

04/21/08

EPA NEW ENGLAND'S TMDL REVIEW

TMDL: **Long Pond**, Kennebec County, Maine
HUC: ME 0103000310; ME ID# 5272 located in Belgrade, Rome, and Mount Vernon, ME
2006 303(d) list: Trophic Trend; 2008 TMDL development.

STATUS: Final

IMPAIRMENT/POLLUTANT: Trophic Trend 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 Long Pond TMDL for total phosphorus (TP) with a transmittal letter dated April 18, 2008.

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.

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 TMDL describes the waterbody and the cause of impairment as identified in the 2006 303(d) list (see pages 4, 11, and 35 TMDL report). Long Pond is a large (2,666-acre), dual-basin, dimictic, non-colored lake with a 22 square mile direct drainage area, and total watershed drainage area of 75 square miles, including Great, Whittier, McIntire, Kidder, and Ingham Ponds. The north basin of Long Pond has a flushing rate of roughly 3.0 times per year, and the south basin has a flushing rate of 3.5 times per year. Thermal stratification commonly results in oxygen depletion in the hypolimnion by August or September. Although the water quality of Long Pond is considered to be above average (page 11 TMDL report), water quality of both basins have generally declined over the long historical monitoring period (since 1970), with water clarity declining by more than one meter over the past three decades. This gradual, downward trend in water clarity violates Maine's water quality standards for Class GPA waters. The decreasing trophic state is attributed to increasing residential development, agriculture, and to a lesser degree, commercial development (page 4 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 (14%) and from 15 subcategories of land use within the watershed which include: agricultural land, shoreline development, non-shoreline development, and non-developed land (see Tables 7 and 8 pages 37-38 TMDL report). The several ponds mentioned above account for loading from the indirect watersheds. Information on human development is provided (pages 11-12 TMDL report). Internal sediment recycling is evaluated (page 41 TMDL report).

ME DEP explained that it was not possible to separate natural background from nonpoint sources (page 36 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 from the total nonpoint source load.

ME DEP provides an explanation and analytical basis for expressing the TMDL for trophic trend impairment 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.

The Long Pond TMDL describes the applicable narrative water quality standards (page 36 TMDL report). The report defines applicable narrative criteria, designated uses, and antidegradation policy. Maine DEP water quality goals for lakes include a stable or decreasing trophic state, and limiting the presence of blooms due to NPS or cultural eutrophication to non-sustained and non-repeated bluegreen summer-time algae blooms.

ME DEP identifies a numeric water quality target for the TMDL of **8 ppb** total phosphorus (TP) (1,834 kg TP/yr for Long Pond North, and 1,947 kg TP/yr for Long Pond South) which ME DEP predicts will result in the attainment of water quality standards. The numeric target was selected based on a state-wide database for lakes, supported by in-lake water quality data. Based on historical water quality records, Long Pond has at times attained this goal, as reflected in suitable measures of both Secchi disk transparency (>2.0 meters) and chlorophyll-a (<8.0 ppb) levels (page 36 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 Long Pond is set at the following levels, based on a target goal of 8 ppb (see page 40 TMDL report):

- **1,834 kg TP/yr** for Long Pond North basin, and
- **1,947 kg TP/yr** for Long Pond South basin.

The loading capacity is set to protect water quality and support uses during *critical conditions* which occur during the late summer and early autumn season when environmental conditions (e.g., higher temperatures, increased light intensity, etc.) are most favorable for aquatic plant growth, and the occurrence and frequency of nuisance algae blooms are greatest (page 42 TMDL report). The TMDL target of 8 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 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 (page 40 TMDL report). (The average monthly loads are also calculated and expressed as daily loading capacity for each month, as discussed below.) 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 36 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 (pages 41-42 TMDL report);
- Estimating and accounting for future development (page 41 TMDL report);
- Using an in-lake phosphorus concentration model to determine phosphorus reduction needed to meet the numeric target (page 24 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 44 and 45 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 for each month of the year (daily loads range from 1.12 kg/day TP in August to 13.86 kg/day TP in April for the north basin; from 1.22 kg/day TP in August to 14.78 kg/day TP in April for the south basin).

Assessment: EPA Region I concludes that the loading capacity has been appropriately set at a level necessary to attain and maintain applicable water quality standards for the lake. The TMDL is based on a reasonable and widely accepted approach for establishing the relationship between pollutant loading and water quality in lakes.

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 **1,834 kg TP/yr** for Long Pond North, and **1,947 kg TP/yr** for Long Pond South as the “load allocation”, a gross allotment to existing and future nonpoint sources and to natural background (page 43 TMDL report). Calculation of necessary reduction on an annual basis is determined using an in-lake phosphorus concentration model (page 24 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.

Long Pond 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 at **0 (zero) kg/year** of total phosphorus because there are no known existing point sources of pollution (including regulated stormwater sources) in the lake watershed (page 43 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 Long Pond TMDL includes an implicit margin of safety (MOS) through the relatively conservative selection of the numeric water quality target of 8 ppb as well as the selection of relatively conservative phosphorus export loading coefficients for cultural pollution sources (Tables 7-8, pages 37-38 TMDL report). Based on the lake's historical records and ME DEP's analysis of a state-wide limnological database, ME DEP believes that a target of 8 ppb represents a highly conservative goal to assure future attainment of Maine DEP water quality goals of a stable or decreasing trophic state (page 43 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 8 ppb based on a state-wide data base for non-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 Long Pond 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 43 TMDL report). The TMDL is protective of all seasons, given the lake's flushing rates of 3.0 (north) and 3.5 (south) flushes per year, and the fact that proposed best management practices (BMPs) have been designed to address TP loading during all seasons.

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

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 Long Pond TMDL is not a phased TMDL, but the document includes a description of a monitoring plan designed to measure progress toward TMDL implementation and attainment of water quality standards. The TMDL describes the history of volunteer monitoring (since 1970), 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 Lake 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 32 TMDL report).

Assessment: EPA Region I concludes that the ongoing monitoring by ME 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 Long Pond phosphorus control action plan is described in pages 25-31 of the TMDL report, and includes recommendations for future work. Specific recommendations for nine action items address the following sources of pollution: agriculture, shoreline erosion, roadways, septic systems, and individual and municipal actions of landowners, homeowners, and municipal officials. There are also recommendations for forest land conservation & management and managing future watershed development.

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 Belgrade Lakes Association (BLA), the Belgrade Regional Conservation alliance (BRCA), Maine Congress of Lakes Association (COLA), and the watershed towns, including the Towns of Belgrade, Rome, and Mount Vernon. The Towns have long recognized the value of local water resources and the ME DEP commends them for providing strong support to lake restoration and protection efforts. The BRCA and BLA have also worked to address invasive aquatic species, and a Watershed Based Management Plan for Long Pond is under development (page 32 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 Long Pond TMDL is described on pages 47-48 of the report and involved several meetings with local officials and watershed groups during winter and spring of 2007. A preliminary two-week stakeholder review of the report was started February 22, 2008. ME DEP issued public notice of the TMDL availability electronically direct to watershed stakeholders, via local newspaper, and on ME DEP’s Internet web site on March 13,

2008, with a deadline for public comment of April 11, 2008. ME DEP received further comment from two stakeholders. Responses to those comments were addressed in or incorporated into the final report (pages 48-49 TMDL 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.

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