



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
ONE CONGRESS STREET SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

June 22, 2009

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

Re: Approval of Chatham Southern Embayments Total Maximum Daily Load Re-Evaluations for Total Nitrogen

Dear Commissioner Burt:

Thank you for your submission of the Re-evaluation of Total Maximum Daily Loads (TMDLs) for total nitrogen in the Chatham Southern Embayments.

The U.S. Environmental Protection Agency (EPA) has reviewed the document entitled "Stage Harbor/Oyster Pond, Sulphur Springs/Bucks Creek, Taylors Pond/Mill Creek Total Maximum Daily Load Re-evaluations for Total Nitrogen (Report # MA96-TMDL-6; Control #206.1)" and approves these eight 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.

My staff and I look forward to continued cooperation with the MassDEP in exercising our shared responsibility of implementing the requirements under Section 303(d) of the CWA. If you have questions regarding this approval, please contact Steve Silva at (617) 918-1561, Beth Edwards at (617) 918-1840, or Mary Garren at (617) 918-1322.

Sincerely,

/s/

Ken Moraff, Acting Director
Office of Ecosystem Protection

Enclosure

cc: Glenn Haas, MassDEP
Dennis Dunn, MassDEP
Brian Dudley, MassDEP

Steve Silva, EPA
Mary Garren, EPA

EPA NEW ENGLAND'S TMDL REVIEW

DATE: June 22, 2009

TMDL: (*Chatham Southern Embayments*) Stage Harbor/Oyster Pond, Sulphur Springs/Bucks Creek, Taylors Pond/Mill Creek TMDL Load Re-evaluations for Total Nitrogen (Control #206.1)

STATUS: Final

IMPAIRMENT/POLLUTANT: 8 TMDLs for Total Nitrogen (See Attachment 1)

BACKGROUND:

On June 21, 2006, EPA approved the original Total Maximum Daily Load (document control #206.0) for the Chatham embayments. The development of the original TMDL was based on the availability of three quarters of water use data provided by the Town. Subsequent to that analysis, data for a full year was collected and was provided by the Town. In addition, the monitoring program was extended, adding to the database. Also, the USGS refined the delineation of the ground watershed. As a result, the Town requested that the TMDL be reevaluated using the additional data and re-delineated ground watershed information. This TMDL report serves to update the 2006 TMDL for the southern embayments – Sulphur Springs, Taylor's Pond, and Stage Harbor Systems. The northern embayments were previously updated and are contained in the Pleasant Bay TMDL, which was approved by EPA on October 24, 2007 (document control #244.0).

The Massachusetts Department of Environmental Protection (MassDEP) released a draft TMDL on January 9, 2008 for public review. Key stakeholders received copies of the document in the mail. The draft TMDL was posted on the Department's web site on that date as well. In addition, a public meeting was held in the Town of Chatham's Town Hall on January 31, 2008. The public comment period was extended and comments accepted until February 22, 2008. MassDEP prepared a response to public comment which was submitted along with the final TMDL to EPA. All comments from the public were taken into account in the Response to Comments and the final TMDL submission. The final submission to EPA was sent on January 2, 2009. In addition to the TMDL itself, the submittal included, either directly or by reference, the following additional documents:

- Response to Comments For: Stage Harbor/Oyster Pond, Sulphur Springs/Bucks Creek, Taylors Pond/Mill Creek Total maximum Daily Load Re-Evaluations For Total Nitrogen (Report dated December 31, 2008)
- Massachusetts Estuaries Project, Linked Watershed-Embayment Model to Determine Critical Nitrogen Loading Thresholds for Stage Harbor, Sulphur Springs, Taylors Pond, Bassing Harbor, and Muddy Creek, Chatham, Massachusetts.
<http://www.oceanscience.net/estuaries/Chatham.htm>
- Massachusetts Year 2008 Integrated List of Waters, Proposed Listing of the Condition of

Massachusetts' Waters Pursuant to Sections 303(d) and 305(b) of the Clean Water Act (CN 281.0), April 2008. <http://www.mass.gov/dep/water/resources/2008il1.pdf>

- Massachusetts Estuaries Project Embayment Restoration and Guidance for Implementation Strategies, MassDEP 2003.
<http://www.mass.gov/dep/water/resources/mepmain.pdf>

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: Beth Edwards, telephone number 617-918-1840,
email: edwards.beth@epa.gov

REVIEW ELEMENTS OF TMDLs

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

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

*The TMDL analytical document must identify the waterbody as it appears on the State/Tribe's 303(d) list, the pollutant of concern and the priority ranking of the waterbody. The TMDL submittal must include a description of the point and nonpoint sources of the pollutant of concern, including the magnitude and location of the sources. Where it is possible to separate natural background from nonpoint sources, a description of the natural background must be provided, including the magnitude and location of the source(s). Such information is necessary for EPA's review of the load and wasteload allocations 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 document for the Stage Harbor/Oyster Pond, Sulphur Springs/Bucks Creek, Taylors Pond/Mill Creek TMDL Re-evaluations for Total Nitrogen describes the water body segments, nature and cause or threat of the impairments. Impairments include partial loss of eelgrass beds, undesirable increases in macro algae, periodic extreme decreases in dissolved oxygen concentrations, reduced benthic animal diversity, and periodic algae blooms. The TMDL document identifies excess total nitrogen originating primarily from septic systems serving individual residences as the cause of the impairments. In addition, nutrient rich bottom sediments, fertilizer and runoff account for some of the impairments.

The TMDL document identifies 8 water body segments needing a TMDL for total nitrogen (Oyster Pond, Oyster Pond River, Stage Harbor, Mill Pond, Harding Beach Pond, Bucks Creek,

Mill Creek, and Taylors Pond). Oyster Pond, Oyster Pond River, Stage Harbor, Mill Pond, Harding Beach Pond, Bucks Creek, Mill Creek and Taylors Pond are listed as impaired for nutrients on the Massachusetts' 2008 Clean Water Act (CWA) §303(d) list and were previously determined to be impaired by nutrients by MassDEP. Mitchell River and Little Mill Pond were determined to be impaired during the development of this TMDL and were not listed on the Massachusetts' 2008 §303(d) List.

The TMDL document provides a good overview of the description and priority ranking of the water bodies, pollutant of concern and pollutant sources (pages 2-8). The companion Massachusetts Estuaries Project final report (February 2007) presents detailed information on the Stage Harbor, Sulphur Springs, and Taylor Pond Embayment Systems, Cape Cod, and the Town of Chatham. MassDEP has determined that all nutrient impaired segments in the Commonwealth are a high priority. See the Massachusetts 2008 Integrated List of Waters at: <http://www.mass.gov/dep/water/resources/08list2.pdf>

Assessment:

EPA New England concludes that the TMDL document meets the requirements for describing water body segments, pollutants of concern, identifying and characterizing sources of impairment, and priority ranking.

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

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

The TMDL document identifies several provisions of the Commonwealth's water quality standards that are relevant to the cultural eutrophication in these waters, including numeric criteria for dissolved oxygen and narrative criteria for nutrients, aesthetics, excess plant biomass, and nuisance vegetation. As stated on page 9 of the TMDL document and in EPA guidance, individual estuarine and coastal marine waters tend to have unique characteristics and therefore, individual water body criteria are typically required. For example, the loading of nitrogen that a specific water body can handle without becoming impaired varies. Factors that influence the effect of nitrogen include: flow velocity, tidal hydraulics, dissolved oxygen, and sediment adsorption and desorption of nitrogen.

The Massachusetts Estuaries Project analytical method is the Linked Watershed-Embayment Management Model (Linked Model) and is discussed on pages 9 - 16 of the TMDL document. It links watershed inputs with embayment circulation and nitrogen characteristics, and:

- requires site-specific measurements within each watershed and embayment;
- uses realistic “best-estimates” of nitrogen loads from each specific type of land-use;
- spatially distributes the watershed nitrogen loading to the embayment;
- accounts for nitrogen attenuation during transport to the embayment;
- includes a 2D or 3D embayment circulation model depending on embayment structure;
- accounts for basin structure, tidal variations, and dispersion within the embayment;
- includes nitrogen regenerated within the embayment;
- is validated by both independent hydrodynamic, nitrogen concentration, and ecological data; and
- is calibrated and validated with field data prior to generation of “what if” scenarios.

Sentinel locations were identified in the embayment system as locations at which restoration will necessarily result in high quality habitat throughout the system and attainment of water quality standards (page 11 - 13 of the TMDL document). These sentinel locations are located in each of the embayment systems (Oyster Pond, Mitchell River, Sulphur Springs, and Taylors Pond).

Attaining the modeled nitrogen target at the sentinel location through implementation of the TMDL will lead to restoration of eelgrass and infaunal habitats in each of the sub-embayments. The target threshold nitrogen concentration which has been determined to be protective for each embayment system is 0.38 mg/L at each sentinel station (Table 2, page 13 of the TMDL document). This concentration, which represents the average water column concentration of nitrogen, will restore or maintain high habitat quality in these embayments.

Assessment:

The use of the Linked Model, the description of the process in the TMDL document, and the companion Technical Report to this TMDL document adequately demonstrate the basis for deriving the target nitrogen loads and demonstrating that the targets will achieve water quality standards. EPA concludes that Massachusetts has properly presented its numeric water quality standards and has made a reasonable and appropriate interpretation of its narrative water quality criteria for the designated uses of the Southern Chatham embayment systems.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

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

In many circumstances, a critical condition must be described and related to physical conditions in the waterbody as part of the analysis of loading capacity (40 C.F.R. § 130.7(c)(1)). The critical condition can be thought of as

the “worst case” scenario of environmental conditions in the waterbody in which the loading expressed in the TMDL for the pollutant of concern will continue to meet water quality standards. Critical conditions are the combination of environmental factors (e.g., flow, temperature, etc.) that results in attaining and maintaining the water quality criterion and has an acceptably low frequency of occurrence. Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards.

The Linked Model, as stated in the TMDL document is a robust and fairly complicated model that determines an embayment’s nitrogen sensitivity, nitrogen threshold loading levels (TMDL) and response to changes in the loading rate. A key feature of the approach involves the selection of sentinel sub-embayments that have the poorest water quality in the embayment system. If these degraded areas come into compliance with the TMDL, other areas will also achieve water quality standards for nitrogen in the system. This approach captures the critical targets needed to address the impaired segments.

Percent reductions of existing nitrogen loads necessary to meet the target threshold loads range from 81% in Oyster Pond to 0% in Bucks Creek. These loads represent one scenario using the Linked Model. The TMDL loading capacity value for each sub-embayment represents the sum of the calculated target threshold load, atmospheric deposition load, and benthic flux load from sediment sources. For example at Oyster Pond, the TMDL is calculated by adding the target threshold load of 1.9 kg/day, the atmospheric load of 1.8 kg/day, and the benthic input which is 14.1 kg/day. See Tables 4a and 5 below taken from pages 16 and 24 of MassDEP’s TMDL document.

TABLE 4 a. Present Watershed Nitrogen Loading Rates, Calculated “Target” Loading Rates, and the Percent Reductions Necessary to Achieve the Target Threshold Loadings

| Embayment Systems and Sub-embayments | Present Watershed Load ¹ (kg/day) | Target Watershed Load ^{1, 2} (kg/day) | Percent Load Reductions Needed to Achieve Target Loads |
|--------------------------------------|--|--|--|
| Stage Harbor | | | |
| Oyster Pond | 10.0 | 1.9 | 81% |
| Oyster River | 9.4 | 2.3 | 76% |
| Stage Harbor | 2.0 | .5 | 75% |
| Mitchell river | 2.6 | 1.5 | 42% |
| Mill Pond | 3.6 | 2.1 | 42% |
| Little Mill Pond | 1.3 | 0.8 | 38% |
| Sulphur Springs | | | |
| Sulphur Springs | 9.5 | 4.6 | 52% |
| Bucks Cr | 3.4 | 3.4 | 0% |
| Taylors Pond | | | |
| Mill Cr | 4.6 | 1.0 | 78% |
| Taylors Pond | 6.2 | 4.2 | 32% |

¹ Composed of combined fertilizer, runoff, and septic system loadings. Does not include direct atmospheric deposition to estuarine surfaces, but does include a small amount (3%-10%) of atmospheric deposition to “natural surfaces.”

²Target threshold watershed load is the load from the watershed needed to meet the embayment threshold concentrations identified in Table 2 above

TABLE 5. The Total Maximum Daily Loads (TMDL) for the Chatham Embayment Systems, Represented as the Sum of the Calculated Target Thresholds Loads, Atmospheric Deposition, and Sediment Sources (Benthic Flux)

| Embayment Systems and Sub-embayments: | Target Watershed Threshold Load ¹ (kg/day) | Atmospheric Deposition ² (kg/day) | Benthic Flux ³ (kg/day) | TMDL ⁴ (kg/day) |
|---------------------------------------|--|---|---------------------------------------|-------------------------------|
| Stage Harbor | | | | |
| Oyster Pond | 1.9 | 1.8 | 14.1 | 18 |
| Oyster River | 2.3 | 1.1 | 0.7 | 4 |
| Stage Harbor | 0.5 | 3.2 | 2.3 | 6 |
| Mitchell river | 1.5 | 0.9 | 3.4 | 6 |
| Mill Pond | 2.1 | 0.6 | 2.9 | 6 |
| Little Mill Pond | 0.8 | 0.1 | 1.4 | 2 |
| | | | | |
| Sulphur Springs | | | | |
| Sulphur Springs | 4.6 | 0.4 | 0 | 5 |
| Bucks Cr | 3.4 | 0.1 | 2.5 | 6 |
| | | | | |
| Taylors Pond | | | | |
| Mill Cr | 0.9 | 0.2 | 0 | 1 |
| Taylors Pond | 4.2 | 0.2 | 1.1 | 6 |

¹ Target watershed threshold load is the load from the watershed needed to meet the embayment threshold concentrations identified in Table 2. Loads are made up of all sources in the watershed and consist of both controllable and a small percentage of non-controllable sources. The target load identified in this table represents one alternative loading scenario to achieve that goal but other scenarios may be possible and approvable as well.

² Atmospheric Deposition is deposition directly to the estuary surface only

³ Projected sediment N loadings obtained by reducing the present loading rates (Table 3) proportional to proposed watershed load reductions and factoring in the existing and projected future concentrations of PON.

⁴ Rounded off Sum of target threshold watershed load, atmospheric deposition load, and sediment sources (benthic flux).

Assessment:

The TMDL document explains and EPA concurs with the approach for applying the Linked Model to specific embayments for the purpose of developing target nitrogen loading rates and in identifying sources of needed nitrogen load reduction. EPA believes that this approach is reasonable because the factors influencing and controlling nutrient impairment were well justified.

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.

Using the Linked Model, Mass DEP has identified the portion of the loading capacity allocated to existing and future non-point sources necessary to meet water quality standards. These non-point sources are primarily on-site subsurface wastewater disposal systems (i.e., septic systems). Additional nitrogen sources include: natural background, storm water runoff (including nitrogen from fertilizers), the Chatham wastewater treatment facility (WWTF) groundwater discharge, atmospheric deposition, and nutrient-rich sediments. The percent contribution of locally controllable sources of nitrogen is approximately 43% from septic systems, 36% from sediments, 13% from fertilizers and runoff, and 8% from atmospheric deposition.

Mass DEP describes and sets forth the load allocations for cultural and natural background sources (see pages 18 - 19 of the TMDL document).

Assessment:

EPA concludes that the TMDL document sufficiently addresses the calculation of the load allocations.

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.

EPA interprets 40 CFR 130.2(h) to require that allocations for NPDES regulated discharges of storm water be included in the waste load component of the TMDL. On Cape Cod the vast majority of storm water percolates into the ground and aquifer and proceeds into the embayment systems through groundwater migration. Although the vast majority of storm water percolates into the ground, there are a few storm water pipes that discharge directly to water bodies that are subject to the requirements of the Phase II Storm Water NPDES Program. The loadings allocated to such storm water discharges must be treated as a waste load allocation. Since the majority of the nitrogen loading comes from septic systems, fertilizer, and storm water that infiltrates into the groundwater, the allocation of nitrogen for any storm water pipes that discharge directly to any of the embayments is insignificant as compared to the overall groundwater load.

Based on land use, the Linked Model accounts for loading of storm water, but does not explicitly breakout storm water into a load and waste load allocation. Nonetheless, based on the fact that there are few storm water discharge pipes within NPDES Phase II communities that discharge directly to embayments or waters that are connected to the embayments, a small relatively insignificant total waste load allocation was calculated for these sources. This is based on the percent of impervious surface within 200 feet of the shoreline that may discharge storm water via pipes directly to the water body. For the purposes of waste load allocation, it was assumed that all impervious surfaces within 200 feet of the shoreline discharge directly to the water body whether or not they actually do so. Although the loading contribution from the point source discharges is insignificant compared to the non-point sources, the point source discharges are subject to the Phase II Storm Water NPDES Program and their collective load is to be treated as a WLA. In the absence of site specific information on direct discharge sources, EPA believes the approach set out in the TMDL for the WLAs is reasonable. The specific WLAs are set forth in Appendix B and on pages 17 and 18 of the TMDL document.

Assessment:

EPA concludes that the TMDL document sufficiently addresses the calculation of the waste load allocations.

6. Margin of Safety (MOS)

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

The implicit margin of safety is set out in the TMDL document on pages 20 - 22. There are several factors that contribute to the margin of safety inherent in the approach used to develop this TMDL including:

1) **Use of conservative data in the Linked Model as follows:**

- Nitrogen concentrations in the watershed that were used in the model were higher and more conservative than those actually measured in the streams;
- Agreement between the modeled and observed values has been approximately 95%;
- Attenuation factors used were lower and more conservative than those that were actually measured;
- Water column nitrogen validation dataset is conservative. High or low measurements are marked as outliers;
- Reductions in benthic regeneration of nitrogen are most likely underestimates. The reduction is based solely on a reduced deposition of particulate organic nitrogen (PON), due to lower primary production rates under the reduced nitrogen loading in these systems. As the nitrogen loading decreases and organic inputs are reduced, it is likely that rates of coupled remineralization-nitrification, denitrification and sediment oxidation will increase. This proportional reduction assumes that the proportion of remineralized nitrogen will be the same as under present conditions, which results in an underestimate. As a result, future nitrogen regeneration rates are overestimated which adds to the margin of safety;

2) **Conservative sentinel station/target threshold nitrogen concentrations.** Sites were chosen that had stable eelgrass or benthic (infaunal) communities. Selection of sites that were starting to show impairment would have resulted in higher nitrogen concentrations; and

3) **Conservative approach.** Target loads were based on averaged nitrogen concentrations on the outgoing tide. This is the worst case scenario because this is when the nitrogen concentrations are highest. Nitrogen concentrations will be lower on the flood tides, due to dilution from the incoming tide.

Assessment:

EPA concludes that the implicit margin of safety for the TMDL is acceptable.

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 for the water body segments identified in the document are based on achieving the nitrogen loads during the most critical time period, i.e., the summer growing season. Since the other seasons are less sensitive to nitrogen loading, the TMDLs are protective of all seasons throughout the year. Seasonal variation is addressed on page 22 of the TMDL document.

Assessment:

Since the other seasons are less sensitive to nitrogen loading, EPA concludes that the TMDL is protective of all seasons throughout the year.

8. Monitoring Plan for TMDLs Developed Under the Phased Approach

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.

Because this TMDL is not a "phased" TMDL, a monitoring plan is not required in order to assure that data is available for updating the TMDL in the near future. Nevertheless, in order to assess the progress in obtaining the TMDLs' water quality goals, MassDEP has recommended that the Town of Chatham track implementation progress as approved in the Town Comprehensive Wastewater Management Planning (CWMP) and monitor ambient water quality conditions at the sentinel stations (page 25 of the TMDL document). MassDEP presents suggested guidelines for water quality, benthic habitat, and eelgrass bed monitoring.

Assessment:

EPA New England concludes that the anticipated monitoring by and in cooperation with MassDEP is sufficient to evaluate the adequacy of the TMDL and attainment of water quality standards, although not a required element for TMDL approval.

9. Implementation Plans

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

The implementation plan for the total nitrogen TMDL for the Stage Harbor, Sulphur Springs, and Taylors Pond Embayment Systems is described on pages 22 - 25 of the TMDL document. EPA concludes that the approach taken by MassDEP is reasonable because of the resources available to the towns to address nitrogen such as the CWMP, additional linked model runs at nominal expense, assessment of cost-effective options for reducing loadings from individual on-site subsurface wastewater disposal systems, land use planning and controls, water conservation, and

storm water control and treatment. MassDEP advised the town to incorporate the nitrogen loading reduction strategies outlined in the Massachusetts Estuaries Implementation Guidance report <http://www.mass.gov/dep/water/resources/restore.htm> into the implementation plan.

Assessment:

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

10. Reasonable Assurances

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

In a 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.”

The Commonwealth has statutory and regulatory authority to encourage implementation of this TMDL. In addition, Chatham has demonstrated its commitment to implement this TMDL through the comprehensive wastewater planning that they initiated well before the generation of this TMDL. The town expects to use the information in this TMDL to generate support from their citizens to take the necessary steps to remedy existing problems related to nitrogen loading from septic systems, storm water, and runoff (including fertilizers), and to prevent any future degradation of these valuable resources. Enforcement of local, state, and federal programs for pollution control contribute to the level of reasonable assurance. There are also financial incentives to encourage the town to follow through with its plans and prevent further degradation to water quality.

Assessment:

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

11. Public Participation

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

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

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

MassDEP publicly announced the draft TMDL on January 9, 2008 and copies were distributed to all key stakeholders. The draft TMDL was also posted on the Department's web site for public review on that date. A public meeting was held at the Town of Chatham's Town Hall on January 31, 2008 for information and solicitation of comments. The public comment period was extended until February 22, 2008. MassDEP submitted a response to comments to EPA along with the final submission on January 2, 2009.

Assessment:

EPA concludes that MassDEP has involved the public during the development of the TMDL, has provided adequate opportunities for the public to comment on the TMDL, and has provided reasonable responses to the public comments.

12. Submittal Letter

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

On January 2, 2009, MassDEP submitted a final TMDL for total nitrogen in the Stage Harbor, Sulphur Springs, and Taylors Pond Embayment Systems for EPA approval. The final TMDL contained revisions based upon public comments. The TMDL document contained all of the elements necessary to approve the TMDL.

Assessment:

MassDEP's letter of January 2, 2009 states that the TMDL is being formally submitted for EPA review and approval.

Attachment 1

8 Total Nitrogen TMDLs

| Sub-Embayment | Segment ID | Description | TMDL (kg/day) |
|---|--------------|--|---|
| Stage Harbor | | | |
| Oyster Pond | MA96-45_2008 | Previously determined to be impaired by nutrients by MassDEP ¹ | 18 |
| Oyster River | MA96-46_2008 | Previously determined to be impaired by nutrients by Mass DEP ¹ | 4 |
| Stage Harbor | MA96-11_2008 | Stage Harbor - Previously determined to be impaired by nutrients by Mass DEP ¹ | 6 |
| | | Including Mitchell River - Determined by the MEP studies to be impaired by excess nitrogen and declining eelgrass beds | [6] (at Mitchell River) ² |
| Mill Pond | MA96-52_2008 | Mill Pond - Previously determined to be impaired by nutrients by MassDEP ¹ | 6 |
| | | Including Little Mill Pond - Determined by the MEP studies to be impaired by excessive nitrogen and declining eelgrass beds | [2] (at Little Mill Pond) ² |
| Sulphur Springs | | | |
| Sulphur Springs (Harding Beach Pd) | MA96-43_2008 | Previously determined to be impaired by nutrients by MassDEP ¹ | 5 |
| Bucks Creek | MA96-44_2008 | Previously determined to be impaired by nutrients by MassDEP ¹ | 6 |
| Taylor's Pond | | | |
| Mill Creek | MA96-41_2008 | Previously determined to be impaired by nutrients by MassDEP ¹ | 1 |
| Taylor's Pond | MA96-42_2008 | Previously determined to be impaired by nutrients by MassDEP ¹ | 6 |
| ¹ also determined by the MEP studies to be impaired by excessive nitrogen and loss of eelgrass ² There are 8 waterbody segments and 8 TMDLs. Endpoint monitoring locations are shown for Mitchell River and Little Mill Pond | | | |

| Data for entry in EPA's National TMDL Tracking System | | | | | | | | |
|--|--------------------------|--|---------------------------------|---------------------------|------------------|-------------------------------------|---|-----------------------------------|
| TMDL Name * | | Chatham Southern Embayments (8 segments) | | | | | | |
| Number of TMDLs* | | 8 | | | | | | |
| Type of TMDLs* | | Nutrients (Nitrogen) | | | | | | |
| Number of listed causes (from 303(d) list) | | 8 | | | | | | |
| Information/prevention TMDLs, Y/N? (#) | | No | | | | | | |
| Lead State | | Massachusetts | | | | | | |
| TMDL Status | | Final | | | | | | |
| Individual TMDLs listed below | | | | | | | | |
| TMDL sub-embayments systems and segment names | TMDL Segment ID # | TMDL Pollutant ID# & name | TMDL Impairment Cause(s) | Pollutant endpoint | Unlisted? | Revision of earlier TMDL? ** | TMDL to be withdrawn for the TMDL on this line | Listed for something else? |
| Stage Harbor | | | | | | | TMDL ID # | |
| Oyster Pond | MA96-45_2008 | 511 (total nitrogen) | Nutrients | 0.38 mg/L Total Nitrogen | No | YES | 30337 | Yes, Pathogens |
| Oyster Pond River | MA96-46_2008 | 511 (total nitrogen) | Nutrients | 0.38 mg/L Total Nitrogen | No | YES | 30338 | Yes, Pathogens |
| Stage Harbor | MA96-11_2008 | 511 (total nitrogen) | Nutrients | 0.38 mg/L Total Nitrogen | No | YES | 30339 | Yes, Pathogens |
| Mill Pond | MA96-52_2008 | 511 (total nitrogen) | Nutrients | 0.38 mg/L Total Nitrogen | No | YES | 30340 | No |
| Sulphur Springs | | | | | | | | |
| Harding Beach Pond | MA96-43_2008 | 511 (total nitrogen) | Nutrients | 0.38 mg/L Total Nitrogen | No | YES | 30345 | Yes, Pathogens |
| Bucks Creek | MA96-44_2008 | 511 (total nitrogen) | Nutrients | 0.38 mg/L Total Nitrogen | No | YES | 30347 | Yes, Pathogens |
| Taylors Pond | | | | | | | | |
| Mill Creek | MA96-41_2008 | 511 (total nitrogen) | Nutrients | 0.38 mg/L Total Nitrogen | No, in 2008 | NO | | Yes, Pathogens |
| Taylors Pond | MA96-42_2008 | 511 (total nitrogen) | Nutrients | 0.38 mg/L Total Nitrogen | No | YES | 30348 | Yes, Pathogens |
| TMDL Type | | Nonpoint Source (Stormwater) | | | | | | |
| Establishment Date (approval)* | | June 22, 2009 | | | | | | |
| EPA Developed | | No | | | | | | |
| Towns affected* | | Chatham | | | | | | |