maine Estuarine and Marine Waters

CWA Goals	Designated Use	Size Fully Supporting – Attaining WQ Standards (acres)	Size Not Supporting – Not Attaining WQ Standards (acres)
Protect & Enhance Ecosystems	Marine Life	10,953[1]	7,078
Protect & Enhance Public Health	Fish Consumption[2]	0	1,840,147
	Shellfish Consumption[3] (excluding lobster tomalley)	10,953[1]	267,935
	Shellfish Consumption[4] (including lobster tomalley)	0	1,840,147
	Swimming (primary and secondary contact)	1,840,147	0
Social & Economic	Aquaculture	1,840,147	0
	Navigation	1,840,147	0
	Industrial supply water	1,840,147	0
	Hydropower	1,840,147	0

[1] This acreage is based on the only two out of 21 waters in Category 2 that been quantified; therefore the value provided here is a significant underestimate.
[2] Based on a statewide fish/shellfish consumption advisory.
[3] Does not include statewide advisories for PCBs or dioxin in lobster tomalley. Size not supporting based on total acres of shellfish harvest closures set by DMR as of 12/31/2012.
[4] Based on a statewide consumption advisory for lobster tomalley for waters naturally capable of supporting lobster.

Table 4-10 Total Sizes of Category 4 and 5 Impaired Maine Rivers and Streams by Listing Cause/Stressor Type

Cause/Stressor Type	Size Impaired (miles[1])
Toxics	**752**
Toxic organics	**433**
Polychlorinated biphenyls (PCBs)	429
Dioxin (including 2,3,7,8-TCDD)	370
Pesticides	**319**
DDT	315
Oxygen depletion	**467**
Dissolved oxygen	456
Biochemical Oxygen Demand (BOD)	21
Aquatic Life Criteria (integrated effects including biocriteria, habitat and nutrient biological indicators)	**429**
Nutrients	**241**
Nutrient/eutrophication biological indicators	180
Pathogens (*E. coli*)	**181**
NPS + CSO-sources	(variable miles)
pH	**32**
Altered flow regime	**25**
Fish passage barrier	13
Toxic inorganics (metals)	**19**
Sedimentation	**15**
Harmful algae blooms (CHL a)	**8**

[1] Summaries were generated by the Maine ADB.

Table 4-11 Total Sizes of Category 4 and 5 Impaired Maine Lakes by Listing Cause/Stressor Type (Total acreage)

Cause/Stressor Type	Size Impaired (acres)
Habitat Assessment (Lakes)	48,964
Methylmercury	986,952
Phosphorus (Total)	35,600
Secchi Disk Transparency	35,600
Turbidity	7,865

Table 4-12 Total Sizes of Category 4 and 5 Impaired Maine Lakes by Listing Cause/Stressor Type (by Category)

Listing Category	Cause/Stressor Type	Size Impaired (acres)	Number Impaired
4A	Methylmercury	986,952	5780
	Dissolved Oxygen	634	1
	Phosphorus (Total)	26,951	23
	Secchi disk transparency	26,951	22
4C	Habitat Assessment (Lakes)	48,964	5
	Turbidity	7,865	1
5A	Secchi disk transparency	8,649	2
	Phosphorus (Total)	8,649	2

Table 4-13 Total Sizes of Category 4 and 5 Impaired Maine Wetlands by Listing Cause/Stressor Type

Cause/Stressor Type	Size Impaired (acres[1])
Benthic-Macroinvertebrate Bioassessments	538
Other flow regime alterations	22
Dioxin (including 2,3,7,8-TCDD)	212
Polychlorinated biphenyls	212
DDT	137

[1] Wetland acreage summaries were generated by the Maine ADB.

Table 4-14 Total Sizes of Category 4 and 5 Impaired Maine Estuarine and Marine Waters by Listing Cause/Stressor Type

Cause/Stressor Type	Size Impaired(acres)
Bacteria (Fecal Coliform)	267,935
Bacteria (Fecal Coliform) (CSOs only)	Variable
Dissolved Oxygen	3,133
Sediment Oxygen Demand	366
Marine Life	768
Nutrient/Eutrophication Biological Indicators	1,221
Toxics	1,840,147
Metals-copper	576
PCBs	1,840,147
Dioxins	1,840,147
Tidal Flow Alteration	35
Unknown	1,380

Table 4-15 Total Sizes of Category 4 and 5 Impaired Maine Rivers and Streams by Source Category

Source Category	Size Impaired (miles[1])
Atmospheric Deposition – Toxics (mercury)	32,883
Agriculture	476
Non-Point Source	443
Industrial Point Source Discharge	433
Source Unknown	386
Municipal Point Source Discharges	185
Unspecified Urban Stormwater	109
Dam or Impoundment	79
RCRA Hazardous Waste Sites	58
Impervious Surface/Parking Lot Runoff	51
Upstream Source	45
Wet Weather Discharges (Point Source and Combination of Stormwater, SSO or CSO)	38
Habitat Modification - other than Hydromodification	35
Inappropriate Waste Disposal	27
Flow Alterations from Water Diversions	23
Airports	19
Aquaculture (Permitted)	18
Sewage Discharges in Unsewered Areas	17
Livestock (Grazing or Feeding Operations)	13
Wet Weather Discharges (Non-Point Source)	13
Landfills	10

Source Category	Size Impaired (miles[1])
Sources Outside State Jurisdiction or Borders	9
Illegal Dumps or Other Inappropriate Waste Disposal	2
Impacts from Abandoned Mine Lands (Inactive)	2
Naturally Occurring Organic Acids	2
Unspecified Land Disturbance	2
Mine Tailings	1
Impacts from Hydrostructure Flow Regulation/modification	1

[1] River and stream mile summaries, except for 'Atmospheric Deposition – Toxics', were generated by the Maine ADB.

Table 4-16 Total Sizes of Category 4 and 5 Impaired Maine Lakes by Source Category

Source Category	Size Impaired (acres)
Atmospheric Deposition – Toxics	986,952
Crop Production (Crop Land or Dry Land)	7,350
Flow Alterations from Water Diversions	30
Impacts from Hydrostructure Flow Regulation/modification	48,964
Industrial Land Treatment	1,820
Internal Nutrient Recycling	11,900
Landfills	29
Livestock (Grazing or Feeding Operations)	5,018
Municipal Point Source Discharge	4,288
Natural Sources	10,144
Non-irrigated Crop Production	10,532
Residential Districts	13,358
Rural (Residential Areas)	21,730
Unspecified Unpaved Road or Trail	11,535
Unspecified Urban Stormwater	11,535

Table 4-17 Total Sizes of Category 4 and 5 Impaired Maine Lakes by Source Category (by Listing Category)

Listing Category	Source Category	Size Impaired (acres)	Number of Lakes
4-A	Atmospheric Deposition - Toxics	986,952	5780
	Crop Production (Crop Land or Dry Land)	6,940	6
	Flow Alterations from Water Diversions	30	1
	Industrial Land Treatment	1,820	2
	Internal Nutrient Recycling	11,490	7
	Landfills	29	1
	Livestock (Grazing or Feeding Operations)	5,018	4
	Municipal Point Source Discharges	4,288	1
	Natural Sources	1,869	2
	Non-irrigated Crop Production	10,532	5
	Residential Districts	5,119	3
	Rural (Residential Areas)	21,320	16
	Unspecified Unpaved Road or Trail	3,296	2
	Unspecified Urban Stormwater	3,296	2
4-C	Impacts from Hydrostructure Flow Regulation/modification	48,964	5
	Natural Sources	7,865	1

Listing Category	Source Category	Size Impaired (acres)	Number of Lakes
5-A	Crop Production (Cropland or Dryland)	410	1
	Internal Nutrient Cycling	410	1
	Natural	410	1
	Residential Districts	8,239	1
	Rural (Residential Areas)	410	1
	Unspecified Unpaved Road or Trail	8,239	1
	Unspecified Urban Stormwater	8,239	1

Table 4-18 Total Sizes of Category 4 and 5 Impaired Maine Wetlands by Source Category

Source Category	Size Impaired (acres[1])
Non-Point Source	334
Agriculture	286
Source Unknown	214
Industrial Point Source Discharge	212
Impacts from Hydrostructure Flow Regulation/modification	149
Upstream Source	135
Unspecified Urban Stormwater	67
Habitat Modification - other than Hydromodification	33
Irrigated Crop Production	22
Dam or Impoundment	22
Impervious Surface/Parking Lot Runoff	9

[1] Wetland acreage summaries were generated by the ADB.

Table 4-19 Total Sizes of Category 4 and 5 Impaired Maine Estuarine and Marine Waters by Source Category

Source Category	Size Impaired (acres)
Combined Sewer Overflows (Category 4-A(b))	Variable
Combined Sewer Overflows (Category 5-A)	1,344
Legacy Pollutants	1,840,147
Municipal Point Sources / Overboard Discharge	3,827
Unknown	2,601
Nonpoint Source	1,134
Stormwater	942
Hazardous Wastes	768
Sediment Oxygen Demand	366
Changes In Tidal Circulation/Flushing	35

RIVERS / STREAMS

Water Classification Program

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Maine has four water quality classes of rivers and streams: AA, A, B, and C (38 M.R.S. § 465). Each classification assigns designated uses and narrative/numeric water quality criteria, and may place specific restrictions on certain activities (Table 4-1 and 4-20) such that the goal conditions of each class may be achieved or maintained. Definitions of terms used in the classification are provided in 38 M.R.S. § 466.

Class AA waters are managed for their outstanding natural ecological, recreational, social, and scenic qualities. Direct discharge of pollutants is allowed but highly restricted. Dams and other significant human disturbances are prohibited.

Class A waters are managed for high quality with limited human disturbance allowed. Direct discharges are allowed but highly restricted. Physical and chemical characteristics should be similar to natural conditions.

Class B waters are general-purpose waters and are managed to attain good physical, chemical and biological water quality. Well-treated discharges with ample dilution are allowed.

Class C waters are managed to attain at least the swimmable-fishable goals of the Federal CWA, including support of indigenous fish species. Aquatic life standards require maintenance of the structure and function of the biological community.

Table 4-20 Maine Water Quality Criteria for Classification of Fresh Surface Waters (38 M.R.S. § 465)

	Dissolved Oxygen Numeric Criteria	**Bacteria (*E. coli*) Numeric Criteria**	**Habitat Narrative Criteria**	**Aquatic Life (Biological) Narrative Criteria**
Class AA	as naturally occurs	as naturally occurs	Free flowing and natural	Direct discharge of pollutants is allowed but highly restricted; ***as naturally occurs***[2]
Class A	7 ppm or 75% saturation	as naturally occurs	Natural	Direct discharges are allowed but highly restricted; ***as naturally occurs***[2]
Class B	7 ppm or 75% saturation	64/100 ml (g.m.[1]) or 236/100 ml (inst.[1])	Unimpaired	Discharges ***shall not cause adverse impact*** to aquatic life in that the receiving waters shall be of sufficient quality to ***support all aquatic species indigenous to the receiving water without detrimental changes to the resident biological community***. [2]
Class C	5 ppm or 60% saturation 6.5 ppm (30-day average) at 22° and 24°F	126/100 ml (g.m.[1]) or 236/100 ml (inst.[1])	Habitat for fish and other aquatic life	Discharges ***may cause some changes*** to aquatic life, provided that receiving waters shall be of sufficient quality to ***support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community***. [2]

[1] "g.m." means geometric mean and "inst." means instantaneous level

[2] Numeric criteria in *Classification Attainment Evaluation Using Biological Criteria for Rivers and Streams, 06-096 C.M.R. ch. 579.*

The current (August 2015) distribution of waters assigned to these four water quality classes is summarized in Table 4-21.

Table 4-21 Percent Distribution of River/Stream Water Classes

Class	Percent of Major Mainstem River* Miles	Percent of Total River and Stream Miles
AA	27.5 %	5.9 %
A	22.3 %	47.0. %
B	29.6 %	46.0 %
C	20.6 %	1.1 %

* Major mainstem rivers are rivers that have a watershed of >500 square miles.

Maine law requires that once every three years, the Department review the classification system and related standards and make recommendations to the Board of Environmental Protection (BEP) for any needed changes in the water quality classifications assigned to specific waterbodies.

In 2011, the classification of one waterbody was changed and in 2012, ambient water quality criteria (human health criteria for inorganic arsenic, acrolein and phenol; aquatic life criteria for acrolein, diazanon, nonylphenol) as included in Chapter 584, Surface Water Quality Criteria for Toxic Pollutants were revised or expanded.

Summary of Statewide River and Stream Attainment Status

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The Integrated Report requires the assignment of each AU into one of five categories (see Assessment Methodology, above). A water is determined to be impaired if one or more of the uses assigned by its classification is not attained, as determined by the criteria assigned to that water class. An overall use attainment summary is provided in Tables 4-6 and 4-22. The 2016 use attainment assessment reports on AUs amounting to 35,029 miles of rivers and streams that are tracked in the ADB. Information on the status of individual AUs may be found in Listings on Individual Waters, Appendix II, Categories 1-5. A spatial representation of many AUs can be viewed using this ArcGIS Online Project (note that the project is under development): http://arcg.is/4aLyP.

AUs can be placed in different Categories (3-5) for different (potential) impairments. For example, an AU may be in Category 4-A for a contact recreation impairment due to the 2009 Statewide Bacteria TMDL; simultaneously, it may be in Category 5-D for legacy pollutants. The mileage totals shown in Table 4-22 are for 'single category' reporting, meaning each AU is only counted once, namely in the highest category it is in. For the example above, the AU would only be counted under Category 5.

It should also be noted that ongoing improvements in mapping technology (higher resolution) and correction of errors affect the mileages assigned to each category in a given reporting cycle. Where such factors significantly affected 2016 mileages, this information is provided below.

Table 4-22 Summary of Changes to Surface Water Assessment Categories – 2014 to 2016[1]

Rivers and Streams						
32,109 = Total Miles Assessed in 2014						
35,029 = Total Miles Assessed in 2016						
	2014 Miles in Category[2]	**% of Total 2014 Assessed Miles**	**2016 Miles in Category[3]**	**% of Total 2016 Assessed Miles**	**% Change '14 - '16**	**Change in Miles '14 - '16**
Category 1	4,832	15.0	5,958	17.0	2	1,126
Category 2	25,543	79.5	27,343	78.1	-1.4	1,800
Category 3	370	1.2	361	1.1	-0.1	-9
Category 4	298	0.9	417	1.3	0.4	119
Category 5	1,066	3.3	951	2.9	-0.4	-115

[1] This table is a partial duplicate of Table 2-1 in Chapter 2; it appears twice for convenience.
[2] Single-Category Reporting miles, as generated by final 2014 cycle Maine ADB.
[3] ingle-Category Reporting miles as generated by 2016 cycle Maine ADB.

Category 1: Rivers and streams attaining all designated uses and water quality standards, and no use is threatened.

The 2016 assessment assigned 5,958 miles (17%) of rivers and streams to Category 1 (fully attaining all uses other than statewide mercury advisory as explained in Category 5-C below). The Department has determined through monitoring and evaluation that large areas of the state should be included in this category, where significant protection is afforded by either state or private conservation efforts. Maine is fortunate to have entire sub-watersheds where there is little to no human habitation, few roads and only minimal disturbance (typically well managed forestry operations that are well buffered to protect water quality) or significant conservation ownership. The increase in this category between 2014 and 2016 (1,126 miles) is entirely due to new mapping of several AUs using higher resolution mapping technology.

Category 2: Rivers and streams attaining some of the designated uses; no use is threatened; and insufficient data or no data and information is available to determine if the remaining uses are attained or threatened (with presumption that all uses are attained).

The 2016 assessment assigned 27,343 miles (78%) of rivers and streams to Category 2 only (fully attaining all uses other than statewide mercury advisory as explained in Category 5-C below); another 19 miles of rivers and streams are in Category 2 and at least one other category. New mapping of a number of AUs in this category, and resulting adjustments in unit lengths, caused an increase (1,800 miles) in total mileage in this category compared to 2014.

Category 3: Rivers and streams with insufficient data and information to determine if designated uses are attained (with presumption that one or more uses may be impaired).

The 2016 assessment assigned 361 miles (1.1%) of rivers and streams to Category 3 only (insufficient information to determine attainment); another 20 miles of rivers and streams are in Category 3 and at least one other category. Most of these segments have been assigned to Category 3 because of inconclusive or conflicting monitoring data. No new segments were added to Category 3 in 2016 but one segment (2.7

miles) was moved from Category 3 to Category 5-A. Four segments totaling 5.5 miles were removed from Category 3 (and eliminated from integrated reporting) because insufficient information is available to allow locating these waters and following up on the potential impairments. There were also small changes in total mileage resulting from the remapping of three waters.

Category 4: Rivers and streams that are impaired or threatened for one or more designated uses, but do not require development of a TMDL.

Category 4 impaired waters do not require the development of a TMDL. The 2016 assessment assigned 417 miles (1.3%) of rivers and streams to Category 4. Waters in Category 4 are placed into one of three subcategories:

- 4-A for waters that already have a TMDL that has been approved by EPA
  - Segments totaling 284 miles are listed in this subcategory only; segments totaling 146 miles are listed in this subcategory and at least one other (sub)category.
  - Twenty-one segments totaling 122 miles were added to Category 4-A due to their inclusion in the Maine Statewide Nonpoint Source TMDL, approved by EPA on August 9, 2016. One of these segments (3 miles) is also listed in Category 5-A for Drinking Water Supply Use impairment.
- 4-B for waters where there is an enforceable mechanism in place to bring the water into attainment (e.g. new or renewed wastewater discharge license; court order, etc.)
  - Segments totaling 105 miles are listed only in this subcategory; segments totaling 314 miles are listed in this subcategory and at least one other (sub)category.
  - One segment (0.5 miles) was moved from Category 4-B to 5-A due to the expiration of an existing permit (enforceable mechanism to bring the waters into attainment) and continued non-attainment of aquatic life uses.
- 4-C for waters where impairment is not caused by a pollutant.
  - Segments totaling 28 miles are listed only in this subcategory; segments totaling 9 miles are listed in this subcategory and at least one other (sub)category.
  - No changes were made in this subcategory in 2016.

Category 5: Rivers and streams that are impaired or threatened for one or more designated uses by a pollutant(s) and a TMDL is required.

The 2016 assessment assigned 951 miles (2.9%) of rivers and streams to Category 5 (impaired for one or more uses as well as statewide mercury advisory as explained in Category 5-C below). Waters in Category 5 are placed into one of four subcategories:

- 5-A for waters impaired by pollutants; a priority for TMDL development
  - Segments totaling 177 miles are listed only in this subcategory; segments totaling 141 miles are listed in this subcategory and at least one other (sub)category.
  - Twenty-one segments totaling 122 miles were moved from Category 5-A to Category 4-A due to their inclusion in the Maine Statewide Nonpoint Source TMDL, approved by EPA on August 9, 2016. One of these segments (3 miles) remains in Category 5-A for Drinking Water Supply Use impairment.
  - A total of three segments totaling 5 miles were added to this subcategory in 2016 due to new monitoring data showing impairments. All of these segments were added to Category 5-A only.
- 5-B for waters impaired by bacteria contamination only
  - No segments are in this subcategory in 2016.
- 5-C for waters impaired by atmospheric deposition of mercury (inactive category due to EPA approved Regional Mercury TMDL)

- All freshwaters in Maine have an advisory for the consumption of fish due to the presence of mercury presumed to be from atmospheric deposition. A Regional Mercury TMDL was approved by EPA making these waters Category 4-A.
- This Integrated Report does not consider this statewide advisory in establishing other category listings.
- The advisory is based on probability data that a stream, river, or lake may contain some fish that exceed the advisory action level [Maine uses a lower action level of 0.2 mg/kg (edible portion) than that established by the EPA]. Any freshwater may contain both contaminated and uncontaminated fish depending on size, age, and species occurrence in that water. The advisory applies to all freshwaters because it may not be possible for someone eating a fish to tell where the fish originated and whether or not it has a high level of mercury.

▪ 5-D for waters impaired by the residuals of "legacy" activities
- No changes were made in this subcategory in 2016.

NUMBER OF SEGMENTS THAT WERE DELISTED

Due to EPA approval of the Statewide Nonpoint Source Pollution TMDL on August 9, 2016, the aquatic life use impairments of 21 river and stream segments were moved from Category 5-A to Category 4-A in 2016 (Table 8-5).

As with any assessment of this kind, the identification of impaired waters or delisted waters cannot be considered complete but rather is a reflection of the findings at a particular point in time, relative to the level of monitoring effort expended by the agency and other cooperating contributors.

Causes and Sources of Impairment in Categories 4 and 5

Cause and stressor type information for rivers and streams is provided in Table 4-10; sources of impairment are provided in Table 4-15. It is important to understand that miles attributed to causes and sources in these two tables may be listed more than once if a waterbody is subjected to several different types of disturbance.

DEP tracks cause and source information using the ADB, which enables increasingly accurate and consistent tracking of this information as the database is populated and updated from cycle to cycle.

CAUSES

The greatest number of impaired miles (752; see Table 4-10) is due to toxic contamination from organics and pesticides, including legacy pollutants such as dioxin, PCBs and DDT. For most mainstem river segments that are affected by pulp and paper mill discharges, dioxins have been listed in Category 4-B since 2004. Measureable differences above and below sources of dioxin are no longer detectable. However, those same segments are listed in Category 5-D for legacy sources of PCB contamination found in fish tissue.

The second largest number of impaired miles (467) is due to oxygen depletion, affecting aquatic life uses. Of similar magnitude (429 miles) is the number of impaired miles that do not attain aquatic life criteria as determined by observations of biological effects. Most of these miles were assessed via benthic macroinvertebrate biocriteria although the number of segments also assessed via the algae/periphyton community continued to increase from 38 segments in 2014 to 40 segments in 2016

(2 new listings in Category 5-A). Other notable causes include nutrients (241 miles) and pathogens (*E. coli*; 181 miles).

The mileage for all causes remained virtually unchanged between 2014 and 2016.

SOURCES

Atmospheric deposition of toxics (mercury) affects all waters of the State and is the largest single source of pollution (see Table 4-15). Agriculture, nonpoint sources, and industrial point source discharges are of similar importance (476, 443 and 433 miles, respectively), followed by unknown sources (386 miles).

Mainstems of Major Rivers

Related Website: www.maine.gov/dep/water/monitoring/rivers_and_streams/modelinganddatareports/index.html

The primary cause of impairment on the mainstems of major rivers (those with a watershed of >500 square miles) is non-attainment of the Fish Consumption use, with segments of the Androscoggin, Kennebec, Penobscot, Salmon Falls and Sebasticook Rivers listed in either Category 4-B or Category 5-D. These impairments were identified from tissue monitoring studies that found legacy PCB and dioxin contamination in mainstem rivers. Aside from these impairments, most of the mainstem rivers are in good condition and are attaining their classification, generally Class B or C[5]. Significant segments of the St. John, Allagash, East and West Branches of the Penobscot, St. Croix, and Kennebec Rivers are Class AA and A.

CSOs continue to occur on segments of major rivers; for more information, see Chapter 3, 'Maine Combined Sewer Overflow Program'. In 2009, the Department completed a statewide bacteria TMDL that establishes a restoration and management plan for all sources of bacteria, including CSOs.

AROOSTOOK RIVER

A 2001/2002 DEP study of the Aroostook River below the confluence of Presque Isle Stream revealed a number of water quality problems related to high nutrient levels, including large diurnal fluctuations of DO, elevated CHL a concentrations, extensive algal growth and some exceedances of pH criteria. The study indicated that problems were more pronounced below point source discharges than above them; however the study did not measure NPS inputs. Therefore, the water quality model based on the 2001 data showed that most of the nutrients in the river originated from discharges. Nutrient inputs caused excessive algal growth which in turn led to large diurnal DO fluctuations. In 2012, a follow-up study confirmed the large DO swings and documented large diurnal fluctuations in pH with widespread and frequent exceedances of Maine's pH criteria. As in the case with DO, nutrients are also the causal factor for pH fluctuations and resulting criteria violations. In addition to studying the main stem of the Aroostook River, water quality studies on a number of tributaries in this reach have recently been performed. Two of these tributaries, Merritt and Everett Brooks, are currently listed as not attaining for Aquatic Life Use (Category 5-A). All nutrient loading in these tributary watersheds is NPS-related.

[5] Note that all freshwaters in Maine are subject to a statewide fish consumption advisory due to "Impairment caused by atmospheric deposition of mercury" (see 'Listing Methodology for the 2014 305(b)/303(d) Integrated Report List', above).

In the 2012 Integrated Report, the Aroostook River between the confluence with Presque Isle Stream and 3 miles upstream of the (former) Caribou water supply intake (ME0101000413_148R) was moved from Category 2 to Category 3 due to the presence of the McCain discharge. In the 2014 report, this segment will be moved to Category 5-A for an aquatic life impairment due to pH. The two downstream segments (ME0101000413_148R01, ME0101000413_148R02) of the river that extend to the Canadian border are also moved to Category 5-A (from Category 2) for the same impairment. The Department is pursuing an adaptive management approach (e.g. reducing discharge permit limits; promoting Best Management Practices) to address the existing problems. Follow-up data collection is scheduled in additional tributary streams in 2014 and 2015 and in the main stem in the summer of 2015.

MEDUXNEKEAG RIVER

Historic data submitted by the Houlton Band of Maliseet Indians Water Resources Program documented high algal growth and large diurnal swings in DO on the Meduxnekeag River mainstem below Houlton. These problems have abated in recent years. The river below the confluence with the South Branch Meduxnekeag River is currently in Category 5-D for legacy pollution with DDT and also in Category 4-A for elevated phosphorus (EPA TMDL approval in 2001). In the 2014 cycle, a new impairment to the aquatic life use was added to the lowermost ~7 miles of the river because algal communities do not meet narrative aquatic life standards.

The Meduxnekeag River upstream of the South Branch has been listed in Category 3 since the 2010 reporting cycle and data collection activities are ongoing. Extensive wetlands along this section of the river may be contributing to low DO levels. In 2013-14, the NRCS provided technical assistance and funding (Environmental Quality Incentives Program funds through the National Water Quality Initiative) to several landowners to improve conservation practices on agricultural lands in the Nickerson Lake sub-watersheds to help reduce impairments in the Meduxnekeag River.

PENOBSCOT RIVER

A total of seven segments on the mainstem of the Penobscot River from the confluence of the East and West Branches to Reeds Brook (Hampden) and the West Branch Penobscot River between Millinocket Stream and East Branch Penobscot River are listed as impaired for aquatic life use because of previously documented non-attainment of DO criteria and problems with nutrient/eutrophication biological indicators. In May of 2011, new MEPDES permits incorporating phosphorus discharge limits for all mills on the freshwater portion of the river were issued, putting in place water quality protection based on actual waste load allocations. As a result of this permitting action, the impaired segments were moved to Category 4-B (Pollution Control Requirements Reasonably Expected to Result in Attainment) in the 2012 reporting cycle[6]. As part of the permit conditions, the Department and permittees have been conducting ambient and effluent monitoring along the segments covered by the permit to assess the effectiveness of the new discharge limits. Data collected in 2011 and 2012 indicated that DO criteria were attained.

[6] The West Branch Penobscot River and the uppermost mainstem segments were moved to Category 4-B in the 2010 cycle based on a consent agreement issued in 2008.

ANDROSCOGGIN RIVER

A 2010 addendum to the 2005 Final Androscoggin River TMDL (Gulf Island Pond and Livermore Falls Impoundment), as well as modifications to the Water Quality Certification of the Gulf Island Deer Rips Hydro project and MEPDES permits for two pulp and paper companies, have resulted in revised discharge limits for Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), and Total Phosphorus (TP) and improved oxygenation of Gulf Island Pond (GIP) in the Androscoggin River. Consequently, the water quality has improved. While water quality still does not meet Standards due primarily to sediment oxygen demand resulting from historic discharges, new permits and certification issued in late 2012 are expected to result in attainment within the permit period (by 2017). Due to this permitting action, this segment was moved to Category 4-B in the 2012 reporting cycle.

For the 2014 reporting cycle, extensive data analysis was undertaken to determine whether the GIP segment in question (ME0104000208_424R_01) could be delisted, i.e. moved from Category 4-B to Category 2, for some impairment causes. The data analysis showed that discharge levels and/or concentrations in the impoundment for BOD, TSS, TP and CHL a have decreased significantly since 2004. However, high-flow conditions combined with reduced discharge levels did not allow an assessment as to whether water quality standards would be attained during critical conditions of low flow, high water temperature and point-source inputs at maximum permit levels. The GIP segment will therefore remain in Category 4-B in the 2014 reporting cycle.

In 2009, the Lower Androscoggin River (Lisbon Falls to Brunswick) was proposed for upgrade from Class C to Class B. The BEP Protection declined to recommend the upgrade, as did the Maine State Legislature. However, a Resolve was passed by the Legislature directing the Department to accelerate monitoring and modeling on this segment in the interest of reviewing this proposal in the future. A water quality field survey was completed in the summer of 2010. A water quality model was developed, which predicted that the Class B criterion could not be met under critical water quality conditions. The mainstem segment of the lower Androscoggin River between the Pejepscot Dam and the Brunswick Dam is listed in Category 4-C (impaired by non-pollutant). Information provided to the Department from DMR indicates that this segment fails to support an indigenous species of fish, the American shad, as required by statute. The dam at Brunswick and the associated fish passage device fail to allow passage of a sufficient number of shad to establish a sustainable population in the river above the dam. This facility is licensed by the Federal Energy Regulatory Commission (FERC) and has a requirement for fish passage as part of a State-adopted restoration plan for this species.

PRESUMPSCOT RIVER

On the Presumpscot River, a 1998 TMDL stated that Class B DO criteria were not always attained in the early to mid-1990s at the Little Falls, Mallison Falls, and Saccarappa dam impoundments. It was recommended that additional data should be collected in the early morning hours, and if non-attainment continued a TMDL should be implemented for nonpoint sources.

The non-attainment of DO criteria was addressed in the 2007 Water Quality Certification (WQC) for the five dams of the “Presumpscot River Hydro Projects”. A recommendation was made for increased spillage from the Dundee Pond and Gambo Falls dams, as well as monitoring requirements when water temperatures in the Gambo Falls impoundment exceeded 22ºC before 8 AM. If the increased spillage did

not maintain Class B standards for DO, the dam owner was required to implement other measures.

The dam owner submitted annual reports for 2008-2011 which showed few DO excursions. This data indicated that non-attainment is associated with low flow discharges from Sebago Lake through the Eel Weir Dam. To address this problem, the WQC and Federal Energy Regulatory Commission (FERC) license for this dam issued in March 2015, and the related Lake Level Management Plan for Sebago Lake (from May 2011) stipulate that minimum flows from the dam must be increased from 270 cfs (cubic feet per second) to 408 cfs from June 1 to September 30 annually. This increase will improve spillage from the Dundee Pond and Gambo Falls dams, which is expected to improve DO conditions in the Presumpscot River. Annual DO monitoring reports to be submitted by the dam owner will allow an assessment of the effectiveness of increased flows.

Toxics

DIOXIN MONITORING PROGRAM

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Related Website: www.maine.gov/dep/water/monitoring/toxics/

The Dioxin Monitoring Program was incorporated into the Surface Water Ambient Toxics (SWAT) monitoring program in 2007. Please refer to the most recent SWAT report for latest information on this subject.

SURFACE WATER AMBIENT TOXICS (SWAT) MONITORING PROGRAM

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Related Website: www.maine.gov/dep/water/monitoring/toxics/swat/

Please refer to the website for annual reports on this subject. Below are the executive summaries for 2011 and 2012.

Maine's SWAT monitoring program was established in 1993 (38 M.R.S. § 420-B) to determine the nature, scope and severity of toxic contamination in the surface waters and fisheries of the State. The authorizing statute states that the program: 1) must comprehensively monitor the lakes, rivers and streams and marine and estuarine waters of the State on an ongoing basis, 2) must incorporate testing for suspected toxic contamination in biological tissue and sediment, 3) may include testing of the water column, 4) must include biomonitoring and the monitoring of the health of individual organisms that may serve as indicators of toxic contamination, and 5) must collect data sufficient to support assessment of the risks to human and ecological health posed by the direct and indirect discharge of toxic contaminants.

2011

- Thirty-nine stations were assessed for the condition of the benthic macroinvertebrate community. Twenty-six of these thirty-nine stations attained the aquatic life standards of their assigned class.

- Dioxin concentrations measured in fish from three stations in the Androscoggin River were similar to those measured in recent years; while lower than levels in the mid-1990s, concentrations still exceeded the Maine Center for Disease Control and Prevention's (MCDC's) Fish Tissue Action Level (FTAL). Dioxin concentrations in fish from Kennebec River at Sidney were below those of previous years and below the FTAL. Dioxin concentrations in Sebasticook Lake were lower than in previous years, but still exceeded the FTAL. Coplanar (dioxin-like) PCBs added to dioxins resulted in an exceedance of the FTAL for the fish from all rivers sampled.
- Total PCBs exceeded the FTAL in fish from the fish from all rivers sampled.
- A project funded at the University of Maine reported the following. The mummichog, *Fundulus heteroclitus*, is a non-migratory resident fish often used as a sentinel of persistent pollutants in its immediate environment. Mercury (Hg) concentrations in Penobscot River *F. heteroclitus* populations ranged from 136 – 241 ppb (total Hg wet weight fillet) in juvenile fish from Souadabscook to Old Pier; levels which are 9-16 times higher than those found in fish from a reference site in Wells National Estuarine Research Reserve. Mercury levels in Penobscot River mummichog are below those shown to have adverse effects in juvenile/adult fish (> 500 ppb). No concentration gradient was evident in mummichog Hg levels.

2012

- Forty-four stations were assessed for the condition of the benthic macroinvertebrate community. Thirty-five of these stations attained the aquatic life standards of their assigned class.
- Evaluation of sediments from impoundments below pulp and paper mills on the Androscoggin River showed little evidence of toxicity from heavy metals.
- Dioxin concentrations in fish from many river stations continued to decline from previous levels. Although concentrations still exceeded the MCDC's FTAL for dioxin alone at many stations, concentrations were below a level that would require river-specific fish consumption advisories more stringent than the statewide fish consumption advisory due to mercury. These results are currently being reviewed by MCDC for possible revision of the current river specific fish consumption advisories. Dioxin concentrations measured in brook trout from Gilead on the Androscoggin River were below the FTAL and lower than previous concentrations in rainbow trout from the same station. Concentrations in smallmouth bass at Rumford Point and in white sucker at Rumford Point above Rumford, Riley and Livermore above and below Jay still exceeded the FTAL although concentrations were lower than in previous years at Rumford Point and Livermore. Dioxin concentrations in filet of American shad from Waterville on the Kennebec River exceeded the FTAL but concentrations in roe did not. Dioxin concentrations in white sucker from Kennebec River at Sidney were below the FTAL, at levels similar to those measured in 2011. Dioxin concentrations in Sebasticook Lake still exceeded the FTAL and were higher than in 2011.
- Coplanar (dioxin-like) PCB concentrations in fish were lower in 2012 than in the 1990's at all stations sampled. Although coplanar PCB concentrations added to the exceedance of the dioxin FTAL, concentrations did not exceed a level that would require river-specific fish consumption advisories more stringent than the statewide fish consumption advisory due to mercury at most stations sampled in

2012. Coplanar PCBs added to dioxins resulted in an exceedance of the FTAL for the American shad roe at Waterville and white sucker from the Kennebec River at Sidney, and white sucker from Sebasticook Lake. Coplanar PCB concentrations were detected and increased the exceedance of the FTAL in fish at all other stations except the brook trout at Gilead. The sum of coplanar PCBs and dioxins exceeded a Statewide Advisory Dioxin Equivalent Threshold, which would require an additional advisory beyond the Statewide Fish Consumption Advisory due to mercury, for white sucker from Riley on the Androscoggin River and from Sebasticook Lake.

Contaminants and Areas to Watch

- Total PCB concentrations were generally a little lower on the Androscoggin River and higher on the Kennebec River compared to previous years. Total PCBs exceeded the FTAL in all fish from the same stations sampled for dioxin, except for brook trout from Gilead on the Androscoggin River, which were below the FTAL and lower than previous levels in brown trout and rainbow trout from this station. Total PCB concentrations in American shad filet were well above the FTAL, while the concentration in shad roe only slightly exceeded the FTAL.
- Contaminant levels were measured in resident fish and freshwater mussel species at locations above and below the two dams scheduled to be removed as part of the Penobscot River Restoration project. The results provide a baseline for contaminant studies following removal of the dams, to document any changes in contaminant levels resulting from movement of any contaminated sediment that has accumulated in the impoundments over the years.

Aquatic Life Monitoring

BIOLOGICAL MONITORING OF RIVERS AND STREAMS

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Related Website: www.maine.gov/dep/water/monitoring/biomonitoring/index.html

The Biological Monitoring Program assesses the health of rivers, streams, and wetlands by evaluating the composition of the resident biological communities. In the 1980s, the Maine Legislature passed the Water Classification Law and made an initial assignment of each river and stream reach in the state to one of four established classes (AA, A, B, and C Table 4-17). Subsequent Water Quality Reclassification initiatives have reassigned waterbodies to more appropriate (usually higher quality) management classifications. Class AA and Class A have the same aquatic life criteria and biological expectations ("as naturally occurs"). Data collected in accordance with Maine's biocriteria protocol are analyzed to predict the likelihood of a waterbody attaining the aquatic life criteria of its assigned class (i.e. AA/A, B, and C). In 2003, DEP adopted numeric biocriteria in *Classification Attainment Evaluation Using Biological Criteria for Rivers and Streams*, 06-096 C.M.R. ch. 579 (for rivers and streams) which describes the process used to make aquatic life use attainment decisions using the benthic macroinvertebrate community. DEP recently developed biological assessment methods for benthic algal communities of wadeable streams and rivers with rocky substrates. DEP also monitors wetland macroinvertebrate and algal communities, and has developed provisional biological criteria for wetland

macroinvertebrates. DEP developed statistical models (linear discriminant functions) to predict aquatic life use attainment based on stream algal and wetland macroinvertebrate community data. The models for stream algae and wetland macroinvertebrates have not yet been fully implemented. For the 2014 Integrated Report, Department biologists determined attainment of the narrative aquatic life criteria already contained in the Water Classification Program (38 M.R.S. § 465) by using expert judgment to evaluate the structure and function of the stream algal (Appendix II) and wetland macroinvertebrate (Appendix IV) communities. *06-096 C.M.R. ch.* 579 will be amended to include the stream algal and wetland macroinvertebrate models, following standard public review protocols, after they have been adequately tested. More detailed information on wetland monitoring and assessment is provided in Chapter 5. Biomonitoring station locations and associated biological and physical data can be found at www.maine.gov/dep/water/monitoring/biomonitoring/data.htm.

REPORTS OF FISH KILLS

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The Department documents all pollution-caused fish kills. For the 2011-12 reporting period, three documented fish kills were found likely to have been due to pollution effects.

On August 10 and 11, 2011, while the Town of Littleton, Maine was replacing a washed out culvert on an unnamed tributary to the Meduxnekeag River, two concrete walls were poured in the streambed. Efforts to keep the streamflow from contacting the fresh concrete failed, and concrete was found downstream along with more than 100 dead trout, suckers, and minnows. Concrete slurry and freshly hardened concrete are known to increase the pH of water to levels lethal to fish.

On July 12, 2012, a fire fighting exercise at the Air National Guard base in Bangor, Maine resulted in the release of fire-fighting foam which resulted in mortality of more than 100 minnows in a ditch draining the base to Birch Stream. No dead fish were found in Birch Stream.

In September of 2012, the Auburn Water District reported more than 200 dead and dying lake trout in Lake Auburn, Auburn, Maine. Subsequent investigation by the District, DIF&W and DEP determined the cause to be low DO resulting from high total phosphorus due to a 6”+ rainstorm in June. This rainstorm caused major erosion to the pond which, in combination with the onset of internal recycling of phosphorus from sediments and an unusually early ice-out and warm spring temperatures, resulted in the fatally low oxygen levels.

ACHIEVING COMPREHENSIVE ASSESSMENT OF ALL STREAMS: PROBABILITY-BASED DESIGN MONITORING

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Biological Monitoring Program staff participated in the design and planning for the National Wetland Condition Assessment (NWCA), and coordinated the sampling efforts in Maine during the summer of 2011. Analysis of the NWCA data is currently being performed by EPA. Additional information about the NWCA is found in Chapter 5 of this report. Biological monitoring staff have also participated in planning for national surveys of wadeable streams and large rivers.

LAKES / PONDS

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Related Website: www.maine.gov/dep/water/lakes/index.html

This section of the 2016 Integrated Report provides an update to information contained in the 2006 - 2014 Integrated Reports, links to which can be found at: www.maine.gov/dep/water/monitoring/305b

Information in the 2006 report (pages 75 – 91) includes:

Physical Extent of Lakes
Statutory Classification of Lakes
Attainment of Classification
Attainment Evaluation Criteria for each Designated Use
How Attainment Status Relates to Listing Categories
Past Use of Probability-based Designs
Summary of Listing Category Changes for 2006
Criteria Used to Change Listing Status
An Overview of Maine's Invasive Aquatic Plant Program
Economic Contribution of Lakes to Maine.

Additional topics required under CWA § 314 and addressed in the 2006 report include:

Maine's Definition of Significant Lakes
Trophic Status of Significant Publicly Owned Lakes
Lake Rehabilitation Techniques
Acid Effects on Lakes
Toxics in Maine lakes
Trend Analyses and Climate Considerations.

A number of tables reappear in this report at the request of EPA Region 1 staff.

Monitoring of Maine lakes continues to rely on a strong volunteer-based program, the Maine Volunteer Lake Monitoring Program (www.mainevlmp.org), as well as both targeted and probability-based monitoring performed by state staff. The Lake Assessment Section participated in an EPA Region 1 probability-based lake monitoring effort in 2006 as well as the National Lake Assessment (NLA) efforts in

2007 and 2012. The results of the NLA survey help to put the overall condition of Maine lakes in perspective nationally and add additional data on the lakes visited by the EPA-State teams. The NLA reinforced the conclusions that Maine's lightly developed watersheds continue to support lakes in full attainment of most designated uses.

Attainment of Classification

The state designated a subset of the total population of lakes as 'Significant Lakes' as requested by EPA under CWA § 314 in the early 1990s. Table 4-23 summarizes numbers and acreages for all lakes having an identification number as well as the subset of Significant Lakes.

Table 4-23 "All" and "Significant" Lake Category Information

Maine Lake Population Summary		
	Number	**Acres**
All Lakes	5,780 (100%)	986,952 (100%)
Significant Lakes	2,313 (40%)	958,977 (97%)

Designated uses actively assessed to determine classification attainment status are: Aquatic Life Support, Fish Consumption, Recreation In/On the Water, and Drinking Water Supply (after disinfection/treatment). Table 4-24 summarizes how lake attainment status relates to specific Listing Categories used in the 2016 report.

Table 4-24 Summary of Listing Categories and Subcategories used in the 2016 Assessment of Maine Lakes

Listing Category	Category Summary
1	Attaining all standards
2	Attaining some standards; assumed to attain others
3	Attaining some standards; insufficient / no data / info to determine if standard(s) are met for use that may be impaired
4a	TMDL complete (includes Regional Hg Deposition TMDL)
4b	Expected to meet standards
4c	Not impaired by a pollutant
5a	TMDL needed

Brief summaries of Listing Categories for lakes follow. Lake-specific changes are typically included in Chapter 8 as well as in Appendix III; however no lakes have been moved among categories during this period. Note that all lakes are also listed in Category 4-A because a regional TMDL was approved to address the fish consumption impairment due to atmospheric deposition of mercury which formerly had all lakes listed in Category 5-C.

Category 1: Lake waters attaining all designated uses and water quality standards, and no use is threatened.

For the purposes of this assessment, lakes having no population in their direct watersheds have been listed in 'Category 1, Attaining all standards' with the exception of four lakes which are listed in Category 4-C, in non-attainment of the Aquatic Life Use (habitat) due to non-pollutant (hydrologic modification). The number

of lakes listed in Category 1 is 2,857, totaling 295,443 acres. Waters are summarized by the 10-digit HUC within which they are located (Appendix III, Category 1). No lakes have moved in or out of this Listing Category since the 2008 reporting cycle.

Category 2: Lake waters attaining some of the designated use(s), no use is threatened, and insufficient data or no data and information is available to determine if the remaining uses are attained or threatened (with presumption that all uses are attained).

The Department is highly confident that these waters attain the following designated uses: drinking water (after disinfection / treatment), recreation in/on the water, fishing (excluding fish consumption), and as habitat for fish and other aquatic life. Category 2 contains 2,894 lakes or 606,945 lake acres. Waters are summarized by the 10-digit HUC within which they are located (Appendix III, Category 2). No lakes have moved in or out of this Listing Category since the 2012 reporting cycle.

Category 3: Lake waters with insufficient data and information to determine if designated uses are attained (with presumption that one or more uses may be impaired).

Currently there are no lakes in Category 3. No lakes have moved in or out of this Listing Category since the 2012 reporting cycle.

Category 4: Lake waters that are impaired or threatened for one or more designated uses, but do not require development of a TMDL.

There are currently 27 lakes covering 75,915 acres listed in Category 4. These lakes fall into two subcategories: waters on which TMDLs have been completed (4-A) and waters with impairments not caused by a pollutant (4-C). Category 4-A contains 22 lakes totaling 26,951 acres. No lakes have moved in or out of this listing category since the 2012 reporting cycle. It is important to acknowledge that most of the lakes listed in Category 4-A are impaired due to internal phosphorus loading to the sediments. When this is the case, NPS work in a lake's watershed does not result in any noticeable improvement. Properly applied sediment alum treatments can result in a dramatic improvement to the lake water quality. Unfortunately, alum treatments are expensive, far exceeding annual state budgets for lake activities. A non-lapsing, dedicated fund for lake restoration using alum treatments would allow lake managers to begin restoring Category 4-A lakes.

Five lakes (48,964 acres) continue to be listed in Category 4-C, lake water impairment not caused by a pollutant. All of these lakes are in non-attainment of aquatic life (habitat) standards due to hydromodification (drawdown).

Note: For the 2008, 2010, 2012 and 2014 reporting cycles, Category 4-A also includes all freshwaters in Maine that were listed in previous cycles in a narrative Category 5-C "Impairment caused by atmospheric deposition of mercury" due to the Statewide fish consumption advisory due to mercury. On December 20, 2007, EPA approved a Regional Mercury TMDL.

Category 5: Lake waters that are impaired or threatened for one or more designated uses by a pollutant(s), TMDL development is required.

Three sub-categories have been designated under Category 5; however lakes have been listed in only one.

Category 5-A includes 2 lakes (8,649 acres) which are designated as 'Significant' (lakes impaired by pollutants, and require a TMDL to be conducted by the State of Maine). No lakes have moved in or out of this Listing Category since the 2012 reporting cycle. Table 4-25 summarizes individual use support for the lakes in Category 5-A.

Table 4-25 Individual Use Support Summary for Lake (acres) in Category 5A (TMDL Needed)

Designated Use	Non-Attainment	Attainment
Drinking Water Supply (after disinfection/treatment)	0	8,649
Aquatic Life Use Support	8,649	0
Fishing (other than fish consumption covered in Cat. 4A)	0	8,649
Recreation In / On the Water	8,649	0
Navigation, Hydropower, Agriculture & Industrial Supply	0	8,649

Causes (or Stressors) resulting in non-attainment and Sources are summarized for all impaired waters in Tables 4-11 and 4-16, respectively and Tables 4-12 and 4-17 provide Causes/Sources organized by listing category. For more information on Lake TMDL projects, contact: Dave Halliwell, DEP, BWQ, DEA, telephone: (207) 287-3901, email: David.Halliwell@maine.gov. Related website:

www.maine.gov/dep/water/monitoring/tmdl.

2016 Assessment Notes. Changes in Categories were considered but not implemented for two lakes during this assessment, and will be reconsidered for the 2018 cycle. Annabessacook Lake is technically meeting the attainment criteria of not blooming in more than half of the 10-year assessment period and could be delisted on that basis. However, discussions with the Cobbossee Watershed District, the primary stakeholder, revealed that they are particularly concerned with the depression of annual transparency means which occurred during the middle of this assessment period, and the slight reversal of improving trend over the last few years. Thus it was decided to continue tracking improvement for one or two additional cycles to increase confidence in any listing changes. Clary Lake's water quality has declined since the dam was damaged in 2011 by tropical storm Irene. Clary Lake is listed in Category 2 but may be moved to Category 4-C in the future. The local lake association has been trying to get the dam owner to repair the structure since it was damaged. Should they succeed, this listing change would no longer be needed. The Lake Assessment Section will continue to track the association's progress.

VARIOUS TABLES AND ADDITIONAL UPDATES REGARDING MAINE LAKES

§ 314 requires a summary of trophic classification for Maine's 'Significant' lakes. This summary is compiled using the numerical criteria in Table 4-4. Table 4-26 summarizes the trophic distribution of Maine Lakes.

Table 4-26 Trophic Status of Maine Lakes

Trophic Category	Significant Lakes		All Lakes	
	Number	Acres	Number	Acres
Dystrophic	2	34	2	34
Eutrophic	593	150,955	670	151,477
Mesotrophic	1,024	664,852	1,127	667,087
Oligotrophic	125	111,500	129	111,547
Total Assessed	**1,744**	**927,341**	**1,928**	**930,145**
Unknown	**569**	**31,636**	**3,852**	**56,807**

Table 4-27 summarizes techniques used to rehabilitate lakes.

Table 4-27 Lake Rehabilitation Technique Summary (§ 319 Projects)

Rehabilitation Technique
Watershed Treatments BMPs associated with Public & Private Road Management BMPs associated with Shoreline Erosion Control / Bank Stabilization
Other Lake Protection/Restoration Techniques Public Information/Education Program/Activities Fish Removal Pilot Project

§ 314 also requires reporting Acid Effects on lakes. Maine is fortunate to be located a considerable distance from many of the sources of atmospheric deposition that can result in acidification of surface waters. Some smaller headwater and seepage lakes having naturally low pH are likely slightly more acidic due to such atmospheric inputs but not to levels that have conclusively altered the biota or caused Maine to consider mitigation activities. Recovery from acidic deposition is apparent in lakes in the northeast, including sensitive populations. Regionally, it is estimated that approximately half of the lakes determined to be acidic in the 1980s are now non-acidic (pH >5). In Maine's high-elevation lakes, only four of the 12 lakes found to be acidic in the 1980s were acidic in 2009. An important change in aquatic chemistry coincident with decreased acidic deposition is increased concentrations of dissolved organic carbon (DOC) in recovering surface waters across the northern hemisphere. This result has led to a shift in the source of acidity from inorganic sources (acid rain), to natural (DOC) sources. Tables 4-28 and 4-29 in the 2010 report estimated numbers and acreages of acidic lakes and sources of acidity (acid deposition and natural sources). These tables have not been included in this report because the estimates are no longer reliable and departmental sampling priorities have not included revisiting all of the originally sampled waters.

Surface Water Ambient Toxics (SWAT) Monitoring Program

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Related Website: www.maine.gov/dep/water/monitoring/toxics/swat/

Please refer to the website for annual reports on this subject. Below are the executive summaries for 2011 and 2012. For background information on the SWAT monitoring program see the SWAT section under River/Streams above (p. 63).

2011

- Fish from 44 lakes were sampled and analyzed for mercury concentrations by a new, quicker and less expensive method using the Direct Mercury Analyzer 80 at the Sawyer Environmental Research and Chemistry Lab at the University of Maine in Orono. There was no statewide trend for fish from 8 lakes comparing 2011 results with those from the 1990s. Combined with the 2010 results from 26 lakes, there appears to be no statewide change in mercury concentrations in Maine freshwater fish in the last 20 years. This is not unexpected given that there have been few efforts to reduce mercury emissions nationally until recently. Given the long history of atmospheric deposition of mercury, it may take a while for reductions in mercury emissions to be reflected as reductions in mercury in fish. The data were sent to the Maine Center for Disease Control and Prevention (MCDC) for use in reviewing the statewide Fish Consumption advisory.

2012

Encouraging Results:

- Although limited data from previous studies indicated that mercury concentrations in fish from thirteen coastal lakes might be higher than historical levels in fish from inland lakes, concentrations were, in fact, similar to those from inland lakes, except for Round Pond, Hodgdon Pond and Seal Cove Pond in Acadia National Park, where concentrations were much higher than in other coastal and inland lakes, as was the case in the mid-1990s for these two lakes.

Contaminants and Areas to Watch

Comparison of current mercury concentrations in twelve inland lakes with historical data from the same lakes from the 1990s showed that, in 2012, concentrations increased in one lake, decreased in five lakes and remained similar in six lakes; this is unlike previous years when the number of lakes with increased and decreased concentrations was generally equal. Aggregated data collected from forty-six lakes from 2010 to 2012 show no clear trends, however. The data were sent to the MCDC for use in reviewing the statewide Fish Consumption advisory.

Invasive Aquatic Plants

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Related Website: www.maine.gov/dep/water/invasives/index.html

The Department's formal program to control and prevent the spread of existing infestations of invasive aquatic plants completed its twelfth year in 2012. The primary

funding mechanism for the Department's work on invasive aquatic plants continues to be a fee on Maine motorized watercraft registrations ($6 of the $10 fee comes to the Department) and a fee on out-of-state motorized boats and seaplanes ($11.40 of the $20 fee comes to the Department). Revenues come to a dedicated fund within the Department.

In February 2012 the Department recalibrated how it tracks and lists invasive-plant-infested waters. This revised approach lists small water bodies, which have unique names, within larger lake systems. The result is a more precise list of infested waters that features meaningful information for boaters and others who make decisions based on whether a given waterbody is infested.

At the end of 2012, 24 lake systems, consisting of 48 public water bodies (out of 5,780 statewide), were known to be infested with invasive aquatic plants. Variable water milfoil (*Myriophyllum heterophyllum*), is the most prevalent invasive aquatic plant. Eurasian water milfoil (*Myriophyllum spicatum*), hydrilla (*Hydrilla verticillata*), and curly-leaf pondweed (*Potamogeton crispus*) are each in two public water bodies. One of the curly-leaf pondweed-infested waters also hosts the invasive European naiad (*Najas minor*), and is the only state water known to have two invasive aquatic plants. Hydrilla was also confirmed in two private ponds in 2011.

As previously reported in the 2012 report, 382-acre Middle Range Pond in Poland was removed from the list of known infestations in Maine. The Range Pond Association (RPA) diligently surveyed for and removed variable milfoil plants first found in 2001. The Department and RPA surveyed the previously-infested area in 2011 and found no variable milfoil, the third consecutive year in which surveys failed to detect the plant. As a result, the Department removed Middle Range Pond from the annual documented infestation list that was developed in March 2012.

Ossipee River (Parsonsfield and Porter) was added to Maine's list of documented infestations in 2012. The invasive plant, variable water milfoil, was confirmed to be present in an area adjacent to the New Hampshire border. The find was not unexpected; variable water milfoil had been documented upstream in NH and downstream in Saco River, but had not been found in the Maine reach of Ossipee River until summer 2012.

In 2011 the Department contracted a ninth consecutive year of herbicide (fluridone) treatment for control of the State's first hydrilla infestation, in Pickerel Pond (Limerick). The Department SCUBA survey in 2011 revealed a second consecutive year without detecting hydrilla, leading the Department to announce that it would forego herbicide treatment for the 2012 season. Department SCUBA divers in 2012 found one hydrilla plant. The Department will continue to survey the pond in collaboration with a newly energized Pickerel Pond Association and trained plant surveyors from elsewhere in Maine.

During 2011 and 2012 the Department continued working on two infestations highlighted in the 2012 report, Eurasian water milfoil in Salmon Lake (Belgrade) and hydrilla in Damariscotta Lake (Jefferson). The Department's response in 2011 and 2012 to each infestation included installation of plant fragment screens to prevent further spread, regular surveys for new plants, hand removal of plants by divers and deployment of benthic barriers to smother plants.

Diver surveys of the infested area in Salmon Lake in 2011 and 2012 revealed no re-emergence of Eurasian water milfoil. This is an encouraging finding but, since eradication is very difficult to achieve, the Department must remain vigilant in surveying for potential regrowth.

As reported in the 2012 Report, a second hydrilla location was found in Damariscotta Lake in 2011, in a tributary stream approximately four miles north of the initial site. The Damariscotta Lake Watershed Association (DLWA) and the Department have continued to collaborate on removal of plants by hand and deployment of benthic barriers at both locations. Management of this infestation, like all others in the state, requires strong partnerships between the Department and groups such as DLWA. The initial Damariscotta infestation was discovered by a volunteer trained through Maine's VLMP Invasive Plant Patrol Program which is funded by the Department's dedicated fund.

Maine's first line of defense, the Courtesy Boat Inspection Program, achieved new highs in boat inspections in both 2011 (76,105 inspections) and 2012 (81,823 inspections). Inspectors recorded at least 287 "saves" in 2011 and 279 in 2012, i.e. instances where an inspector found and removed a confirmed invasive aquatic plant from a boat before entering or after leaving the water. Maine's statewide Courtesy Boat Inspection Program is managed by Lakes Environmental Association (LEA), a regional watershed protection organization based in Bridgton, under a contract with the Department.

The Department offers annual grants to local groups coordinating boat inspection programs and removing invasive aquatic plants from lakes and ponds. The grant program is administered by LEA through the aforementioned contract. Cash and in-kind matching funds from local lake groups and municipalities exceed the amount granted by the Department.

The Department continued to work in 2011 and 2012 with the Maine Milfoil Initiative (MMI), a project spearheaded by a consortium of lake groups and housed at St. Joseph's College in Standish. After significant effort on the part of the lake groups, MMI formally began in 2009 and received federal funds in 2010 to conduct research on and assist lake groups in the control of variable water milfoil.

The diatom *Didymosphenia geminata* (didymo) had yet to be confirmed in Maine as of the end of 2012. DEP and DIF&W continue to coordinate research efforts regarding the risk of spread posed by felt waders and informing anglers how to reduce the risk of spreading the invasive diatom.

ESTUARIES / COASTAL WATERS

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Maine has three classes for the management of estuarine and marine waters: SA, SB, and SC. Classification assignments are based on the minimum level of quality intended for each waterbody. **SA waters** are outstanding natural resources that receive minimal human impact, and are managed for the highest water quality of the three classes. No direct discharges of pollutants, including those from finfish aquaculture, are allowed in SA waters. **SB waters** are general purpose waters that are managed to attain good quality water. Well-treated discharges of pollutants with ample dilution are allowed. **SC waters** are managed for the lowest water quality, but must be fishable and swimmable and maintain the structure and function of the biological community. Well-treated discharges of pollutants are allowed in SC waters.

Each class is managed for designated uses and each has DO, bacteria and aquatic life standards (see Table 4-28).

Table 4-28 Maine's Estuarine and Marine Waters Classification Standards

Class	Designated Uses	Dissolved Oxygen	Bacteria	Aquatic Life
SA	Recreation in and on the water Fishing Aquaculture (excludes finfish) Propagation and harvesting of shellfish Navigation Habitat for fish and estuarine and marine life	As naturally occurs	As naturally occurs	As naturally occurs
SB	Recreation in and on the water Fishing Aquaculture Propagation and harvesting of shellfish Industrial process and cooling water supply Hydroelectric power generation Navigation Habitat for fish and estuarine and marine life	Not less than 85% of saturation	Enterococcus of human and domestic animal origin not higher than geometric mean of 8/100ml or instantaneous level of 54/100ml from 5/15 to 9/30 May not exceed National Shellfish Sanitation Program criteria for shellfish harvesting	Support all indigenous estuarine and marine species Discharge not to cause closure of shellfish beds
SC	Recreation in and on the water Fishing Aquaculture Propagation and restricted harvesting of shellfish Industrial process and cooling water supply Hydroelectric power generation Navigation Habitat for fish and estuarine and marine life	Not less than 70% of saturation	Enterococcus of human and domestic animal origin not higher than geometric mean of 14/100ml or instantaneous level of 94/100ml from 5/15 to 9/30 May not exceed National Shellfish Sanitation Program criteria for restricted shellfish harvesting	Maintain structure and function of the resident biological community Support all indigenous fish species

Maine law requires that once every three years, the Department review the classification system and related standards and make recommendations to the BEP for any needed changes in the water quality classifications assigned to specific waterbodies. A major review of water quality standards and classifications was completed in 2009. No changes were made to marine classifications during the current assessment period. The present distribution of waters assigned to three marine water quality classes is summarized in Table 4-29.

Table 4-29 Area and Percentage of Estuarine and Marine Waters in Each Classification

Class	Acres	Percentage
SA	145,421	8 %
SB	1,657,455	91 %
SC	18,417	1 %
Total	**1,821,474**	**100 %**

This chapter provides an assessment of the degree to which water quality supports the designated uses defined by the State of Maine statutes for the protection of aquatic life. Designated uses in this chapter and in Chapter 7 (Public Health-Related

Assessments) are divided into two broad use categories: protection of human health and protection of aquatic life. The protection of these uses will result in the protection of other uses (e.g. navigation, industrial process and cooling supply). Applicable monitoring results and attainment assessments are summarized within each of these two categories in this chapter as well as in Chapter 7.

Summary of Statewide Status

This Integrated Report requires the assignment of each assessment unit (AU), currently by Department Waterbody ID and/or DMR Pollution Area, into one of five categories (see Methodology). Specific segments of waterbodies are determined to be impaired if they do not attain, or are suspected not to attain, one or more of the uses assigned by their classification based on the standards for that classification. As with any assessment of this kind, the identification of impaired waters cannot be considered complete but rather is a reflection of the findings (to date) relative to the level of effort expended by the agency and other cooperating contributors.

The Department has been involved in ongoing discussions with DMR to consider how shellfish harvest closure area determinations can be incorporated into the development of marine AUs (similar to what is used in the ADB for freshwaters). Creation of new AUs would allow digitization of listed segments that would permit spatial tracking of closure areas and other listed segments in subsequent reports. It is anticipated that new AUs will be used in the 2018 reporting cycle. The 2016 report carries forward the updated Categories 2 through 5-B-1 lists that account for DMR shellfish harvest closure area classifications as of 2012.

An overall use attainment summary for 2016 is provided below and in Table 4-5. Note that for the 2016 report, assessment updates occurred for only selected impaired segments in Categories 4-C and 5-A, and minor edits were made to Categories 5-B-1(a) and 5-B-1(b) to correct erroneously omitted approved shellfish harvest areas.

Category 1: Estuaries/coastal waters attaining all designated uses and water quality standards, and no use is threatened.

No changes were made to Category 1 as part of this 2016 assessment.

Category 2: Estuaries/coastal waters attaining some of the designated uses; no use is threatened; and insufficient data or no data and information is available to determine if the remaining uses are attained or threatened (with presumption that all uses are attained).

No changes were made to Category 2 as part of this 2016 assessment.

Category 3: Estuaries/coastal waters with insufficient data and information to determine if designated uses are attained (with presumption that one or more uses may be impaired).

No changes were made to Category 3 as part of this 2016 assessment.

Category 4: Estuaries/coastal waters that are impaired or threatened for one or more designated uses, but do not require development of a TMDL.

No changes were made to Categories 4-A and 4-B-1 as part of this 2016 assessment. The Category 4-C listing for the New Meadows River and “Lake” (ID

802-27) was updated for two additional years of water quality data and a revised watershed delineation and land use assessment.

Category 5: Estuaries/coastal waters that are impaired or threatened for one or more designated uses by a pollutant(s) and a TMDL is required.

The 2016 assessment updated the Category 5-A listings in the Piscataqua River and Portsmouth Harbor to include consideration of additional survey data with the potential to affect the impairment causes and associated comments. Category 5-A segments in the Mousam and Royal Rivers were given revised comments to address implications of new survey data in light of these two segments being included in Maine's 303(d) Vision (Appendix VI) as priority waters for modeling of waste load allocations. Category 5-B-1(a) is unchanged with the exception of three segments in the Kennebec River, one segment in the East Branch of Little Kennebec Bay, and one segment in White Creek and Masons Bay that were approved for shellfish harvest as of the end of 2012 but were inadvertently omitted from the 2014 report.

Category 5-B-1(b) was updated with revised Waterbody IDs for two segments in Bar Harbor whose 2014 report Waterbody IDs did not distinguish between identical bacteria listings. Otherwise, Category 5-B-1(b) is unchanged.

Categories 5-B-1(c) and 5-D are unchanged in this 2016 assessment.

Causes and Sources of Impairment in Categories 4 and 5

Cause and stressor type information is provided in Table 4-14, while information on sources of impairment is provided in Table 4-19. Causes include impairments due to elevated bacterial counts (fecal contamination with Enterococcus as the indicator organism), low dissolved oxygen, elevated nutrients and/or biological indicators of eutrophication, tidal flow alteration, or elevated toxics concentrations. These causes are presented below in greater detail.

BACTERIA

The intent of the Maine Statewide Bacteria Total Maximum Daily Load (TMDL) was to "support action to reduce public health risk from waterborne disease-causing organisms." Non-pathogenic bacteria, including Enterococci in the marine environment, are used as indicator organisms for fecal pathogens in water. Waterborne pathogens (bacteria, viruses, etc.) enter surface waters from a variety of sources, including human sewage and the feces of warm-blooded wildlife. These pathogens can pose a risk to human health due to gastrointestinal illness through different exposure routes, including contact with and ingestion of recreational waters, ingestion of drinking water, and consumption of filter-feeding shellfish (clams, mussels, etc.). Additionally, the TMDL was intended to identify waterbody segments that were not meeting attainment of the designated uses of swimming and shellfishing based on associated water quality criteria.

Implementation of the approved 2009 Statewide Bacteria TMDL is intended to result in improved management of bacterial sources of impairment that cause shellfish closures. For the 2014 list, the acreage for all estuarine and marine waters impaired due to shellfish harvest closures as of 2012 was 190,809 acres. For the 2016 reporting cycle, the 2014 acreage has been adjusted to include five additional segments (which had been inadvertently omitted in 2014) for approved shellfish harvest, for a revised total of 211,218 acres. While DMR utilizes fecal coliform

bacteria to determine appropriate shellfish harvest closures (see also Chapter 7), bacterial monitoring using Enterococci as indicator organisms is conducted by the Department in selected urban streams, and the Maine Healthy Beaches program on swimming beaches and occasionally in tidal waters that influence bacterial loads to recreational areas. All monitoring programs aid in the identification of fecal contamination from point and non-point sources through local knowledge, Department permits, and applied techniques such as Microbial Source Tracking.

DISSOLVED OXYGEN

Eight waterbody segments are listed as impaired (six in Categories 4-A, 4-B-1 and 4-C, and two in Category 5-A) due to lack of attainment of state dissolved oxygen (DO) standards. The reasons for non-attainment are varied and include loadings from point and non-point sources in waterbody segments with insufficient flow, factors such as benthic respiration (sediment oxygen demand), and restriction of water circulation caused by man-made structures. Other than the Royal and Mousam River listings, no updates were made to any of the segments described below in this report.

- The estuarine portion of the lower Salmon Falls/upper Piscataqua River has a completed TMDL; however, implementation in ME and NH is incomplete. The New Hampshire Department of Environmental Services collected sonde and grab sample data during July and August 2011 and July 2012 at four estuarine sites and demonstrated regular DO non-attainment (<85% saturation) predominantly in the lower portion of the water column, occasionally extending close the surface at shallower sites. Sonde data from a site approximately 1.4 miles below head of tide in 2011 reflect the pattern of non-attainment and show large diel DO swings. These 2011 and 2012 data strengthen observations of non-attainment from the prior reporting cycle.
- The estuarine portions of the Ogunquit River, Goosefare Brook, and Medomak River are not known to have been monitored for DO since the 2012 reporting cycle, so no additional information on attainment is available since relocation of municipal point sources.
- The Department and the Georges River Tidewater Association (GRTA) collected data from the St. George River estuary in 2012, which show widespread DO non-attainment in bottom water from just below head of tide through mid-estuary, and non-attainment at depth at the two most seaward sites. Additional monitoring by the GRTA in 2013 and the Maine Coastal Observing Alliance (MCOA) in 2014 may assist with identification of low DO signals relative to tide stage.
- The draft Royal River Waste Load Allocation Study, dated March 2006, recommended delisting the estuary for DO due to potential natural causes. The estuary will remain in Category 5 due to uncertainty of the low DO cause(s). An update to the listing comments in the 2016 report notes that data collection continued in 2015 and 2016 to better characterize water quality conditions and confirm dissolved oxygen non-attainment.
- The draft Mousam River Waste Load Allocation Study, dated February 2005, indicated that the majority of oxygen loss is due to benthic respiration and circulation factors and that the Kennebunk treatment facility has only a very marginal effect. Suggested upgrades to the facility including biological treatment improvements have been completed and minimum summer DO limits for effluent have been established. An update to the listing comments in the 2016 report

notes that data collection continued in 2013 and 2015 to better characterize water quality conditions and confirm dissolved oxygen non-attainment.

Generally, data from various studies and volunteer monitoring programs show DO levels along the coast to be adequate to protect marine life. As presented in the Casco Bay Estuary Partnership's 2010 State of the Bay report, the Friends of Casco Bay have determined that approximately 90% of all DO data from Casco Bay (7,600+ measurements from 1993-2008) indicate values above 7.2 mg/L, with periodically lower values generally located in warmer estuarine waters such as Portland Harbor, Maquoit Bay, and the Royal, New Meadows, and Harraseeket Rivers. While some estuaries have DO levels that do not meet their classification criteria, the Department has concluded that some of these instances are a result of natural processes including bacterial respiration within the benthic boundary layer.

NUTRIENT/EUTROPHICATION BIOLOGICAL INDICATORS

Along the Maine coast there are instances of elevated nutrient conditions and in some cases, corresponding biological responses. From Bar Harbor to Eastport, the principal nutrient sources are naturally occurring organic loads from rivers and streams, atmospheric deposition, and flood tide contributions from the Gulf of Maine. More developed areas of the Maine coastline along Penobscot Bay, Casco Bay and the southern bays experience eutrophication from freshwater inflows carrying treated and occasionally untreated wastewater, stormwater runoff, and groundwater in areas with sandy soils. While nitrogen is consistently conveyed through water, atmospheric deposition can be a dominant nitrogen source in more rural areas of Maine.

Typical biological indicators of nutrient enrichment effects within Maine's marine waters include primary producers such as phytoplankton, macroalgae and eelgrass (*Zostera marina*). Phytoplankton blooms are more often observed in tidal waters with ample nutrient supply and light availability, and less turbulent water leading to reduced vertical mixing. While spring, summer and fall blooms of nuisance phytoplankton (e.g. diatoms and dinoflagellates) have been shown to coincide with increased availability of inorganic water column nutrients, a 2010 report prepared for the Casco Bay Estuary Partnership concluded that based on 2006-2008 data, bloom intensity of the toxic red tide organism, *Alexandrium fundyense*, in Casco Bay did not correlate with anthropogenic, land-derived nutrient loading.

Similar to phytoplankton, proliferation of opportunistic macroalgae generally occurs when favorable temperature, irradiance and nutrient availability coincide. Anthropogenic nitrogen has been shown to fuel growth of nuisance macroalgae on the benthic surface, particularly of the genus *Ulva* (formerly *Enteromorpha*). While nuisance macroalgal growth typically occurs on protected shorelines with shallow slopes such as mudflats, excessive growth can also be observed along more exposed shorelines and within vertical structure provided by eelgrass. Opportunistic macroalgal growth is a natural occurrence, although widespread and dense blooms covering intertidal and shallow subtidal shorelines can smother organisms living in the sediment and result in production of toxic concentrations of hydrogen sulfide by bacteria.

The success of eelgrass is strongly influenced by light availability, which can be limited by accumulations of epiphytes (diatoms, tunicates, bryozoans, e.g.) or elevated water column turbidity and/or dissolved organic matter. Confounding interpretations of eutrophication effects, eelgrass epiphyte abundance can be controlled seasonally by grazing pressure from marine invertebrates such as snails

and small crustaceans. Extensive mapping surveys along the Maine coast were completed by DMR in the 1990s and 2000s, but knowledge of eelgrass distribution since that time is available only for isolated areas of the coast. Use of eelgrass as an indicator of eutrophication has occurred most notably in the Great Bay estuary in New Hampshire as well as embayments surrounding Cape Cod, Massachusetts where wastewater and non-point source nitrogen contributions have been implicated in eelgrass losses.

As of this 2016 report, one waterbody segment is listed as impaired based on a cause of nutrient/eutrophication biological indicators.

- The State of New Hampshire listed the Piscataqua River Estuary (Lower Piscataqua River, NH Assessment Units NHEST600031001-02-01 and NHEST600031001-02-02) and Upper Portsmouth Harbor, NH Assessment Unit NHEST600031001-11, on its 2010 303(d) list for Aquatic Life impairment due to >20% loss of eelgrass. For the 2012 reporting cycle, DEP determined that eelgrass within Waterbody ID 812-2 (Piscataqua River) had declined from 299.1 acres to 6.8 acres (98% loss) from 1996 to 2010, and that sufficient data existed to assign a Category 5 listing for a Marine Life Use Support impairment with cause of "nutrient/eutrophication biological indicators". DEP also added the adjacent Portsmouth Harbor segment (Waterbody ID 812-3) to the 2012 impaired list based on a 49% decrease between 1996 and 2010. A cause 'unknown' designation was assigned to Waterbody ID 812-3 until further data collection and analyses could be completed to investigate potential reasons for decline. The impairment listings and causes for both Maine segments were carried over in the 2014 report due to continued declines in eelgrass areal extent and insufficient data to change causes for these declines.

  For this 2016 reporting cycle, DEP assessed aerial survey and groundtruthing data from the University of New Hampshire (UNH) (2013, 2014) and Piscataqua Region Estuaries Partnership (PREP) and project partners (2013 only). By 2014, eelgrass within Waterbody ID 812-2 decreased slightly from 9.9 acres in 2012 to 7.23 acres. Waterbody ID 812-3 eelgrass area decreased from 121 acres in 2012 to 111 acres in 2014. Notable migrations of eelgrass bed deep edges were not apparent from the UNH surveys. The 2013 PREP survey provided valuable insight to the use of multiple tools for refining aerial survey estimates of eelgrass cover, and determined that underwater video via drop camera was a repeatable assessment method for eelgrass and macroalgae percent cover quantification.

  Based on 2013 PREP survey methods, DEP conducted a 2014 survey of 18 sites in Waterbody IDs 812-2 and 812-3 using underwater video deployed from a boat. Eight of the 18 DEP sites and survey coordinates were redundant with the 2013 PREP sites, and allowed for methodological as well as visual comparisons of the same beds. The 2014 DEP survey utilized percent cover classes of eelgrass, eelgrass epiphytes and benthic macroalgae within ≤5, 0.25 m^2 quadrats, and qualitatively noted sediment surface characteristics and epiphyte and macroalgal types to address symptoms of eutrophication. The 2014 DEP survey indicated distinct differences between parameters of interest in the 812-2 and 812-3 segments. Specifically, 812-2 sites exhibited:

  - >30-60% eelgrass cover and 10-50% epiphyte cover, on average,
  - 14% of quadrat replicates with 1 - <10% benthic macroalgae cover, and 68% of replicates with 10 – 50% macroalgae cover (n = 22 replicates),

- the predominant epiphyte type of filamentous algae, and
- a flocculent organic layer on the sediment surface that revealed underlying grey sediment when overturned.

812-3 sites demonstrated:

- >60-90% eelgrass cover and 10-50% epiphyte cover, on average,
- 55% of quadrat replicates with 1 - <10% macroalgae cover, and 25% of replicates with 10 – 50% macroalgae cover (n = 55 replicates),
- the predominant epiphyte type of encrusting bryozoans, and
- a consolidated sediment surface characterized by silt, sand and small gravel.

Based on 2013 and 2014 aerial and groundtruthing survey estimates, eelgrass loss may have continued since 2012 within Waterbody IDs 812-2 and 812-3, but calculated declines may also be a reflection of normal interannual variability since areal extent has remained relatively similar since 2009. Additionally, intra-annual differences in percent cover estimates based on survey methodology were revealed by the UNH (2013) and PREP (2013) studies, and demonstrate that interpretation of interannual changes can be influenced considerably by methodological accuracy. Nevertheless, eelgrass acreage in Waterbody IDs 812-2 and 812-3 as of 2014 justifies continued impairment listings.

The Waterbody ID 812-2 cause of “nutrients/eutrophication biological indicators” is supported through eelgrass epiphyte and benthic macroalgal evidence from 2013 PREP and 2014 DEP underwater survey video. 2013 and 2014 water quality data provided by the NH Department of Environmental Services (DES) do not enable attribution of nutrients or eutrophication biological indicators to the marine life impairment based on water column nitrogen and chlorophyll concentrations that are not consistent with levels expected to result in eelgrass decline. Further, other pertinent water column parameter data such as diurnal dissolved oxygen and light attenuation do not indicate swings symptomatic of significant production or high values demonstrative of persistent limitation, respectively. Support from water quality data in subsequent reports would be strengthened by larger sample sizes and more representative sites.

The Waterbody ID 812-3 cause ‘unknown’ designation remains supported based on insufficient data to attribute a cause. 2014 DEP data and video of eelgrass epiphytes and benthic macroalgae indicate more offshore, exposed, and less anthropogenically influenced characteristics than in ID 812-2, which are not adequately symptomatic of eutrophication. 2013 and 2014 water quality data provided by DES from the “GRBCML” station closest to ID 812-3 do not include representative data with which to conclude possible effects of nitrogen, water column chlorophyll, diurnal DO swings, or light attenuation.

DEP field assessments of water quality within the Waterbody ID 812-3 segment are planned for 2015, as well as near term establishment of a long-term monitoring site within the persistent eelgrass beds to the south of Gerrish Island in Portsmouth Harbor. Future monitoring efforts will aim to address data gaps including spatial representativeness of data, water column optical properties, and the role of invertebrate grazers on eelgrass epiphytes.

TIDAL FLOW ALTERATION

Tidal flow restrictions are inevitabilities of historic transportation projects designed to permit automobile traffic over marine waters via constructed causeways. Due to these restrictions, natural tidal flow is diminished when flood tides are not permitted to regularly fill upper portions of estuaries, resulting in longer flushing times and increased water column stratification, often as a detriment to water chemistry and the resident biological community. The presence of the tidal restrictions provides suitable conditions for surface water phytoplankton proliferation and enables benthic respiration to deprive bottom water of oxygen. For the 2016 report, one waterbody segment is listed as impaired based on the cause of tidal flow alteration.

- The New Meadows River, including the "Lake" upstream of Howard Point (Waterbody ID 802-27) is listed in Category 4-C due to tidal restrictions created by the installation of causeways in 1937 and the 1960s. While previously listed in this category as impaired for Marine Life Use Support based on low dissolved oxygen conditions, the presence of three tidal restrictions, most notably at the seaward extent of the "Lake" at the Bath Rd./State Rd. crossing, was documented in the 2014 report as the underlying cause for impairment. This restricted flow has resulted in persistently elevated nutrient concentrations, moderate chlorophyll concentrations (although based on limited sample size) and observations of surface water phytoplankton blooms, low water column transparency, and low dissolved oxygen concentrations.

  Data used to support continued inclusion of this segment in Category 4-C were collected in 2013 and 2014 by the Friends of Casco Bay at two sites, one at the head of the "Lake" and one at the New Meadows Marina just seaward of the Bath Rd./State Rd. tidal restriction. The site at the head of the "Lake" was consistently turbid, with regular dissolved oxygen non-attainment observed in the morning and large diel swings indicative of productive surface water. The site below the causeway presented fewer dissolved oxygen extremes and greater transparencies. For the 2016 report, a revised watershed delineation and land use assessment were conducted for the impaired segment. Most notably, the land use assessment determined that approximately 45% of the land area draining directly to the New Meadows "Lake" is developed land or agriculture. While no nutrient or chlorophyll information was available from 2013 or 2014, the land use assessment may suggest possible sources of non-point source nutrient loading.

TOXICS

The general category of toxics is by far the most widespread cause of impairment in marine waters in the State. The toxics subcategories of Polychlorinated Biphenyls (PCBs), dioxins and/or mercury impaired 1,821,440 acres of marine waters due to the statewide marine consumption advisories for lobster tomalley and certain saltwater finfish. Industrial point sources have historically been the largest contributing source category for dioxin. Some industrial loads that are treated through municipal point sources are additional sources although pretreatment is required in most cases. These industrial sources account for most of the shellfish and finfish consumption listed waters where dioxins remain the primary contaminant. Due to changes in bleaching at the state's bleached kraft pulp and paper mills, as of 2005 the mills were found to be no longer discharging measurable amounts of dioxin. As a result,

concentrations in fish are declining, although elevated levels remain in fish in some estuarine portions of rivers due to historical discharges.

The removal of CSOs over the past several years has improved environmental quality in some of Maine's harbors. However, many locations, for example Kittery, Portland, Boothbay Harbor, Rockland and Searsport, have lingering toxic pollution problems resulting from past activities. These activities include papermaking, shipbuilding, energy production (e.g. gasworks), tanning, and metal working. Toxics derived from these industries include dioxin, pesticides such as DDT, metals, and PCBs. Landfills were also often located on the coast (e.g. Eastern Promenade in Portland) and continue to be sources of toxic pollutants. More recent elevations in toxic pollution, especially from Polycyclic Aromatic Hydrocarbons (PAHs) and metals (e.g. lead, copper, zinc), are related to increases in urban development and boat-related activities. Direct untreated discharges through CSOs still deliver toxic pollutants and bacteria to Maine's coastal waters during and after storms. Some toxic pollutants (e.g. PAHs, mercury) are deposited from the air. No changes were made to the toxics section for the 2016 report.

Surface Water Ambient Toxics (SWAT) Monitoring Program

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Please refer to the website for annual reports on this subject. Below are the executive summaries for 2011 and 2012. For background information on the SWAT monitoring program see the SWAT section under River/Streams above (p. 63). The marine portion of the SWAT program has utilized blue mussel, softshell clam, and American lobster tissue as indicators of toxic contamination likely to affect human and ecological health.

2011

- Blue mussel tissue from East End Beach, Portland, Mill Creek, Falmouth, Rockland, and Sandy Point, Stockton Springs, was analyzed for contaminants including metals, mercury, Polycyclic Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs), and organochlorinated pesticides. In 2011, tissue from six additional blue mussel sites in the Sheepscot estuary was analyzed for metals and mercury only.
- Softshell clam tissue from Fort Point Cove, Stockton Springs was tested and reported with data from seven other softshell clam sites sampled in 2004-05 and 2010. Clam tissue was analyzed for contaminants including metals, mercury, PAHs, PCBs, and organochlorinated pesticides.
- Lead in mussel tissue exceeded the National Status and Trends (NS&T) Musselwatch 85th percentile concentration at six sites tested in 2011, resulting in these sites receiving an "elevated" designation. Two of these sites, East End Beach, Portland and Crockett Point, Rockland, also exceeded the Maine Center for Disease Control's (MCDC) fish tissue action level (FTAL) for lead in finfish. Lead in clam tissue in 2011 at Fort Point Cove, Stockton Springs fell just below the MCDC FTAL for lead in finfish. Previous clam tissue sampling in 2005 at Fort Point Cove exceeded the FTAL for lead in finfish.

- Mercury in mussel tissue exceeded the NS&T Musselwatch 85th percentile concentration at all ten sites tested in 2011, which resulted in assignment of an "elevated" classification. Mercury levels in 2011 mussel and clam tissue were below the MCDC methylmercury developmental FTAL for finfish.
- PAH concentrations in mussel and clam tissues did not exceed the NS&T Musselwatch 85th percentile at any site and were not considered to be elevated.
- PCB concentrations in mussel tissue at East End Beach, Portland and Crockett Point, Rockland exceeded the MCDC cancer FTAL. The results from Crockett Point are consistent with elevated concentrations detected in 2007 at the same location. PCB concentrations in clam tissue were below the MCDC cancer FTAL.
- Organochlorinated pesticide concentrations in mussel and clam tissue were low at Maine sites compared to national Musselwatch data, and pesticide levels were safely below MCDC FTAL values.
- EPA, through the 2010 National Coastal Condition Assessment (NCCA), will be analyzing lobster tissues for metals, mercury, PCBs, and organochlorinated pesticides. These data are not yet available from EPA.

2012

General Approach:

- Blue mussel tissue from Scarborough River, Scarborough and Spring Point, South Portland was analyzed for contaminants including metals, mercury, PAHs, PCBs, and organochlorinated pesticides. Tissue from four additional blue mussel sites in the Sheepscot estuary was analyzed for metals and mercury only.
- Softshell clam tissue from Presumpscot River, Falmouth/Portland and Mare Brook (Harpswell Cove), Brunswick was tested and reported with historical data from eight additional softshell clam sites sampled in 2004-05 and 2010-11. Clam tissue was analyzed for contaminants including metals, mercury, PAHs, PCBs, and organochlorinated pesticides.

Encouraging Results:

- PAH concentrations in mussel and clam tissues did not exceed the NS&T Musselwatch nationwide 85th percentile at any site and were not considered to be elevated. PAH levels in Maine shellfish tend to be low when compared to the national average.
- PCB concentrations in mussel and clam tissues did not exceed the NS&T Musselwatch 85th percentile at any site and were not considered to be elevated. PCB concentrations in mussel and clam tissue were below the MCDC cancer FTAL, indicating shellfish remained safe for human consumption with regard to PCBs.
- Organochlorinated pesticide concentrations in mussel and clam tissue were low at Maine sites compared to NS&T Musselwatch data, and pesticide levels were safely below MCDC FTAL values, indicating shellfish remained safe for human consumption with regard to pesticides.

Contaminants and Areas to Watch:

- Lead in mussel tissue exceeded the NS&T Musselwatch 85th percentile concentration at two sites in 2012, Spring Point, South Portland and Turnip Island,

Georgetown, resulting in these sites receiving an "elevated" designation. Lead concentrations at these two sites also exceeded the MCDC FTAL for lead in finfish. Lead in clam tissue in 2012 at Mare Brook, Brunswick and Presumpscot River, Falmouth/Portland exceeded the MCDC FTAL for lead in finfish. These four sites are considered problematic for human shellfish consumption based on these lead concentrations.

- Mercury in mussel tissue exceeded the NS&T Musselwatch 85th percentile concentration at five of six sites tested in 2012, resulting in these sites receiving an "elevated" designation. Mercury levels in 2012 mussel and clam tissue were below the MCDC methylmercury developmental FTAL for finfish, indicating shellfish remained safe for human consumption with regard to mercury.
- Mercury in Sheepscot River estuary blue mussel tissue is elevated over Maine coast background levels by a factor of 2.5 on average.
- Cadmium in mussel tissue exceeded the NS&T Musselwatch 85th percentile concentration at one site, Turnip Island, Georgetown in 2012, which resulted in assignment of an "elevated" classification. Cadmium levels in 2012 mussel and clam tissue, including Turnip Island, were below the MCDC FTAL for cadmium in finfish, indicating shellfish remained safe for human consumption with regard to cadmium.

Gulfwatch Contaminants Monitoring Program

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Related Website: www.gulfofmaine.org/gulfwatch/

In addition to the SWAT program, DEP participates in the Gulfwatch Contaminants Monitoring Program, a part of the Gulf of Maine Council on the Marine Environment. In addition to the Maine coastline, monitoring occurs across Massachusetts, New Hampshire, New Brunswick and Nova Scotia, and utilizes the blue mussel, *Mytilus edulis*, as an indicator for habitat exposure to contaminants. Mussel tissue samples are analyzed for heavy metals, mercury, PAHs, PCB congeners, and organochlorinated pesticides. Contaminant accumulation in mussel tissue represents the biologically available portion that is not always apparent from measurement of contaminants in other environmental matrices such as water, sediment, and suspended particles. Gulfwatch has sampled over 50 sites across the Gulf of Maine since 1991, including 13 regularly sampled sites on the Maine coast.

In each of 2011 and 2012, blue mussel tissue was sampled from six sites along the coast of Maine, including three sites that were sampled in both years. These sites are sampled more frequently to generate sufficient data to examine temporal trends. Trace metals data from analysis of blue mussel tissue samples was recently received and is currently being reviewed by each jurisdiction. Tin and vanadium were added to the suite of metals for which analysis was conducted in 2012. Currently, no funding is available to complete organic analysis of 2012 samples, which have been archived. The data report for 2011-12 samples collected from the six sites along the Maine coast is not yet available.

Ocean acidification

No changes have been made to the following section since the 2014 report. Ocean acidification (OA as a consequence of rising atmospheric CO2) is a topic of mounting concern worldwide. For the 2008, 2010 and 2012 Integrated Reports, the Center for Biological Diversity (CBD) in San Francisco, CA requested that coastal states list their coastal waters as threatened or impaired, in Category 5, due to information that has been gathered indicating marine ecosystems may already be experiencing declines in ocean pH. The most recent letter from the CBD that pertained to the 2012 report was dated December 22, 2011. As one of the conditions of a settlement agreement with the CBD, the EPA issued a memorandum on November 15, 2010, describing how states can move forward, where OA information exists, to address OA during the 2012 listing cycle using the current 303(d) Integrated Reporting framework. At the same time, this memorandum acknowledged that in the case of OA, information is largely absent or limited at this point in time to support the listing of waters for OA in many states. The following EPA webpage includes a copy of the signed memorandum, "Integrated Reporting and Listing Decisions Related to Ocean Acidification": www.epa.gov/tmdl/epa-issues-november-15-2010-memorandum-integrated-reporting-and-listing-decisions-related-ocean.

DEP acknowledges that OA and its effects on pH and marine life have been documented in other areas of the world's estuarine and coastal waters and may be of concern in Maine's marine waters. While DEP has not established a monitoring program specifically targeted at identifying OA and its effects on water quality criteria and designated uses, DEP has been and continues to be in contact with environmental organizations and universities whose researchers are conducting focused studies on pH and effects on shellfisheries within Maine jurisdictional waters.

For the 2012 report, DEP reviewed the articles submitted by CBD and determined that none of them provided sufficient information to demonstrate that Maine's marine waters are failing to attain Maine's water quality standards (or will not be in attainment by the next listing cycle), including those for protection of pH, marine life use, and antidegradation. Waters are listed in Category 5 as threatened when impairment of a designated use is anticipated in the next listing cycle. Maine marine waters are not expected to show impairment of water quality criteria (pH) or relevant designated uses (marine life use support) in that timeframe, or within the timeframe relevant to this 2014 report. Nevertheless, Maine agrees that OA may be a significant concern in the future.

WATER QUALITY AND DESIGNATED USES

Pursuant to the General Provisions of the Maine Revised Statutes (38 M.R.S. § 464), the Department may not issue a water discharge license if "Discharge of pollutants to any water of the State that violates §§ 465, 465-A and 465-B, except as provided in § 451;…causes the "pH" of estuarine and marine waters to fall outside of the 7.0 to 8.5 range." DEP regularly monitors marine waters for multiple water quality parameters, including pH, in the vicinity of permitted discharges based on established DEP priorities for assessing receiving waterbodies for attainment of water quality criteria. The monitoring conducted by DEP is most often intended to characterize ambient conditions. Monitoring efforts conducted to date by DEP do not indicate failure to attain pH criteria in marine waters, because data values fall within the allowable pH range.

The CBD 2011 letter also indicates that Maine must list marine waters as threatened or impaired based on aquatic life threats and impairments caused by OA. The referenced designated use of aquatic life can be addressed by the Maine Revised Statute that states that classified marine waters "…must be of such quality that they are suitable for the designated uses of recreation in and on the water, fishing, aquaculture, propagation and harvesting of shellfish, industrial process and cooling water supply, hydroelectric power generation, navigation and as habitat for fish and other estuarine and marine life. The habitat must be characterized as unimpaired." (38 M.R.S. § 465-B).

Impacts of OA on marine life and habitat would be most likely manifested by acidic sediments and bottom waters, and reduced success of shellfish recruitment and shell formation. Shellfish and relevant habitat are mostly monitored by DMR as the regulatory agency of commercially-harvested species, but monitoring is also conducted by municipal shellfish wardens and as part of field and laboratory studies being carried out by the Friends of Casco Bay and St. Joseph's College, respectively. No supporting data were submitted to DEP as part of the 303(d) assessment process, and therefore were not readily available for preparation of the 303(d) list. Further, studies referenced in the CBD letter generally pertain to 1) trends in global carbon emissions, 2) oceanic impacts of elevated atmospheric CO2 (pH, carbonate chemistry, calcification in pelagic organisms), or 3) lowered pH, salinity and temperature interactions and extrapolated impacts on shellfish of varying species and life stages. None of these references directly relate to the condition of Maine's waters due to the global location, spatial scale of comparison and/or the applicability of laboratory experimental results. As such, no demonstrated impairments to pH, marine life or habitat have been documented to support a threatened or impaired listing based on the contents of the CBD letter.

More specifically, the CBD letter states that coastal estuaries and temperate nearshore ecosystems are especially susceptible to changes in pH, and that calcifying organisms in particular are already threatened in Maine's coastal waters by OA. Casco Bay was identified by the CBD as being especially vulnerable to OA. Of all articles submitted by the CBD, Waldbusser et al. (2011) was flagged as having information potentially relevant to Maine's marine waters; however, it was determined that the article's contents were insufficient to make a listing determination (see "State Assessment" below).

Summary of Waldbusser et al. (2011):

Waldbusser et al. (2011) assessed linear regressions of Chesapeake Bay water temperature, salinity, and pH data, grouped into mesohaline and polyhaline sites, from April-September of 1985-2008. Shell calcification rates were then measured on cultured eastern oysters in a factorial experiment with differing temperature, salinity and pH treatments to determine Total Alkalinity (TA) change over time as a measure of calcification rate. From historical data analyses, the authors observed a significant seasonal decline in average daytime pH within polyhaline (>18 ppt) surface waters, but not in mesohaline (5-18 ppt) surface waters. From the laboratory experiment, significant interactions of pH with salinity or temperature were determined, and calcification rates decreased steadily with decreasing pH under the lower salinity (16 ppt) and lower temperature (20°C) treatments. Waldbusser et al. state that "the importance of pH versus saturation state versus pCO2 on calcification will likely vary with species, life stage, mode of calcification, and the degree of departure from what are currently poorly quantified thresholds to changes in carbonate variables."

State Assessment:

Physical conditions in the Chesapeake Bay differ from those in Maine marine waters. In the Maine intertidal and shallow subtidal environment, shellfish are subject to wider swings in temperature and salinity based on exposure to solar radiation and the relative influences of freshwater inputs from rivers and streams, surface conveyance and groundwater flow, and more saline water from flood tides and eddies from offshore currents. The lowered calcification rates of eastern oyster shells measured in the laboratory by Waldbusser et al. (2011) as a result of lower pH, polyhaline conditions and higher water temperatures do not provide sufficient cause and effect for shellfish impacts of OA in Maine's marine waters.

ANTIDEGRADATION

Maine's antidegradation policy states that "Existing in-stream water uses and the level of water quality necessary to protect those existing uses must be maintained and protected." (38 M.R.S. § 464). Based on CBD's letter, it is not clear which waters are the focus of the antidegradation concerns and therefore existing uses and necessary water quality cannot be appropriately assessed. Further, the CBD letter does not indicate which components of the antidegradation policy are not in compliance with Maine's water quality standards. Nevertheless, the water quality data the DEP has in its possession do not suggest that existing uses in Maine's marine waters are not being met.

CHAPTER 5 WETLANDS

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Related Websites: www.maine.gov/dep/water/wetlands/ and www.maine.gov/dep/water/monitoring/biomonitoring/index.html

BACKGROUND

Federal Regulation

EPA Contact: Beth Alafat, EPA Region I, Office of Ecosystem Protection

Tel: (617) email: Alafat.Beth@epa.gov

Related Website: (EPA) water.epa.gov/type/wetlands/

ACE Contact: Ruth Ladd, ACE New England Region, Regulatory Division

Tel: (978) 318-8818 email: ruth.m.ladd@usace.army.mil

Related Website: (ACE) el.erdc.usace.army.mil/wetlands/ and www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx

Lead Agencies: EPA Region I and the U.S. Army Corps of Engineers (ACE) – Maine Project Office

The Clean Water Act provides for wetland protection and regulation through a number of federal programs, most of which are administered by EPA. The § 404 regulatory program is jointly administered by EPA and the U.S. Army Corps of Engineers. Key elements of the federal wetland protection framework are described in more detail in the Chapter 5 of Maine's 2006 Water Quality Assessment.

Wetlands Regulatory Program in Maine's Organized Towns

Contact: Mark Bergeron, DEP, Bureau of Land Resources (BLR), Division of Land Resources (DLR)

Tel: (207) 215-4397 email: Mark.Bergeron@maine.gov

Related Website: (NRPA) www.maine.gov/dep/land/nrpa/

Maine DEP regulates wetland alterations in the organized townships under the Natural Resources Protection Act 38 M.R.S. §§ 480-A et seq. (NRPA) and *Wetlands and Waterbodies Protection Rules*, 06-096 C.M.R. ch. 310 (effective date January 26, 2009). Additional information on the DEP wetlands regulatory program is available at the above web site.

NATURAL RESOURCES REGULATORY UPDATE

In 2013, the Department revised the *Significant Wildlife Habitat Rules,* 06-096 C.M.R. ch. 335 (effective date September 15, 1998, last amended January 7, 2014) to be consistent with the statutory changes made by the Legislature in Public Law 2011, Chapter 362.

For vernal pools, a landowner will not be subject to regulation if the vernal pool is not on the property or otherwise under the control of the landowner. If only a portion of

the vernal pool is on the property of the landowner and a landowner does not have permission to access portions of the pool on abutting property, only that portion of the vernal pool that is on the landowner's property may be assessed for purposes of determining significance. A Department determination that a vernal pool is not significant remains valid regardless of timeframe. Additionally, an artificial vernal pool created in connection with a compensation project is exempt.

Wetlands Regulatory Program in Unorganized Territories

Contact: Maine Land Use Planning Commission, Department of Agriculture, Conservation and Forestry

Website: www.maine.gov/dacf/lupc/

Staff directory: www.maine.gov/dacf/lupc/about/staff/index.shtml

The Maine Land Use Planning Commission (LUPC) uses a land use planning approach to regulate wetlands in unorganized portions of the State, in accordance with the provisions of Title 12, §§681-689 (Use Regulation) and Chapter 10 rules (Land Use Districts and Standards). Details about the LUPC statute and rules may be found at www.maine.gov/dacf/lupc/laws_rules/index.shtml.

Development of Wetland Water Quality Standards

Contact: Jeanne DiFranco, DEP, BWQ, DEA

Tel: (207) 699-8345 email: Jeanne.L.Difranco@maine.gov

Related Websites: (EPA)

(Wetland Water Quality) www.epa.gov/owow/wetlands/regs/quality.html

(General Water Quality Standards) www.epa.gov/ost/standards/

Maine's Water Classification Program

In Maine, wetlands are included in the definition of "Waters of the State" set forth in the Protection and Improvement of Waters Act, 38 M.R.S. § 361-A, and are further defined as either "fresh surface waters" or "estuarine and marine waters". As waters of the State, wetlands are subject to all pertinent provisions of the Maine Water Classification Program statute (38 M.R.S. §§ 464 et seq.) including designated uses, narrative biological criteria and the State's anti-degradation policy. Wetlands that are part of great ponds or natural lakes and ponds less than 10 acres in size are considered GPA waters. All freshwater wetlands not classified as GPA waters are classified under §§ 467 and 468 (Classification of Major River Basins and Classification of Minor Drainages) according to the drainage basin in which they occur and the classification of associated water bodies. Where not otherwise specified, wetlands assume the default classifications listed for tributaries, since virtually all wetlands in the State drain to other water bodies via surface and/or groundwater. Coastal wetlands are classified according to the provisions of 38 M.R.S. § 469 (Classification of Estuarine and Marine Waters).

Narrative Aquatic Life Use Criteria

The following is a summary of pertinent narrative aquatic life criteria:

Class GPA waters, including wetlands associated with great ponds and natural ponds and lakes less than 10 acres in size:

Habitat for fish and aquatic life must be characterized as natural. Must have stable or decreasing trophic state, subject to natural fluctuations, and be free of culturally induced algal blooms which impair use and enjoyment.

Fresh surface waters not classified GPA, including wetlands associated with rivers and streams:

Class AA: Habitat for fish and aquatic life must be characterized as free-flowing and natural. Aquatic life shall be as naturally occurs.

Class A: Habitat for fish and aquatic life must be characterized as natural. Aquatic life shall be as naturally occurs.

Class B: Habitat for fish and aquatic life must be characterized as unimpaired. Must support all indigenous aquatic species without detrimental changes in the resident biological community.

Class C: Some changes to aquatic life allowed. Must support all indigenous fish species. Structure and function of the resident biological community must be maintained.

Wetland Numeric Biocriteria Development

The DEP Biological Monitoring Program assesses the condition of rivers, streams and freshwater wetlands by evaluating resident aquatic macroinvertebrate and algal communities. River and stream biomonitoring data have been used for many years to inform a variety of resource management activities and regulatory programs, supported by the development of numeric biological criteria based on sound statistical modeling. In recent years, requests to the Biological Monitoring Program for assessments of wetland water quality and ecological condition have significantly increased. In response, DEP biologists developed a provisional linear discriminant model (LDM) to assess freshwater wetland macroinvertebrate communities by predicting attainment of tiered aquatic life use criteria described in Maine's water quality standards. Sites included in the LDM are typically lacustrine and riverine fringe wetlands having emergent and/or aquatic bed vegetation. DEP also developed macroinvertebrate inference models for selected environmental stressors, individual taxa tolerance values, and a community level invertebrate tolerance index.

DEP biologists rely on expert judgment to interpret narrative aquatic life use criteria for wetlands, using macroinvertebrate community data and statistical tools to inform water quality class attainment determinations. The LDM has greatly enhanced the ability of the Biological Monitoring Program to provide data users with standardized assessments of wetland condition, and will become the basis for wetland-specific numeric criteria once implemented through rule-making. Numeric biological criteria will enable DEP to fully integrate wetlands into its water quality monitoring and assessment program and fulfill federal requirements for wetland monitoring, assessment and water quality standards under the Clean Water Act.

The Biological Monitoring Program is building capacity to use additional biological assemblages for wetland monitoring and assessment. The use of multiple indicators including macroinvertebrates, algae and plant communities will provide important tools to supplement current methods. Additional biological indicators will enable DEP to evaluate impacts from a wider array of environmental stressors and conduct monitoring and assessment on more types of wetlands. Over the past year, DEP biologists developed taxa tolerance values and a community level tolerance index for wetland algae, and are currently testing metrics for use in an algal LDM to predict aquatic life class attainment. Wetland algae are sensitive indicators of nutrient enrichment, toxic contamination, sedimentation, acidification and other human disturbance. The Biological Monitoring Program is exploring options to incorporate vegetative indicators into wetland monitoring and assessment program. This may include application of the Floristic Quality Assessment Index developed through the New England Biological Assessment of Wetlands Workgroup (NEBAWWG). DEP plans to conduct a pilot project to assess the condition of forested wetlands during the summer of 2015, including collection of plant community data.

INTEGRITY OF WETLAND RESOURCES

Contact: Jeanne DiFranco, DEP, BWQ, DEA

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Related Website: www.maine.gov/dep/water/monitoring/biomonitoring/index.html

Wetland Biological Monitoring and Assessment

Wetland biological monitoring and assessment are performed by DEP's Biological Monitoring Program in the Division of Environmental Assessment. Wetland biomonitoring is coordinated with the State's river and stream Biological Monitoring Program using a 5-year rotating basin schedule. DEP conducts sampling for aquatic macroinvertebrates, epiphytic algae and phytoplankton. Associated physical and chemical data are obtained through field measurements and analysis of water samples. Habitat descriptions, Cowardin classification, hydrogeomorphic setting, substrate, dominant plant species and community type are also documented. In addition, the DEP Biological Monitoring Program uses a Human Disturbance Score as part of a rapid assessment of environmental stressors. This information is used to characterize relative levels of human disturbance, identify sources and causes of degradation, and verify that candidate reference wetlands are actually minimally-disturbed. Currently, annual monitoring is focused primarily on emergent and aquatic bed wetland habitat, including freshwater lacustrine and riverine fringe wetlands. Additional wetland types may be monitored in the future as resources allow.

Wetland Monitoring and Assessment Activities for 2013 and 2014

Biological monitoring in 2013 was focused in the Androscoggin River basin and included 29 wetland sites. In 2014, DEP conducted biological monitoring and assessment of 27 wetland sites in the St. John and Allagash River watersheds. In addition, 2013 and 2014 were the second and final years of a multi-year study to

compare bacteria (*Escherichia coli*) levels in paired wetlands and associated outlet streams. Bacteria monitoring for the study was conducted at a total of 12 wetland and stream sites.

Summary of Wetland Aquatic Life Use Attainment

Aquatic life use attainment decisions for wetlands included in the 2016 Integrated Report are based on expert judgment of DEP biologists using the statutory narrative aquatic life use criteria described above as guidance. DEP biologists examined macroinvertebrate data for each wetland site sampled to evaluate structure and function of the resident biological community, and assigned an attained water quality class by consensus. For Category 3-5 wetlands that are located in a river/stream or lake/pond (e.g. a wetland that occurs in a slow-flowing section of a stream), any impairments, for example to the fish consumption use, that are listed for the related river/stream or lake/pond assessment unit (AU) are also assigned to the wetland AU. For Category 3-5 wetlands that are not located in a river/stream or lake/pond, DEP biologists will decide on a case-by-case basis whether any other impairments should be carried over or not.

EPA requires that each AU is placed into one of five categories (see Chapter 4, Assessment Methodology). A summary of wetland attainment status follows, and also appears in Table 4-5. Information on the status of individual wetland AUs may be found in Appendix IV: Maine Wetlands Assessment.

Category 1: Wetlands attaining all designated uses and water quality standards, and no use is threatened.

The 2016 assessment assigned 15 acres of wetlands to 'Category 1, Attaining all standards' (other than statewide mercury advisory as explained in Category 5 below).

Category 2: Wetlands attaining some of the designated use(s), no use is threatened, and insufficient data or no data and information is available to determine if the remaining uses are attained or threatened (with presumption that all uses are attained).

DEP determined with high confidence that these waters attain their assigned aquatic life use based on aquatic macroinvertebrate community composition. In addition, a review of other available data including physical/chemical attributes, field-based stressor information and spatial data do not indicate potential causes of impairment. Category 2 contains 85 wetland AUs. Acreages for all AUs have not been determined, but those that have been determined (21) total 4,082 acres. One of these 85 AUs is also in Category 5-D for legacy PCB and dioxin sources, bringing the acreage of Category 2-only AUs to 3,870.

Category 3: Wetlands with insufficient data and information to determine if designated uses are attained (with presumption that one or more uses may be impaired).

There are 12 wetland AUs totaling 1,782 acres listed in Category 3. Wetlands assigned to this category have conflicting or insufficient available data to determine attainment status with relative certainty. For the sites listed, there is significant evidence of human stressors, with the presumed likelihood they are causing impairment of one or more uses.

Category 4: Wetlands impaired or threatened for one or more designated uses, but do not require development of a TMDL.

10 wetland AUs totaling 547 acres are listed in Category 4-A for aquatic life uses (TMDL Completed). Five of these are covered under the statewide % Impervious Cover TMDL; one of these AUs increased in size by 5 acres due to updated mapping techniques. Three of the 10 AUs in 4-A are covered under the Prestile Stream (& Christina Reservoir) TMDL. Two new AUs were placed in 4-A in this cycle: one is covered by the Sabattus Pond TMDL, and the other by the Daigle Pond TMDL. Daigle Pond is affected by altered hydrology, and therefore this new 4-A AU is also listed in 4-C (Impairment not Caused by a Pollutant). One additional wetland AU totaling 6 acres is listed in category 4-B (Expected to Attain Standards), with court-ordered controls in place. These sites do not currently attain their aquatic life uses based on an evaluation of the aquatic life standards ascribed to their assigned classification (38 M.R.S. § 465), but pollution control requirements are expected to result in attainment once implemented. Two of the AUs listed in Category 4-A (137 acres) are also listed in Category 5-D for legacy DDT sources, bringing the acreage of Category 4-only AUs to 416.

Category 5: Wetlands that are impaired or threatened for one or more designated uses by a pollutant(s), TMDL development is required.

Two wetland AUs totaling 11 acres are listed in Category 5-A (TMDL Required). Note: size increased from last cycle due to updated mapping techniques. These sites do not currently attain aquatic life uses based on an evaluation of the aquatic life standards ascribed to their assigned classification (38 M.R.S. § 465), and there are no pollution control requirements in place that are expected to result in attainment. Three additional wetland AUs totaling 349 acres are listed in Category 5-D (Impaired by Legacy Pollutants). Of these, one AU (212 acres) is listed for both dioxin and PCBs. This AU was delisted to Category 2 for wetland benthic macroinvertebrate bioassessments and benzene in the 2014 cycle. The other two 5-D AUs (137 acres) are listed for DDT, and are also listed in Category 4-A for wetland benthic macroinvertebrate bioassessments.

All freshwaters in Maine have an advisory for the consumption of fish due to the presence of mercury presumed to be from atmospheric deposition. These waters (Category 5-C “Impairment caused by atmospheric deposition of mercury”) were moved to Category 4-A due to the approval of a Regional Mercury TMDL.

EXTENT OF WETLAND RESOURCES

Wetland Loss Tracking in Maine’s Organized Towns

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Maine DEP tracks permitted wetland losses and mitigation in the organized townships through an application tracking system. When applications for wetland alterations are logged in, the amount of fill or area to be altered is entered by wetland type and geographical location. This system enables DEP to monitor and report on annual wetland losses. Wetland mitigation and DEP permitted impacts for 2011 and 2012 are summarized in Tables 5-1 and 5-2 below.

Table 5-1 Wetland Mitigation Totals in the Organized Townships

Source: Maine DEP Wetland Loss Tracking System

Area of Mitigation (Acres) – 2011 (1/1/2011-12/31/2011)						
Wetland Type	**In Lieu Fee***	**Creation**	**Enhancement**	**Preservation**	**Restoration**	**Total**
Emergent	0.03	-	-	26.00	-	**26.03**
Forested	0.54	-	-	60.45	0.20	**61.19**
Great Pond	-	-	-	-	0.20	**0.20**
Intertidal-mudflat	-	-	-	-	-	**-**
Intertidal-other	-	-	-	-	-	**-**
Intertidal-vegetated	-	-	-	-	-	**-**
Open water	-	-	-	-	-	**-**
Other/Mixed	0.93	-	3.65	56.28	-	**60.86**
Peatland	-	-	-	-	-	**-**
Riverine	-	-	-	-	-	**-**
Scrub-shrub	2.33	-	-	56.45	-	**58.78**
Subtidal-aquatic bed	-	-	-	-	-	**-**
Subtidal-other	-	-	-	-	-	**-**
Upland	-	-	-	-	-	**-**
Vernal pool	-	-	-	-	-	**-**
Wet Meadow	2.06	-	-	-	-	**2.06**
Total	**5.89**	**0**	**3.65**	**199.18**	**0.40**	**209.12**

Area of Mitigation (Acres) – 2012 (1/1/2012-12/31/2012)						
Wetland Type	**In Lieu Fee***	**Creation**	**Enhancement**	**Preservation**	**Restoration**	**Total**
Emergent	-	-	-	-	-	**-**
Forested	7.59	0.31	-	103.03	3.28	**114.21**
Great Pond	-	-	-	-	-	**-**
Intertidal-mudflat	-	-	-	-	-	**-**
Intertidal-other	-	-	-	-	-	**-**
Intertidal-vegetated	4.88	-	-	-	0.10	**4.98**
Open water	-	-	-	-	-	
Other/Mixed	6.04	-	-	39.50	0.10	**45.64**
Peatland						
Riverine	5.21	-	-	-	-	**5.21**
Scrub-shrub	-	-	-	-	-	**-**
Subtidal-aquatic bed	-	-	-	-	-	**-**
Subtidal-other	-	-	-	-	-	**-**
Upland	-	-	-	-	-	**-**
Vernal pool	5.21	-	-	-	-	**5.21**
Wet Meadow	-	-	-	-	-	**-**
Total	**28.93**	**0.31**	**-**	**142.53**	**3.48**	**175.25**

*This column indicates that an in lieu fee (ILF) payment was received for an impact to that type of wetland.

Table 5-2 Permitted Wetland Impact Totals in the Organized Townships

Source: Maine DEP Wetland Loss Tracking System

Area Impacted (Acres) – 2011 (1/1/2011-12/31/2011)								
Wetland Type	**Full NRPA permit**		**Tier I**		**Tier II**		Total	
	Filled	Altered	Filled	Altered	Filled	Altered	Filled	Altered
Emergent	0.07	0.11	0.15	0.12	0.32		0.54	0.23
Forested	2.62	5.63	5.03	0.77	2.95	0.09	10.60	6.49
Great Pond	0.04	0.49	-	-	-	-	0.04	0.49
Intertidal-mudflat	0.04	0.25	-	-	-	-	0.04	0.25
Intertidal-other	0.22	0.95	-	-	-	-	0.22	0.95
Intertidal-vegetated	0.003	0.09	0.11	-	-	-	0.11	0.09
Open Water	0.05	-	-	-	-	-	0.05	-
Other/Mixed	1.91	0.10	1.53	0.15	0.50		3.94	0.25
Peatland	-	-	-	-	-	-	-	-
Riverine	0.07	6.07	-	-	-	-	0.07	6.07
Scrub-shrub	2.66	0.84	0.64	0.36	0.62		3.92	1.20
Subtidal-aquatic bed	-	-	-	-	-	-	-	-
Subtidal-other	0.43	0.34	-	-	-	-	0.43	0.34
Upland	0.01	-	-	-	-	-	0.01	-
Vernal Pool	0.45	-	-	-	-	-	0.45	-
Wet Meadow	4.12	-	0.66	0.07			4.78	0.07
Total	**12.69**	**14.87**	**8.12**	**1.48**	**4.39**	**0.09**	25.20	16.44

Area Impacted (Acres) – 2012 (1/1/2012-12/31/2012)								
Wetland Type	**Full NRPA permit**		**Tier I**		**Tier II**		**Total**	
	Filled	Altered	Filled	Altered	Filled	Altered	Filled	Altered
Emergent	0.87	-	0.36	0.01	0.77	-	2.00	0.01
Forested	7.26	23.11	4.03	0.74	1.56	0.43	12.85	24.28
Great Pond	0.01	0.23	-	-	-	-	0.01	0.23
Intertidal-mudflat	0.29	0.16	-	-	-	-	0.29	0.16
Intertidal-other	0.23	0.29	-	-	-	-	0.23	0.29
Intertidal-vegetated	0.19	0.11	-	-	-	-	0.19	0.11
Open Water	0.001	0.08	-	-	-	-	0.001	0.08
Other/Mixed	1.83	0.19	-	-	0.22	-	2.05	0.19
Peatland	-	-	0.03		-	-	0.03	-
Riverine	0.39	-			-	-	0.39	-
Scrub-shrub	0.50	-	1.05	0.44	-	-	1.55	0.44
Subtidal-aquatic bed	0.01	0.03	-	-	-	-	0.01	0.03
Subtidal-other	0.001	0.08	-	-	-	-	0.001	0.08
Upland	-	-	-	-	-	-	-	-
Vernal Pool	0.12	-	-	-	-	-	0.12	-
Wet Meadow	0.26	-	1.09	0.08	-	-	1.35	0.08
Total	**11.96**	**24.28**	**6.56**	**1.27**	**2.55**	**0.43**	**21.07**	**25.98**

CHAPTER 6 GROUNDWATER MONITORING & ASSESSMENTS

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Related Website: www.maine.gov/dep/water/groundwater/index.html

OVERVIEW

Maine's groundwater may be threatened by contamination, particularly in the unforested areas that comprise approximately 11% of the State. Important sources of groundwater contamination in Maine include disposal activities such as landfills and septic systems, leaking storage facilities, agriculture, and sites contaminated by hazardous materials spills, winter salt applications, or by previously unregulated activities.

Generally, the groundwater supply in Maine is adequate. The total withdrawal of groundwater by all water users is less than one percent of the annual groundwater recharge each year. The remaining annual groundwater recharge is lost through evapotranspiration or discharges to ponds, lakes, rivers, streams and the Atlantic Ocean. Seasonal variations in water tables can lead to local groundwater shortages. The Maine Drought Task Force (convened by the Maine Emergency Management Agency) publishes information on Maine groundwater and surface water levels at the following website: www.state.me.us/rfac/. The USGS also maintains information on groundwater levels in Maine, available at the following website: me.water.usgs.gov/.

Groundwater is withdrawn from three basic types of aquifers in Maine: unconsolidated glaciofluvial deposits (stratified drift or sand and gravel aquifers), till, and fractured bedrock. The stratified drift deposits are the most favorable for development of large-volume water supply wells, but these deposits are limited in size and distribution, comprising less than ~10% of the state. Discontinuous bedrock aquifers underlie the entire state and are used for domestic, commercial, industrial, and agricultural purposes, and to supply small public facilities such as schools, restaurants, and summer camps. Wells in till do not generally yield large quantities of water and are most often used for individual domestic water supplies.

Background

The protection of Maine groundwater is an issue of concern at all levels of government. Serious groundwater pollution problems have occurred throughout the State and have raised awareness of the need for protecting groundwater supplies. A few municipalities and regional planning agencies have conducted groundwater quality assessment studies, but programs for comprehensive assessment of the quality of groundwater resources are needed. Maine's groundwater protection programs emphasize three areas of effort:

1. Interagency coordination of groundwater programs;
2. Assessment of groundwater protection problems, including enhancement of the Environmental and Geographic Analysis Database (EGAD); and
3. Statutory changes to enable building upon implemented state groundwater protection programs to increase groundwater protection and risk reduction.

ASSESSMENT OF GROUNDWATER QUALITY

In Maine, groundwater is classified by its suitability for drinking water purposes. Under the Maine Water Classification Program, groundwater is classified as either potable (GW-A) or unpotable (GW-B). Water is unpotable when the concentrations of chemical compounds detected exceed either the Maximum Contaminant Levels (MCL) or the Maximum Exposure Guidelines (MEG) as defined in the Rules Relating to Drinking Water administered by the Maine Department of Health and Human Services (DHHS). Although there are many localities where groundwater is unpotable and highly contaminated, no groundwater is currently classified GW-B. The state is not currently attempting to designate non-attainment areas.

Aquifer Risk Assessment

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The state is actively assessing ways to use existing groundwater data and spatial data to evaluate relative risk to existing and potential water supplies. The cumulative impact of residential, commercial, and industrial development on 300 of the significant sand and gravel aquifers mapped by the Maine Geological Survey (MGS) is being evaluated through the Aquifer Quantitative Use Assessment (AQUA) Index. Nonpoint source risks due to population and travel corridors are treated as a function of the area of impervious surface in the aquifer polygon; road density is also used as a surrogate for population density and a range of associated possible nonpoint discharges. The remaining acreage was divided by a factor based on the presence and relative risk of petroleum tanks (underground or aboveground storage tanks, USTs or ASTs, respectively), former tank locations (i.e. possible legacy contamination) and potential or actual sources of contamination to groundwater (as derived from EGAD Site Data). The sum of these values is divided by the total acreage of the aquifer to give the dimensionless AQUA index, which can also be expressed as a percent. An AQUA index of 1 or 100% means no impact. In general, larger overall acreage in combination with remoteness or other limits on development results in a higher AQUA index. This index may be used to assess the relative risk to present or future municipal, private, or commercial drinking water uses and to identify those aquifers most at risk from commercial/industrial development or residential pressures.

Overall, 77 high yield aquifer locations (26%) are non-impacted (4,881 acres or 16% of total acres), 145 (48%) are less than 50% impacted (8,540 acres or 29% of total acres), and 78 (26%) are more than 50% impacted (13,325 acres or 55% of total acres (29,746). Of the non-impacted high yield sand and gravel aquifers, 18% have public water supply wells. Of the aquifers with AQUA values between 1.0 and 0.5, 28% have public water supply wells, while of those with AQUA values less than 0.5, 38% have public water supply wells.

Additional work on risk assessment includes analysis of the effect of road salt on residential well water quality in seventy-seven areas spatially distributed throughout Maine. This work confirms the dependence of chloride concentration on slope and distance from road indicated by previous Department studies, and includes additional factors in the analysis, such as slope direction, simplified hydrologic soil groupings, surficial geology, and bedrock geology. Chloride-concentration data were obtained

from pre-construction well sampling conducted by DOT from 2003 through 2008; the analysis removes outliers from this data set and develops a risk model using data from 968 wells. The set of all normalized data shows a distribution pattern of chloride concentrations with distance from the road centerline, with highest concentrations occurring on the downslope side but within 75 feet of the centerline of the road. Preliminary results suggest that the distribution of chloride concentrations with distance from the road centerline at any study site falls under an envelope curve that is a form of the normal distribution, with the parameters controlling the shape of the curve controlled by local variables, such as slope, fracture orientation, and dominant hydrologic soil groups.

Where topographic gradients are low and fracture densities are also low, or fractures are at low angles to roads, chloride concentrations tend to be more symmetric about the road centerlines, but at sites where slope vectors and/or principal fracture orientations are at high angles to the road, strong asymmetry is observed in the pattern of chloride concentrations, with elevated concentrations downgradient and at greater distances from the road. Work is underway to determine whether a functional relationship can be demonstrated between these vectors and the chloride data distribution, and also to evaluate mechanisms for storage of chloride in soils and shallow aquifers, an effect which has also been observed downgradient of stormwater infiltration systems.

Aquifer Characterization Activities

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Related Websites:

Aquifer Fact Sheet www.maine.gov/dacf/mgs/frontend/homeowners.htm

Aquifer Mapping: www.maine.gov/dacf/mgs/pubs/digital/aquifers.htm

Aquifer data and publications: www.maine.gov/dacf/mgs/pubs/index.shtml

MGS is at the "average characteristics" stage in characterizing the physical and chemical attributes of the State's stratified drift aquifers. While site specific data do exist for some aquifers (primarily in the vicinity of groundwater resource evaluation projects and contamination sites), complete physical pictures of most aquifer systems do not exist. Hard data on the exact natural chemical processes controlling groundwater chemical evolution that occur along a flow path in sand and gravel aquifers are also lacking. MGS has some ambient water quality data but has not yet fully characterized any particular aquifer system.

MGS has begun preliminary examination of annual physical groundwater data from selected wells at DEP monitoring sites in both sand and gravel aquifers and in bedrock aquifers. This effort is to supplement data in the statewide groundwater monitoring system conducted by the USGS as part of its annual groundwater monitoring program.

Please refer to page 126 of the 2006 Integrated Report for further discussion of aquifer characterization activities.

www.maine.gov/dep/water/monitoring/305b/2006/2006_Final_305b_Report.pdf

Significant Groundwater Wells

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Related Website: www.maine.gov/dep/land/nrpa/significant_groundwater_wells/#intro

Although Maine has abundant groundwater when recharge and use are averaged over the state, certain large wells, and the density of smaller wells in certain areas, may have locally adverse effects on protected resources and wells on nearby properties. Installation and operation of large groundwater extraction wells, with certain exceptions, is now regulated under the Natural Resources Protection Act. Applicants must demonstrate that the extraction of groundwater will not have an undue unreasonable effect on waters of the State, groundwater-related natural resources, and existing uses, including, but not limited to, public or private wells. Applicants must submit adequate background data, including stream flows and wetted perimeter and wetland water levels, pump test data and analysis, and a site-specific plan for monitoring groundwater elevation, precipitation, and other relevant hydrogeologic criteria. The Department must consider both the direct effects of the proposed withdrawal and its effects in combination with existing water withdrawals, and establishes in each approval site-specific and season-specific performance criteria for flows and water levels at all sites. Applicants must conduct monitoring to demonstrate compliance with these criteria, and legislatively mandated peer reviews of these monitoring data indicate that the criteria developed by the Department and specified in the approvals are adequately protecting surface water and groundwater resources to date. Ongoing work by the MGS is evaluating whether or not the cumulative impacts of groundwater withdrawals by wells of all sizes in some larger watersheds may exceed the minimum amounts required to supply all existing uses, including both water supply and streamflow, in some watersheds.

Overview of Groundwater Contamination Sources

Most groundwater contamination in Maine originates from nonpoint source pollution rather than point source pollution. The following discussion focuses primarily on nonpoint contamination sources that appear to be responsible for most groundwater contamination in the State: agriculture, hazardous substance sites, spill sites, landfills, leaking underground storage tanks, septic systems, winter salt applications, and shallow well injection.

Please refer to the 2006 Integrated Report beginning on page 127 for additional background information on other sources of contamination, and for additional information on the sources listed above.

www.maine.gov/dep/water/monitoring/305b/2006/2006_Final_305b_Report.pdf

PETROLEUM STORAGE TANKS AND PRODUCT SPILLS

Underground Tanks

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Related Websites: General Information: www.maine.gov/dep/waste/ust/index.html

Rules for UST Facilities: www.maine.gov/sos/cec/rules/06/096/096c691.doc

Rules for Siting of Oil Storage Facilities:

www.maine.gov/sos/cec/rules/06/096/096c692.doc

Leaking Underground Tanks and Drinking Water Wells

The BRWM Priority List tracks clean-up sites and provides an objective scoring system to determine which sites receive scarce clean-up dollars. In general, the higher the score, the more quickly resources are allocated to clean up a site. Table 6-1 shows the number of sites placed on this Priority List and the change since the previous Integrated Report.

Table 6-1 Remediation Priority List Sites – Number of Sites as of January 2013

Total Number of Sites Since 1994	Number of Sites Closed	Number of Active Sites
2442	1982	460
Numerical / Percent Change from 2 years ago (previous Integrated Report)		
97 / 4% increase	148 / 8% increase	-50/ 9.8% decrease

The sites on the priority list are limited to those contaminated by petroleum products (as opposed to all hazardous chemicals and all hazardous wastes), but the sites are not limited to underground storage tanks (USTs). Many of the sites on the priority list are home heating oil tanks, which are typically aboveground storage tanks (ASTs).

Table 6-2 shows the number of private water wells and public water supplies contaminated by petroleum products or threatened with contamination by petroleum products as of January 2013. Note that one active site can contaminate or threaten more than one well.

Table 6-2 Current (January 2013) Remediation Priority List Sites – Contamination Summary

Number of Contaminated Wells*	Number of Contaminated Public Water Supplies	Number of Threatened Wells*	Number of Threatened Public Water Supplies
129	2	449	6
Numerical / Percent Change from 2 years ago (previous Integrated Report)			
-58 / 31%decrease	-1 / 33% decrease	-112 / 20% decrease	-4 / 40% decrease

* Does not include public water supplies.

On December 1, 2009 new petroleum cleanup guidelines went into effect. The new guidelines are based on the toxicity of petroleum fractions in addition to the presence of target compounds typically found in petroleum. The remediation approach is

based on the analytical method that fractionates petroleum using two different tests pioneered by Massachusetts. The tests are: Volatile Petroleum Hydrocarbons (VPH) and Extractable Petroleum Hydrocarbons (EPH). These tests have replaced GRO (Gasoline Range Organics) and DRO (Diesel Range Organics) that had been used by Maine for the past 20 years or more. The new guidelines are described in a document published by BRWM, titled "Remediation Guidelines for Petroleum Contaminated Sites in Maine", effective December 1, 2009.

Legislative Changes

In 2001, the UST siting law came into effect. New facilities must be located over 300 feet from a private well, over 1,000 feet from a public well, and cannot be above a mapped sand and gravel aquifer or in the mapped source water protection area of a public water supply. In 2010, these same siting restrictions were applied to ASTs. As of January 1, 2011, the legal loophole that had favored ASTs over USTs (by allowing underground piping systems attached to ASTs and installed before June of 1991 to operate without leak detection) was closed. Under current rules, ASTs and USTs have the same siting criteria, and any underground piping must now meet the same standards for either type of tank.

Aboveground Storage Tank Spill Information

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Related Website: www.maine.gov/dep/waste/abovegroundtanks/index.html

In 2002, the Maine Legislature gave DEP authority to oversee compliance with the federal Spill Prevention, Control, and Countermeasures (SPCC) requirements at facilities that are used to market and distribute oil. This has led to DEP providing technical assistance to a large number of small facilities that were often unaware of the SPCC requirements. Completion and improvement of SPCC plans, along with improved spill containment structures, has often resulted from DEP's technical assistance at these facilities.

Aboveground Storage Tanks at Single Family Residences

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www.maine.gov/dep/waste/abovegroundtanks/replacement.html

Maine averages over one heating oil spill per day from ASTs at single family residences. One reason for this statistic is that ASTs are commonly used in Maine. The 2000 U.S. Census figures show that approximately 78% of Maine households are heated with oil. The vast majority of these households have 275 gallon ASTs located either in the basement or outside the residence. These tanks pose a threat to Maine's groundwater.

The number one cause (23%) of spills from residential ASTs is internal corrosion of the tank itself. Since 1995, internal corrosion has consistently led the "Cause of Spill" category. One effective tool to combat the high number of spills from internal corrosion and other causes is the DEP Home Heating Oil Tank Replacement Program. Since 1998, this program has replaced sub-standard home heating oil tanks free of charge at single family, owner-occupied residences served by Low Income Home Energy Assistance Program (LIHEAP). Although dwarfed by the huge

population of oil tanks, this program typically replaces approximately 250 oil tanks per year. Almost all of the 2011 and 2012 installations used double-bottom steel tanks. Beginning in 2014, double wall tanks manufactured by Roth and consisting of a primary tank of rustproof polyethylene plastic surrounded by a sheet metal jacket for fire protection and secondary containment are used for both interior and exterior installations. Also new in 2014, the program is evaluating oil tank replacements with an eye to converting heating systems to propane or natural gas when it is economical to do so.

Oil or Hazardous Materials Spills

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Related Websites: www.maine.gov/dep/rwm/hoss/

For users who want to download raw data and then run statistics of their own: www.maine.gov/dep/ftp/hoss/

The Department's Response Division responded to 5,648 reports of oil or hazardous material events between January 2011 and December 2012. Of these 5,648 events, 228 do not have completed spill reports and, therefore, are not included in this report. During this period, response services personnel discovered approximately 37 wells that had been contaminated from these spills. Due to ongoing investigation and pending report completion, these figures are subject to change. Table 6-3 provides information on the 5,420 spills for which spill reports had been completed.

Table 6-3 Oil and Hazardous Material Reports - January 2011 through December 2012

Spill Location Type	Percent of Total Reports	Number of Reports	Number of Wells Impacted
Business	20.0 %	1082	0
Government	4.6%	249	0
Other	2.8%	151	0
Residential	28.90%	1565	30
School	2.3%	124	0
Terminal	6.9%	374	6
Transportation System	19.6%	1064	0
Utility	15.0%	811	1
Totals	**100%**	**5420**	**37**

Please refer to the links above for further information on this program.

AGRICULTURE

Contact: Matthew Randall, DACF, Bureau of Agriculture, Food and Rural Resources (BAFRR), Division of Agricultural Resource Development, Agricultural Compliance Program

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Related Website: www.maine.gov/dacf/php/ag_compliance/index.shtml

In 2002, the total estimated cropland in Maine was 536,839 acres. The agricultural community uses chemicals for pest control and weed eradication; in addition, many farmers apply chemical fertilizers and manure to their agricultural lands. These are all potential sources of groundwater contamination. The major areas of chemical application include potato fields in Aroostook County, blueberry barrens in Hancock and Washington Counties, and apple orchards and forage cropland in Central Maine. Pesticides and nitrates are the main categories of agricultural groundwater contaminants.

Maine's Nutrient Management Law

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Related Website: www.maine.gov/dacf/php/nutrient_management/index.shtml.

Impacts of the Law: Implementing nutrient management practices on farms can enhance the protection of ground and surface water. Studies of Maine farms indicate that water quality within a watershed can be improved significantly where nutrient management practices have been implemented. By applying manure and other nutrients only in the amounts needed for crop production, and under appropriate conditions, fewer nutrients will leave the site, which minimizes adverse impacts to waterbodies and other sensitive resources. During 2011 and 2012, nutrient management plans were developed for 50 new operations covering 14,465 animal units and 6,359 acres; nutrient management plans for 88 existing farms were updated, and covered 21,335 animal units and 33,129 acres. For more information on Maine's Nutrient Management Law, follow the link above to the Nutrient Management Program webpage maintained by DACF.

In order to protect our valuable agricultural land from degradation and to protect public health and the environment, many larger farms are subject to enhanced oversight, and may be required to obtain a livestock operations permit. Eighteen permits have been issued to Maine farms during the past several years. In addition, farm composting of on-farm and off-farm nutrients is expanding, 22 compost management plans have been developed or updated recently, and more plans are currently being written. The Department's Chapter 211: *Rules for the Disposal of Animal Carcasses* was updated and adopted in 2012. Formal carcass disposal plans now are required for certain farming operations, and setback provisions for disposal sites near sensitive features have been revised.

Pesticides

Contact: Mary E. Tomlinson, DACF, BAFRR, DAPH, Board of Pesticides Control (BPC)

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Related Website:

www.maine.gov/dacf/php/pesticides/public/water_quality.shtml

Every five to seven years since 1994, the BPC has conducted a statewide pesticide and groundwater monitoring program to determine the impact of agricultural pesticide use on the quality of groundwater. Randomly selected private drinking water wells within ¼ mile down gradient of an agricultural crop are sampled. The results of past surveys have indicated that in wells in which pesticides have been detected, the concentrations of pesticides do not present a health threat to the citizens of Maine when compared to the health-based standards established by EPA and the Maine Centers for Disease Control. Efforts on the part of growers to use best management practices and the trend toward newer pesticides with lower application rates have had positive impacts on the quality of Maine's groundwater. Water samples collected from private wells during spring of 2014 were processed using a multi-residue method that is capable of screening for over 90 pesticides. The results will be available in late 2014.

Please refer to pages 132-133 of the 2006 Integrated for further information on pesticides in groundwater.

www.maine.gov/dep/water/monitoring/305b/2006/2006_Final_305b_Report.pdf

LANDFILLS

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Related Website: www.maine.gov/dep/waste/solidwaste/index.html

The Department is directed by statute to regulate the location, establishment, construction, expansion, operation, and closure of all solid waste facilities in the state, including landfills.

Active Landfills

As of December 2012, there were 43 active, licensed landfills in the state of Maine (Figure 6-1). A current file of these active landfills is available at the following link: www.maine.gov/dep/maps-data/documents/swactiveliclf.pdf.

Inactive Landfills

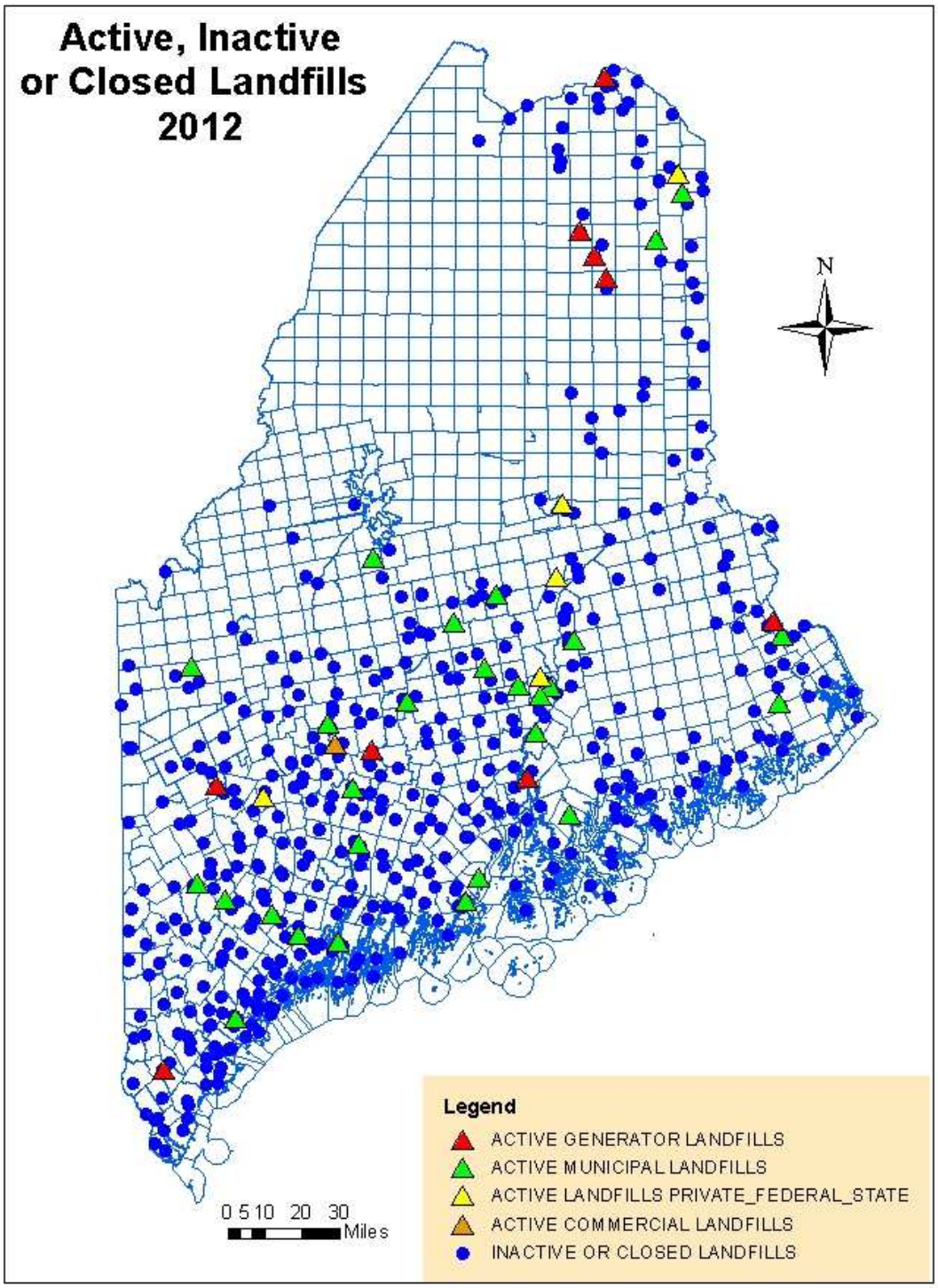
Related Website: www.maine.gov/dep/waste/solidwaste/index.html

A total of 397 inactive, closed and capped municipal landfills had been identified in the state as of December 2012. In addition, there are 20 inactive private and/or industrial landfills (Figure 6-1).

Please refer to pages 133-136 of the 2006 Integrated Report for further information on Maine landfills and residual land applications.

www.maine.gov/dep/water/monitoring/305b/2006/2006_Final_305b_Report.pdf

Figure 6-1 Active and Inactive Landfills in Maine



ROAD SALT AND SAND-SALT PILES

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Related Websites: Rules – Chapter 574 and Sand Salt Piles

www.maine.gov/dep/water/wd/sandsalt/index.html

DOT information on Plowing and Sanding, and Sand/Salt Building Program

www.maine.gov/mdot/csd/mlrc/technical/winterplowsand/ and

www.maine.gov/mdot/csd/sandsalt/saltstorage.htm

DEP is actively involved with siting of new sand-salt buildings and piles and continues to investigate contamination from sand-salt piles on a case-by-case basis. DEP's Chapter 574: *Siting and Operation of Road Salt and Sand-Salt Storage Areas* prohibits siting of new sand-salt storage areas above significant sand and gravel aquifers, within source water protection areas of public water supplies or within 300 feet of a private domestic well. DOT continues to handle complaints related to sand-salt piles that they operate, and roads they maintain. Please refer to the links above for further information on these programs.

FEDERAL FACILITIES, SUPERFUND, BROWNFIELD, VOLUNTARY RESPONSE, AND OTHER HAZARDOUS SUBSTANCE SITES

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Related Websites: (Federal EPA Information) www.epa.gov/superfund/

(DEP Information) www.maine.gov/dep/spills/programs/index.html

As of July, 2013, DEP had identified 1,632 hazardous substance sites in Maine (Table 6-4), 43% of which were still active. The Division of Remediation investigates and mitigates the risk posed to public health and the environment from these sites. The Department may undertake the investigation and clean-up themselves, or compel responsible parties to undertake the work, either through the state's uncontrolled sites program (for smaller sites) or with EPA via the federal Comprehensive Environmental Response and Comprehensive Liability Act (CERCLA), aka Superfund, or the Defense State Memorandum of Agreement (DSMOA) for military sites. Additionally, many sites are investigated and remediated under one of two voluntary programs: the Brownfields Program, which partially funds the work with federal dollars, and Maine's Voluntary Remedial Action Program (VRAP).

Table 6-4 Number of Hazardous Substance Sites by Program and Status

Remediation Program	Investigation	Remediation	O&M	No Further Action	Total
Brownfields	140	22	1	36	199
VRAP	84	47	7	605	743
Federal Facilities	108	8	1	48	165
Superfund	1	3	6	2	12
Uncontrolled Sites	219	31	23	240	513
Total	**552**	**111**	**38**	**931**	**1,632**

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) SITES

Contact: Stacy Ladner, DEP, BRWM, Division of Oil and Hazardous Waste Facilities Regulation (OHWFR)

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Related Website: www.maine.gov/dep/waste/hazardouswaste/rcrafax.html

In the State of Maine there are approximately 380 currently active large quantity hazardous waste generators (defined as producing more than 100 kilograms per month of hazardous waste) and 9,700 active small quantity generators (generating less than 100 kilograms per month).

DEP currently lists approximately 70 sites with non-interim Hazardous Waste licenses and 60 sites with interim licenses. Over 66 sites are under investigation for possible groundwater or surface water contamination. Forty-three sites have confirmed ground or surface waters that have been contaminated by discharges of hazardous substances. Sixteen of these 43 facilities have ongoing, active remediation.

Please refer to the link above for further information on the RCRA program.

SEPTIC SYSTEMS

Contact: James A. Jacobsen, DHHS, MCDC, Division of Environmental Health, Drinking Water Program, Subsurface Wastewater Unit

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Related Website:

www.maine.gov/dhhs/mecdc/environmental-health/plumb/index.htm

The Subsurface Wastewater Unit and its antecedents in DHHS have regulated onsite sewage disposal since 1926. This responsibility rests with DHHS because the treatment and disposal of human sanitary waste has historically been considered a public health issue. The Subsurface Wastewater Unit promulgates and administers the Subsurface Wastewater Disposal Rules. The Program also maintains microfiche and electronic copies of all plumbing and subsurface wastewater permits that have been issued statewide from 1974 to the present. During the period from January 2011 through December 2011 the Program processed approximately 6,286 internal and 3,675 external plumbing and subsurface wastewater permits. For the period

from January 2012 through December 2012 the Program processed approximately 8,839 internal and 5,654 external plumbing and subsurface wastewater permits.

Nitrates and Septic Systems

The DHHS's Health and Environmental Testing Laboratory (HETL) database contains the results of water tests done on private wells. This database provides the largest sample of private well nitrate concentrations in the state. Assuming that the HETL database for nitrate-N represents Maine groundwater quality, data from January 2009 to December 2014 indicate that approximately 98% of wells sampled have concentrations below 5 mg/L, well below the 10 mg/L drinking water standard for nitrate-N (Table 6-5). This percentage has remained steady for the past few reporting cycles.

Table 6-5 Nitrate-N Frequency Distributions for Private Well Analyses

	HETL Database (percent) – Analyses between (dates)				
Nitrate-N (mg/L)	**1/1/04 and 5/31/05**	**1/1/06 and 5/31/07**	**1/1/08 and 5/31/09**	**1/5/09 and 12/31/10**	**1/3/11 and 12/31/12**
0.00 to 2.50	91.9	93.7	93.9	94.5	94.8
2.51 to 5.00	5.6	4.5	4.2	3.8	3.8
5.01 to 7.50	2.0	1.1	1.2	1.3	1.0
7.51 to 10.00	0.5	0.5	0.4	0.4	0.2
Greater than 10.0	0.0	0.2	0.3	0.0	0.1
# of Analyses	**2,197**	**7,100**	**6,000**	**8711**	**8709**

Bacteria

Private well testing for bacteria shows that there is a greater contamination potential from bacteria than from nitrate. In public and private drinking water supplies, coliform bacteria are used as the indicator of microbial contamination. The Primary Drinking Water Standard for total coliform bacteria is 0 colonies per 100 ml.

Table 6-6 uses data from the HETL database until August of 2006, and shows that larger percentages of dug wells test positive for bacteria than drilled wells. This lends support to the belief that dug wells are more susceptible to bacterial contamination than drilled wells. Table 6-7 shows more recent well testing data, however HETL no longer distinguishes between dug and drilled wells in its reporting.

Table 6-6 Wells testing positive for *E. coli* or total coliform, 1960 to August 2006

Well Type	**HETL Database – Analyses between (dates)**		
	1960-1990	**1/04-5/05**	**6/06-8/06**[1]
Dug	52%	32%	35%
Drilled	24%	14%	16%

[1] Only data available from HETL which distinguishes the well type was from this time period in 2006. HETL stopped collecting well type data after 2006.

Table 6-7 Wells testing positive for *E. coli* or total coliform, January 2008 to December 2012

Test Type	HETL Database – Analyses between (dates)			
	1/1/08-12/31/10		1/3/11-12/31/12	
	Total number of tests	% wells positive	Total number of tests	% wells positive
Total Coliform	18,571	30.0 %	10,881	34%
E. coli	18,550	2.9 %	10,908	3.8%

Please refer to pages 138-140 of the 2006 Integrated Report for further information on nitrates, bacteria, and septic systems in Maine.

www.maine.gov/dep/water/monitoring/305b/index.htm.

SHALLOW WELL INJECTION AND THE UNDERGROUND INJECTION CONTROL (UIC) PROGRAM

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Related Websites:

UIC Program: www.maine.gov/dep/water/wd/uic/index.html

Rules: www.maine.gov/sos/cec/rules/06/096/096c543.doc

The underground discharge of pollutants by shallow well injection has been illegal in Maine since 1983 when the State adopted the Federal Underground Injection Control (UIC) regulations. The revised rule for UIC was adopted by the Board of Environmental Protection (BEP) in September 2006 and the Primacy package was sent to the EPA in October 2006. Table 6-8 lists information on numbers of inspections and registrations for the federal fiscal years 2008-2010.

Table 6-8 Underground Injection Control Program Information

Federal Fiscal Year	Wells Addressed	Wells Licensed	Non-UIC violations	Inspections and Follow-ups
FFY 2008	44	0	48	317
FFY 2009	28	0	0	245
FFY 2010	26	5	20	295
FFY 2011	4	0	9	394
FFY 2012	0	0	0	65

OTHER PROGRAMS

Please refer to pages 142-144 of the 2006 Integrated Report for further information on programs which may monitor for effects to groundwater from the following activities.

www.maine.gov/dep/water/monitoring/305b/2006/2006_Final_305b_Report.pdf

Stormwater Infiltration

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Use of infiltration as a stormwater management technique is common in many regions, but is practical in Maine only in the limited areas underlain by glacial sand and gravel deposits. These aquifers contain large volumes of easily extracted water, but are highly vulnerable to contamination. Groundwater monitoring at large commercial and industrial sites shows that the volume of pollutants discharged to these infiltration systems generally exceeds the treatment capacity of the soil and aquifer. Chloride is the most common pollutant, but data also indicate that changes in chemical conditions in the infiltration systems, principally related to low oxygen concentrations in basin waters and volumes of the aquifer affected by infiltration, can release accumulated metals and other pollutants to the underlying aquifer over time. Chloride concentrations in groundwater downgradient of large infiltration basins have frequently been shown to exceed aquatic life criteria; together with the very low DO concentrations observed in some plumes downgradient of infiltration areas, these data indicate that infiltration of water from large connected impervious areas may not be ideal to support baseflow conditions. These data are consistent with findings in other states and in the European Union, and have been cited by EPA in a recent summary of stormwater recharge methods. Ongoing work on stormwater management rules is intended to encourage infiltration, where geologically feasible, from low-pollutant sources, while discouraging concentrated discharges to groundwater from large areas of connected impervious surface. Groundwater monitoring will continue at currently-monitored sites.

Metallic Mining

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Related Website: www.maine.gov/dep/land/mining/index.html

In April 2012, the Maine Legislature enacted a law directing the DEP to undertake a two-part rulemaking process to modernize the State's regulatory process for metallic mineral mining.

In the first phase, the Department clarified the permit requirements for exploration and advanced exploration activities. Under the amended rules, exploration activities, which limit excavations to a maximum surface opening of no more than 300 square feet, do not require a permit, but must instead submit a work plan and meet a number of performance standards designed to protect natural resources and properly restore the exploration site. The revised advanced exploration requirements include a two tier permitting process that creates a graduated scale for classifying advanced exploration activities based on the level of environmental impact. Advanced exploration activities fall within into two general categories: Tier One advanced exploration activities involve the excavation and removal of up to 1,000 tons of material, while Tier Two advanced exploration activities may involve up to 5,000 tons of excavated material. The routine technical rules for exploration and advanced exploration adopted by the Department in March 2013 remain in effect and can be found in Subchapter 3 of the Department's Chapter 200: *Metallic Mineral Exploration, Advanced Exploration and Mining*.

The second part of the rulemaking process directed the Department to provisionally adopt and submit to the Legislature for review rules that update Maine's mining regulations to provide a comprehensive application and permitting process for several types of activities related to mining. Mining activities involve the excavation of 5,000 tons or more of material and are subject to a wide-ranging suite of requirements. While the BEP provisionally adopted these rules on January 10, 2014, they were not approved by the Legislature.

Permit applications for metallic mineral mining will be processed in accordance with the Maine Metallic Mineral Mining Act and the Department's existing Chapter 200 rules. In the event of conflicting statutory and rule requirements, the statute will control. Currently there is no metallic mineral exploration activity occurring in the state.

Gravel Pits and Quarries

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Related Website: www.maine.gov/dep/land/mining/index.html

The Performance Standards were created as a streamlined approach to regulating mineral excavations in the organized towns of the state. Qualifying excavations are registered with DEP through a simple notification process, called “Notice of Intent to Comply” (NOITC). To date, DEP has licensed 866 mining sites through the notification process. Once a NOITC has been filed, the licensee is responsible for operating the pit in compliance with the Performance Standards. The registration system also includes a variance process, which is a more formal permitting process that requires the submission of an application to the Department. It provides an opportunity to vary from the specific statutory performance standards contained in 38 M.R.S. § 490-D (Performance Standards for Excavations) and 38 M.R.S. § 490-Z (Performance Standards for Quarries). This legislation states that variances may only be granted where explicitly allowed. Some of the variance allowed include excavation below the water table, excavating closer than 100 feet to a public road, operating an externally drained pit, and operating an area greater than 10 acres for the working pit. Each type of variance application requires a different set of submissions to the Department. For example, excavation below the water table requires a hydrogeological study that includes one year of baseline monitoring for groundwater level and quality. In addition, ongoing monitoring of groundwater is required as a permit condition of operation to excavate sand and gravel from below the water table. The Department has issued approximately 166 variances, with 72 issued for excavation below the water table.

Radioactive Waste Storage and Disposal Sites

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Related Website: www.maine.gov/dhhs/mecdc/environmental-health/rad/

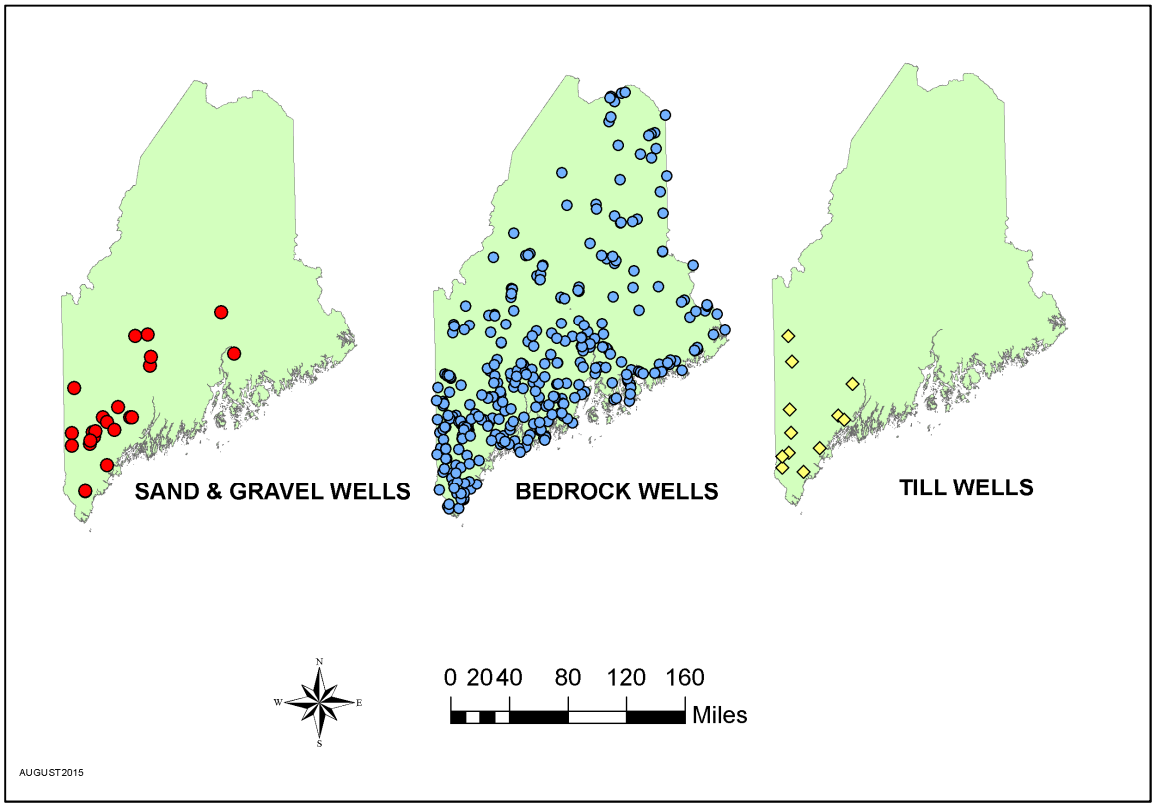
Please refer to page 144 of the 2006 Integrated Report for further information this program.

www.maine.gov/dep/water/monitoring/305b/2006/2006_Final_305b_Report.pdf

SUMMARY OF GROUNDWATER QUALITY

For 2014, the ambient groundwater quality monitoring network consisted of 447 public water supplies. Each of the selected public water supplies is provided by only one source of water: either a drilled well in bedrock; a dug well in glacial till; or a drilled well, well point, or dug well in glacial outwash sand and gravel or recent sandy alluvium (Figure 6-2). Some of the wells are large community water supplies; some are non-transient, non-community water supplies. Analytical results for periodic, routine sampling of raw water were provided by the Drinking Water Program. Not all the well samples were analyzed for the same chemical constituents every time they were obtained: frequency of testing for particular contaminants is dependent on the type of water supply and the population served. Nevertheless, DEP believes that the selection represents ambient groundwater quality in the three major geologic settings that provide groundwater in Maine. Sand and gravel aquifers are often high-yield water sources and are often found in developed areas, and are therefore vulnerable to contamination. Bedrock aquifers, though not usually hydrologically connected, underlie the entire state and are mostly used as private water supplies, as are glacial till aquifers. The locations of the wells used to indicate ambient water quality are shown in Figure 6-3, and a summary of the ambient water quality data is in Table 6-9. Figure 6-2 shows the distribution of these wells by aquifer type.

Figure 6-2 Distribution of Sole Source Public Water Supply Wells for the Ambient Water Quality Monitoring Network by Aquifer Type



Wells shown are those which were sampled.

Figure 6-3 Ambient Water Quality Monitoring Network Well Location Map

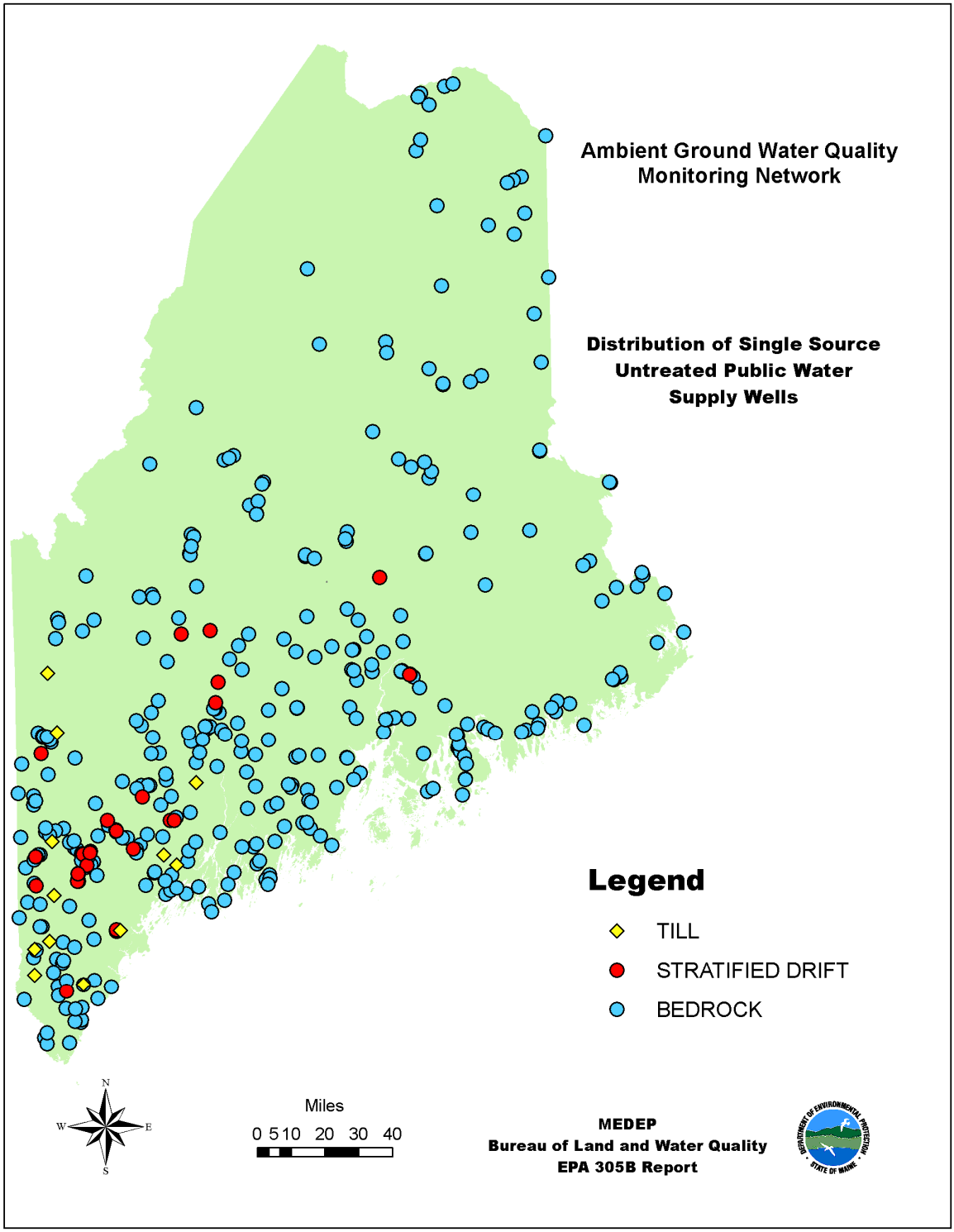


Table 6-9 Ambient Aquifer Monitoring Data

Data supplied by DHHS/MCDC/DEH/Drinking Water Program, analysis by DEP/BWQ/DEA/Environmental Geology Unit

Ambient Groundwater Quality Monitoring Well Data

Aquifer Description: Till
Statewide

Data Reporting Period: Jan. 2011-Dec. 2012

Monitoring data type *	Total number of wells used in assessment	Parameter groups	No detections of parameters above MDLs or background levels	No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to ≤5 mg/l	Parameters are detected at concentrations exceeding the MDL, but are less than or equal to MCLs and/or nitrate ranges from >5 to ≤10 mg/l		Parameters are >10m/l detected at concentrations exceeding MCL's
Ambient (raw) water quality data from public water supply wells	15	VOC[1]	12	0	0	0	0
		SVOC[1]	0	0	0	0	0
	# of Tests:	NO3[2]	73	18	0	0	0
	111	Other	8	0	0	0	0

Ambient Groundwater Quality Monitoring Well Data

Aquifer Description: Bedrock
Statewide

Data Reporting Period: Jan. 2011-Dec. 2012

Monitoring data type *	Total number of wells used in assessment	Parameter groups	No detections of parameters above MDLs or background levels	No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to ≤5 mg/l	Parameters are detected at concentrations exceeding the MDL, but are less than or equal to MCLs and/or nitrate ranges from >5 to ≤10 mg/l		Parameters are >10m/l detected at concentrations exceeding MCL's
Ambient (raw) water quality data from public water supply wells	401	VOC[1]	687	0	1	0	0
		SVOC[1]	34	0	0	0	0
	# of Tests:	NO3[2]	2188	570	0	0	0
	3924	Other	445	0	44	0	0

Major uses of aquifers or hydrologic units: X Public water supply ___ Irrigation ___ Commercial ___ Mining ___ Baseflow
X Private water supply ___ Thermoelectric ___ Livestock ___ Industrial ___ Maintenance

Uses affected by water quality problems units: X Public water supply ___ Irrigation ___ Commercial ___ Mining ___ Baseflow
X Private water supply ___ Thermoelectric ___ Livestock ___ Industrial ___ Maintenance

[1] VOC - Volatile Organic Compound; SVOC – Semi Volatile Organic Compound

[2] Includes results from testing for parameters: Nitrate, Nitrate-Nitrite, and Nitrite

Table 6-9 Ambient Aquifer Monitoring Data, continued

Ambient Groundwater Quality Monitoring Well Data

Aquifer Description: Stratified Drift **Data Reporting Period:** Jan. 2011-Dec. 2012

Statewide

Monitoring data type *	Total number of wells used in assessment	Parameter groups	No detections of parameters above MDLs or background levels	No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to ≤5 mg/l	Parameters are detected at concentrations exceeding the MDL, but are less than or equal to MCLs and/or nitrate ranges from >5 to ≤10 mg/l		Parameters are >10m/l detected at concentrations exceeding MCL's
Ambient (raw)	31	VOC[1]	36	0	0	0	0
water quality		SVOC[1]	26	0	0	0	0
water supply	# of Tests:	NO3[2]	81	55	0	0	0
wells	233	Other	35	0	0	0	0

Major uses of aquifer or hydrologic unit: X Public water supply___ Irrigation___ Commercial___ Mining___ Baseflow X Private water supply ___ Thermoelectric __ Livestock ___ Industrial___ Maintenance

Uses affected by water quality problems: X Public water supply___ Irrigation___ Commercial___ Mining___ Baseflow X Private water supply ___ Thermoelectric ___ Livestock ___ Industrial___ Maintenance

[1] VOC - Volatile Organic Compound; SVOC – Semi Volatile Organic Compound
[2] Includes results from testing for parameters: Nitrate, Nitrate-Nitrite, and Nitrite

Groundwater Trends

New occurrences of groundwater contamination are documented in Maine each year. Although discovery of existing contamination and consequent remediation is expected to continue, future reports of contamination are expected to decline as the State's groundwater protection initiatives continue to be implemented, stressing contamination prevention.

Please refer to pages 149-153 of the 2006 Integrated Report for further information on programs which may indicate groundwater quality trends.

www.maine.gov/dep/water/monitoring/305b/2006/2006_Final_305b_Report.pdf

CHAPTER 7 PUBLIC HEALTH-RELATED ASSESSMENTS

MAINE HEALTHY BEACHES PROGRAM

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Related Websites: (Maine-specific) www.mainehealthybeaches.org

(Federal) www.epa.gov/ost/beaches

The Maine Healthy Beaches Program (MHB) monitors ocean beaches in order to provide protection of swimmer health. During the current reporting cycle, DEP managed the program through a partnership with the University of Maine Cooperative Extension (UMaine Extension) and Sea Grant as well as numerous local beach managers and volunteers. All participating beaches, including State Parks, conduct routine monitoring of beach water quality from Memorial Day through Labor Day. When exceedances occur, resampling is conducted for those sites where they are discovered. In Maine, the monitoring of town-owned beaches and public notification of beach status is the responsibility of the municipality and participation in the MHB program is voluntary. Private beach owners are responsible for their own monitoring programs unless they choose to work with the local municipality and MHB. Private beach owners may opt not to participate in any monitoring. The beaches participating in the program are listed in Table 7-1. Note that the list of beaches may vary from year to year.

EPA initiated the Beaches Environmental Assessment, Closure and Health (BEACH) Act of 2000 in response to the growing concern about public health risks posed by polluted coastal swimming beaches. MHB is a voluntary program and includes these components: water quality assessment and public notification of beach status, education and outreach, and working with communities and program partners to identify and remediate pollution sources through applied research and special studies.

The assessment component includes measurement of critical factors that affect the health of the beach environment as well as sanitary surveys to determine the likely sources impacting surf-zone water quality (for participating beaches only).

Table 7-1 Beaches Participating in Program

Beach Name	Managing Organization
Sand Beach	Acadia National Park
Hadley Point	Town of Bar Harbor
Hulls Cove	Town of Bar Harbor
Town Beach	Town of Bar Harbor
Fortunes Rocks Beach	City of Biddeford
Gil Bouche Park/Biddeford Pool	City of Biddeford
Middle Beach (Biddeford)	City of Biddeford
Pemaquid Beach	Town of Bristol
Laite Beach	Town of Camden
Crescent Beach	Crescent Beach State Park
Kettle Cove Beach	Crescent Beach State Park
Ferry Beach (Saco)	Ferry Beach State Park
Winslow Park	Town of Freeport
Higgins Beach	Higgins Beach Association
Hills Beach	Hills Beach Association
Goochs Beach	Town of Kennebunk
Libby Cove Beach	Town of Kennebunk
Middle Beach	Town of Kennebunk
Mother's Beach	Town of Kennebunk
Colony Beach	Town Kennebunkport
Goose Rocks	Town Kennebunkport
Crescent Beach (Kittery)	Town of Kittery
Fort Foster	Town of Kittery
Sea Point Beach	Town of Kittery
Ducktrap River	Town of Lincolnville
Lincolnville Beach Area	Town of Lincolnville
Footbridge (Ogunquit)	Town of Ogunquit
Little Beach	Town of Ogunquit
Main (Ogunquit)	Town of Ogunquit
Moody (Ogunquit)	Town of Ogunquit
Riverside (Ogunquit)	Town of Ogunquit
OOB - Central	Town of Old Orchard Beach
OOB - North End	Town of Old Orchard Beach
OOB - Ocean Park	Town of Old Orchard Beach
Popham - Center Beach	Popham Beach State Park
Popham - East Beach	Popham Beach State Park
Popham - West Beach/Morse River	Popham Beach State Park
East End Beach	City of Portland
East Beach	Reid State Park
Half mile Beach	Reid State Park
Lagoon Beach	Reid State Park
Mile Beach	Reid State Park
Sandy Beach	City of Rockland
Goodies Beach	Town of Rockport

Beach Name	Managing Organization
Bay View	City of Saco
Kinney Shores	City of Saco
Ferry Beach (Scarborough)	Town of Scarborough
Pine Point	Town of Scarborough
Scarborough Beach	Scarborough Beach State Park
Willard Beach	City of South Portland
Casino Square	Town of Wells
Crescent Beach (Wells)	Town of Wells
Drakes Isl. Beach	Town of Wells
Wells Beach	Town of Wells
Wells Harbor	Town of Wells
Laudholm Beach	Wells National Estuarine Research Reserve
Cape Neddick Beach	Town of York
Long Sands Beach	Town of York
Short Sands Beach	Town of York
York Harbor Beach	Town of York

Swimming Beach Advisories and Closures

Under Clean Water Act (CWA) guidelines, the designated use of swimming beaches is for "recreation in and on the water." Beaches can have advisories or closures posted to warn of potential health risks; these actions are based on a risk analysis performed by the beach manager with assistance from MHB staff. The beaches listed in Tables 7-2 and 7-3 had advisories and/or closures for the number of days noted.

Beach advisories/closures are posted according to:

- Results obtained from water samples exceeding State and federal guidelines or standards for bacteria (i.e. 104 Enterococci MPN/100 ml).
- Conditions at a monitoring site indicating the possible presence of disease-causing organisms.

These advisories/closures are recommendations to the public to avoid water contact activities at the beach until further analyses reveal safe conditions and/or conditions at the monitoring site change.

For this 2014 Integrated Report, 2011 data show there were 112 advisory days and no closure days at 18 beaches. In 2012, there were 187 advisory days and 7 closure days at 42 beaches.

Table 7-2 2011 Beach Advisory and Closure Information

Town Name	Beach Name	Advisory Days	Closure Days	Total Days in 2011
Camden	Laite Beach	17	0	17
Georgetown	Lagoon Beach	2	0	2
Kennebunk	Goochs Beach	4	0	4
Kennebunkport	Goose Rocks	6	0	6
Kittery	Crescent Beach (Kittery)	6	0	6
Kittery	Fort Foster – Horn Point	2	0	2
Lincolnville	Lincolnville Beach	5	0	5
Ogunquit	Little Beach	6	0	6
Ogunquit	Riverside (Ogunquit)	6	0	6
Portland	East End Beach	9	0	9
Rockland	Sandy Beach	6	0	6
Rockport	Goodies Beach	12	0	12
Saco	Kinney Shores	4	0	4
Scarborough	Higgins Beach	6	0	6
York	Cape Neddick Beach	6	0	6
York	Long Sands Beach – North	9	0	9
York	Long Sands Beach – South	2	0	2
York	Short Sands Beach	4	0	4
Totals		**112**	**0**	**112**

Table 7-3 2012 Beach Advisory and Closure Information

Town Name	Beach Name	Advisory Days	Closure Days	Total Days in 2012
Bar Harbor	Hadley Point	2	0	2
Bar Harbor	Hulls Cove	3	0	3
Bar Harbor	Town Beach	4	0	4
Biddeford	Fortunes Rocks	2	0	2
Biddeford	Gil Bouche/Biddeford Pool	2	0	2
Biddeford	Hills Beach	4	0	4
Biddeford	Middle Beach (Biddeford)	2	0	2
Camden	Laite Beach	6	0	6
Cape Elizabeth	Crescent Beach	2	0	2
Freeport	Winslow Park	2	0	2
Kennebunk	Goochs Beach	1	0	1
Kennebunkport	Colony Beach	2	0	2
Kennebunkport	Goose Rocks	20	0	20
Kittery	Crescent Beach (Kittery)	6	0	6
Kittery	Fort Foster – Horn Point	2	0	2
Kittery	Sea Point Beach	2	0	2
Lincolnville	Lincolnville Beach	3	0	3
Mount Desert	Seal Harbor	5	0	5
Ogunquit	Riverside (Ogunquit)	12	0	12
Old Orchard Beach	OOB – Central	3	0	3
Old Orchard Beach	OOB – North End	2	0	2
Old Orchard Beach	OOB – Ocean Park	9	0	9
Phippsburg	Popham - Center Beach	2	0	2

Town Name	Beach Name	Advisory Days	Closure Days	Total Days in 2012
Phippsburg	Popham - East Beach	2	0	2
Phippsburg	Popham - West Beach-Morse River	2	0	2
Portland	East End Beach	12	7	19
Rockland	Sandy Beach	2	0	2
Rockport	Goodies Beach	23	0	23
Saco	Bay View	3	0	3
Saco	Ferry Beach (Saco)	2	0	2
Saco	Kinney Shores	3	0	3
Scarborough	Ferry Beach (Scarborough)	4	0	4
Scarborough	Higgins Beach	6	0	6
South Portland	Willard Beach	1	0	1
Wells	Casino Square	2	0	2
Wells	Crescent Beach (Wells)	3	0	3
Wells	Laudholm Beach	1	0	1
Wells	Wells Beach	1	0	1
York	Cape Neddick Beach	6	0	6
York	Long Sands Beach – North	6	0	6
York	Long Sand Beach – South	2	0	2
York	Short Sands Beach	8	0	8
Totals		**187**	**7**	**194**

SHELLFISH GROWING AREA CLASSIFICATION PROGRAM

Shellfish Harvest Area Closures

Contact: Bryant Lewis, Growing Area Program Supervisor - West, or David Miller, Growing Area Program Supervisor – East, DMR, Bureau of Public Health (BPH)

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Related Website: www.maine.gov/dmr/rm/public_health/shellfishgrowingarea.htm

DMR assesses information on shellfish growing areas to ensure that harvested shellfish are safe for consumption. A goal of the CWA is to have these areas meet their designated use of "Propagation and Harvest of Shellfish." Shellfish areas are closed by DMR if the area is found to have elevated levels of bacteria or if the area is determined to be threatened by potential sewage pollution problems due to proximity of wastewater outfalls or intense storm runoff events. At least six times per year, water samples are collected from each of the more than 2,000 established sampling sites that are located along the entire Maine coast, and tested for fecal coliform bacteria. The sampling protocol includes a visual inspection of the shoreline to determine the location and magnitude of any potential sewage pollution or toxic contamination problems.

For information on closures, call DMR's hotline at 1-800-232-4733 or 207-624-7727 or visit the web at www.maine.gov/dmr/rm/public_health/closures/shellfishhotline.htm .

Marine Biotoxins (Red Tide/PSP)

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"Red tide" refers to the rapid increase in the amount of microscopic marine algae that contain potentially lethal toxins. The toxin is transferred to humans by the ingestion of shellfish that have filtered the organisms into their systems. The toxin affects humans by paralyzing the central nervous system and, in high doses, may cause death.

DMR's Biotoxin Monitoring Program monitors levels of marine biotoxins, including saxitoxin, that cause PSP (Paralytic Shellfish Poisoning or “red tide”) and other types of shellfish poisoning. Shellfish samples are collected statewide between April and October and evaluated at the DMR biotoxin laboratories in West Boothbay Harbor and Lamoine, and also at the Bigelow Laboratory for Ocean Sciences. When toxins are found in concentrations approaching quarantine levels, closures of shellfish harvest areas are implemented. Maine has historically exhibited high levels of the PSP-causing biotoxin during the warmer periods of the year. While the occurrence of red tide events can be related to water quality conditions, a direct cause and effect relationship between red tide and anthropogenically-caused pollution has not been established. Closures, therefore, are not reported as violations of water quality standards.

For information on closures, call DMR’s hotline at 1-800-232-4733 or 207-624-7727 or visit the web at www.maine.gov/dmr/rm/public_health/closures/shellfishhotline.htm

Ocean Fish and Shellfish Consumption Advisories

Contact Andrew Smith, DHHS, MCDC, Division of Environmental Health, Environmental and Occupational Health Program

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Related Website: www.maine.gov/dhhs/mecdc/environmental-health/eohp/

Waters fail to attain their "CWA-designated use for Fishing,” whenever government agencies issue fish and/or shellfish consumption advisories. These advisories are designed to let citizens know that there may be an increased risk to their health if they choose to consume certain species of fish or shellfish. Since 1992, human health consumption advisories have been in place to warn the public against the consumption of lobster tomalley due to high levels of toxic contaminants. No evidence of elevated levels of these contaminants has been found in lobster meat. The advisory was expanded to include bluefish and striped bass in 1996, also due to detection of elevated levels of toxic contaminants in their flesh. The advisory for striped bass and bluefish was substantially revised in June 2009 based on sampling data from Maine and other Atlantic coastal states. The entire Maine coast (in waters naturally capable of supporting lobster propagation and harvest) is only in partial attainment of its designated use for fishing due to these consumption advisories. Toxic contamination found in lobster tomalley is presumed to originate in Maine waters, which has resulted in their listing in Category 5-D for non-attainment due to legacy pollutants.

Advisory Overview

Current information on ocean fish and shellfish advisories as adapted from the MCDC (last revised on June 3, 2009) is as follows:

WARNING ABOUT EATING SALTWATER FISH AND LOBSTER TOMALLEY

Warning: Chemicals in some Maine saltwater fish and lobster tomalley may harm people who eat them. Women who are or may become pregnant and children should carefully follow the Safe Eating Guidelines.

It's hard to believe fish that looks, smells, and tastes fine may not be safe to eat. But the truth is that some saltwater fish have mercury, PCBs and Dioxins in them.

All these chemicals settle into the ocean from the air. PCBs and Dioxins also flow into the ocean through our rivers. These chemicals then build up in fish.

Small amounts of mercury can damage a brain starting to form or grow. That's why babies in the womb, nursing babies, and young children are at most risk. Mercury can also harm older children and adults, but it takes larger amounts.

PCBs and Dioxins can cause cancer and other health problems if too much builds up in your body. Since some saltwater fish contain several chemicals, we ask that all consumers of the following saltwater species follow the safe eating guidelines.

Specific Ocean Fish Consumption Advisories

SAFE EATING GUIDELINES

Striped Bass and Bluefish: Pregnant and nursing women, women who may get pregnant, nursing mothers and children under 8 years of age should not eat any striped bass or bluefish. All other individuals should eat no more than 4 meals per year.

Shark, Swordfish, King Mackerel, and Tilefish: Pregnant and nursing women, women who may get pregnant and children under 8 years of age are advised to not eat any swordfish or shark. All other individuals should eat no more than 2 meals per month.

Canned Tuna: Pregnant and nursing women, women who may get pregnant and children under 8 years of age should eat no more than 1 can of "white" tuna or 2 cans of "light" tuna per week.

All other ocean fish and shellfish, including canned fish and shellfish: Pregnant and nursing women, women who may get pregnant and children under 8 years of age should eat no more than 2 meals per week.

Lobster Meat and Tomalley Consumption Advisories

Lobster Meat: Consumption advisories do not exist for lobster meat.

Lobster Tomalley: Recommended to completely avoid consumption of lobster tomalley. While there is no known safety considerations when it comes to eating lobster meat, consumers are advised to refrain from eating the tomalley. The tomalley is the soft, green substance found in the body cavity of the lobster that

functions as the liver and pancreas, and test results have shown that the tomalley can accumulate contaminants found in the environment.

For more information, including warnings on freshwater fish, call (866) 292-3474 or visit the related web site at: www.maine.gov/dhhs/mecdc/environmental-health/eohp/

Freshwater Fish Consumption Monitoring, Assessments and Advisories

Contact: Barry Mower, DEP, BWQ, DEA

Tel: (207) 215-0291 email: Barry.F.Mower@maine.gov

Related Website: www.maine.gov/dep/water/monitoring/toxics/

In addition to marine fish and shellfish, DEP monitors freshwater fish in its Surface Waters Ambient Toxics (SWAT) monitoring program for contaminants that may present a risk for human consumption. The results are forwarded to the MCDC, which is responsible for recommending any warnings on eating fish based on the presence of chemicals (22 M.R.S. §1696-I). The MCDC does this in the form of Fish Consumption Advisories, which can be seen along with additional information at www.maine.gov/dhhs/eohp/fish/. There is a statewide Fish Consumption Advisory for all freshwaters due to mercury, and additional advisories for specific waters due to other contaminants.

Mercury Statewide Fish Consumption Advisory

Based on monitoring of mercury concentrations in freshwater fish from all over Maine, the MCDC issued a statewide advisory for all Maine lakes and ponds in 1994, expanded it to include all freshwaters in 1997, and revised it in 2009 as follows:

Pregnant and nursing women, women who may get pregnant, and children under age 8 SHOULD NOT EAT any freshwater fish from Maine's inland waters. Except, for brook trout and landlocked salmon, 1 meal per month is safe.

All other adults and children older than 8 CAN EAT 2 freshwater fish meals per month. For brook trout and landlocked salmon, the limit is 1 meal per week.

Dioxin

Dioxin levels in fish from Maine rivers continue to decline, approaching background levels at some locations but still exceeding that level at others.

An evaluation of the need for fish consumption advisories due to the presence of dioxin-like compounds in fish requires a comparison to a health benchmark. The MCDC uses a health benchmark that is expressed as a toxicity-weighted concentration of dioxin-like compounds in fish tissue, referred to as a “Fish Tissue Action Level” or FTAL. For the present report, the MCDC compared the most recent data on contaminant levels to its current FTALc for dioxin-like compounds of 1.5 parts per trillion (ppt) for protection from cancer-related effects, and a 0.4 ppt FTALr for protection of noncancer reproductive-related effects. The FTALc has been used by the MCDC since 1990. The FTALr is based on the same toxicity data relied upon since 1990, but has been adjusted downward to account for the substantial background exposure all people get from the presence of these chemicals in most

foods. The MCDC also uses a statewide mercury advisory dioxin equivalent threshold, which is the dioxin concentration equivalent to the FTAL for mercury, and below which risk to human consumers is covered by the Statewide Mercury Advisory.

In 2011 and 2012 dioxin concentrations in fish from many river stations continued to decline from previous levels. Although concentrations still exceed the MCDC's FTAL for dioxin alone at many stations, concentrations were below the level that would require river-specific fish consumption advisories more stringent than the statewide fish consumption advisory due to mercury. These results are currently being reviewed by the MCDC for possible revision of the current river-specific fish consumption advisories. In 2012, dioxin concentrations measured in brook trout from Gilead on the Androscoggin River were below the FTAL and lower than previous concentrations in rainbow trout from the same station. Concentrations in smallmouth bass sampled at Rumford Point, and in white sucker sampled at Rumford Point, Riley and Livermore still exceeded the FTAL, although concentrations were lower than in previous years at Rumford Point and Livermore. Dioxin concentrations in filet of American shad from Waterville on the Kennebec River exceeded the FTAL, but concentrations in roe did not. Dioxin concentrations in white sucker from the Kennebec River at Sidney were below the FTAL, and similar to concentrations found in 2011. Dioxin concentrations in Sebasticook Lake still exceeded the FTAL, and were higher than in 2011.

River and Stream-Specific Fish Consumption Advisories

The dominant causes for the following fish consumption advisories are identified as dioxin/furans/coplanar PCBs, total PCBs, and total DDTs (DDD + DDE + DDT). The MCDC is currently reviewing all the fish contaminant data since 2003 and expects any revisions to the fish consumption advisories to be issued in 2015.

Current advisories are listed below.

Department of Health and Human Services Guidelines about Eating Freshwater Fish

Warning: **Mercury in Maine freshwater fish may harm the babies of pregnant and nursing mothers, and young children.**

SAFE EATING GUIDELINES

Pregnant and nursing women, women who may get pregnant, and children under age 8 SHOULD NOT EAT any freshwater fish from Maine's inland waters. Except, for brook trout and landlocked salmon, 1 meal per month is safe.

All other adults and children older than 8 CAN EAT 2 freshwater fish meals per month. For brook trout and landlocked salmon, the limit is 1 meal per week.

It's hard to believe that fish that looks, smells, and tastes fine may not be safe to eat. But the truth is that fish in Maine lakes, ponds, and rivers have mercury in them. Other states have this problem too. Mercury in the air settles into the waters. It then builds up in fish. For this reason, older fish have higher levels of mercury than younger fish. Fish (like pickerel and bass) that eat other fish have the highest mercury levels.

Small amounts of mercury can harm a brain starting to form or grow. That is why unborn and nursing babies and young children are most at risk. Too much mercury can affect behavior and learning. Mercury can harm older children and adults, but it takes larger amounts. It may cause numbness in hands and feet or changes in vision. The Safe Eating Guidelines identify limits to protect everyone.

***Warning*: Some Maine waters are polluted, requiring additional limits to eating fish.**

Fish caught in some Maine waters have high levels of PCBs, Dioxins or DDT in them. These chemicals can cause cancer and other health effects. The Bureau of Health recommends additional fish consumption limits on the waters listed below. Remember to check the mercury guidelines. If the water you are fishing is listed below, check the mercury guideline above and follow the most limiting guidelines.

Androscoggin River Gilead to Merrymeeting Bay:---------- **6-12** fish meals a year.
Dennys River Meddybemps Lake to Dead Stream:---------- **1-2** fish meals a month.
Green Pond, Chapman Pit, & Greenlaw Brook
(Limestone):----------**Do not eat any fish from these waters**.
Little Madawaska River & tributaries
(Madawaska Dam to Grimes Mill Road):----------**Do not eat any fish from these waters**.
Kennebec River Augusta to the Chops:----------**Do not eat any fish from these waters**.
Shawmut Dam in Fairfield to Augusta:--------- **5** trout meals a year, **1-2** bass meals a month.
Madison to Fairfield: ---------- **1-2** fish meals a month.
Meduxnekeag River: ---------- **2** fish meals a month.
North Branch Presque Isle River*---------- **2** fish meals a month.
Penobscot River below Lincoln:---------- **1-2** fish meals a month
Prestile Stream:---------- **1** fish meal a month.
Red Brook in Scarborough: ---------- **6** fish meals a year.
Salmon Falls River below Berwick: ---------- **6-12** fish meals a year.
Sebasticook River (East Branch, West Branch & Main Stem)
(Corinna/Hartland to Winslow):----------**2** fish meals a month.

* Correct name is North Branch Presque Isle Stream

GROUNDWATER AND PUBLIC HEALTH CONCERNS

Public Health and Environmental Concerns

Contaminants found in groundwater can have numerous adverse human health and environmental impacts. Public health concerns arise because some contaminants have been individually linked to toxic effects ranging from allergic reactions and respiratory impairment to liver and kidney damage, and damage to the central nervous system. Additional public health concerns also arise because information is not available about potential health impacts of many contaminants found in groundwater.

Due to uncertainties regarding the relationship between exposure to contaminants and impacts on human health, public health efforts are based on identifying the probabilities of impacts (i.e. risk assessment). Conducting risk assessments for combinations of contaminants that are commonly found in groundwater is difficult because there are no generally accepted protocols for testing for such effects. The primary route of exposure to contaminants is through ingestion of drinking water, although exposure is also possible through contact with skin and inhalation of vapors from groundwater sources (bathing, food preparation, industrial processes, etc.)

Because groundwater generally provides base flow to streams and rivers, environmental impacts include toxic effects on benthic invertebrates, fish, wildlife and aquatic vegetation. This also presents a public health concern if the surface waterbody is a source of food or recreation. In some areas of the State there are probably links between low-level, long-term groundwater quality degradation and the water quality of streams and brooks during low-flow conditions.

Drinking Water Programs and Groundwater Contaminant Assessments

WELLHEAD PROTECTION PROGRAM

Contact: David Braley, DHHS, CDC, Division of Environmental Health (DEH), Drinking Water Program (DWP)

Tel: (207) 441-5224 email: David.Braley@maine.gov

Related Websites: www.medwp.com or www.state.me.us/dhhs/eng/water/

The State of Maine DWP, located in DHHS, administers the Wellhead Protection Program (WHPP). The WHPP continues to be a voluntary program for Maine's public water suppliers, with all reduced or waived monitoring tied to approved protection programs. To be eligible for reduced or waived monitoring, a system must have an approved local Wellhead Protection Plan and the owner or operator must complete a waiver application.

SOURCE WATER ASSESSMENT AND PROTECTION PROGRAM

Contact: Michael Abbott, DHHS, CDC, DEH, DWP

Tel: (207) 287-6196 email: Michael.Abbott@maine.gov

Related Websites:

www.maine.gov/dhhs/mecdc/environmental-health/dwp/index.shtml and

www.maine.gov/dhhs/mecdc/environmental-health/dwp/pws/swp.shtml

Water supply protection is the first line of defense in protecting public health. Protecting a water supply source has long been recognized as the cornerstone of providing safe drinking water. The most effective source protection method is to keep the area contributing water to the supply open and undeveloped. The DWP's past assessments of source protection for public water supplies identified rapid residential and commercial development in source protection areas as the most significant threat to water quality and quantity, and few water suppliers are prepared to deal with these risks.

Public Water Systems have a limited suite of tools for source protection: they can purchase land, inspect existing activities, and ask local government to enact (and enforce) protective ordinances. Less than half of Maine's community water systems have implemented effective source protection plans. The DWP continues to work to assess the risk to new sources and systems, and to encourage systems to establish source water protection programs.

FINISHED WATERS

Contact: Michael Abbott, DHHS, CDC, DEH, DWP

Tel: (207) 287-6196 email: Michael.Abott@maine.gov

Related Websites:

www.maine.gov/dhhs/mecdc/environmental-health/dwp/index.shtml and

www.maine.gov/dhhs/mecdc/environmental-health/dwp/pws/swp.shtml

The DWP is the front line enforcement agent of the EPA for the rules and regulations set forth in the Safe Drinking Water Act (SDWA). The requirements of SDWA apply to the approximately 1,900 public drinking water systems in Maine. There are 70 water systems that use surface water as their primary source, and these all have water treatment systems and watershed protection programs. Of the approximately 1,800 groundwater systems, approximately 900 have some form of treatment on-line (and this number is likely to continue to rise) while the remaining systems have no treatment and serve raw water. Water testing on finished water is the primary means for assessing public water system compliance while verifying the quality of water that is reaching consumers.

PRIVATE WELLS

Contact Andrew Smith, DHHS, CDC, Environmental and Occupational Health Program

Tel: (207) 287-5189 email: Andy.E.Smith@maine.gov

Related Website: www.maine.gov/dhhs/mecdc/environmental-health/eohp/wells/

Maine has one of the highest per capita uses of domestic household wells for drinking water in the U.S. Based on data from Maine's 2003 Behavioral Risk Factors Surveillance Survey (BRFSS), 52% of the state's population relies on private domestic wells for their drinking water. Despite the fact that the majority of Maine residents obtain their drinking water from private household wells, the State does not have an environmental health services program focused specifically on meeting the needs of private well owners.

Please refer to pages 162-167 of the 2006 Integrated Report for additional information on Maine's Wellhead Protection and Source Water Protection programs, and Finished Water and Private Well information.

www.maine.gov/dep/water/monitoring/305b/index.htm.

RADON

Contact: Bob Stilwell, DHHS, CDC, DEH, Radiation Control Program

Tel: (207) 287-5698 (or 800-232-0842 in Maine) email: radon.dhhs@maine.gov

Related Website:

www.maine.gov/dhhs/mecdc/environmental-health/rad/radon/hp-radon.htm

Not all public health concerns that involve groundwater are caused by pollution released from human activities. The presence of naturally-occurring radioactive radon gas in groundwater drawn from granite bedrock aquifers and overlying soils has long been recognized as a problem in Maine. Based on studies of miners and more recently on people living in homes with high radon concentrations, medical researchers have shown that high radon levels in air are associated with an increased incidence of lung cancer. Radon in water supplies is a concern because the compound is readily released into the air from water. Therefore the health concerns stems more from inhalation of the radon rather than from drinking the water. A large number of Maine wells have radon concentrations that, through normal household water use, release radon into the air resulting in concentrations that are as high as or higher than those associated with an increased incidence of lung cancer.

The concentration of radon in public or private water supplies in Maine ranges from 5,000 to 10,000 picocuries/Liter (pCi/L). The Maine State Toxicologist set a maximum exposure guideline (MEG) of 4,000 pCi/L for radon in water effective January 1 2007. For private wells with radon concentrations between 4,000 and 10,000 pCi/L, the Toxicologist recommends investigation of the total radon risk in the structure from water and soil gas (air), then making a decision on whether to reduce radon based on the amount of risk the occupants are willing to accept and the resources available for radon risk reduction. For private wells with radon concentrations of 10,000 pCi/L or higher in water, the guidance recommends reducing the radon in water concentration regardless of the radon in air concentration. The radon in water MEG is also being used by the DWP when evaluating new community water supplies and new non-transient, non-community water supplies.

ARSENIC

Contacts: Robert Marvinney, State Geologist, DAFC, MGS

Tel: (207) 287-2804 email: Robert.G.Marvinney@maine.gov

David Braley, DHHS, CDC, DEH, DWP

Tel: (207) 441-5224 email: David.Braley@maine.gov

Related Websites: www.maine.gov/dacf/mgs/explore/water/arsenic/index.shtml and www.maine.gov/dhhs/mecdc/environmental-health/eohp/index.htm

Several types of cancer, including skin and bladder cancer, along with other health problems have been linked to the presence of arsenic in drinking water. The current Maximum Contaminant Level (MCL) for arsenic is 10 ppb (parts per billion) in drinking water. A 2010 study by the USGS, in cooperation with the MCDC, reviewed nearly 14,000 well water analyses statewide, and determined that more than 25% of the wells sampled in 44 towns had arsenic concentrations in excess of 10 ppb. However, because these wells were self-selected by the homeowners for analysis, it is likely that the data are biased toward higher arsenic concentrations. It is likely that 10-15% of wells statewide have arsenic concentrations in excess of the MCL. Additional work by the MGS, Columbia University, and the USGS on potential sources of arsenic in well water in central Maine strongly suggests that the local metamorphic bedrock is a significant source. However, potential anthropogenic sources cannot be ruled out in some areas.

CHAPTER 8 SUMMARY OF IMPAIRED WATERS

OVERVIEW

Chapter 8 contains four sets of tables and each table is presented for each waterbody type assessed (rivers/streams, lakes/ponds, wetlands, estuarine/marine waters). The four sets are: 1) New Listings (Tables 8-1 to 8-4); 2) New Delistings (8-5 to 8-8); 3) Status of Delisted Category 5 Waters (8-9 to 8-12); and 4) TMDL Current Project Update (8-13 to 8-16). For each item listed below, also see the related record in Appendices II-V as additional information may be presented there.

NEW LISTINGS

Table 8-1 New Rivers/Streams Listings

This table provides a list of new impairments (Category 5 listings). See the 'Comments' column for more information. A '0' in column 'Category, 2014' indicates that the AU was not listed in that year for that cause. Abbreviations used in column 'Category, Other 2016' in Table 8-1 are as follows: A/P, (Algae) Periphyton (Aufwuchs) Indicator Bioassessments; MI, Benthic-Macroinvertebrate Bioassessments (Streams); NH3, Ammonia (Un-ionized).

ADB Assessment Unit ID	Segment Name	Location	Cause	Category			Comments
				2014	2016	Other 2016	
ME0103000305_322R01	Perkins Stream (Waterville)	Tributary to Messalonskee Stream	Benthic-Macroinvertebrate Bioassessments (Streams)	3	5-A	none	New listing for Aquatic Life Use impairment based on 2014 biological monitoring data.
ME0103000305_322R01	Perkins Stream (Waterville)	Tributary to Messalonskee Stream	Periphyton (Aufwuchs) Indicator Bioassessments	3	5-A	none	
ME0103000308_331R01	Martin Stream (Dixmont)	Tributary to East Branch Sebasticook	Ammonia (Un-ionized)	4-B	5-A	5-A (MI, A/P)	New listing for Aquatic Life Use impairment based on biological monitoring data - permit expired, moved from Category 4-B to 5-A.
ME0103000308_331R01	Martin Stream (Dixmont)	Tributary to East Branch Sebasticook	Benthic-Macroinvertebrate Bioassessments (Streams)	4-B	5-A	5-A (A/P, NH3)	
ME0103000308_331R01	Martin Stream (Dixmont)	Tributary to East Branch Sebasticook	Periphyton (Aufwuchs) Indicator Bioassessments	4-B	5-A	5-A (MI, NH3)	

ADB Assessment Unit ID	Segment Name	Location	Cause	Category			Comments
				2014	2016	Other 2016	
ME0103000308_331R02	Martin Stream (Dixmont)	Trib to East Br. Sebasticook R, below Mitchell Rd	Benthic-Macroinvertebrate Bioassessments (Streams)	0	5-A	5-A (A/P)	New listing for Aquatic Life Use impairment based on 2004 to 2016 biological monitoring data.
ME0103000308_331R02	Martin Stream (Dixmont)	Trib to East Br. Sebasticook R, below Mitchell Rd	Periphyton (Aufwuchs) Indicator Bioassessments	0	5-A	5-A (MI)	

Table 8-2 New Lakes/Ponds Listings

HUC		Lake Name	Lake ID	Impaired Use	Category		Other Listing Categories having Lakes within this HUC	Comments
					2012	2014		
								No new Lakes/Ponds added in 2016

Table 8-3 New Wetlands Listings

This table provides a list of new impairments (Category 5 listings) as well as new AUs that were added in other, non-impaired categories; the term 'listings' is therefore used in a general sense here. A '0' in column 'Category, 2014' indicates that the AU was not listed in that year for that cause. Abbreviations used in column 'Category, Other 2016' in Table 8-3 are as follows: MI, Benthic-Macroinvertebrate Bioassessments (Wetlands).

ADB Assessment Unit ID	Segment Name	Location	Cause	Category			Comments
				2014	2016	Other 2016	
ME0101000303_1665L_W208	Daigle Pond west wetlands	New Canada, wetland station W-208	Benthic - Macroinvertebrate Bioassessments (Wetlands)	0	4-A	4-C	Delisted to Category 4A - impairment covered under approved Daigle Pond TMDL, 9/28/2006. Segment also listed as 4-C for Other flow regime alterations.
ME0101000303_1665L_W208	Daigle Pond west wetlands	Includes site W-200	Other flow regime alterations	0	4-C	4-A (MI)	Also listed in Category 4-A for Benthic-Macroinvertebrate Bioassessments (Wetlands).

ADB Assessment Unit ID	Segment Name	Location	Cause	Category			Comments
				2014	2016	Other 2016	
ME0104000210_3796_W099	Sabattus Pond wetlands	Wetlands at lake inlet (north end of lake), wetland site W-099	Benthic - Macroinvertebrate Bioassessments (Wetlands)	3	4-A	none	Delisted to Category 4-A - covered under approval Sabattus Lake TMDL, 8/12/2004. Corrected AU size, previously 89 acres.
ME0101000501_150R01_W198	Robinson Dam Pond wetlands	Blaine, Wetland station W-198	Benthic - Macroinvertebrate Bioassessments (Wetlands)	0	3	None	New listing for Aquatic Life Use based on 2009 and 2014 biological monitoring data.
ME0104000206_411R_W104	Bog Brook wetlands (Leeds)	Wetland station W-104	Benthic - Macroinvertebrate Bioassessments (Wetlands)	0	3	None	New listing for Aquatic Life Use based on 2003 and 2013 biological monitoring data.
ME0104000210_418R03_W103	Hooper Brook wetlands	Greene, wetland station W-103	Benthic - Macroinvertebrate Bioassessments (Wetlands)	0	3	None	New listing for Aquatic Life Use based on 2003 and 2013 biological monitoring data.
ME0101000404_130R_W119	West Branch Umcolcus Stream wetlands	Umcolcus Deadwater, T8 R6 WELS, wetland station W-119	N/A	0	2	None	New attainment listing for Aquatic Life Use based on 2006 and 2011 biological monitoring data.
ME0106000210_615R03_W252	Branch Brook wetlands and tributary wetlands	Newfield, wetland stations W-047 and W-252. Branch Brook mainstem from Rock Haven Lake to Lewis Hill Road and western tributary.	N/A	0	2	None	New attainment listing for Aquatic Life Use based on 2001, 2005, and 2014 biological monitoring data.
ME0102000205_2036_W226	Whidden Pond #2	Baxter State Park, Mount Katahdin Twp, wetland station W-226	N/A	0	1	None	New attainment listing for Aquatic Life Use based on 2010 biological monitoring data.

Table 8-4 New Estuarine/Marine Waters Listings

Waterbody ID	Segment Description	Location	Cause	Category			Comments
				2014	2016	Other 2016	
							No new Estuarine/Marine waters added in 2016.

NEW DELISTINGS

Tables 8-5 through 8-8 present specific Causes of impairment that have been removed from the list of Impaired Waters [the"303(d) List"] for the specified waterbody segments. Refer to the "Delisting" section in Chapter 4 for an explanation of the delisting process. Segments may appear multiple times if multiple causes have been delisted. For each waterbody, the category change in 2016 for the noted Cause is presented as well as information on whether the waterbody is also listed in other categories. For AUs that were delisted for reasons other than TMDL approval, delisting information is presented below.

Listing of New Impairment Causes for Impaired Waters with Approved TMDLs (Category 4-A)

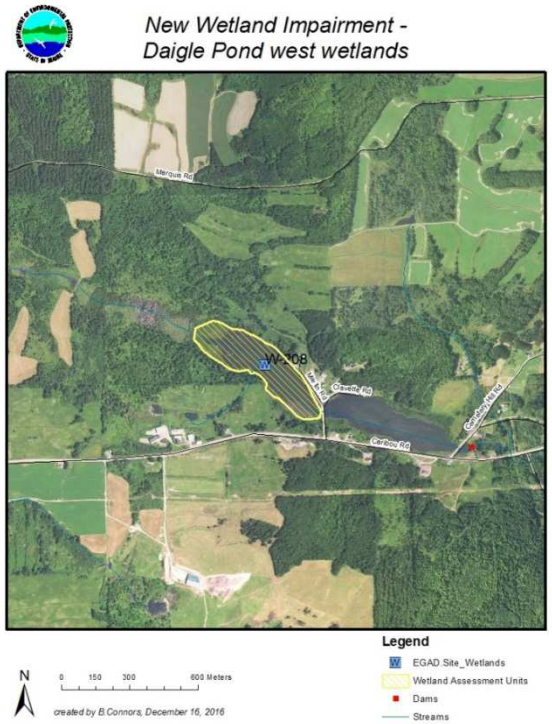
SABATTUS POND, located in the towns of Sabattus, Wales, and Greene in Androscoggin County, (ME0104000210_3796L) is a 1,962-acre Class GPA lake impaired for primary contact recreation based on Total Phosphorus levels and Secchi Disk Transparency. This assessment unit was moved from Category 5-A to 4-A in the 2006 reporting cycle, due to a TMDL approved in August 2004 for Total Phosphorus. The TMDL was designed to address water quality stressors associated with non-point source (NPS) runoff (nutrients) primarily from agricultural fields, but also from residential uses, roadways, forestry practices, recreational activities and other lesser sources from the immediate shoreline and throughout the watershed. The TMDL also identified the continuance of an existing water level management plan as a means for partially controlling total phosphorus concentrations.

In the 2016 listing cycle, DEP proposes to list an additional assessment area with aquatic life use impairments in the wetland macroinvertebrate community (Benthic-

Macroinvertebrate Bioassessments (Wetlands)) in category 4-A [Maine's Class GPA water quality standards require that waters must be of such quality that they are "*suitable...as habitat for fish and other aquatic life. The habitat must be characterized as natural.*" 38 M.R.S., Chapter 3, § 465-A(1)(A)]. The *SABATTUS POND wetlands* assessment unit in Greene and Wales (ME0104000210_3796_W099) is contiguous to and directly adjacent to the SABATTUS POND assessment unit covered by the TMDL. It is a 155-acre assessment area comprised of Palustrine scrub-shrub and emergent wetland habitat along the north end of Sabattus Pond (see figure on right).

In the 2012 and 2014 reporting cycles, this assessment area was listed in category 3 with suspected aquatic life use impairments in the wetland macroinvertebrate community, based on wetland Biomonitoring data collected in 2003. This impairment was confirmed with data collected in 2013.

The primary stressors of the macroinvertebrate community in the open water wetland habitats of the north end of Sabattus Pond are nutrients (Total Phosphorus) and fluctuations in water levels. The TMDL identified phosphorus export from developed and non-developed lands in the watershed as a contributor to the impairments in the lake basin. The report specified watershed management efforts, best management practices, education/outreach actions (targeting agricultural land owners, forestry operators, and homeowners), and a water level management plan as part of its Recommendations to curb this form of NPS pollution. It is therefore anticipated that the existing TMDL will address the recently confirmed impairments to the wetland macroinvertebrate community.



DAIGLE POND, located in New Canada Plantation in Aroostook County, Maine, (ME0101000303_1665L) is a 34-acre shallow, impounded, dual-basin, colored pond. Daigle Pond is a Class GPA lake, impaired for primary contact recreation due to excessive nutrient loading from nonpoint source pollution. This assessment unit was moved from Category 5-A to 4-A in the 2006 reporting cycle, due to a TMDL approved in September 2006 for Total Phosphorus. The TMDL was designed to address water quality stressors associated with NPS runoff (nutrients) primarily from agricultural land, actively managed forest, shoreline development, non-shoreline development, and non-developed land. The TMDL also identified lower than expected flushing rates, possibly caused by inter-basin and outlet culvert restrictions. These restrictions may lead to higher than normal phosphorus retention.

Daigle Brook flows into Daigle Pond from the northwest, and continues from the pond outlet to Cross Lake to the southeast. The *Daigle Brook* assessment unit (ME0101000303_124R02) is a 7.4 mile Class B segment, with aquatic life use

impairment due to excessive nutrient loading and low dissolved oxygen levels. This nutrient impairment is included in both the Daigle Pond TMDL mentioned above and Cross Lake TMDL. The *Daigle Brook* assessment unit was moved from Category 5-A to 4-A in the 2006 reporting cycle. It is expected that attainment of Daigle Pond water quality targets will ensure attainment of Daigle Brook uses.

In the 2016 listing cycle, DEP proposes to list an additional assessment area with aquatic life use impairments in the wetland macroinvertebrate community (Benthic-Macroinvertebrate Bioassessments (Wetlands)) in category 4-A [Maine's Class GPA water quality standards require that waters must be of such quality that they are "*suitable...as habitat for fish and other aquatic life. The habitat must be characterized as natural*." 38 M.R.S., Chapter 3, § 465-A(1)(A)]. The *DAIGLE POND WEST wetland* assessment unit in New Canada (ME0101000303_1665L_W208) is contiguous to and directly adjacent to the *DAIGLE POND* assessment unit covered by the TMDL, and it is a 22-acre assessment area comprised of Palustrine unconsolidated bottom and emergent wetland habitat within the western basin of DAIGLE Pond (see figure above).

The impairment of the wetland macroinvertebrate community within the *DAIGLE POND WEST wetland* assessment area (ME0101000303_1665L_W208) was first suspected based on 2009 wetland Biomonitoring data and confirmed with data collected in 2014. Because the impairment was not confirmed until this reporting cycle, the assessment area has not been listed in previous cycles.

The primary stressors of the macroinvertebrate community in the open water wetland habitats of the Daigle Pond western basin are nutrients (Total Phosphorus) and constricted hydrology. The TMDL identified phosphorus export from developed and non-developed lands in the watershed as a contributor to the impairments in the lake basin. The report specified watershed management efforts, education/outreach actions (targeting agricultural land owners and homeowners), roadway best management practices, and development of a septic/sewage system inspection program as part of its Recommendations to curb this form of NPS pollution. It is therefore anticipated that the existing TMDL will address the recently confirmed impairments to the wetland macroinvertebrate community.

The hydrological modification of Daigle Pond has been well documented since the pond was created by the construction of a mill and dam in 1874. Work done for the TMDL confirmed that the modification was still in place, and recommended studying the hydrology of the two basins to consider the potential need for additional culverts in order to increase flow. The TMDL stated that “Lower flushing rates caused by the culvert restriction may be contributing to higher than normal retention of phosphorus which would normally be flushed naturally from the system.” Therefore, the DEP also proposes to list the *DAIGLE POND WEST wetland* assessment area (ME0101000303_1665L_W208) in category 4-C Impairment not Caused by a Pollutant, with ‘Other flow regime alterations’ as the cause.

Table 8-5 Rivers/Streams Delisted to Another Category

Abbreviations used in column 'Category, Other 2016' in Table 8-5 are as follows: 1,1/1,2-Dichloroethane, DCE; A/P, (Algae) Periphyton (Aufwuchs) Indicator Bioassessments; DO, Dissolved Oxygen; Ec, *Escherichia coli*; MI, Benthic-Macroinvertebrate Bioassessments (Streams); N/E, Nutrient/Eutrophication Biological Indicators. Note that all delisted waters were included in Maine's implementation of EPA's 303(d) Vision and are thus italicized).

ADB Assessment Unit ID	Segment Name	Location	Cause	Category			Reason for Removal	Delisting Comment
				2014	2016	Other 2016		
ME0101000412_143 R01	Everett Brook (Ft. Fairfield)	Tributary to Aroostook River	Oxygen, Dissolved	5-A	4-A	None	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0101000412_143 R02	Merritt Brook	Entering Aroostook R. from south, downstream of Presque Isle	Benthic-Macroinvertebrate Bioassessments (Streams)	5-A	4-A	4-A (A/P)	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0101000412_143 R02	Merritt Brook	Entering Aroostook R. from south, downstream of Presque Isle	Periphyton (Aufwuchs) Indicator Bioassessments	5-A	4-A	4-A (MI)	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0101000413_146 R02	Coloney Brook	Fort Fairfield, tributary to Limestone Stream	Benthic-Macroinvertebrate Bioassessments (Streams)	5-A	4-A	4-A (A/P)	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0101000413_146 R02	Coloney Brook	Fort Fairfield, tributary to Limestone Stream	Periphyton (Aufwuchs) Indicator Bioassessments	5-A	4-A	4-A (MI)	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0102000510_224 R01	Burnham Brook (Garland)	Tributary to Kenduskeag Stream	Oxygen, Dissolved	5-A	4-A	None	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0102000510_224 R07	Crooked Brook, Corinth	Tributary to Kenduskeag Stream	Periphyton (Aufwuchs) Indicator Bioassessments	5-A	4-A	None	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.

ADB Assessment Unit ID	Segment Name	Location	Cause	Category			Reason for Removal	Delisting Comment
				2014	2016	Other 2016		
ME0103000308_325 R02	Brackett Brook (Palmyra)	Tributary to East Branch Sebasticook River	Oxygen, Dissolved	5-A	4-A	None	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0103000308_325 R03	Mulligan Stream (St. Albans)	Below Mulligan Stream Dam, to Sebasticook Lake	Oxygen, Dissolved	5-A	4-A	None	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0103000309_327 R01	Mill Stream (Albion)	Tributary to Fifteenmile Stream	Oxygen, Dissolved	5-A	4-A	None	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0103000311_334 R03	Jock Stream (Wales)	Tributary to Cobbosseecontee Lake/Stream	Nutrient/Eutrophication Biological Indicators	5-A	4-A	4-A (DO)	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0103000311_334 R03	Jock Stream (Wales)	Tributary to Cobbosseecontee Lake/Stream	Oxygen, Dissolved	5-A	4-A	4-A (N/E)	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0104000210_413 R02	Penley Brook (Auburn)	Tributary to Androscoggin River	Oxygen, Dissolved	5-A	4-A	None	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0105000218_521 R01	Warren Brook (Belfast)	Tributary to Passagassawakeag River	Oxygen, Dissolved	5-A	4-A	None	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0105000305_528 R03	Dyer River below Rt 215	Tributary to Sheepscot River	Oxygen, Dissolved	5-A	4-A	4-A (Ec)	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0105000305_528 R04	Trout Brook (Alna)	Tributary to Sheepscot River	Oxygen, Dissolved	5-A	4-A	None	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.

ADB Assessment Unit ID	Segment Name	Location	Cause	Category			Reason for Removal	Delisting Comment
				2014	2016	Other 2016		
ME0105000305_528R05	Meadow Bk (China)	Tributary to West Branch Sheepscot River	Oxygen, Dissolved	5-A	4-A	None	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0105000305_528R06	Carlton Bk (Whitefield)	Tributary to Sheepscot River	Oxygen, Dissolved	5-A	4-A	None	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0105000305_528R07	Choate Bk (Windsor)	Tributary to West Branch Sheepscot River	Oxygen, Dissolved	5-A	4-A	None	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0105000305_528R08_01	Chamberlain Bk (Whitefield)	Tributary to Sheepscot River	Oxygen, Dissolved	5-A	4-A	None	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0106000102_603R02	Chandler River including East Branch	Tributary to Royal River	Oxygen, Dissolved	5-A	4-A	None	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0106000103_607R06	Hobbs Brook (Cumberland)	Tributary to Piscataqua River	Oxygen, Dissolved	5-A	4-A	4-A (Ec)	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0106000103_607R10	Thayer Brook	Gray, tributary to Pleasant River	Oxygen, Dissolved	5-A	4-A	None	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.
ME0106000304_625R03	West Brook (N. Berwick)	From 0.1 miles above Bragdon Rd to confluence with Great Works River	Oxygen, Dissolved	5-A	4-A	5-A (DCE)	TMDL approved or established by EPA (4-A)	8/9/2016: Aquatic life use impairment now Category 4-A due to TMDL approval.

Table 8-6 Lakes/Ponds Delisted to Another Category.

No lakes were moved among assessment listing categories in 2016.

HUC	Lake Name	Lake ID	Impaired Use	Category			Reason for Removal	Delisting Comment
				2014	2016	Other 2016		
								No Lakes/Ponds Delisted

Table 8-7 Wetlands Delisted to Another Category

Abbreviations used in column 'Category, Other 2016' in Table 8-7 are as follows: FA, Flow Alteration; MI, Benthic-Macroinvertebrate Bioassessments (Wetlands).

ADB Assessment Unit ID	Segment Name	Location	Cause	Category			Reason for Removal	Delisting Comment
				2014	2016	Other 2016		
ME0101000303_1665L_W208	Daigle Pond west wetlands	New Canada, wetland station W-208	Benthic - Macroinvertebrate Bioassessments (Wetlands)	0	4-A	4-C (FA)	TMDL approved or established by EPA (4A)	Delisted to Category 4A - impairment covered under approved Daigle Pond TMDL, 9/28/2006. Segment also listed as 4-C for Other flow regime alterations.
ME0101000303_1665L_W208	Daigle Pond west wetlands	New Canada, wetland station W-208	Other flow regime alterations	0	4-C	4-A (MI)	Impairment not Caused by a Pollutant TMDL not required (4C).	
ME0104000210_3796_W099	Sabattus Pond wetlands	Wetlands at lake inlet (north end of lake), wetland site W-099	Benthic - Macroinvertebrate Bioassessments (Wetlands)	3	4-A	none	TMDL approved or established by EPA (4A)	Delisted to Category 4-A - covered under approval Sabattus Lake TMDL, 8/12/2004. Corrected AU size, previously 89 acres.

Table 8-8 Estuarine/Marine Waters Delisted to Another Category

Waterbody ID	Segment Description	Location	Cause	Category			Reason for Removal	Delisting Comment
				2014	2016	Other 2016		
								No new Estuarine/Marine waters removed in 2016.

STATUS OF DELISTED CATEGORY 5 WATERS

Table 8-9 Status of Delisted Category 5 Rivers/Streams

This table presents the listing history (2002–2016) of Category 5 AUs that were delisted over time. Bold font indicates AU/Cause combinations that changed category during the 2016 cycle. Waters that are included in Maine's implementation of EPA's 303(d) Vision are indicated in italics.

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'04-'08	'10 '16				ME0101000105_103R 01	Shields Branch of Big Black R	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'08	'10 '16				ME0101000121_117R	St. John River at Madawaska	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02 '04	'06-'16				ME0101000303_124R 01	Dickey Brook	Nutrient/Eutrophi-cation Biological Indicators	TMDL approved by EPA (4A) 9/28/2006	Submitted with Daigle Pond/Cross Pond TMDL in September 2006. EPA approved TMDL 9/28/06
'02 '04	'06-'16				ME0101000303_124R 01	Dickey Brook	Oxygen, Dissolved	TMDL approved by EPA (4A) 9/28/2006	
	'16				ME0101000303_124R 01	Dickey Brook	Periphyton (Aufwuchs) Indicator Bioassessments	TMDL approved by EPA (4A) 9/15/2006	5/23/2012: New 5-A listing for Aquatic Life Use due to algae (periphyton) non-attainment (2003 and 2009, biomonitoring station 688); covered under existing TMDL, causes delisted to Category 4-A

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'02 '04	'06-'16				ME0101000303_124R02	Daigle Brook	Nutrient/Eutrophi-cation Biological Indicators	TMDL approved by EPA (4A) 9/28/2006	Submitted with Daigle Pond/Cross Pond TMDL in September 2006. EPA approved TMDL 9/28/06
'02 '04	'06-'16				ME0101000303_124R02	Daigle Brook	Oxygen, Dissolved		
'02		'04		'06-'16	ME0101000412_140R01	No. Br. Presque Isle Stream between Mapleton and Presque Isle	BOD, Biochemical oxygen demand	State Determines water quality standard is being met (Category 2) 8/31/2006	Removal of Mapleton POTW complete. 2004 biomonitoring-showed attainment of Class A biocriteria and attains DO criteria at Station 11, 0.2 km downstream of Mapleton POTW
'02		'04		'06-'16	ME0101000412_140R01	No. Br. Presque Isle Stream between Mapleton and Presque Isle	Dissolved oxygen		
'04 -'08	'10 '16				ME0101000412_140R02	Dudley Brook (Chapman)	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A)	EPA approved TMDL 4/26/2010 (for Total Phosphorus, Total Nitrogen and sediments)
'02 - '14	***'16***				***ME0101000412_143R01***	***Everett Brook (Ft. Fairfield)***	***Oxygen, Dissolved***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
'12 - '14	***'16***		***'06 - '10***		***ME0101000412_143R02***	***Merritt Brook***	***Benthic-Macroinvertebrate Bioassessments (Streams)***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
'12 - '14	***'16***				***ME0101000412_143R02***	***Merritt Brook***	***Periphyton (Aufwuchs) Indicator Bioassessments***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
'02			'06-'16		ME0101000413_142R01	Caribou Stream	Benthic-Macroinvertebrate Bioassessments (Streams)	Flaws in original listing (Category 3) 10/2006	Administrative error, conflicting data Biocriteria non-attainment is inconsistent; segment was 5-A for non-attainment of biocriteria in 1994 only. Subsequent samples showed attainment; requires re-sampling

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
		’02-‘16			ME0101000413_145R01	Little Madawaska River	Polychlorinated biphenyls	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) 3/15/2004	Haz waste remediation project is complete (Superfund)--expected to attain standards by 2020. Needs re-sampling to confirm
		’02-‘16			ME0101000413_145R02	Greenlaw Brook	Polychlorinated biphenyls	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) 2002	9/6/2012: Corrected name, was Greenlaw Stream. Haz waste remediation project (Superfund)--expected to attain standards by 2020
’04-‘08				‘10 '16	ME0101000413_146R01	Webster Brook	Escherichia coli	Applicable WQS attained; original basis for listing was incorrect	Monitoring for Statewide bacteria TMDL indicates this water attains bacteria standards
’12 - ‘14	***‘16***				***ME0101000413_146R02***	***Coloney Brook***	***Benthic-Macroinvertebrate Bioassessments (Streams)***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
’12 - ‘14	***‘16***				***ME0101000413_146R02***	***Coloney Brook***	***Periphyton (Aufwuchs) Indicator Bioassessments***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
’04-‘08	’10-'16				ME0101000501_149R01	Prestile Stream above dam in Mars Hill	Benthic-Macroinvertebrate Bioassessments (Streams)	EPA approval of TMDL 5/10/2010	EPA approval of TMDL (5/10/10), delisted to Category 4-A (macroinvertebrates, nutrients and DO).
’04-‘08	’10-'16				ME0101000501_149R01	Prestile Stream above dam in Mars Hill	Nutrient/Eutrophi-cation Biological Indicators		
’04-‘08	’10-'16				ME0101000501_149R01	Prestile Stream above dam in Mars Hill	Oxygen, Dissolved		

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
		’10-'16		’02-‘08	ME0102000109_205R01	West Branch Penobscot R main stem, below confluence with Millinocket Str	Oxygen, dissolved		
'02-‘08	’10-'16				ME0102000110_205R03	Millinocket Stream (Millinocket)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'04-‘08	’10-'16				ME0102000402_219R_02	Piscataquis River at Dover Foxcroft	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'04-‘08	’10-'16				ME0102000403_215R_02	Sebec River at Milo	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
‘02-'06				‘08-'16	ME0102000403_215R01	Sebec River at Milo above confluence with Piscataquis R	Benthic-Macroinvertebrate Bioassessments (Streams)	Applicable WQS attained due to restoration activities	Previously listed in 5-A for biocriteria non-attainment based on 1985 data. This segment has been delisted: Resampling in 2006, at Biomonitoring Station 827, below the Milo Dam, shows attainment of Class A biocriteria.
‘04				‘02 '06-'16	ME0102000502_220R_01	Mattanawcook Stream (Lincoln)	Escherichia coli	State determines water quality standard is being met (Category 2)	CSO has been removed. Data from multiple sampling events collected by the Penobscot Indian Nation during summer 2004 for Mattanawcook Stream confirm attainment of numeric criteria for dissolved oxygen and bacteria. Segment is also Category 3 listed for sediment contamination; possible fish consumption impairment. Needs sampling to confirm
‘04				‘02 '06-'16	ME0102000502_220R_01	Mattanawcook Stream (Lincoln)	Oxygen, Dissolved		
‘02 '04				‘06-'16	ME0102000502_230R	Penobscot R-(Mattawamkeag to Cambolasse)	Benthic-Macroinvertebrate Bioassessments (Streams)	Flaws in original listing of this cause (Category 2)	Administrative error, no data to support impaired biocriteria assessment. Erroneously listed for benthic macroinvertebrates prior to 2002 cycle.
‘02-'10		'12-‘16			ME0102000502_230R	Penobscot R-(Mattawamkeag to Cambolasse)	Nutrient/Eutrophi-cation Biological Indicators	Other point source or nonpoint source controls are expected	

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'02-'10		'12-'16			ME0102000502_230R	Penobscot R-(Mattawamkeag to Cambolasse)	Oxygen, Dissolved	to meet water quality standards (Category 4B) May 2011	
'02 '04				'06-'16	ME0102000502_231R	Penobscot R, main stem, from Cambolasse Str to Piscataquis R	Benthic-Macroinvertebrate Bioassessments (Streams)	Flaws in original listing of this cause (Category 2) 12/6/2006	Administrative error, no data to support impaired biocriteria assessment. Erroneously listed for benthic macroinvertebrates prior to 2002 cycle; has attained applicable biocriteria in 1992, 1993, 1994 and 1995.
'02 '04		'06-'16			ME0102000502_231R	Penobscot R, main stem, from Cambolasse Str to Piscataquis R	Dioxin (including 2,3,7,8-TCDD)	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) 8/1/2006	Dioxin controls in place and monitoring confirms improvement. Dioxin data from 2003 and 2005 showed no difference in fish above and below Lincoln.
'02-'10		'12-'16			ME0102000502_231R	Penobscot R, main stem, from Cambolasse Str to Piscataquis R	Nutrient/Eutrophi-cation Biological Indicators	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) May 2011	2011 permits providing nutrient limits are expected to correct existing aquatic life use impairments. Expected to attain in 2016.
'02-'10		'12-'16			ME0102000502_231R	Penobscot R, main stem, from Cambolasse Str to Piscataquis R	Oxygen, Dissolved		
'04		'06-'16		'02	ME0102000503_221R 01	Cold Stream (Enfield) downstream of hatchery	Benthic-Macroinvertebrate Bioassessments (Streams)	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) 6/20/2006	9/4/12: hatchery permit renewed 12/7/11; macroinvertebrates met Class A biocriteria in 2006 and 2011 (station S-484).
'02-'08	'10-'16				ME0102000506_222R 01	Costigan Str (Costigan)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
‘04		‘06-‘16			ME0102000506_232R	Penobscot R	Dioxin (including 2,3,7,8-TCDD)	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) 8/1/2006	Dioxin controls in place.
'10		’12-‘16			ME0102000506_232R	Penobscot R	Nutrient/Eutrophi-cation Biological Indicators	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) May 2011	2011 permits providing nutrient limits are expected to correct existing aquatic life use impairments. Expected to attain in 2016.
'10		’12-‘16			ME0102000506_232R	Penobscot R	Oxygen, Dissolved		
'02-‘08	‘10 '16				ME0102000509_226R 01	Otter Stream, Milford	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-‘08	‘10			'12-‘16	ME0102000509_226R 02	Boynton Brook	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Delisted to Category 2 due to newer monitoring data showing attainment of bacteria standards.
'04-'06		'08-'16			ME0102000509_233R _01	Penobscot R	Dioxin (including 2,3,7,8-TCDD)	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) 2006	Dioxin controls in place.
'10		’12-‘16			ME0102000509_233R _01	Penobscot R	Nutrient/Eutrophi-cation Biological Indicators	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) May 2011	2011 permits providing nutrient limits are expected to correct existing aquatic life use impairments. Expected to attain in 2016.
'10		’12-‘16			ME0102000509_233R _01	Penobscot R	Oxygen, Dissolved		
'02-‘08	’10-'16				ME0102000509_233R _02	Penobscot River at Orono	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-‘08	’10-'16				ME0102000509_233R _03	Penobscot River at Old Town-Milford	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
’02 - ‘14	***‘16***				***ME0102000510_224R 01***	***Burnham Brook (Garland)***	***Oxygen, Dissolved***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'02-'08	'10-'16				ME0102000510_224R02	Kenduskeag Stream	Escherichia coli	Applicable WQS attained; original basis for listing was incorrect	
'02-'06	'08-'16				ME0102000510_224R04	Birch Stream (Bangor)	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved by EPA (4A) 9/12/07	EPA approved TMDL 9/12/2007
	'12-'16				ME0102000510_224R04	Birch Stream (Bangor)	Periphyton (Aufwuchs) Indicator Bioassessments	TMDL approved by EPA (4A) 9/12/07	3/20/12 New 5A listing for Aquatic Life Use due to algae (periphyton) non-attainment (2001, 2003 and 2006, biomonitoring station 691); covered under existing TMDL, causes delisted to Category 4A
'02-'10	'12-'16				ME0102000510_224R05	Capehart (Pushaw) Brook (Bangor)	Habitat Assessment (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'02-'10	'12-'16				ME0102000510_224R06	Arctic Brook (near Valley Ave, Bangor)	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'06-'10	'12-'16				ME0102000510_224R06	Arctic Brook (near Valley Ave, Bangor)	Habitat Assessment (Streams)		
'12-'14	***'16***				***ME0102000510_224R07***	***Crooked Brook, Corinth***	***Periphyton (Aufwuchs) Indicator Bioassessments***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
'06-'10	'12-'16				ME0102000511_225R01_02	Shaw Brook (Bangor, Hampden)	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'02-'10	'12-'16				ME0102000511_225R01_02	Shaw Brook (Bangor, Hampden)	Habitat Assessment (Streams)		

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
	'12-'16				ME0102000511_225R01_02	Shaw Brook (Bangor, Hampden)	Periphyton (Aufwuchs) Indicator Bioassessments		
'04-'10	'12-'16				ME0102000511_225R02	Sucker Brook (Hampden) (formerly 'Unnamed St.-Hampden')	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'06-'10	'12-'16				ME0102000511_225R02	Sucker Brook (Hampden) (formerly 'Unnamed St.-Hampden')	Oxygen, Dissolved		
		'10-'16		'02-'08	ME0102000512_229R	Penobscot R main stem, above Mattawamkeag R.	Nutrient/Eutrophi-cation Biological Indicators	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) May 2011	2011 permits providing nutrient limits are expected to correct existing aquatic life use impairments. Expected to attain in 2016.
		'10-'16		'02-'08	ME0102000512_229R	Penobscot R main stem, above Mattawamkeag R.	Oxygen, Dissolved		
'02-'08	'10-'16				ME0102000513_234R	Penobscot River	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
		'02-'16			ME0102000513_234R02	Penobscot	Dioxin (including 2,3,7,8-TCDD)	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B)	Dioxin controls in place.
'10		'12-'16			ME0102000513_234R02	Penobscot	Nutrient/Eutrophi-cation Biological Indicators	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) May 2011	2011 permits providing nutrient limits are expected to correct existing aquatic life use impairments. Expected to attain in 2016.
'10		'12-'16			ME0102000513_234R02	Penobscot	Oxygen, Dissolved		

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'02 '04		'06-'16			ME0103000304_313R01	Mill Stream (Embden)	Benthic-Macroinvertebrate Bioassessments (Streams)	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) 6/20/2006	Hatchery permit issued 1/30/2006; exp. date 1/30/2011; other pollution controls are in place, attainment expected by 2009;
'04		'06-'16		'02	ME0103000305_315R_02	Unnamed Stream trib to Sandy R (Avon-Dunham Hatchery)	Benthic-Macroinvertebrate Bioassessments (Streams)	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) 6/20/2006	Hatchery permit issued 10/18/2005; expiration date 10/18/10; hatchery is now closed; other pollution controls are in place, attainment expected by 2008;
'02-'08	'10-'16				ME0103000306_320R02	Currier Brook	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'08	'10-'16				ME0103000306_320R03	Whitten Brook (Skowhegan)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'06-'10	'12-'16				ME0103000306_320R03	Whitten Brook (Skowhegan)	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'04-'10	'12-'16				ME0103000306_320R03	Whitten Brook (Skowhegan)	Habitat Assessment (Streams)		
'02-'08	'10-'16				ME0103000306_338R_02	Kennebec River at Skowhegan, CSO	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'08	'10-'16				ME0103000306_339R_03	Kennebec River, near Fairfield	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	
		'02-'12		'16	ME0103000308_325R01	East Branch Sebasticook River Corundel Pd to Sebasticook L (Corinna)	Benthic-Macroinvertebrate Bioassessments (Streams)	Applicable WQS attained; due to restoration activities	9/15/2014: Long-term monitoring data show criteria attainment for chlorinated benzenes and attainment of Class C aquatic life standards.
		'02-'12		'16	ME0103000308_325R01	East Branch Sebasticook River, Corundel Pd to Sebasticook L (Corinna)	Benzene		

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'02 - '14	***'16***				***ME0103000308_325R 02***	***Brackett Brook (Palmyra)***	***Oxygen, Dissolved***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
'02 - '14	***'16***				***ME0103000308_325R 03***	***Mulligan Stream (St. Albans)***	***Oxygen, Dissolved***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
'16		'06-'14			ME0103000308_331R 01	Martin Stream (Dixmont)	Ammonia (Un-ionized)	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) 7/13/2006	11/12/2014: CAFO ceased operation in late 2013; permit expired. CAFO permit issued 8/15/06; other pollution controls in place, expected to attain standards
'16		'06-'14			ME0103000308_331R 01	Martin Stream (Dixmont)	Benthic-Macroinvertebrate Bioassessments (Streams)		
'16		'14			ME0103000308_331R 01	Martin Stream (Dixmont)	Periphyton (Aufwuchs) Indicator Bioassessments		8/12/2014: New listing for Aquatic Life Use - algae (periphyton) only met Class B in 2006 and 2012, biomonitoring stations S-756, S-679); covered under existing (expired) permit, cause delisted to Category 4-B.
'02 - '14	***'16***				***ME0103000309_327R 01***	***Mill Stream (Albion)***	***Oxygen, Dissolved***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
'06-'08	'10-'16				ME0103000309_332R	Sebasticook River	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'04-'10				'12-'16	ME0103000309_332R	Sebasticook River	Nutrient/Eutrophi-cation Biological Indicators	Applicable WQS attained; due to restoration activities	10/2/12 Nutrient/Eutrophication Biological Indicators cause of Aquatic Life Use impairment delisted to Category 2 due to new data showing removal of cause of impairment.
		(4C) '02-'08		'12-'16	ME0103000309_332R 01	Sebasticook River (Halifax impoundment)	Benthic-Macroinvertebrate Bioassessments (Streams)	Applicable WQS attained due to restoration activities	Biomonitoring following removal of Halifax Dam confirms attainment of biocriteria
'02 '04	'06-'16				ME0103000310_322R 01	Fish Brook (Fairfield)	Benthic-Macroinvertebrate Bioassessments (Streams)	EPA approval of TMDL (Category 4A) 8/30/2005	EPA approved TMDL 8/30/2005

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'02 '04	'06-'16				ME0103000310_322R01	Fish Brook (Fairfield)	Oxygen, Dissolved		
'02 - '14	***'16***				***ME0103000311_334R03***	***Jock Stream (Wales)***	***Nutrient/Eutrophication Biological Indicators***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
'02 - '14	***'16***				***ME0103000311_334R03***	***Jock Stream (Wales)***	***Oxygen, Dissolved***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
'02-'08	'10-'16				ME0103000312_333R02	Whitney Brook (Augusta)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'10	'12-'16				ME0103000312_333R02	Whitney Brook (Augusta)	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'10	'12-'16				ME0103000312_333R02	Whitney Brook (Augusta)	Periphyton (Aufwuchs) Indicator Bioassessments		
'02-'10	'12-'16				ME0103000312_333R03	Kennedy Brook (Augusta)	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
	'12-'16				ME0103000312_333R03	Kennedy Brook (Augusta)	Periphyton (Aufwuchs) Indicator Bioassessments		
'06-'10	'12-'16				ME0103000312_333R04	Unnamed tributary to Bond Brook	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'04-'10	'12-'16				ME0103000312_333R04	Unnamed tributary to Bond Brook	Habitat Assessment (Streams)		
	'12-'16				ME0103000312_333R04	Unnamed tributary to Bond Brook	Periphyton (Aufwuchs) Indicator Bioassessments		

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'06-'08	'10-'16				ME0103000312_339R_02	Kennebec River at Waterville, CSO	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'08	'10-'16				ME0103000312_340R_02	Kennebec River at Augusta, including Riggs Brook- CSO	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'08	'10-'16				ME0103000312_340R_03	Kennebec River at Hallowell- CSO	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'08	'10-'16				ME0103000312_340R_04	Kennebec River at Gardiner-Randolph	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'04	'06			'08-'16	ME0104000206_423R01	Androscoggin R, main stem, Livermore impoundment	Benthic-Macroinvertebrate Bioassessments (Streams)	Applicable WQS attained due to restoration activities	EPA approved TMDL 7/18/2005 (TMDL #11594). Attained Class C biocriteria in 2003, and attained Class B biocriteria in 2004, 2005 and 2006. Benthic invertebrate and TSS causes delisted to 'WQS attainment'. Also 4-B listed for dioxin and 5D listed for legacy PCB contamination
'04	'06			'08-'16	ME0104000206_423R01	Androscoggin R, main stem, Livermore impoundment	Total Suspended Solids	Applicable WQS attained due to restoration activities	
		'02-'16			ME0104000206_423R01	Androscoggin R, main stem, Livermore impoundment	Dioxin (including 2,3,7,8-TCDD)	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) 3/15/2004	Dioxin controls in place. Also 5-D listed for legacy PCB contamination.
		'02-'16			ME0104000207_412R02	House/Lively Brook	Nitrogen (Total)	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) 3/15/2004	Waste (manure) removal (Agric NPS) by Consent Order and Site Permit-expected to attain standards; needs additional monitoring to confirm attainment.
'04-'08	'10-'16				ME0104000208_413R01	Jepson Brook (Lewiston)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'08	'10-'16				ME0104000208_413R03	Stetson Brook (Lewiston)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'08	'10-'16				ME0104000208_413R04	Logan Brook, Auburn	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'04-'10	'12-'16				ME0104000208_413R04	Logan Brook, Auburn	Habitat Assessment (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'02-'10	'12-'16				ME0104000208_413R04	Logan Brook, Auburn	Oxygen, Dissolved		
'02-'08	'10-'16				ME0104000208_413R07	Gully Brook (Auburn)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	
'04			'06-'16	'02	ME0104000208_413R08	Bobbin Mill Brook (Lake Auburn Outlet, Auburn)	Benthic-Macroinvertebrate Bioassessments (Streams)	Flaws in original listing (Category 3) 3/9/05	6/7/12: Conflicting biomonitoring results (at station S-357): macroinvertebrates attained only Class C in 1998 (likely due to natural conditions) but met Class B in 2003 and 2008; algae (periphyton) showed non-attainment in 2008. Resampling needed to confirm whether impairment exists.
		'02-'16			ME0104000208_424R_01	Androscoggin R, main stem, upstream of the Gulf Island Dam	Dioxin (including 2,3,7,8-TCDD)	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) 3/15/2004	Dioxin controls in place
	'08-'10	'12-'16			ME0104000208_424R_01	Androscoggin R, main stem, upstream of the Gulf Island Dam	Algae blooms	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) December 2012	2012 permits are expected to correct existing aquatic life use impairments. Expected to attain in 2017.
	'06-'10	'12-'16			ME0104000208_424R_01	Androscoggin R, main stem, upstream of the Gulf Island Dam	BOD, Biochemical oxygen demand		
	'06-'10	'12-'16			ME0104000208_424R_01	Androscoggin R, main stem, upstream of the Gulf Island Dam	Oxygen, Dissolved		

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
	'06-'10	'12-'16			ME0104000208_424R_01	Androscoggin R, main stem, upstream of the Gulf Island Dam	Phosphorus (Total)		
	'06-'10	'12-'16			ME0104000208_424R_01	Androscoggin R, main stem, upstream of the Gulf Island Dam	Total suspended solids		
'02-'08	'10-'16				ME0104000209_417R_02	Little Androscoggin River at Mechanic Falls	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'04 - '14	***'16***				***ME0104000210_413R 02***	***Penley Brook (Auburn)***	***Oxygen, Dissolved***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
'04-'10				'16	ME0104000210_418R 01	Sabattus River between Sabattus and Androscoggin R	Benthic-Macroinvertebrate Bioassessments (Streams)	Applicable WQS attained; original basis for listing was incorrect	Aquatic life use impairment was delisted to Category 2 due to classification attainment at 3 biomonitoring stations (S-359, S-629, S-630) on 2-3 occasions.
'02-'08	'10-'16				ME0104000210_418R 02	No Name Brook (Lewiston)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'10	'12-'16				ME0104000210_419R 01	Unnamed Brook (Biomon Sta. 347-Lisbon Falls at Rt 196)	Habitat Assessment (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'06-'08	'10-'16				ME0104000210_419R 02	Hart Brook (Lewiston) A.K.A Dill Brook and including Goff Bk	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'06-'10	'12-'16				ME0104000210_419R 02	Hart Brook (Lewiston) A.K.A Dill Brook and including Goff Bk	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'02-'10	'12-'16				ME0104000210_419R 02	Hart Brook (Lewiston) A.K.A Dill Brook and including Goff Bk	Habitat Assessment (Streams)		

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'06-'10	'12-'16				ME0104000210_419R02	Hart Brook (Lewiston) A.K.A Dill Brook and including Goff Bk	Oxygen, Dissolved		
	'12-'16				ME0104000210_419R02	Hart Brook (Lewiston) A.K.A Dill Brook and including Goff Bk	Periphyton (Aufwuchs) Indicator Bioassessments		
'10	'12-'16				ME0104000210_420R01	Unnamed tributary (Brunswick 2) to Androscoggin R	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'04-'10	'12-'16				ME0104000210_420R01	Unnamed tributary (Brunswick 2) to Androscoggin R	Habitat Assessment (Streams)		
'10	'12-'16				ME0104000210_420R02	Unnamed tributary (Brunswick 3) to Androscoggin R	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'04-'10	'12-'16				ME0104000210_420R02	Unnamed tributary (Brunswick 3) to Androscoggin R	Habitat Assessment (Streams)		
'10	'12-'16				ME0104000210_420R03	Unnamed tributary (Brunswick 4) to Androscoggin R	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'04-'10	'12-'16				ME0104000210_420R03	Unnamed tributary (Brunswick 4) to Androscoggin R	Habitat Assessment (Streams)		
	'12-'16				ME0104000210_420R04	Unnamed tributary (Topsham 2) to Androscoggin R	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'04-'10	'12-'16				ME0104000210_420R04	Unnamed tributary (Topsham 2) to Androscoggin R	Habitat Assessment (Streams)		

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'10	'12-'16				ME0104000210_420R05	Unnamed tributary (Topsham 4) to Androscoggin	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'06-'08	'10-'16				ME0104000210_425R_02	Androscoggin River, Lewiston-Auburn	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'08-'10	'10-'16				ME0105000108_505R_02	St. Croix R., Calais CSO	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
		'02-'16			ME0105000201_507R01	Dennys River	Polychlorinated biphenyls	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) 9/5/2006	Haz waste remediation project (Superfund)--expected to attain standards by 2010.
'08-'10	'12-'16				ME0105000213_514R_01	Card Brook (Ellsworth)	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'04-'10	'12-'16				ME0105000213_514R_01	Card Brook (Ellsworth)	Oxygen, Dissolved		
'02 '04	'06-'16				ME0105000217_520R01	Carleton Stream (Blue Hill)	Benthic-Macroinvertebrate Bioassessments (Streams)	EPA approval of TMDL (Category 4A) 10/7/2004	EPA approved TMDL 10/7/2004
'02 '04	'06-'16				ME0105000217_520R01	Carleton Stream (Blue Hill)	Iron		
'02 - '14	***'16***				***ME0105000218_521R01***	***Warren Brook (Belfast)***	***Oxygen, Dissolved***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
'02-'08	'10-'16				ME0105000220_522R01_01	Megunticook River (Camden)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'02-'08	'10			'12-'16	ME0105000220_522R02_01	Rock Brook (formerly 'Unnamed Brook') (Camden)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	5/24/2012: Delisted to Category 2 due to newer monitoring data showing attainment of bacteria standards. 7/28/2010: Stream name updated from 'Unnamed Brook' Camden to Rock Brook.
'04-'08				'10-'16	ME0105000220_522R03	Unnamed Brook (Rockport)	Escherichia coli	Applicable WQS attained; original basis for listing was incorrect	Monitoring for Statewide bacteria TMDL indicates this water attains bacteria standards
'02-'08	'10-'16				ME0105000220_522R04	Unnamed Brook (Rockland)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	11/7/12: City of Rockland performed remedial sewer work in 2012 to address bacteria contamination; more work is likely needed in the future to successfully address the entire watershed.
'02-'08	'10-'16				ME0105000305_528R01	Sheepscot River at Alna	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'10-'12	'14-'16				ME0105000305_528R02	West Branch Sheepscot River	Escherichia coli	TMDL approved by EPA (4A) 9/22/2014	EPA approval of TMDL
'04-'08				'10-'16	ME0105000305_528R02	West Branch Sheepscot River	Oxygen, Dissolved	Applicable WQS attained; due to restoration activities	TMDL analysis of additional monitoring data demonstrates that segment attains dissolved oxygen standards.
			'10	'12-'16	ME0105000305_528R02	West Branch Sheepscot River	Benthic-Macroinvertebrate Bioassessments (Streams)		Erroneous Category 3 listing – no data available
'12-'16			'10		ME0105000305_528R02	West Branch Sheepscot River	Periphyton (Aufwuchs) Indicator Bioassessments	Insufficient information to determine if WQS attained	Category 3 due to inconsistent attainment of narrative aquatic life standards for algae
'02-'08	'10-'16				ME0105000305_528R03	Dyer River below Rt 215	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02 - '14	***'16***				***ME0105000305_528R03***	***Dyer River below Rt 215***	***Oxygen, Dissolved***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'02 - '14	***'16***				***ME0105000305_528R 04***	***Trout Brook (Alna)***	***Oxygen, Dissolved***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
'02 - '14	***'16***				***ME0105000305_528R 05***	***Meadow Bk (China)***	***Oxygen, Dissolved***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
'02 - '14	***'16***				***ME0105000305_528R 06***	***Carlton Bk (Whitefield)***	***Oxygen, Dissolved***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
'02 - '14	***'16***				***ME0105000305_528R 07***	***Choate Bk (Windsor)***	***Oxygen, Dissolved***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
'04 - '14	***'16***				***ME0105000305_528R 08_01***	***Chamberlain Bk (Whitefield)***	***Oxygen, Dissolved***	***TMDL approved or established by EPA (4A)***	***EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016***
'02 '04		'06-'16			ME0105000305_528R 08_02	Sheepscot River below Sheepscot L	Oxygen, Dissolved	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) 6/20/2006	8/6/2012: hatchery permit renewed 12/19/11, expiration date 12/19/2016. Expected to attain standards by 2016.
'02 '04		'06-'16			ME0106000101_605R 01	Mile Brook (Casco)	Benthic-Macroinvertebrate Bioassessments (Streams)	Other point source or nonpoint source controls are expected to meet water quality standards (Category 4B) 6/20/2006	6/8/2012: Hatchery permit re-issued 5/2/12, expiration date 5/1/17. Macroinvertebrates only attained Class C criteria in 2010. Facility upgrades occurred in the fall of 2011.
'02 - '14	**'16**				**ME0106000102_603R 02**	**Chandler River including East Branch**	**Oxygen, Dissolved**	**TMDL approved or established by EPA (4A)**	**EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016**
'02 '04				'06-'16	ME0106000102_603R 05	Royal River, segment below Collyer Bk	Drinking water-trichloroethylene	State determines water quality standard is being met (Category 2) 8/31/2006	Per CERCLA hazardous waste site manager: June 2006 surface water monitoring determined that the trichloroethylene standards and all other water quality criteria are being met in the Royal River at sites down-gradient of the contaminated site.

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'02-'08	'10-'16				ME0106000103_607R03	Colley Wright Brook (Windham)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'04-'08				'10-'16	ME0106000103_607R04	Piscataqua River (Falmouth)	Escherichia coli	Applicable WQS attained; original basis for listing was incorrect	Monitoring for Statewide bacteria TMDL indicates this water attains bacteria standards
'02-'08	'10-'16				ME0106000103_607R04	Piscataqua River (Falmouth)	Escherichia coli	Applicable WQS attained; original basis for listing was incorrect	
'02-'08	'10-'16				ME0106000103_607R06	Hobbs Brook (Cumberland)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'14	**'16**				**ME0106000103_607R06**	**Hobbs Brook (Cumberland)**	**Oxygen, Dissolved**	**TMDL approved or established by EPA (4A)**	**EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016**
'02-'08	'10-'16				ME0106000103_607R07	Inkhorn Brook (Westbrook)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'08	'10-'16				ME0106000103_607R08	Mosher Brook (Gorham)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'08	'10-'16				ME0106000103_607R09	Otter Brook (Windham)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'14	**'16**				**ME0106000103_607R10**	**Thayer Brook**	**Oxygen, Dissolved**	**TMDL approved or established by EPA (4A)**	**EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016**
'02-'08	'10-'16				ME0106000103_607R11	Nason Brook (Gorham)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'06-'08	'10-'16				ME0106000103_607R12	Pleasant River (Windham)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
	'02 '04			'06-'16	ME0106000103_609R_01	Presumpscot R, main stem, below Sacarappa Dam	BOD, Biochemical oxygen demand	State determines water quality standard is being met (Category 2) 8/31/2006	Sources removed, pulping operation closed and Smelt Hill Dam has been breached. Bioassessment (2005) shows attainment of Class C dissolved oxygen and biocriteria (Class B biocriteria just above Smelt Hill dam site).
	'02 '04			'06-'16	ME0106000103_609R_01	Presumpscot R, main stem, below Sacarappa Dam	Total Suspended Solids (TSS)		
'02-'08	'10-'16				ME0106000103_609R_02	Presumpscot River at Westbrook	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'04-'10	'12-'16				ME0106000104_611R02	Phillips Brook (Scarborough)	Habitat Assessment (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
	'12-'16				ME0106000104_611R02	Phillips Brook (Scarborough)	Oxygen, Dissolved		
'06-'10	'12-'16				ME0106000105_607R11_01	Nasons Brook (Portland), trib to Fore River	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
	'12-'16				ME0106000105_607R11_01	Nasons Brook (Portland), trib to Fore River	Oxygen, Dissolved		
	'12-'16				ME0106000105_607R11_01	Nasons Brook (Portland), trib to Fore River	Periphyton (Aufwuchs) Indicator Bioassessments		
'06-'10	'12-'16				ME0106000105_607R11_02	Nasons Brook (Westbrook), trib to Fore River	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
	'12-'16				ME0106000105_607R11_02	Nasons Brook (Westbrook), trib to Fore River	Oxygen, Dissolved		
	'12-'16				ME0106000105_607R11_02	Nasons Brook (Westbrook), trib to Fore River	Periphyton (Aufwuchs) Indicator Bioassessments		
'06-'10	'12-'16				ME0106000105_609R01	Dole Brook (formerly known as 'Unnamed Stream-Portland 3')	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'06-'10	'12-'16				ME0106000105_610R01	Capisic Brook	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'02-'10	'12-'16				ME0106000105_610R01	Capisic Brook	Habitat Assessment (Streams)		
	'12-'16				ME0106000105_610R01	Capisic Brook	Periphyton (Aufwuchs) Indicator Bioassessments		
'02-'08		'10 '16			ME0106000105_610R03	Long Creek (South Portland)	Benthic-Macroinvertebrate Bioassessments (Streams)	Other enforceable controls are in place 6/9, 2010. Expected to attain: 2020	10/15/2012: Watershed restoration process in third year now. Long Creek was moved to Category 4-B due to Stormwater General Permit, MEPDES MEG190000 (November 6, 2009).
'02-'08		'10 '16			ME0106000105_610R03	Long Creek (South Portland)	Habitat Assessment (Streams)		
'02-'06	'08-'16				ME0106000105_610R05	Trout Brook (So. Portland)	Benthic-Macroinvertebrate Bioassessments (Streams)	EPA approval of TMDL (Category 4A) 10/25/2007	EPA approved TMDL 10/25/2007 (under bundled urban stream project)
'06-'10	'12-'16				ME0106000105_610R06	Kimball Brook	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'02-'10	'12-'16				ME0106000105_610R06	Kimball Brook	Habitat Assessment (Streams)		
'02-'10	'12-'16				ME0106000105_610R07	Red Brook (Scarborough, S Portland)	Habitat Assessment (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'02-'06	'08-'16				ME0106000105_610R09	Barberry Cr	Benthic-Macroinvertebrate Bioassessments (Streams)	EPA approval of TMDL (Category 4A) 6/21/2007	EPA approved TMDL 6/21/2007 (under bundled urban stream project.)
'02-'06	'08-'16				ME0106000105_610R09	Barberry Cr	Habitat Assessment (Streams)	EPA approval of TMDL (Category 4A) 6/21/2007	EPA approved TMDL 6/21/2007 (under bundled urban stream project.)
'02-'08	'10-'16				ME0106000106_602R01	Frost Gully Brook	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
'04-'10	'12-'16				ME0106000106_602R01	Frost Gully Brook	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'04-'10	'12-'16				ME0106000106_602R01	Frost Gully Brook	Habitat Assessment (Streams)		
	'12-'16				ME0106000106_602R02	Mare Brook (Brunswick) and selected tributaries	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'02-'10	'12-'16				ME0106000106_602R02	Mare Brook (Brunswick) and selected tributaries	Habitat Assessment (Streams)		
'10	'12-'16				ME0106000106_602R03	Concord Gully (Freeport)	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'04-'10	'12-'16				ME0106000106_602R03	Concord Gully (Freeport)	Habitat Assessment (Streams)		
'10	'12-'16				ME0106000106_602R03	Concord Gully (Freeport)	Oxygen, Dissolved		
	'12-'16				ME0106000106_602R03	Concord Gully (Freeport)	Periphyton (Aufwuchs) Indicator Bioassessments		
'04			'06-'16	'02	ME0106000106_607R12	Norton Brook (Falmouth)	Benthic-Macroinvertebrate Bioassessments (Streams)	Flaws in original listing of this cause (Category 3) 10/2006	Administrative error, conflicting data. More data required to support impaired assessment. Non-attainment of biocriteria in 2002 may be due to natural habitat effects; needs resampling
'12	'14-'16				ME0106000106_612R01	Goosefare Brook above I-95	Escherichia coli	TMDL approved by EPA (4A) 9/22/2014	EPA approval of TMDL
'12	'14-'16				ME0106000106_612R01_01	Goosefare Brook below I-95	Escherichia coli	TMDL approved by EPA (4A) 9/22/2014	EPA approval of TMDL

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
	'12-'16				ME0106000106_612R01_01	Goosefare Brook below I-95	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'02	'04-'16				ME0106000106_612R01_01	Goosefare Brook	Cd, Cr, Cu, Fe, Pd, Ni, Zn	TMDL approved by EPA (4A) 9/29/2003	EPA approved TMDL 9/29/2003; name changed in 2012 - added 'below I-95'
'02-'08	'10-'16				ME0106000106_612R01_02	Bear Brook, Saco CSO	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'08	'10-'16				ME0106000106_616R04	Bear Bk	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'04-'08				'10-'16	ME0106000204_618R01	Saco R., Fryeburg	Escherichia coli	Applicable WQS attained; original basis for listing was incorrect	Monitoring for Statewide bacteria TMDL indicates this water attains bacteria standards
'04 '06 '08				'10-'16	ME0106000209_614R01	Ossippee R	Escherichia coli	Applicable WQS attained; original basis for listing was incorrect	Monitoring for Statewide bacteria TMDL indicates this water attains bacteria standards
'02-'08	'10-'16				ME0106000211_616R02	Tappan Bk	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'08	'10-'16				ME0106000211_616R03	Sawyer Bk	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'06-'10	'12-'16				ME0106000211_616R05	Thacher Bk (Biddeford)	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
'02-'08	'10-'16				ME0106000211_616R05	Thatcher Bk (Biddeford)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'08	'10-'16				ME0106000211_616R06	Swan Pond Brook at South Street (Biddeford)	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'06-'08	'10-'16				ME0106000211_619R01	Saco River at Biddeford-Saco	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'02-'08	'10-'16				ME0106000301_622R01	Kennebunk River	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
'06 '08		'10-'16			ME0106000301_622R02	Lord's Brook (Lyman)	BOD, Biochemical oxygen demand	TMDL Alternative	Court-ordered controls in place

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
’06 ‘08		’10-’16			ME0106000301_622R02	Lord's Brook (Lyman)	Nutrient/Eutrophication Biological Indicators		
’06 ‘08		’10-’16			ME0106000301_622R02	Lord's Brook (Lyman)	Oxygen, Dissolved		
‘12	’14-‘16				ME0106000301_622R03	Duck Brook and tributaries	Escherichia coli	TMDL approved by EPA (4A) 9/22/2014	EPA approval of TMDL
	‘04-’12	’14-‘16			ME0106000302_628R01	Mousam R, Main stem, Rt. 224 (Bridge St.) bridge in Sanford to Estes Lake	Aluminum	TMDL Alternative (4B)	3/5/2015: Ammonia, BOD, Total Phosphorus, Aluminum and Copper moved to Category 4-B because 6/12/2013 permit established limits for these pollutants.
	‘04-’12	’14-‘16			ME0106000302_628R01	Mousam R, Main stem, Rt. 224 (Bridge St.) bridge in Sanford to Estes Lake	Ammonia (Un-ionized)		
	‘04-’12	’14-‘16			ME0106000302_628R01	Mousam R, Main stem, Rt. 224 (Bridge St.) bridge in Sanford to Estes Lake	BOD, Biochemical oxygen demand		
	‘04-’12	’14-‘16			ME0106000302_628R01	Mousam R, Main stem, Rt. 224 (Bridge St.) bridge in Sanford to Estes Lake	Copper		
	‘04-’12	’14-‘16			ME0106000302_628R01	Mousam R, Main stem, Rt. 224 (Bridge St.) bridge in Sanford to Estes Lake	Phosphorus (Total)		
'02-‘08	’10-’16				ME0106000302_628R02	Mousam River at Sanford	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	
’02 - ‘14	**‘16**				**ME0106000304_625R03**	**West Brook (N. Berwick)**	**Oxygen, Dissolved**	**TMDL approved or established by EPA (4A)**	**EPA approved Statewide Nonpoint Source Pollution TMDL 8/9/2016**

Category by Report Year									
5	4-A	4-B	3	2	ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
	'12		'06-'16		ME0106000304_625R04	Goodall Brook (Sanford)	Benthic-Macroinvertebrate Bioassessments (Streams)	TMDL approved or established by EPA (4A) 9/27/12	Approval of Statewide % Impervious Cover TMDL.
	'12-'16				ME0106000304_625R04	Goodall Brook (Sanford)	Habitat Assessment (Streams)		
'02-'08	'10-'16				ME0106000305_630R01	Salmon Falls R	Escherichia coli	TMDL approved by EPA (4A) 9/28/2009	Approval of Statewide Bacteria TMDL
	'02-'16				ME0106000305_630R01	Salmon Falls R	Ammonia (Un-ionized)	EPA approval of TMDL (Category 4A) 11/1/1999	4-A EPA approved TMDL 11/22/99 for BOD, ammonia and phosphorus; 5-D fish tissue monitoring shows legacy PCBs and Dioxin
	'02-'16				ME0106000305_630R01	Salmon Falls R	Nutrient/Eutrophi-cation Biological Indicators		
	'02-'16				ME0106000305_630R01	Salmon Falls R	Oxygen, Dissolved		

Table 8-10 Status of Listed and Delisted Category 5 Lakes and Ponds

Note that history (2000–2014) is provided for lakes that have been listed in Category 5 at any time since 2002 per request of EPA Region I staff. Bold font indicates AU/Cause combinations that changed Category during this cycle (note that none have changed from 2012 to 2014). Waters that are included in Maine's implementation of EPA's 303(d) Vision are indicated in italics.

Lake	Town	MIDAS	Acres	HUC10	List Cat 00[2]	List Cat 02	List Cat 04	List Cat 06	List Cat 08	List Cat 10	List Cat 12	List Cat 14	List Cat 16	Comments
CHRISTINA RESERVOIR	FT FAIRFIELD	9525	400	0101000501	(5a)	5a	5a	5a	5a	4a	4a	4a	4a	16: Stable, chronic blooming 'wetland'; TMDL March 2010
LILLY P	ROCKPORT	83	29	0105000220	(5a)	5a	5a	4a	4a	4a	4a	4a	4a	16: Stable; TMDL Dec. 2005
NARROWS P (UPPER)	WINTHROP	98	279	0103000311	(3)	5a	5a	2 *	2 *	2 *	2 *	2 *	2 *	16: Originally listed in 1998, TMDL 2005. Data indicate stable trend
ELL (L) P	WELLS	119	32	0106000304	(5a)	3	2	2 *	2 *	2 *	2 *	2 *	2 *	16: Delisted; no longer supports repeated nuisance blooms
ARNOLD BROOK L	PRESQUE ISLE	409	395	0101000412	(5a)	5a	5a	5a	4a	4a	4a	4a	4a	16: Stable; TMDL Feb. 2007
DAIGLE P	NEW CANADA	1665	36	0101000303	(5a)	5a	5a	4a	4a	4a	4a	4a	4a	16: Stable; TMDL Sept. 2006
CROSS L	T17 R05 WELS	1674	2515	0101000303	(5a)	5a	5a	4a	4a	4a	4a	4a	4a	16: Stable; TMDL Sept. 2006

Lake	Town	MIDAS	Acres	HUC10	List Cat 00[2]	List Cat 02	List Cat 04	List Cat 06	List Cat 08	List Cat 10	List Cat 12	List Cat 14	List Cat 16	Comments
ECHO L	PRESQUE ISLE	1776	90	0101000412	(5a)	5a	5a	5a	4a	4a	2 *	2 *	2 *	16: Improving, occasional bloom ; TMDL Feb. 2007
MADAWASKA L	T16 R04 WELS	1802	1526	0101000413	(5a)	4a	4a	2 *	2 *	2 *	2 *	2 *		16: Stable, occasional bloom; TMDL 2000
MONSON P	FT FAIRFIELD	1820	160	0101000413	(5a)	5a	5a	5a	4a	4a	4a	4a	4a	16: Stable; TMDL Nov. 2006
SEBASTICOOK L	NEWPORT	2264	4288	0103000308	(5a)	4a	4a	4a	4a	4a	4a	4a	4a	16: Slow Improv.; TMDL 2001
HERMON P	HERMON	2286	461	0102000511	(5a)	5a	5a	5a	5a	5a	2	2	2	16: Stable; Paleo evidence of historic natural productivity; in equilibrium with adjacent wetlands
HAMMOND P	HAMPDEN	2294	83	0102000511	(5a)	5a	5a	5a	5a	5a	2	2	2	16: Stable; Paleo evidence of historic natural productivity; in equilibrium with adjacent wetlands and upstream lake
TOOTHAKER P	PHILLIPS	2336	30	0103000305	(3)	5a	5a	4a	4a	4a	4a	4a	4a	16: Stable; TMDL Sept. 2004
HIGHLAND L	BRIDGTON	3454	1401	0106000101	(5a)	5a	5a	2*	2*	2*	2 *	2 *	2 *	16: TMDL Aug 2004; data indicates persistent stable trend
HIGHLAND (DUCK) L	FALMOUTH	3734	634	0106000103	(5a)	5a	4a	4a	4a	2 *	2 *	2 *	2 *	16: TMDL 2003; stable
SABATTUS P	GREENE	3796	1962	0104000210	(5a)	5a	5a	4a	4a	4a	4a	4a	4a	16: Stable perhaps Improving; TMDL August 2004
COCHNEWAGON P	*MONMOUTH*	*3814*	*410*	*0103000311*	*(2)*	*2*	*2*	*3*	*3*	*3*	*5a*	*5a*	*5a*	*16: Alum treatment no longer effective*
WILSON P	WAYNE	3832	582	0103000311	(3)	3	2	5a	4a	4a	4a	4a	4a	16: deteriorating trophic trend – all trophic param.; TMDL Aug. 2007
MOUSAM L	ACTON	3838	900	0106000302	(5a)	5a	4a	2*	2*	2 *	2 *	2 *	2 *	16: Attainment of monitored uses verified. Data indicate stable trend.
UNITY P	UNITY	5172	2528	0103000309	(5a)	5a	5a	4a	4a	4a	4a	4a	4a	16: Stable; TMDL Sept 2004
LOVEJOY P	ALBION	5176	324	0103000309	(5a)	5a	5a	4a	4a	4a	4a	4a	4a	16: Stable; TMDL 2004
COBBOSSEECONTEE L	WINTHROP	5236	5543	0103000311	(5a)	4a	4a	2 *	2 *	2 *	2 *	2 *	2 *	16: persistent improvement
PLEASANT (MUD) P	GARDINER	5254	746	0103000311	(5a)	5a	4a	4a	4a	4a	4a	4a	4a	16: Stable, blooms persist; TMDL complete 2004
LONG P	BELGRADE	5272	2714	0103000310	(3)	3	3	5a	5a	4a	4a	4a	4a	16: Deterior. Trophic & DO; Gloeotrichia blooms; trophic param. indicate shift; TMDL April 2008
GREAT P	*BELGRADE*	*5274*	*8239*	*0103000310*	*(3)*	*3*	*3*	*3*	*3*	*5a*	*5a*	*5a*	*5a*	*16: Deterior. Trophic & DO; Gloeotrichia blooms*
EAST P	SMITHFIELD	5349	1823	0103000310	(5a)	4a	4a	4a	4a	4a	4a	4a	4a	16: blooms persist; deteriorating trophic trend continues; TMDL 2001
WEBBER P	VASSALBORO	5408	1201	0103000312	(5a)	5a	4a	4a	4a	4a	4a	4a	4a	16: Stable; chronic blooms; TMDL 2003
THREEMILE P	CHINA	5416	1162	0103000312	(5a)	5a	4a	4a	4a	4a	4a	4a	4a	16: Stable; chronic blooms; TMDL 2003
THREECORNERED P	AUGUSTA	5424	182	0103000312	(5a)	5a	4a	3	3	2 *	2 *	2 *	2 *	16: TMDL 2003;Improving; no recent blooms
CHINA L	CHINA	5448	3845	0103000309	(5a)	4a	4a	4a	4a	4a	4a	4a	4a	16: Stable, blooms persist; TMDL 2001.
DUCKPUDDLE P	NOBLEBORO	5702	293	0105000303	(5a)	5a	5a	3	3	2 *	2 *	2 *	2 *	16: Stable; TMDL Sept 2005, occasional bloom
LONG L	BRIDGTON	5780	4867	0106000101	(5a)	5a	5a	2 *	2 *	2 *	2 *	2 *	2 *	16: TMDL May 2005; Data indicate stable trend.
LITTLE COBBOSSEECONTEE	WINTHROP	8065	75	0103000311	(5a)	5a	5a	4a	4a	4a	2 *	2 *	2 *	16: Improving; rarely blooms; TMDL 2005
TRAFTON L	LIMESTONE	9779	85	0101000413	(5a)	5a	5a	5a	4a	4a	4a	4a	4a	16: Stable; TMDL Oct. 2006

Lake	Town	MIDAS	Acres	HUC10	List Cat 00[2]	List Cat 02	List Cat 04	List Cat 06	List Cat 08	List Cat 10	List Cat 12	List Cat 14	List Cat 16	Comments
TOGUS P	AUGUSTA	9931	660	0103000312	(5a)	5a	5a	4a	4a	4a	4a	4a	4a	16: Stable; TMDL Sept 2005
SEWALL P	ARROWSIC	9943	46	0105000307	(3)	3	5a	4a	4a	4a	4a	4a	4a	16: Stable; TMDL March 2006
ANNABESSACOOK L	MONMOUTH	9961	1420	0103000311	(5a)	5a	4a	4a	4a	4a	4a	4a	4a	16: Improving but blooms persist; TMDL 2004

[1] Non TMDL listing changes are summarized in Appendix III, Category Listing Change Summary
[2] In 2000, current Listing Categories had not been established. Equivalent Listing Categories have been assigned for purposes of comparison.
* Lakes currently listed in Category 2 do not appear individually in Appendix III but rather are included in the overall lake summary for the HUC.

Table 8-11 Status of Delisted Category 5 Wetlands

Wetlands were listed for the first time in the 2010 cycle. As a result, Table 8-11 only contains the listing history of wetlands that were delisted in the 2010 through 2016 cycles. Bold font indicates AU/Cause combinations that changed category during the 2016 cycle. For more detailed comments, consult Appendix IV, Category 4-A, 4-B and 2.

Category by Report Year					ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
5	4-A	4-B	3	2					
	'16				**ME0101000303_1665L_W208**	**Daigle Pond west wetlands**	**Benthic - Macroinvertebrate Bioassessments (Wetlands)**	**TMDL approved or established by EPA (4A) 9/28/2006**	**Delisted to Category 4A - impairment covered under approved Daigle Pond TMDL, 9/28/2006. Segment also listed as 4-C for Other flow regime alterations.**
		'12		'14	ME0103000308_325R01_W080	East Branch Sebasticook River Wetland	Benthic-Macro-invertebrate Bioassessments	Applicable WQS attained; due to restoration activities	9/15/2014: Long-term monitoring data show criteria attainment for chlorinated benzenes and attainment of Class C aquatic life standards.
		'12		'14	ME0103000308_325R01_W080	East Branch Sebasticook River Wetland	Benzene		
	'16				**ME0104000210_3796_W099**	**Sabattus Pond wetlands**	**Benthic - Macroinvertebrate Bioassessments (Wetlands)**	**TMDL approved or established by EPA (4A) 8/12/2004.**	**Delisted to Category 4-A - covered under approval Sabattus Lake TMDL, 8/12/2004. Corrected AU size, previously 89 acres.**
'10	'12-'14				ME0106000105_607R11_01_W127	Nasons Brook Wetland Complex, Portland	Benthic-Macroinvertebrate Bioassessments	TMDL approved or established by EPA (4A) 9/27/12	2010: impaired as determined by 2005 wetland bioassessment.

Category by Report Year					ADB Assessment Unit #	Water Name	Cause	Delisting Reason / Date	Comments
5	4-A	4-B	3	2					
							(Wetlands)		
'10	'12-'14				ME0106000105_607R11_02_W172	Nasons Brook Wetland Complex, Westbrook	Benthic-Macroinvertebrate Bioassessments (Wetlands)	TMDL approved or established by EPA (4A) 9/27/12	2010: impaired as determined by 2008 wetland bioassessment.
	'12-'14		'10		ME0106000105_609R01_W026	Dole Brook wetlands	Benthic-Macroinvertebrate Bioassessments (Wetlands)	TMDL approved or established by EPA (4A) 9/27/12	February 2012: Wetland biological monitoring showed impairment in 2000 and 2010.
'10	'12-'14				ME0106000105_610R01_W023	Capisic Pond wetland	Benthic-Macroinvertebrate Bioassessments (Wetlands)	TMDL approved or established by EPA (4A) 9/27/12	
'10	'12-'14				ME0106000211_616R05_W043	Thacher Brook (Biddeford) wetland	Benthic-Macroinvertebrate Bioassessments (Wetlands)	TMDL approved or established by EPA (4A) 9/27/12	
		'10 '12			ME0106000301_622R02_W176	Lord's Brook Pond wetland	Benthic-Macroinvertebrate Bioassessments (Wetlands)	TMDL Alternative	Court-ordered controls in place 2/09

Table 8-12 Status of Delisted Category 5 Marine/Estuarine Waters

A history table similar to tables 8-9 to 8-11 for other waterbody types has not been previously compiled for marine/estuarine waters. Due to the lack of Category 5 delistings during the current reporting cycle and the anticipated 2018 segment realignment using new Assessment Units, such a table is not included in this report. Future reports will include marine/estuarine delistings with new Assessment Units and Waterbody IDs, where relevant.

TMDL Development Status

Table 8-13 Rivers/Streams TMDL Current Project Update

Waters that are included in Maine's 303(d) Vision are indicated in italics.

Assessment Unit ID	AU Name	Location Description	Cause	Project Status	TMDL Submittal Target Date/ Priority
ME0101000105_103R01	Shields Branch of Big Black R	Mainstem	Oxygen, Dissolved	11/10/2014: Need more data.	L
ME0101000412_140R01	No. Br. Presque Isle Stream between Mapleton and Presque Isle	From Mapleton Sewer District outfall to confluence with Presque Isle Stream	DDT	Legacy pollutant 5-D	2020 / L
ME0101000412_140R03_02	N Br Presque Isle Stream	Tributary to Presque Isle Stream	DDT	Legacy pollutant 5-D	2020 / L
ME0101000412_140R04	Unnamed Stream (P.I. airport) - 'Hanson Brook, BioSta 743'	Tributary to Presque Isle Stream, draining the airport	Benthic-Macroinvertebrate Bioassessments (Streams)	5/29/12: Consider for future % impervious cover TMDL, need additional information on airport runoff.	2016 / M
ME0101000412_140R04	Unnamed Stream (P.I. airport) - 'Hanson Brook, BioSta 743'	Tributary to Presque Isle Stream, draining the airport	Periphyton (Aufwuchs) Indicator Bioassessments		2016 / M
ME0101000412_140R05	Kennedy Brook (Presque Isle)	Tributary to Presque Isle Stream	Periphyton (Aufwuchs) Indicator Bioassessments	11/21/2014: Not started.	2016
ME0101000413_148R	Aroostook River	Main stem between confluence with Presque Isle Stream and 3 miles upstream of Caribou water supply intake	pH	9/2/2015: Feasibility of reducing nutrient loadings via permit requirements and Best Management Practices is being assessed.	L
ME0101000413_148R01	Aroostook River (Caribou)	Main stem between 3 miles upstream of Caribou water supply intake and 100 yards downstream of intake	pH	9/2/2015: Feasibility of reducing nutrient loadings via permit requirements and Best Management Practices is being assessed.	L

Assessment Unit ID	AU Name	Location Description	Cause	Project Status	TMDL Submittal Target Date/ Priority
ME0101000413_148R02	Aroostook River	Main stem between 100 yards downstream of Caribou water supply intake and international boundary	pH	9/2/2015: Feasibility of reducing nutrient loadings via permit requirements and Best Management Practices is being assessed.	L
ME0101000501_149R	Minor tributaries to Prestile Stream above dam in Mars Hill		DDT	Legacy pollutant 5-D	2020 / L
ME0101000501_149R01	Prestile Stream above dam in Mars Hill	Including Christina Reservoir	DDT	Legacy pollutant 5-D	2020 / L
ME0101000501_150R	Tributaries to Prestile Str entering below dam in Mars Hill		DDT	Legacy pollutant 5-D	2020 / L
ME0101000501_150R01	Prestile Stream below dam in Mars Hill	From Mars Hill dam (Rt 1A) to international border	DDT	Legacy pollutant 5-D	2020 / L
ME0101000504_152R01_01	Meduxnekeag River	From confluence with S Branch to biomonitoring station S-364	DDT	Legacy pollutant 5-D	2020 / L
ME0101000504_152R01_03	Meduxnekeag River	From biomonitoring station S-364 to border	DDT	Legacy pollutant 5-D	2020 / L
ME0101000504_152R01_03	Meduxnekeag River	From biomonitoring station S-364 to border	Periphyton (Aufwuchs) Indicator Bioassessments	6/2/2015: Not started (new in 2014 cycle)	L
ME0102000402_219R01	*Piscataquis R*	*Main stem, Dover-Foxcroft POTW outfalls to about 4 miles upstream of confluence with Sebec River*	*Oxygen, Dissolved*	*10/13/2016: 2016 low flow data for DO and 2014 biomonitoring data is anticipated to be used to define nutrient waste load allocations in future permitting action.*	*H*
ME0102000404_216R01_01	W. Br. Pleasant R (KIW Twp)	Below Silver Lake	Iron	5/29/2012: Monitoring indicates potentially natural condition; consider future delisting.	L
ME0102000404_216R01_02	Blood Bk (KIW Twp)	Tributary to West Branch Pleasant River	Iron	Legacy pollutant 5-D	L
ME0102000502_231R	Penobscot R	Main stem, from	Polychlorinated	Legacy pollutant 5-D	2020 / L

Assessment Unit ID	AU Name	Location Description	Cause	Project Status	TMDL Submittal Target Date/ Priority
		Cambolasse Str to Piscataquis R	biphenyls		
ME0102000506_222R01	Costigan Brook (Milford)	Tributary to Penobscot River	Oxygen, Dissolved	11/20/2014: Low DO may be due to natural causes (wetlands); mostly forested watershed.	2017 / M
ME0102000506_232R	Penobscot R	Main stem, from Piscataquis R to Orson Is	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0102000509_233R_01	Penobscot R	Main stem, from Orson Is to Veazie Dam	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0102000510_224R03	French Stream (Exeter)	Tributary to Kenduskeag Stream	Benthic-Macroinvertebrate Bioassessments (Streams)	5/27/2014: Mapshed and watershed survey complete.	M
ME0102000510_224R03	French Stream (Exeter)	Tributary to Kenduskeag Stream	Periphyton (Aufwuchs) Indicator Bioassessments		M
ME0102000511_225R02	Sucker Brook (Hampden) (formerly 'Unnamed St.-Hampden')	Tributary to Penobscot R. entering from the west, in Hampden	Periphyton (Aufwuchs) Indicator Bioassessments	6/3/2014: Algae (periphyton) impairment due to urban influence addressed in % Impervious Cover TMDL (approved 9/27/2012). Impairment due to agricultural influences will be addressed separately.	L
ME0102000513_226R03	*Penjajawoc Stream (Bangor) Meadow Bk (Bangor)*	*Tributaries to Penobscot River*	*Benthic-Macroinvertebrate Bioassessments (Streams)*	*10/14/2016: Negotiations will continue with City of Bangor about TMDL development versus alternative restoration approach.*	*H*
ME0102000513_226R03	*Penjajawoc Stream (Bangor) Meadow Bk (Bangor)*	*Tributaries to Penobscot River*	*Habitat Assessment (Streams)*		*H*
ME0102000513_226R03	*Penjajawoc Stream (Bangor) Meadow Bk (Bangor)*	*Tributaries to Penobscot River*	*Oxygen, Dissolved*		*H*
ME0102000513_234R02	Penobscot	Main stem, Veazie Dam to Reeds Bk	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L

Assessment Unit ID	AU Name	Location Description	Cause	Project Status	TMDL Submittal Target Date/ Priority
ME0103000305_319R_02	*Sandy R,*	*Main stem, segment below Farmington WWTP*	*Benthic-Macroinvertebrate Bioassessments (Streams)*	*10/14/2016: 2016 low flow data for DO is anticipated to be used to define nutrient waste load allocations in future permitting action.*	*M*
ME0103000305_319R_02	*Sandy R,*	*Main stem, segment below Farmington WWTP*	*Oxygen, Dissolved*		*M*
ME0103000305_322R01	Perkins Stream (Waterville)	Tributary to Messalonskee Stream	Benthic-Macroinvertebrate Bioassessments	11/1/2016: New listing, not started.	L
ME0103000305_322R01	Perkins Stream (Waterville)	Tributary to Messalonskee Stream	Periphyton (Aufwuchs) Indicator Bioassessments		L
ME0103000306_314R02	Cold Brook (Skowhegan)	Tributary to Wesserunsett Stream	Benthic-Macroinvertebrate Bioassessments (Streams)	11/20/2014: Needs more assessment.	2017 / L
ME0103000306_320R04	Mill Stream (Norridgewock)	Tributary to Kennebec River	Benthic-Macroinvertebrate Bioassessments (Streams)	11/20/2014: Do Mapshed analyses to aid in determination of source of impairment.	2017 / M
ME0103000306_338R_01	Kennebec R,	Main stem between Mill Str., Norridgewock, and Weston Dam	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0103000306_338R_04	Kennebec R,	Main stem, from Carrabassett R to Fairfield-Skowhegan boundary (excluding Mill Str., Norridgewock, to Weston Dam)	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0103000306_339R_01	Kennebec R,	Shawmut Dam	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0103000306_339R_02	Kennebec R,	Main stem, from Fairfield-Skowhegan boundary to Sebasticook R	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0103000307_330R	W Branch of Sebasticook R	Main stem, below Rt. 23 bridge in Hartland	Dioxin (including 2,3,7,8-TCDD)	TMDL not started	L

Assessment Unit ID	AU Name	Location Description	Cause	Project Status	TMDL Submittal Target Date/ Priority
ME0103000307_330R	W Branch of Sebasticook R	Main stem, below Rt. 23 bridge in Hartland	Polychlorinated biphenyls	10/29/2012: No current sources of contamination, remaining PCBs are legacy pollutants.	2020 / L
ME0103000308_325R01	East Branch Sebasticook River Corundel L to Sebasticook L	Corinna Superfund site	Dioxin (including 2,3,7,8-TCDD)	Legacy pollutant 5-D	L
ME0103000308_325R01	East Branch Sebasticook River Corundel L to Sebasticook L	Corinna Superfund site	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0103000308_331R	E Branch of Sebasticook R	Main stem, below Sebasticook Lake	Oxygen, Dissolved	11/7/2014: Eutrophic lake source. Total Phosphorus and CHL a levels in the lake have decreased in the past decade.	L
ME0103000308_331R	E Branch of Sebasticook R	Main stem, below Sebasticook Lake	Phosphorus (Total)		L
ME0103000308_331R	E Branch of Sebasticook R	Main stem, below Sebasticook Lake	Dioxin (including 2,3,7,8-TCDD)	Legacy pollutant 5-D	L
ME0103000308_331R	E Branch of Sebasticook R	Main stem, below Sebasticook Lake	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0103000308_331R01	Martin Stream (Dixmont)	Tributary to East Branch Sebasticook	Ammonia (Un-ionized)	11/1/2016: New listing, not started.	L
ME0103000308_331R01	Martin Stream (Dixmont)	Tributary to East Branch Sebasticook	Benthic-Macroinvertebrate Bioassessments		L
ME0103000308_331R01	Martin Stream (Dixmont)	Tributary to East Branch Sebasticook	Periphyton (Aufwuchs) Indicator Bioassessments		L
ME0103000308_331R02	Martin Stream (Dixmont)	Trib to East Br. Sebasticook R, below Mitchell Rd	Benthic-Macroinvertebrate Bioassessments	11/1/2016: New listing, not started.	L
ME0103000308_331R02	Martin Stream (Dixmont)	Trib to East Br. Sebasticook R, below Mitchell Rd	Periphyton (Aufwuchs) Indicator Bioassessments		L
ME0103000308_332R	Sebasticook R	Main stem, from E and W Branches to Burnham	Dioxin (including 2,3,7,8-TCDD)	Low priority	2020 / L

Assessment Unit ID	AU Name	Location Description	Cause	Project Status	TMDL Submittal Target Date/ Priority
		bridge, including Burnham impoundment			
ME0103000308_332R	Sebasticook R	Main stem, from E and W Branches to Burnham bridge, including Burnham impoundment	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0103000309_326R02	Halfmoon Stream (Knox, Thorndike)	From Montville-Knox townline to Rt 220 bridge in Thorndike	Periphyton (Aufwuchs) Indicator Bioassessments	Not started (new in 2014 cycle)	L
ME0103000309_326R03	Halfmoon Stream (Thorndike, Unity)	From Rt 220 bridge in Thorndike to confluence with Sandy Stream	Periphyton (Aufwuchs) Indicator Bioassessments	Not started (new in 2014 cycle)	L
ME0103000309_328R01	China Lake Outlet Stream (Vassalboro, Winslow)	Tributary to Sebasticook River (in Winslow)	Periphyton (Aufwuchs) Indicator Bioassessments	2/4/2015: Not started.	L
ME0103000309_332R	Sebasticook River	Main stem, from Burnham bridge to Kennebec R (excluding site of former Halifax Impd)	Dioxin (including 2,3,7,8-TCDD)	Legacy upstream sources (W. Br. Sebasticook) 5-D	L
ME0103000309_332R	Sebasticook River	Main stem, from Burnham bridge to Kennebec R (excluding site of former Halifax Impd)	Oxygen, Dissolved	10/19/2011: Impairment likely due to Benton impoundment; good candidate for monitoring to confirm or reject continued DO impairment. No recent monitoring data.	2018 / L
ME0103000309_332R	Sebasticook River	Main stem, from Burnham bridge to Kennebec R (excluding site of former Halifax Impd)	Polychlorinated biphenyls	Legacy upstream sources (W. Br. Sebasticook) 5-D	2020 / L
ME0103000309_332R01	Sebasticook River (site of former Halifax impoundment)	Tributary to Kennebec River	Dioxin (including 2,3,7,8-TCDD)	Low priority	L
ME0103000309_332R01	Sebasticook River (site of former Halifax impoundment)	Tributary to Kennebec River	Polychlorinated biphenyls	Legacy upstream sources (W. Br. Sebasticook) 5-D	2020 / L

Assessment Unit ID	AU Name	Location Description	Cause	Project Status	TMDL Submittal Target Date/ Priority
ME0103000311_334R04	Mill Stream (Winthrop)	Between Maranacook and Annabessacook Lakes	Benthic-Macroinvertebrate Bioassessments (Streams)	6/11/2012: TMDL monitoring in 2005 & 2010, EPA assistance monitoring 2010; biomonitoring in 2004; toxic spill probable source.	2017 / M
ME0103000311_334R04	Mill Stream (Winthrop)	Between Maranacook and Annabessacook Lakes	Cause Unknown		2017 / M
ME0103000311_334R05	Cobbosseecontee Stream (Gardiner)	Tributary to Kennebec River, from outlet of Pleasant Pond to Kennebec R.	Benthic-Macroinvertebrate Bioassessments (Streams)	11/4/2014: Not started.	L
ME0103000311_334R05	Cobbosseecontee Stream (Gardiner)	Tributary to Kennebec River, from outlet of Pleasant Pond to Kennebec R.	Periphyton (Aufwuchs) Indicator Bioassessments		L
ME0103000312_333R01_02	Bond Brook mainstem	From confluence of Spring and Tanning Brook to tidal influence	Periphyton (Aufwuchs) Indicator Bioassessments	6/6/2014: Not started.	M
ME0103000312_335R03	Meadow Brook (Farmingdale)	Tributary to Kennebec River	Benthic-Macroinvertebrate Bioassessments (Streams)	11/21/2014: No new data, probably due to habitat and flow, low priority for TMDL.	2018 / L
ME0103000312_339R_01	Kennebec R,	Main stem, from Sebasticook R to Augusta (Calumet Bridge)	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0103000312_340R_01	Kennebec R,	Main stem, from Augusta (Calumet Bridge) to Merrymeeting Bay (Chops)	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0103000312_427R	Merrymeeting Bay	including tidal portions of tributaries from the Androscoggin R to The Chops	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0103000324_333R_01	Riggs Brook (Augusta)	Augusta, including portions of tribs affected by watershed development	Benthic-Macroinvertebrate Bioassessments (Streams)	6/9/2014: Not started, needs more assessment of potential stressors and sources.	L
ME0103000324_333R_01	Riggs Brook (Augusta)	Augusta, including portions of tribs affected by	Periphyton (Aufwuchs) Indicator		L

Assessment Unit ID	AU Name	Location Description	Cause	Project Status	TMDL Submittal Target Date/ Priority
		watershed development	Bioassessments		
ME0103000324_333R_01	Riggs Brook (Augusta)	Augusta, including portions of tribs affected by watershed development	Phosphorus (Total)		L
ME0103000324_333R_02	Spring Brook (Augusta)	From Gov Hill fish hatchery to Mt Vernon Rd, Augusta	Benthic-Macroinvertebrate Bioassessments (Streams)	10/26/2012: Pursue permitting actions to improve conditions.	L
ME0103000324_333R_02	Spring Brook (Augusta)	From Gov Hill fish hatchery to Mt Vernon Rd, Augusta	Phosphorus (Total)		L
ME0104000201_421R	Androscoggin R	Main stem, from Maine-NH border to Wild R	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0104000202_421R	Androscoggin R	Main stem, from Wild R to Rumford Point	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0104000204_421R	Androscoggin R	Main stem, from Rumford Pt to Virginia Bridge	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0104000204_422R	Androscoggin R	Main stem, from Virginia Bridge to Webb R	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0104000205_410R01_02	Whitney Brook (Canton)	From Lake Anasagunticook Dam to Androscoggin River	Benthic-Macroinvertebrate Bioassessments (Streams)	11/21/2014: Not started.	L
ME0104000205_422R	Androscoggin R	Main stem, Webb R to Riley dam	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0104000206_423R	Androscoggin R	Main stem, from Riley Dam to Nezinscot R	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0104000206_423R01	Androscoggin R	Main stem, Livermore impoundment	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0104000208_413R01	Jepson Brook (Lewiston)	Tributary to Androscoggin River	Benthic-Macroinvertebrate Bioassessments (Streams)	6/11/2012: Develop TMDL as precursor to potential Use Attainability Analysis.	2018
ME0104000208_413R01	Jepson Brook (Lewiston)	Tributary to Androscoggin River	Habitat Assessment (Streams)		2018
ME0104000208_413R01	Jepson Brook (Lewiston)	Tributary to Androscoggin River	Oxygen, Dissolved		2018

Assessment Unit ID	AU Name	Location Description	Cause	Project Status	TMDL Submittal Target Date/ Priority
ME0104000208_413R03	*Stetson Brook (Lewiston)*	*Tributary to Androscoggin River*	*Oxygen, Dissolved*	*10/7/2016: DO impairment excluded from Statewide NPS TMDL (approved 8/9/2016); DEP expects to include this impairment in a future update to this TMDL.*	*2017*
ME0104000208_413R07	Gully Brook (Auburn)		Oxygen, Dissolved	5/29/2012: Mostly urban: include in future % Impervious Cover TMDL.	2017 / L
ME0104000208_424R	Androscoggin R,	Main stem, from confluence of Nezinscot R to confluence with Little Androscoggin R, except Gulf Island Pond	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0104000208_424R_01	Androscoggin R, GIP	Main stem, upstream of the Gulf Island Dam	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0104000210_418R01	Sabattus River between Sabattus P and Androscoggin R	From Sabattus Pond to limits of Lisbon urban area	Nutrient/Eutrophica-tion Biological Indicators	11/4/2014: Sabattus Pond eutrophic and source of SOD in river; lake TMDL complete 2004; slow recovery is expected.	2017 / L
ME0104000210_418R01	Sabattus River between Sabattus P and Androscoggin R	From Sabattus Pond to limits of Lisbon urban area	Oxygen, Dissolved		2017 / L
ME0104000210_418R02	*No Name Brook (Lewiston)*	*Tributary to Sabattus River*	*Oxygen, Dissolved*	*10/7/2016: DO impairment excluded from Statewide NPS TMDL (approved 8/9/2016); DEP expects to include this impairment in a future update to this TMDL.*	*2017*
ME0104000210_418R03	Sabattus River between Sabattus P and Androscoggin R	From limits of Lisbon urban area to Androscoggin R	Benthic-Macroinvertebrate Bioassessments (Streams)	11/4/2014: Effects from legacy pollutants, habitat and development as well as nutrients/DO on macroinvertebrates.	2017 / L
ME0104000210_418R03	Sabattus River between Sabattus P and Androscoggin R	From limits of Lisbon urban area to Androscoggin R	Nutrient/Eutrophica-tion Biological Indicators	11/4/2014: Sabattus Pond eutrophic and source of SOD in river; lake TMDL complete	2017 / L

Assessment Unit ID	AU Name	Location Description	Cause	Project Status	TMDL Submittal Target Date/ Priority
ME0104000210_418R03	Sabattus River between Sabattus P and Androscoggin R	From limits of Lisbon urban area to Androscoggin R	Oxygen, Dissolved	2004; slow recovery is expected.	2017 / L
ME0104000210_419R03	Unnamed Stream (Lewiston Municipal Landfill)	Biomon Sta 857 affected by Lewiston Municipal Landfill near Plourde Pky	Benthic-Macroinvertebrate Bioassessments (Streams)	11/21/2014: Not started.	L
ME0104000210_425R_01	Androscoggin R,	Main stem, from L Androscoggin R to Pejepscot Dam	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0104000210_425R_01_01	Androscoggin R,	Main stem, from Pejepscot Dam to Brunswick Dam	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0104000210_426R	Androscoggin R	Main stem, from Brunswick Dam to Brunswick-Bath boundary	Polychlorinated biphenyls	Legacy pollutant 5-D	2020 / L
ME0105000209_512R_02	McCoy Brook (Deblois)	Tributary to Narraguagus River	Benthic-Macroinvertebrate Bioassessments (Streams)	10/29/2014: Need new data.	L
ME0105000209_512R_02	McCoy Brook (Deblois)	Tributary to Narraguagus River	pH		L
ME0105000209_512R_03	Great Falls Branch, Schoodic Stream (Deblois)	Tributary to Narraguagus River	Benthic-Macroinvertebrate Bioassessments (Streams)	5/27/2014: Need new data.	L
ME0105000305_528R02	West Branch Sheepscot River	Below Halls Corner, Rt 17/32	Periphyton (Aufwuchs) Indicator Bioassessments	6/13/2014: Algae (periphyton) met Class A in 2012 and 2013, TMDL delayed.	2018 / M
ME0106000102_603R06	Cole Brook (Gray)	Tributary to Collyer Brook and Royal River	Benthic-Macroinvertebrate Bioassessments (Streams)	6/13/2014: Need new data.	M
ME0106000103_607R01	Black Brook (Windham)	Tributary to Presumpscot River	Escherichia coli	10/7/2016: Bacteria TMDL in development (for inclusion in future update to statewide bacteria TMDL, approved	2017 / H

Assessment Unit ID	AU Name	Location Description	Cause	Project Status	TMDL Submittal Target Date/ Priority
				9/28/09).	
ME0106000103_607R01	*Black Brook (Windham)*	*Tributary to Presumpscot River*	*Oxygen, Dissolved*	*10/7/2016: DO impairment excluded from Statewide NPS TMDL (approved 8/9/2016); DEP expects to include this impairment in a future update to this TMDL.*	*2017*
ME0106000103_607R03	*Colley Wright Brook (Windham)*	*Tributary to Presumpscot River*	*Oxygen, Dissolved*	*10/7/2016: DO impairment excluded from Statewide NPS TMDL (approved 8/9/2016); DEP expects to include this impairment in a future update to this TMDL.*	*2017*
ME0106000103_607R07	*Inkhorn Brook (Westbrook)*	*Tributary to Presumpscot River*	*Oxygen, Dissolved*	*10/7/2016: DO impairment excluded from Statewide NPS TMDL (approved 8/9/2016); DEP expects to include this impairment in a future update to this TMDL.*	*2017*
ME0106000103_607R08	*Mosher Brook (Gorham)*	*Tributary to Presumpscot River*	*Oxygen, Dissolved*	*10/7/2016: DO impairment excluded from Statewide NPS TMDL (approved 8/9/2016); DEP expects to include this impairment in a future update to this TMDL.*	*2017*
ME0106000103_607R09	*Otter Brook (Windham)*	*Tributary to Presumpscot River*	*Oxygen, Dissolved*	*10/7/2016: DO impairment excluded from Statewide NPS TMDL (approved 8/9/2016); DEP expects to include this impairment in a future update to this TMDL.*	*2017*
ME0106000103_607R12	*Pleasant River (Windham)*	*Mainstem of Pleasant River from Thayer Brook to confluence with Presumpscot R*	*Oxygen, Dissolved*	*10/7/2016: DO impairment excluded from Statewide NPS TMDL (approved 8/9/2016); DEP expects to include this impairment in a future update to this TMDL.*	*2017*

Assessment Unit ID	AU Name	Location Description	Cause	Project Status	TMDL Submittal Target Date/ Priority
ME0106000105_610R02	Clark Brook (Westbrook)	Tributary to Stroudwater River	Oxygen, Dissolved	11/20/2014: Needs more assessment.	2017 / L
ME0106000105_610R04	Stroudwater River (Portland, Westbrook)	Tributary to Fore River and Casco Bay	Oxygen, Dissolved	2/26/2015: Monitoring for DO in 2013 showed criteria attainment. TMDL deferred.	L
ME0106000105_610R07	Red Brook (Scarborough, S Portland)	Tributary to Long Creek	Polychlorinated biphenyls	10/29/2012: No current sources of contamination, remaining PCBs are legacy pollutants	2020 / L
ME0106000105_610R08	Fall Bk (Portland)	Tributary to Back Cove and Casco Bay	Habitat Assessment (Streams)	6/11/2012: Develop TMDL as precursor to potential Use Attainability Analysis	L
ME0106000106_602R03	Concord Gully (Freeport)	Tributary to Harraseeket River	Escherichia coli	10/7/2016: Bacteria TMDL in development (for inclusion in future update to statewide bacteria TMDL, approved 9/28/09).	2016 / H
ME0106000210_615R01	Little Ossipee R	Segment from Lake Arrowhead (Ledgemere) Dam to Saco River	Benthic-Macroinvertebrate Bioassessments (Streams)	5/31/2012: Impairment likely due to upstream impoundment.	L
ME0106000210_615R01	Little Ossipee R	Segment from Lake Arrowhead (Ledgemere) Dam to Saco River	Oxygen, Dissolved		L
ME0106000210_615R02	Brown Brook (Limerick)	Sokokis Lake to Lake Arrowhead	Benthic-Macroinvertebrate Bioassessments (Streams)	11/20/2014: Not started.	2017 / M
ME0106000210_615R02	Brown Brook (Limerick)	Sokokis Lake to Lake Arrowhead	Habitat Assessment (Streams)		2017 / M
ME0106000211_616R	*Wales Pond Brook (Hollis)*	*Tributary to Saco River*	*Benthic-Macroinvertebrate Bioassessments (Streams)*	*11/4/2015: Permit was renewed in June 2015. Segment is candidate for moving to Category 4-B in 2016 cycle.*	*H*
ME0106000303_624R01	Stevens Brook (Wells, Ogunquit)	Only portion flowing in westerly-to-easterly	Benthic-Macroinvertebrate	5/27/2014: Mapshed and watershed survey complete.	L

Assessment Unit ID	AU Name	Location Description	Cause	Project Status	TMDL Submittal Target Date/ Priority
		direction, to start of wetland section	Bioassessments (Streams)		
ME0106000304_625R01	*Adams Brook (Berwick)*	*Tributary to Lovers Brook and Great Works River*	*Benthic-Macroinvertebrate Bioassessments (Streams)*	*10/7/2016: Aquatic life use impairment excluded from Statewide NPS TMDL (approved 8/9/2016); DEP expects to include this impairment in a future update to this TMDL.*	*2017*
ME0106000304_625R03	West Brook (N. Berwick)	From 0.1 miles above Bragdon Rd to confluence with Great Works River	1,1-Dichloroethane	5/29/2012: Remediation of original contaminant source has occurred; attenuation of contaminant concentration expected over time; monitoring continues.	2020 / L
ME0106000304_625R03	West Brook (N. Berwick)	From 0.1 miles above Bragdon Rd to confluence with Great Works River	1,2-Dichloroethane		2020 / L
ME0106000305_630R01	Salmon Falls R	Main stem, from Route 9 to tidewater	Dioxin (including 2,3,7,8-TCDD)	Legacy pollutant 5-D	2020 / L
ME0106000305_630R01	Salmon Falls R	Main stem, from Route 9 to tidewater	Polychlorinated biphenyls		2020 / L

Table 8-14 Lakes/Ponds TMDL Current Project Update

Waters that are included in Maine's 303(d) Vision are indicated in italics

HUC	Lake	Lake ID	Cause	Project Status	Priority	TMDL Submittal Target Date
ME0103000310	*Great Pond*	*5274*	*Total phosphorus; Secchi disk transp.*	*Included in TMDL for downstream lake (Long P, TMDL 2008) thus low priority*	*2*	*2020*
ME0103000311	*Cochnewagon Pond*	*3814*	*Total phosphorus; Secchi disk transp.*	*Listed this cycle*	*1*	*2020*

Table 8-15 Wetland TMDL Current Project Update

Assessment Unit ID	AU Name	Location Description	Cause	Project Status	TMDL Submittal Target Date/ Priority
ME0101000501_149R_W200	Tributary wetlands to Prestile Stream above dam in Mars Hill	Includes site W-200	DDT	5-D listed for legacy pollutant	L / 2020
ME0101000501_149R01_W203	Prestile Stream wetlands above dam in Mars Hill	Including sites W-203 and W-204	DDT	5-D listed for legacy pollutant	L / 2020
ME0103000308_325R01_W080	East Branch Sebasticook River Wetland	Between Corundel Pond and Sebasticook Lake, wetland site W-080	Dioxin (including 2,3,7,8-TCDD)	5-D listed for legacy pollutant	L
ME0103000308_325R01_W080	East Branch Sebasticook River Wetland	Between Corundel Pond and Sebasticook Lake, wetland site W-080	Polychlorinated biphenyls	5-D listed for legacy pollutant	L / 2020
ME0104000210_418R01_W188	Sabattus River Wetland, between Sabattus P and Rt 126	Wetland site W-188, between Sabattus Pond and Rt 126 in Sabattus	Benthic-Macroinvertebrate Bioassessments	5/1/12: Sabattus Pond eutrophic and source of SOD in river; lake TMDL complete 2004; slow recovery expected. Updated, revised modeling report completed 2006	L / 2015
ME0106000302_628R01_02_W054	Unnamed tributary wetland to Mousam River, Sanford	Wetland Station W-054	Benthic - Macroinvertebrate Bioassessments (Wetlands)	Not started	L

Table 8-16 Estuarine/Marine Current TMDL Project Update

Waters that are included in Maine's 303(d) Vision are indicated in italics

Waterbody ID	Segment Description	Cause	Project Status	TMDL Submittal Target Date/Priority
812-2	Piscataqua R. Estuary (Eliot, Kittery)	Nutrient/ Eutrophication Biological Indicators	TMDL dictated by NH licensing and ME nitrogen criteria development processes.	L
812-3	Portsmouth Harbor (south and west of Gerrish Island)	Unknown	TMDL contingent on identification of impairment cause(s); data collection planned for summer 2015	L
811-9	*Mousam River*	*Dissolved Oxygen*	*Modeling report complete. Monitoring in upper portions of comparable estuaries without point sources suggests natural causes of low DO. Additional data collection planned for 2017.*	*2016*
811-8	Saco R. Estuary	Toxicity, Copper	Further data collection required	L
804-7	Fore R. Estuary	Marine life, Toxics	Further data collection required	M
802-25	*Royal R. Estuary*	*Dissolved Oxygen*	*Monitoring in comparable estuaries without point sources suggests natural causes of low DO. Additional data collection planned for 2017.*	*2016*

As indicated in Notes prior to Category 5-B-1(a-c) tables, a major revision to the 2009 Statewide Bacteria TMDL is anticipated based on the updating and relocation of marine/estuarine water segments in this report that pertain to shellfish harvest closure areas. As soon as permittable, the revision will encompass all current closure areas pertaining to the most recent report and DMR closure information.

CHAPTER 9 ACCESSING AND MANAGING DATA USED IN MAKING DECISIONS ON STATUS OF WATERS

MAINE DEP QUALITY MANAGEMENT SYSTEM

Contact: William Longfellow, DEP Quality Assurance Manager (QAM), Office of the Commissioner

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Related Website: www.maine.gov/dep/about/planning.html

Data used in making decisions on the status of Maine waters are collected, analyzed, and evaluated according to the standards contained in the Department's annual Quality Management Plan (QMP). The QMP documents DEP's Quality Management System (QMS) which applies to all program areas and activities in the DEP. The QMS uses a rigorous internal second-party audit approach to managing for quality, which includes corrective action plans and program-level Quality Assurance/Quality Control (QA/QC) activities. The latter are documented in Standard Operating Procedures (SOPs) developed and implemented for each program area. SOPs are included in all Quality Assurance Project/Program Plans (QAPPs) applicable to environmental data gathering and analysis. SOPs are continually updated and managed. Maine DEP has received delegated authority from EPA Region 1 (Memorandum of Understanding 7/24/09) to review and approve most QAPPs related to environmental data used in making decisions on status of waters. Certain other QAPPs related to water quality describe quality assurance activities for projects outside DEP's span of control, including projects carried out by EPA-Region 1 in Maine. Since 2003, DEP has used its delegated authority from EPA-Region 1 to review and approve several QAPPs for water quality sampling and monitoring activities carried out by non-DEP organizations. These have included Presumpscot River Watch, Friends of Casco Bay, Sheepscot Valley Conservation Association, Georges River Tidewater Association, the Spruce Creek Water Quality Monitoring Program, Field Geology Services, the Cumberland County Soil and Water Conservation District, and a number of towns.

ENVIRONMENTAL AND GEOGRAPHIC ANALYSIS DATABASE (EGAD)

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Related Websites: www.maine.gov/dep/maps-data/egad/index.html and

www.maine.gov/dep/gis/datamaps/index.htm (for access to DEP data via Google Earth or ArcGIS Online projects on the internet)

The DEP Environmental and Geographic Analysis Database (EGAD) stores site and water quality information in a relational database using Oracle technology, and spatial locations using Environmental Systems Research Institute (ESRI) Spatial Database Engine (SDE) software. The database includes data from groundwater and surface water samples as well as sediment and biological samples and other pertinent information. To date (August 2014), data from the following DEP programs involved in monitoring activities has been incorporated: Environmental Geology, Biological

Monitoring, SWAT (Surface Water Ambient Toxics; freshwater and marine), Dioxin Monitoring, Rivers-Stream TMDL, Rivers-Modeling, Rivers-Salmon, Aquaculture, Volunteer River Monitoring Program (VRMP), and Maine Healthy Beaches; data from the Lakes Assessment section has been partly incorporated. There are a total of 11.0 million samples from a total of 26,570 sampling sites in the database, each of which has one to many results records; ~3.1 million of these samples are used in water quality assessments in general. For each year covered by this report (2011 and 2012), an average of 353 groundwater sites and 603 surface water sites were added to the database.

Data collected by DEP staff or submitted by contractors or laboratories are loaded to EGAD using a standard EDD (Electronic Data Deliverable) which offers automated quality control. The EGAD system allows complete integration of all data via spatial relationships. Database functionalities exist to assess trends in water quality information, satisfy requests for data, assist in answering inquiries, provide automated analysis, and enable customized reporting and map-making. The database allows rapid access to information, which is critical for emergency response to hazardous materials spills. DEP staff can also geo-locate, browse and access all EGAD data together with related site and monitoring information on the internet via several Google Earth or ArcGIS Online projects. The ability to access a large variety of data quickly, easily and in a number of different formats allows staff to identify resources that require protection, such as lakes, streams, or municipal or private wells, and to target monitoring efforts.

Water quality assessment results are stored in Maine's version of the EPA Assessment Database (ADB) and a link to an ArcMap project shows geo-referenced assessment units and the water quality geodatabase. DEP envisions that all raw water quality data in support of the Integrated Report will ultimately be stored in EGAD. The GIS-facilitated link to ADB assessments will ultimately allow for waterbody assessments via a fully geo-referenced Maine ADB.

Since 2008, Maine water quality data stored in EGAD have been exported to national EPA databases (STORET, PRAWN) via the Water Quality Exchange (WQX) system; to date data from the SWAT (freshwater and marine), River-Stream TMDL, Rivers-Modeling, and Maine Healthy Beaches programs have been transferred to WQX. Like DEP staff, the public can access Maine surface and groundwater data as well as related site and monitoring information data via Google Earth.

WATER QUALITY MONITORING AND REPORTING UTILIZING GIS AND THE NATIONAL HYDROGRAPHY DATASET

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The BWQ is highly active in designing, creating, and maintaining hydrologic and terrestrial spatial data for use in water quality decision-making programs for the State of Maine. Since 2011, the Bureau's objective has been to establish and maintain the National Hydrography Dataset (NHD) as Maine's primary surface water dataset. The BWQ has a staff person who serves as one of the State's two NHD data stewards. The data stewards are responsible for identifying needed corrections to the NHD

layers and incorporating them into the national dataset using GIS tools. Working collaboratively with additional DEP GIS staff, BWQ is are incorporating water quality information into a NHD-compatible format. By using the NHD with NHD-compatible data it is possible to study relationships between surface waters and other features within the linked datasets. To promote use of the NHD, staff has created on-line tutorials for both internal and external users of the NHD (www.maine.gov/megis/pdfs/nhd_training_session.pdf).

The NHD and all supporting spatial data sets regarding water quality are housed at the Maine Office of GIS (MEGIS) for efficient on-line access through the MEGIS Internet Data Catalog (megis.maine.gov/catalog). The Catalog is provided at no cost to users and is supported by Maine's Legislative initiative (Chapter 649, L.D. 2116, "*An Act to Establish the Maine Library of Geographic Information*"). The initiative established data custodians within Departments to organize, catalog, and provide access to public geographic information for all levels of government and for the public. The DEP and BWQ are responsible for disseminating spatial components of water quality information and analysis activities.

These programs will ensure easy access and retrieval of water quality information for DEP users as well as State and national users of Maine's GIS water quality information.

LISTINGS ON INDIVIDUAL WATERS

See Appendices II through V (separate document) for listing information on specific waters. Appendices include assessments for rivers/streams, lakes, wetlands and estuarine/marine waters.