10/26/06

EPA NEW ENGLAND'S TMDL REVIEW

TMDL: **Trafton Lake**, Aroostook County, Maine
HUC: ME 0101000413; ME ID# 9779 located in the Town of Limestone
2004 303(d) list: Primary Contact; 2004-6 TMDL development.

STATUS: Final

IMPAIRMENT/POLLUTANT: Primary contact recreation impairment due to excessive nutrient loading from nonpoint source pollution. The TMDL is calculated for total phosphorus (TP).

BACKGROUND: The Maine Department of Environmental Protection (ME DEP) submitted electronically to EPA New England the final Trafton Lake TMDL for total phosphorus (TP) with a transmittal letter dated October 13, 2006. ME DEP took into account all of EPA's September 18, 2006 comments on the September 12, 2006 draft TMDL.

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.

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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.

- **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 TMDL describes the waterbody and the cause of impairment as identified in the 2004 303(d) list (see pages 4, 9, and 23 TMDL report). Trafton Lake is an impounded waterbody created in 1969 to provide spring flood protection, now providing irrigation for local agricultural fields. The lake is lightly colored with a flushing rate of 3.5 times per year. Nutrient contamination has been documented since lake sampling began in 1977, due primarily to the contribution of phosphorus that is prevalent in area soils. Predominant sources of pollutants are agriculture and poorly maintained State roads (page 4 TMDL report).

Trafton Lake is impaired because of a documented trend of increasing trophic state; water quality has generally been poor during the entire historical monitoring period and has continued to decline since 1980. Since then, minimum tranparencies have averaged at or below 2 meters, and summertime nuisance algal blooms have been a regular occurrence (page 23, TMDL report).

The document describes the pollutant of concern, total phosphorus, and identifies the location (by direct or indirect watershed) and magnitude of phosphorus sources from atmospheric deposition (0.5%) and from 16 subcategories of land use within the watershed which include: agricultural land (90% TP export), actively managed forest, shoreline development, non-shoreline development, and non-developed land (see Table 2 page 25 TMDL report). Information on human development is provided (page10 TMDL report). Internal sediment recycling is evaluated (page 28 TMDL report).

ME DEP explained that it was not possible to separate natural background from nonpoint sources (page 23 TMDL report). In this case, not separating natural background is reasonable because of the limited and general nature of the information available (land use categories) related to potential phosphorus sources. Without more detailed site-specific information on nonpoint source loading, it would be very difficult to separate natural background form the total nonpoint source load.

ME DEP provides an explanation and analytical basis for expressing the TMDL for nuisance algae blooms through surrogate measures using Secchi disk transparency (SDT), phosphorus loadings, and chlorophyll a. (See also section 2 below which documents ME's water quality standards.)

Assessment: EPA Region I concludes that the ME DEP has done an adequate job of characterizing sources of impairment.

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.

Trafton Lake TMDL describes the applicable narrative water quality standards (page 24 TMDL report). The report defines applicable narrative criteria, designated uses, and antidegradation policy.

ME DEP identifies a numeric water quality target for the TMDL of **16 ppb** total phosphorus (TP) (180 kg TP/yr) which ME DEP predicts will result in the attainment of water quality standards. The numeric target was selected based on observed late spring – early summer (pre water column stratification) measures generally corresponding to non-bloom conditions, as reflected in suitable measures of both Secchi disk transparency (>2.0 meters) and chlorophyll-a (<8.0 ppb) levels (page 24 TMDL report).

Assessment: EPA Region I concludes that ME DEP has properly presented its water quality standards and has made a reasonable interpretation of the narrative water quality criteria in the standards when setting the numeric water quality target.

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 loading capacity for Trafton Lake is set at **180 kg TP/yr** (see page 30 TMDL report), based on a target goal of 16 ppb. The loading capacity is set to protect water quality and support uses during *critical conditions* which occur during the summer season when environmental conditions (e.g., higher temperatures, increased light intensity, etc.) are most favorable for aquatic plant growth (page 31 TMDL report). The TMDL target of 16 ppb is expected to be met at all times (daily, monthly, seasonally, and annually). ME DEP recommends the TMDL expressed as an

annual load be used to guide implementation efforts because (1) the lake has an annual flushing rate of 3.5 (see discussion of seasonal variation below), and (2) the annual load of TP is more easily aligned with the design of best management practices used to implement nonpoint source and stormwater TMDLs for lakes than daily loads of specific pollutants. Ultimate compliance with water quality standards for the TMDL will be determined by measuring in-lake water quality.

ME DEP links water quality to phosphorus loading by:

- Picking a target in-lake phosphorus level, based on historic state-wide and in-lake water quality data (page 24 TMDL report);
- Using an empirical phosphorus retention model, calibrated to in-lake phosphorus concentration data, to link watershed total phosphorus (external) loading to existing in-lake total phosphorus concentrations (page 29);
- Estimating and accounting for future growth (page 28 TMDL report);
- Using an in-lake phosphorus concentration model to determine phosphorus reduction needed to meet the numeric target (page 16 TMDL report);
- Using a GIS-based model to provide a relative estimation of impacts from watershed land uses in order to assist stakeholders in developing phosphorus reduction strategies.

These analytical methods are widely recognized as appropriate for lake TMDL development.

The loading capacity for total phosphorus is also presented in terms of daily pollutant loads of TP (pages 27-28 and 31 TMDL report). The TP TMDL is originally calculated as an annual load. Daily flushing rates are determined by first calculating the monthly discharge (using USGS formulas for Maine), then calculating the monthly load capacity and converting to daily loading capacity as an allowable daily load for each month of the year (daily loads range from 0.12 kg/day TP in August to 1.37 kg/day TP in April) (see page 31 TMDL report).

Assessment: EPA Region I concludes that the loading capacity has been appropriately set at levels necessary to attain and maintain applicable water quality standards. The TMDL in terms of annual load is based on a reasonable and widely accepted approach for establishing the relationship between pollutant loading and water quality in lakes. The TMDLs in terms of daily loads are based on the annual load, and a reasonable approach was used to convert the annual load to daily loads for each month of the year. EPA Region I also concurs with expressing the TMDL as an annual loading for purposes of implementation, for the reasons stated by Maine (i.e., relatively long average hydraulic residence time).

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.

ME DEP allocates all of the loading capacity of **180 kg TP/yr** for Trafton Lake as the "load allocation", a gross allotment to existing and future nonpoint sources and to natural background (page 30 TMDL report). Calculation of the necessary reduction on an annual basis is determined using an in-lake phosphorus concentration model (page 16 TMDL report).

Assessment: EPA Region I concludes that the load allocation is adequately specified in the TMDL at a level necessary to attain and maintain water quality standards. The degree of load reductions necessary to achieve the in-lake phosphorus level is based on the measured average summertime total phosphorus concentration plus an estimate to account for future development.

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.

Trafton Lake is a Class GPA water in Maine. According to Maine statute, "There may be no new direct discharge of pollutants into Class GPA waters." [38 MRSA 465-A (1) (c)] ME DEP sets the waste load allocation for all existing and future point sources is set at **0 (zero) kg/year** of total phosphorus because there are no existing point sources of pollution (including regulated stormwater sources) in the lake watershed (page 30 TMDL report).

Assessment: EPA Region I concurs that the WLA component of the TMDL is appropriately set equal to zero based on ME DEP's determination that there are no existing point sources discharges subject to NPDES permit requirements in the watershed.

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 Trafton Lake TMDL includes an implicit margin of safety (MOS) through the relatively conservative selection of the numeric water quality target of 16 ppb as well as the selection of relatively conservative phosphorus export loading coefficients for cultural pollution sources (Table 2) (page 25 TMDL report). Based on the lake's historical records and ME DEP's analysis of a state-wide limnological database for colored lakes (>30 SPU), ME DEP believes that a target of 16 ppb represents a highly conservative goal because "summer nuisance algae blooms (growth of algae which causes Secchi disk transparency to be less than 2 meters) are more likely to occur at 18 ppb or above (page 30 TMDL report). ME DEP also mentions an additional unquantified margin of safety for attainment of state water quality goals is provided by the inherently conservative methods used to estimate future growth (page 28 TMDL report).

Assessment: EPA Region I concludes that adequate MOS is provided for the following reasons: (1) EPA believes an adequate implicit MOS is provided in the selection of an in-lake TP concentration of 16 ppb based on a state-wide data base for naturally colored lakes, and (2) the adequacy of this MOS is supported by in-lake data.

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 Trafton Lake TMDL considered seasonal variations because the allowable annual load was developed to be protective of the most sensitive time of year - during the summer, when conditions most favor the growth of algae and aquatic macrophytes (page 30 TMDL report). The TMDL is protective of all seasons, given the lake's flushing rate of 3.5 flushes/year, and the fact that BMPs proposed for the watershed have been designed to address TP loading during all seasons. Seasonal variation is further considered in calculations of seasonal, monthly, and daily TP loads (pages 27-28 and 31 TMDL report).

Assessment: EPA Region I concludes that seasonal variation has been adequately accounted for in the TMDL because the TMDL was developed to be protective of the most environmentally sensitive period, the summer season. In addition, phosphorus controls are expected to be in place throughout the year so that these controls will reduce pollution whenever sources are active.

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), recommends a monitoring plan when a TMDL is developed under the phased approach. The guidance recommends that a TMDL developed under the phased approach also should provide assurances that nonpoint source controls will achieve expected load reductions. The phased approach is appropriate when a TMDL involves both point and nonpoint sources and the point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur. EPA's guidance provides that a TMDL developed under the phased approach should include a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of water quality standards.

The Trafton Lake TMDL describes the history of volunteer monitoring (since 1977), and describes the long-term water quality monitoring to be conducted monthly during the open water months (from May to October) through continued efforts of the Maine Volunteer Lakes Monitoring Program (VLMP) in cooperation with ME DEP. ME DEP anticipates sufficient data will be acquired to adequately track seasonal and inter-annual variation and long term trends in water quality in the lake (page 20 TMDL report).

Assessment: EPA Region I concludes that the ongoing monitoring by VLMP in cooperation with ME DEP is sufficient to evaluate the adequacy of the TMDL.

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 Trafton Lake phosphorus control action plan is described in pages 17-20 of the TMDL report, and includes recommendations for future work. Specific recommendations for five action items address the following sources of pollution: agriculture, roadways, and individual actions of landowners and homeowners.

Assessment: Addressed, though not required.

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."

ME DEP addresses reasonable assurances that NPS reductions will occur by providing information on the cooperative efforts of the Maine Association of Conservation Districts and the Central Aroostook Soil and Water Conservation District in cooperation with lake stakeholders to initiate the process of addressing nonpoint source pollution in the watershed. The Town of Limestone has initiated efforts to address NPS pollution in the watershed. Technical assistance is available to watershed residents to mitigate phosphorus export from existing NPS pollution sources, and to prevent excess loading from future sources (page 20, TMDL report).

Assessment: Addressed, though not required.

11. Public Participation

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

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

The public participation process for Trafton Lake TMDL is described on pages 33-34 of the report. ME DEP issued public notice of the TMDL availability on September 12, 2006 electronically direct to watershed stakeholders, via local newspapers, and on ME DEP's Internet web site. MACD and CA-SWCD co-sponsored a public meeting in Limestone on June 7, 2006 to collect information on agricultural conservation practices, discuss the TMDL, and solicit stakeholder feedback on land use maps. The public comment deadline was October 11, 2006. ME DEP received comments from two parties, responded (page 34 TMDL report), and incorporated those public comments into the final report.

Assessment: EPA Region I concludes that ME DEP has done an adequate job of involving the public during the development of the TMDL, provided adequate opportunities for the public to comment on the TMDL, and provided reasonable responses to the public comments.

Data for entry in EPA's National TMDL Tracking System

TMDL Name*	**Trafton Lake**
Number of TMDLs*	1
Lead State / Towns	Maine (ME) / Town of Limestone
TMDL Status	Final
Pollutant ID	515 (total phosphorus)
TMDL End Point	16 ppb TP
TMDL Type	Nonpoint Source
List ID (from system)	
Impairment ID (from system)	Decline in water quality due to excessive nutrient loading from nonpoint sources.
Cycle (list date)	2004 (use 2002 until 2004 is in the system)
Establishment Date (approval)	October 26, 2006
EPA Developed	No / EPA Approved

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