

August 28, 2009

Laurie Burt, Commissioner
Department of Environmental Protection
1 Winter Street Boston, MA 02108

Re: Approval of the Pathogen TMDL for the Three Bays Watershed

Dear Commissioner Burt:

Thank you for submitting the Final Pathogen TMDL for the Three Bays Watershed on July 7, 2009. We appreciate your efforts and involvement with our office to finalize this TMDL. We believe this TMDL combined with the other pathogen watershed TMDLs in various stages of development within the Commonwealth will be a catalyst in the restoration of this and other watersheds.

The U.S. Environmental Protection Agency (EPA) has reviewed the document entitled "Final Pathogen TMDL for the Three Bays Watershed, July 2009 (Control Number 309.0) and it is my pleasure to approve the four TMDLs. EPA has determined, as set forth in the enclosed review document, that these TMDLs meet the requirements of Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 Code of Federal Regulations (CFR) Part 130.

We commend your efforts again to develop "pollution prevention" TMDLs on water body segments not currently impaired. This approach can encourage the maintenance and protection of existing water quality and help prevent further degradation of water bodies that are downstream or linked to other water body segments. Although EPA does not approve pollution prevention TMDLs, EPA acknowledges the establishment of these TMDLs consistent with developing information as set forth in CWA Section 303(d)(3).

Once again, please pass on to your staff in the Division of Watershed Management our appreciation for their excellent work in developing these TMDLs.

Sincerely,

/s/

Ken Moraff, Acting Director
Office of Ecosystem Protection

Enclosure

cc:
Glenn Haas, MassDEP
Rick Dunn, MassDEP
Steve Silva, EPA
Steven Winnett, EPA
Mary Garren, EPA

EPA NEW ENGLAND'S TMDL REVIEW

TMDL: **Three Bays Watershed Pathogen TMDL**

Cotuit Bay	MA96-63
Seapuit River	MA96-64
North Bay	MA96-66
Prince Cove	MA96-07
West Bay	MA96-65*

Location: Town of Barnstable, Massachusetts.

STATUS: Final

IMPAIRMENT/POLLUTANT: These four water body segments are not meeting criteria for fecal coliform bacteria (pathogens) and are not supporting the designated uses of shellfishing, fishing, and contact recreation.*

BACKGROUND: Pathogen TMDL for the Three Bays watershed, August 2009. The documents submitted by MassDEP as part of the record for this TMDL include:

- Final Pathogen TMDL for the Three Bays watershed, August 4, 2009, (Report Number MA96-TMDL 19, Control Number: CN: 309.0);
- Public Meeting Information and Response to Comments, Appendix A;
- The Massachusetts Estuaries Project Basis for Development of Total Maximum Daily Loads of Bacteria for Prince Cove/Three Bays Watershed, Executive Summary and Section VI – Conclusions and Recommendations, Appendix B;
- Lower Charles River Illicit Discharge Detection & Elimination (IDDE) Protocol Guidance for Consideration – November 2004;
- Mitigation Measures to Address Pathogen Pollution in Surface Waters: A TMDL Implementation Guidance Manual for Massachusetts.

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

REVIEWER: Steven Winnett, telephone number 617.918.1687, E-mail: winnett.steven@epa.gov

*Note that West Bay is not listed for pathogen impairment. MassDEP is including it in this TMDL as it is a part of the Three Bays Estuary, and is establishing a pollution prevention TMDL for it as part of this action.

REVIEW ELEMENTS OF TMDLs

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

Introduction

The Three Bays Watershed Pathogen TMDL is designed to support reduction of waterborne disease-causing organisms, known as pathogens (including bacteria), to reduce public health risk. Waterborne pathogens enter surface waters from a variety of sources including sewage, the feces of warm-blooded wildlife such as pets, geese, and gulls, illicit discharges of boat wastes, and stormwater runoff. These pathogens can pose a risk to human health due to gastrointestinal illness through exposure via ingestion and contact with recreational waters, ingestion of drinking water, and consumption of filter-feeding shellfish.

The TMDL for the Three Bays watershed includes four water bodies that are impaired for pathogens. The document also contains the equivalent of a "pollution prevention" TMDL for one water body, West Bay, which is currently not impaired for pathogens. The approach outlined in this pathogen TMDL includes two types of daily TMDL targets:

- 1) Concentration-based targets, expressed as the number of indicator bacteria organisms per 100 ml, based on the Water Quality Standards (WQS) for each discharge source by category (e.g., storm water, boats, etc.); and
- 2) Maximum loads, expressed as the number of indicator bacteria organisms per day, for each embayment segment. The maximum loads are expressed as daily loads based on the amount of storm water flow from impervious surfaces contributing to the watershed.

The TMDL includes: a) monitoring data related to water quality impairments in each embayment (i.e., the TMDL report provides specific data describing the range of pathogen concentrations in each water body), b) an illicit discharge detection and elimination protocol guidance document, c) a supplementary TMDL Implementation Guidance Manual that suggests ways in which the TMDL can be implemented, and d) selected parts of a Massachusetts Estuaries Project document on the development of TMDLs for these water bodies..

MassDEP provides TMDL targets as concentrations (Section and Table 5-1), and daily mass load TMDL targets (Section and Table 5-2), but believes that concentration based targets are most useful for guiding implementation. Loading capacities based on concentration are advantageous for several reasons. In particular, a concentration limit is more readily understandable to the public and will allow interested citizens and/or watershed groups to more easily determine whether any particular source is exceeding its allocation. This is particularly true for storm water sources because the link between pathogen discharges and rainfall creates a complex relationship between loadings and flow conditions.

Finally, while not required as part of the TMDL approval process, MassDEP, in the document, “Mitigation Measures to Address Pathogen Pollution in Surface Waters: A TMDL Implementation Guidance Manual for Massachusetts” which accompanies the TMDL, presents a broad array of implementation tools to address pathogen control. As discussed more fully below, Massachusetts has a variety of regulatory requirements to mitigate pathogens within the Commonwealth.

1. Description of Water Bodies, Pollutant of Concern, Pollutant Sources and Priority Ranking

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

The TMDL document describes the Three Bays watershed and specifically the water body segments identified as not attaining designated uses (primarily contact recreation and shellfishing) due to exceedances of Massachusetts’ WQS for pathogens. The document identifies a total of four impaired segments included on Massachusetts’ 2006 Integrated 303(d) list for pathogens. Mass DEP has established a pollution prevention TMDL for an adjacent water body which is currently not impaired.

The TMDL document identifies the non-point and point sources of pathogens that are present and contribute to exceedances of Massachusetts’ WQS. As set forth in Sections 4 and 5, the TMDL document articulates both general categories and specific sources of pathogen contributions from the range of possible pathogen source categories. General sources identified include storm water run-off, illicit discharges from sewage system and boats, failing septic systems, and wildlife, including birds. On a broader scale, MassDEP has determined that all pathogen impaired segments in the Commonwealth are a high priority (see Massachusetts Integrated List of Waters at: <http://www.mass.gov/dep/water/priorities/priorities.htm>). Approximately 24% of the Commonwealth’s assessed waters are impaired for pathogens.

Sources of data collected and highlighted by MassDEP in the TMDL assist the public in understanding the sources of pathogen contamination in the Three Bays watershed. Ambient data collected during both dry and wet weather conditions provide an insight into the overall magnitude of sources contributing to the impairments in the Three Bays watershed, and ranges of pathogens present within each water body segment. Since MassDEP divides the water bodies within the watershed into small, manageable segments, the linkage of the sources of pathogens to the impairment within each water body segment is more apparent because of the association of

landuse and the types of sources of pathogens. The assessments and monitoring that occur in these spatially-refined water body segments allow for a high degree of association with the sources of pollution and their ultimate remediation.

Assessment:

EPA concurs with MassDEP's determination to address pathogen-impaired waters in the Three Bays watershed as a high priority, given the growing use of the area for recreation and shellfishing. EPA concludes that the Three Bays watershed TMDL document adequately characterizes the nature of the pathogen impairments and causes by summarizing ambient pathogen data. MassDEP has relied on the best available information, including three sets of ambient monitoring data collected during both dry and wet weather, to characterize the source categories. EPA believes that MassDEP has consequently, appropriately documented the extent of the impairments due to pathogen contamination, as well as the types of sources that are likely to be present that are in need of abatement (see Sections 4 and 6 of the TMDL).

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

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

The segments of the Three Bays watershed included in this TMDL are Class SA, suitable for shellfish harvesting. The Massachusetts Surface Water Quality Standards include water quality criteria for fecal coliform, E. coli, total coliform and enterococci as indicator organisms of potential harmful pathogens for fresh water and fecal coliform and enterococci for marine waters. The TMDL document explains the use of the different types of indicator bacteria (Section 1.1), and presents the applicable Massachusetts WQS for these TMDLS and the associated designated uses of the water bodies (Section 3.0).

Section 4.0 of the TMDL document describes each of the four impaired water segments of the Three Bays watershed, including a summary of data, sources of pathogens when available, and other characteristics.

The EPA-approved numeric water quality criteria for each segment are the targets upon which both the daily concentration and load TMDL targets of the TMDL are based.

Assessment:

EPA concludes that MassDEP has properly described and interpreted the applicable water quality standards to set the TMDL targets as indicated in Section 3.0 of the TMDL document,

and has presented the designated uses of the water bodies. Section 4.0 describes each water body segment, including a summary of data, sources of pathogens where available, and other characteristics. MassDEP is directly applying the numeric criteria in its WQS to derive the TMDL targets.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

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

In many circumstances, a critical condition must be described and related to physical conditions in the water body as part of the analysis of loading capacity (40 C.F.R. § 130.7(c)(1)). The critical condition can be thought of as the "worst case" scenario of environmental conditions in the water body in which the loading expressed in the TMDL for the pollutant of concern will continue to meet water quality standards. Critical conditions are the combination of environmental factors (e.g., flow, temperature, etc.) that results in attaining and maintaining the water quality criterion and has an acceptably low frequency of occurrence. Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards.

The TMDL expresses the loading capacity as concentration targets and as daily loadings. Specifically, for the final TMDL, MassDEP set daily concentration TMDL (WLA/LA) targets for each of the discharge sources by category (i.e., permitted stormwater discharges, nonpoint source storm water runoff, etc). MassDEP recommends that the concentration targets be used as the primary guide for implementation. Second, maximum daily loads were developed as a function of run-off volume and the water quality criteria for each segment. Run-off volume is calculated as a function of the observed long-term precipitation on Cape Cod and the estimated average run-off associated within 200 feet from each embayment (see Section 5.2 of the TMDL document for a more detailed description).

1) MassDEP chose to express the loading capacities in terms of concentrations (Table 5-1) set equal to the WQS. MassDEP believes that expressing a loading capacity for bacteria in terms of concentrations set equal to the Commonwealth's adopted criteria provides the clearest and most understandable expression of water quality goals to the public and to groups that conduct water quality monitoring. Specific water body segment data are provided that indicate the range in magnitude of the pathogen concentrations for each impaired segment. In the Three Bays watershed, storm water run-off, illicit connections, failing septic systems, wildlife, and boat discharges are significant causes of pathogen criteria water quality impairment.

2) MassDEP also expressed the loading capacity for the bays in terms of maximum daily loads based on the product of runoff volume and the applicable State Water Quality Standard for pathogens (see Table 5-2 of the TMDL document). WLAs for each embayment segment were

calculated based on the amount of impervious area within 200 feet of each water body and are provided in Table 5-2. MassDEP believes that “expressing the bacteria TMDL in terms of daily loads is difficult to interpret given the very high numbers of indicator bacteria and the magnitude of the allowable load which is dependent on flow conditions. Therefore the magnitude of the bacteria load that is allowable with the water quality standards will vary as the flow rates change. For example, a very high number of indicator bacteria are allowable if the volume of water that transports the bacteria is also high provided water quality standards are still met. Conversely, a relatively low number of bacteria may exceed the water quality standards if flow rates are low.”

As stated above, MassDEP believes the concentration targets are most useful for evaluating whether a particular source is exceeding its allocation because it does not require complex simultaneous flow measurement. The mass loadings for each water body segment provide information on the degree of relative assimilative capacity available in each water body and identify the loads necessary to meet quality standards

Assessment:

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

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

The daily maximum loads were calculated by multiplying the concentration criterion by storm water run-off volume to calculate a daily mass loading. The loading capacity expressed in this way is mathematically derived to assure that the sum of the loads to the receiving water from runoff will result in a concentration at the water quality standard.

In sum, the above loading capacity targets are directly linked to the Commonwealth’s WQS’s pathogen criteria to achieve the designated use of the water bodies covered by this TMDL.

4. Load Allocations (LAs)

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

separate natural background from nonpoint sources, load allocations should be described separately for background and for nonpoint sources.

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

The TMDL sets the concentration-based target load allocations for non-point sources of stormwater runoff equal to the applicable water quality standard of the receiving water, and to zero for those prohibited sources (e.g., failing septic systems, and waterfowl and wildlife) (Table 5-1). The difference between the LAs and WLAs for stormwater (discussed in the next Section) is whether the stormwater discharge is of a point source or non-point source nature, and whether it is from an identifiable source (illicit discharges and boats). Despite providing a concentration target for nonpoint source runoff to the bays, MassDEP expects there to be no such runoff, for the reasons expressed below. Consequently, MassDEP has assigned no load allocation to these currently listed water bodies, nor do they anticipate doing so for future listed segments in the Three Bays watershed.

In addition, maximum daily loads were calculated as a function of the observed long-term precipitation on Cape Cod, the estimated average run-off associated with the area of impervious surfaces within 200 feet from each embayment and the water quality criteria for each segment (see Section 5.2 of the TMDL document for a more detailed description). However, due to estimated recharge and evaporation rates, and the coarse sandy soil, runoff from the pervious areas within the 200 foot buffer area adjacent to each impaired bay was assumed to be negligible. Hence, the LAs for each segment are set to zero.

Assessment:

As discussed in Section 5 of the TMDL, MassDEP used the applicable numeric water quality criteria directly related to the use impairment which the TMDL is designed to address to develop the concentration-based load allocation targets, although there is likely to be no such runoff. The aggregate daily load LA targets are derived from the applicable criteria, flow and land cover, which in these TMDLs indicates LAs equal to zero. EPA concludes that load allocations are adequately specified in the TMDL at levels necessary to attain and maintain WQS.

5. Wasteload Allocations (WLAs)

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

In preparing the wasteload allocations, it is not necessary that each individual point source be assigned a portion of the allocation of pollutant loading capacity. When the source is a minor discharger of the pollutant of concern or if

the source is contained within an aggregated general permit, an aggregated WLA can be assigned to the group of facilities. But it is necessary to allocate the loading capacity among individual point sources as necessary to meet the water quality standard.

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

Point source discharges subject to the NPDES permit program must be addressed by the wasteload allocation component of a TMDL, as required by 40 C.F.R. § 130.2(h). MassDEP has established WLA targets for concentration (colonies/100ml) by discharge source category (Table 5-1). Because sufficient information to separate permitted and non-permitted point sources of stormwater do not exist, MassDEP has included both in the WLA. Note that this approach does not affect the regulation of storm water that is subject to Phases I or II of EPA's storm water program. The WLAs for non-storm water sources (e.g., boats and illicit discharges) are set at zero as these sources are illegal and the Commonwealth's goal is complete elimination. There are no NPDES-regulated wastewater treatment plant discharges in the Three Bays watershed.

In addition to the concentration targets, the TMDL includes maximum daily loads for each impaired water body. They are calculated as a function of the applicable WQs and runoff volume, which is calculated as a function of the amount of impervious area within a 200 foot buffer adjacent to the impaired water body (Section 5.2). Given the porous nature of the soils, and the resulting infiltration, recharge, and evapotranspiration rates, these surfaces are most likely to discharge to a storm sewer system.

Storm water discharges are less amenable to individual wasteload allocations. In recognition of this fact, EPA's November 22, 2002 guidance entitled "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs," provides that it is reasonable to express allocations for NPDES-regulated storm water discharges from multiple point sources as a single categorical or aggregate wasteload allocation when data and information are insufficient to assign each source or outfall individual WLAs. Consequently, MassDEP established concentration (colonies/100ml) TMDL targets for each individual discharge and daily loads (colonies/day) on an aggregated basis by segment because of insufficient flow data on each storm water source outfall.

MassDEP believes the concentration targets are most useful for guiding implementation because the concentration targets are independent of storm water flow volume.

Assessment:

MassDEP established concentration-based WLAs to each individual discharge by applying the numeric criteria directly to each applicable discharge source category, which in these TMDLs is point sources of stormwater runoff (both regulated and unregulated).

Aggregate mass WLAs were established for the storm water sources because it is impossible to determine with any precision or certainty the actual and projected loadings for individual discharges or groups of discharges. MassDEP derived aggregate storm water daily loading

targets for each embayment as a function of impervious cover within a set distance from the impaired water bodies. EPA's November 22, 2002 TMDL guidance suggests that it is acceptable in such cases to allocate storm water by gross allotments.

EPA concludes that the wasteload allocations are adequately specified in the TMDL at levels necessary to attain and maintain WQS.

6. Margin of Safety (MOS)

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

The TMDL provides for an implicit margin of safety (TMDL report Section 5.3). The TMDL sets the concentration-based target loading capacity, load allocations, and wasteload allocations equal to either the applicable water quality standard of the receiving water, or zero if the sources are prohibited. The daily load targets are calculated based on the applicable water quality standards for each water body. Therefore, there is a high level of confidence that the TMDLs are established at levels that are consistent with the WQS. In addition, the TMDLs assume criteria will be met at the end of pipe and allow for no dilution, providing a further margin of safety. Finally, in establishing the concentration WLAs and LAs, the approach used by MassDEP does not rely on in-stream processes such as bacteria die-off and settling which are known to reduce in-stream bacteria concentrations.

Assessment:

EPA concludes that the approach used in developing the TMDLs provide for an adequate implicit MOS. Setting the concentration TMDL targets at the water quality criteria with no allowance for in-stream bacteria die-off and settling, or for dilution between the end of pipe and the receiving waters, provides an implicit margin of safety. The daily load TMDL expressions are derived from the same water quality criteria and concentration TMDL targets multiplied by the appropriate flow factor to obtain a mass TMDL expression with the same implicit MOS.

7. Seasonal Variation

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

The TMDLs are protective throughout the year as they are based on the Massachusetts water quality standards, which are independent of season.

Assessment:

The pathogen TMDLs apply over the entire year, based on the Massachusetts water quality standards for pathogens, which are independent of season or climatic conditions. Therefore, the TMDL adequately accounts for all seasons. EPA concludes that the TMDL documents have adequately addressed seasonal variability.

8. Monitoring Plan for TMDLs

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

The pathogen TMDL for the Three Bays watershed is not a phased TMDL, but the document includes a description of a monitoring plan designed to measure attainment of WQS.

The TMDL document describes the Massachusetts Division of Fisheries shellfish monitoring program, which includes annual fecal coliform water quality monitoring, in addition to surveys and evaluations at other time intervals. The companion TMDL Implementation Guidance Manual document describes post-TMDL monitoring activities including various community efforts and MassDEP's commitment for monitoring every five years. The monitoring plan is designed to identify and eliminate specific sources and track improvements in water quality. In addition, the TMDL document recommends additional monitoring that should be conducted.

Assessment:

EPA concludes that the anticipated monitoring by and in cooperation with MassDEP is sufficient to evaluate the adequacy of progress toward attainment of WQS, although not a required element of EPA's TMDL approval process.

9. Implementation Plans

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

The implementation plan set out in the Three Bays Watershed Pathogen TMDL identifies the impaired water body segments. *"Mitigation Measures to Address Pathogen Pollution in Surface Waters: A TMDL Implementation Guidance Manual for Massachusetts"* sets forth an approach to addressing the pathogen impaired water body segments.

Phase II storm water communities are or will be required to implement aggressive illicit discharge detection and elimination programs. Watershed stakeholders are providing valuable assistance in defining hot spots and sources of pathogen contamination as well as with the implementation of mitigation or preventative measures.

Through Phase II NPDES regulations, EPA has the authority to 1) require general and/or individual permits for many types of storm water discharges and 2) enforce storm water permits to assure adequate progress in storm water pollution abatement is being made. In addition, EPA has the authority to require non-regulated point source storm water discharges to obtain NPDES permits if it determines that such storm water discharge causes or contributes to a water quality violation, or is a significant contributor of pollutants, or where controls are needed based on a waste load in an EPA approved TMDL. MassDEP has similar authority under the Commonwealth's law.

Although the TMDL targets are expressed in a variety of numeric terms, EPA anticipates that NPDES permits for regulated storm water discharges will contain Best Management Practice (BMP) based requirements rather than numeric effluent limits. This approach is consistent with EPA's November 22, 2002 guidance entitled "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs." The guidance states "WQBELs [water quality based effluent limits] for NPDES-regulated storm water discharges that implement WLAs in TMDLs may be expressed in the form of best management practices (BMPs) under specified circumstances. See 33 U.S.C. 1342(p)(3)(B)(iii); 40 C.F.R. 122.44(k)(2)&(3)." This memorandum goes on to state:

...because storm water discharges are due to storm events that are highly variable in frequency and duration and are not easily characterized, only in rare cases will it be feasible or appropriate to establish numeric limits for municipal and small construction storm water discharges. The variability in the system and minimal data generally available make it difficult to determine with precision or certainty actual or projected loadings for individual dischargers or groups of dischargers.

Therefore, EPA believes that in these situations, permit limits typically can be expressed as BMPs, and that numeric limits will be used only in rare instances. ... [i]n light of 33 U.S.C. §1342(p)(3)(B)(iii), EPA recommends that for NPDES-regulated municipal and small construction storm water discharges effluent limits should be expressed as best management practices (BMPs) or other similar requirements, rather than as numeric effluent limits. See *Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits*, 61 FR 43761 (Aug. 26, 1996). The Interim Permitting Approach Policy recognizes the need for an iterative approach to control pollutants in storm water discharges. Specifically, the policy anticipates that a suite of BMPs will be used in the initial rounds of permits and that these BMPs will be tailored in subsequent rounds.

Assessment:

MassDEP has included an outline of implementation plans, priorities and authorities, although not a required element of the TMDL approval. EPA is taking no action on the implementation plan.

10. Reasonable Assurances

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

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

Although no regulated point source was given a less stringent allocation based on the assumption that non-point source load reduction would occur, MassDEP provides reasonable assurance that both point and non-point allocations will be achieved. The TMDL will be implemented through enforcement of regulations, availability of financial incentives and local, state and federal programs for pollution control. Communities subject to storm water NPDES permit Phase II coverage will address discharges from municipally-owned storm water drainage systems. Enforcement of regulations controlling non-point discharges include local implementation of the Commonwealth’s Wetlands Protection Act, the Rivers Protection Act, Title 5 regulations for septic systems and other local regulations. Financial incentives include federal and state funds available under Sections 319 and 104(b) programs of the CWA as well as the State Revolving Loan Program. Other potential funds and assistance are available through Massachusetts’ Department of Agriculture’s Enhancement Program and the United States Department of Agriculture’s Natural Resources Conservation Services. Additional financial incentives include

income tax credits for Title 5 upgrades and low interest loans for Title 5 septic system upgrades available through municipalities participating in this portion of the state revolving loan fund program.

As stated above, MassDEP has in place a number of state regulatory and financial programs that will help to assure implementation of the TMDL will be achieved. These programs are more fully discussed in Sections 8 and 10 of the TMDL document.

Finally, it should be noted that MassDEP has had some experience implementing pathogen TMDLs. A previous TMDL was developed and approved by EPA for the Neponset River Watershed. The implementation recommendations outlined in that TMDL were similar to the Three Bays TMDL. Since the time of approval, MassDEP has worked closely with a local watershed group (Neponset River Watershed Association) to develop a 319 project to implement the recommendations of the TMDL. The total project cost was approximately \$472,000 of which \$283,000 was provided through federal 319 funds and the additional 40% provided by the watershed association and two local communities. Although the project is not yet completed, the towns and watershed association have worked closely together to identify and install several new structural BMPs (enhanced wetland treatment, bioretention cells and vegetated buffers) to reduce storm water and bacterial inputs into Pine Tree Brook which was impaired due to pathogens.

In summary, MassDEP's existing programs set out a wide variety of tools communities can use to address pathogens, based on land use and the commonality of pathogen sources (e.g., failing septic systems, storm water and illicit connections, pet waste, etc.) Since there are only a few categories of sources of pathogens, the necessary remedial actions to address these sources are well established.

Since pathogen impairment in many communities has a significant economic impact, for example due to shellfish and beach closures, watershed stakeholders are often eager to implement measures to mitigate pathogen impairments. The TMDL provides a mechanism and incentive for community administrators to among other things seek funding, educate the public and prioritize remedial action. Moreover, for sources beyond the scope of federal and state jurisdiction (e.g., storm water not subject to Phase II NPDES regulation), this TMDL and the companion document, "*Mitigation Measures to Address Pathogen Pollution in Surface Water: A TMDL Implementation Guidance Manual for Massachusetts*," provide communities with information and tools for mitigating pathogen sources.

Assessment:

Although not required because MassDEP did not increase WLAs based on expected LA reductions, MassDEP has provided reasonable assurance that WQS will be met.

11. Public Participation

EPA policy is that there must be full and meaningful public participation in the TMDL development process. Each State/Tribe must, therefore, provide for public participation consistent with its own continuing planning process and public participation requirements (40 C.F.R. § 130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs

submitted to EPA for review and approval must describe the State/Tribe's public participation process, including a summary of significant comments and the State/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment (40 C.F.R. § 130.7(d)(2)).

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

Following advanced notification to a wide potential audience of town officials, agencies, and stakeholders, through electronic media, MassDEP held a public informational meeting on November 27, 2007 to present the findings of the draft TMDL report and to solicit public comment. The public meeting was attended by approximately 20 people, and the meeting was also carried on the local access public TV cable channel. Cape Cod Broadcasting also aired an interview with two Mass DEP staff. MassDEP received a number of comments, and has provided a comprehensive record of the comments received and provided clear responses to those comments, including the changes made to the document in response to the public comments, in Appendix A of the TMDL report.

Assessment:

EPA concludes that MassDEP has done a sufficient job of involving the public in the development of the TMDL, provided adequate opportunities for the public to comment and has fully addressed the comments received as set forth in the response to comment section of the TMDL document. As discussed above, MassDEP made a number of changes and clarifications to the final TMDL in response to comments received during the public comment period.

12. Submittal Letter

A submittal letter should be included with the TMDL analytical document, and should specify whether the TMDL is being submitted for a technical review or is a final submittal. Each final TMDL submitted to EPA must be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final submittal, should contain such information as the name and location of the water body, the pollutant(s) of concern, and the priority ranking of the water body.

Assessment:

On August 4, 2009, MassDEP submitted the Final Pathogen TMDL for the Three Bays watershed (Control Number: CN 309.0) and associated documents for EPA approval. The documents contained all of the elements necessary to approve the TMDL.

Attachment 1
TMDL Addressing Four Pathogen Impaired Water Body Segments
Three Bays Watershed
 (Tables reprinted by permission of MassDEP)

Table 5-1. Concentration-based Fecal Coliform Wasteload Allocations (WLAs) and Load Allocations (LAs) for Three Bays Watershed.

Surface Water Classification	Pathogen Source Category	Waste Load Allocation (CFU/100 ml)	Load Allocation (CFU/100 ml)²
SA	Illicit discharges to Storm drains	0	Not applicable
SA	Failing Septic Systems	Not applicable	0
SA	Stormwater Runoff Phase II	Geometric Mean ≤ 14 Nor shall 10% of samples be ≥ 28	Not applicable
SA	Nonpoint Source Stormwater Runoff	Not applicable	Geometric Mean ≤ 14 Nor shall 10% of samples be ≥ 28
SA	Wildlife ¹	None	None
SA	Boat Discharges	0	Not applicable

¹ Given that sources of fecal coliform from wildlife are naturally occurring no allocation has been assigned.

² A concentration-based load allocation has been included for completeness in the Three Bays TMDL. Due to the moderate to high permeability of soils in the Three Bays System there is a limited potential for net runoff on an annualized basis to occur beyond the 200 foot buffer included in the WLA. Therefore, a load allocation will not be assigned to currently listed segments nor is it anticipated that a load allocation will be assigned to future listed segments in the Three Bays System.

Table 5-2. Waste Load Allocation and Total Maximum Daily Load (TMDL) by Segment.

Segment	Applicable Water Quality Standard	200 ft Buffer Area	WLA (Impervious Buffer Area)		TMDL (WLA + LA ¹)
			Percent of Impervious Area within 200 ft buffer	Daily Load (CFU/day)	Daily Load (CFU/day)
	SA - Shellfishing	Acres			
MA96-63 Cotuit Bay	14 fecal coliform/100ml	154	11.4	1.08E+08	1.08E+08
MA96-64 Seapuit River	14 fecal coliform/100ml	40	9.2	5.67+05	5.67+05
MA96-65 West Bay ²	14 fecal coliform/100ml	101	10.8	6.73E+07	6.73E+07
MA96-66 North Bay	14 fecal coliform/100ml	107	10.9	7.19E+07	7.19E+07
MA96-07 Prince Cove	14 fecal coliform/100ml	123	6.5	4.93E+07	4.93E+07
<p>¹ Load Allocation (LA) equals zero since runoff from the pervious area is assumed to be negligible because high soil permeability makes direct discharge unlikely except within the 200 foot buffer area of a water body.</p> <p>² West Bay is included in this TMDL document although it is not currently impaired by pathogens, nor listed on the Massachusetts 2006 303(d) list of impaired waters.</p>					

Data for entry in EPA's National TMDL Tracking System							
TMDL Name		Three Bays Watershed (4 segments)					
Number of TMDLs*		4*					
Type of TMDLs*		Bacteria^					
Number of listed causes (from 303(d) list)		4					
Any pollution prevention TMDLs? (Y/N)		(Y) 1					
Lead State		Massachusetts (MA)					
TMDL Status		Final					
Individual TMDLs listed below							
TMDL Segment name	TMDL Segment ID #	TMDL Pollutant ID# & name	TMDL Impairment Cause(s)	Pollutant endpoint	Unlisted?	NPDES Point Source & ID#	Listed for anything else?
Cotuit Bay	MA96-63	259 (Fecal coliform bacteria)	Pathogens (41)	SA: 14 fc /100 ml; 49 fc /100 ml		NPDES MS4 General Stormwater permit MAR0410000	Yes, nutrients
Seapuit River	MA96-64	259 (Fecal coliform bacteria)	Pathogens (41)	SA: 14 fc /100 ml; 49 fc /100 ml		NPDES MS4 General Stormwater permit MAR0410000	
North Bay	MA96-66	259 (Fecal coliform bacteria)	Pathogens (41)	SA: 14 fc /100 ml; 49 fc /100 ml		NPDES MS4 General Stormwater permit MAR0410000	Yes, nutrients
Prince Cove	MA96-07	259 (Fecal coliform bacteria)	Pathogens (41)	SA: 14 fc /100 ml; 49 fc /100 ml		NPDES MS4 General Stormwater permit MAR0410000	Yes, nutrients
303D3 Pollution Prevention TMDL segment name	303D3 TMDL Segment ID	303D3 Pollutant ID	303D3 Impairment cause	303D3 Pollutant endpoint	Unlisted?	NPDES Point Source & ID#	Listed for anything else?
West Bay	MA96-65	259 (Fecal coliform bacteria)	Pathogens (41)	SA: 14 fc /100 ml; 49 fc /100 ml	YES,	NPDES MS4 General Stormwater permit MAR0410000	Yes, nutrients

TMDL Type	Point & Nonpoint Sources
Establishment Date (approval)*	Aug 28, 2009
EPA Developed	No
Towns affected*	Barnstable, MA