



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

September 1, 2005

Andrew Fisk  
Maine Department of Environmental Protection  
#17 State House Station  
Augusta, Maine 04333-0017

**SUBJECT: Notification of Approval of Duckpuddle Pond TMDL**

Dear Mr. Fisk:

Thank you for Maine's submittal of the Duckpuddle Pond Total Maximum Daily Load (TMDL) for total phosphorus. This waterbody is included on Maine's 2004 303(d) list and was prioritized for TMDL development. The purpose of the TMDL is to address impaired primary contact recreational use due to excessive nutrient loading from nonpoint source pollution.

The U.S. Environmental Protection Agency (EPA) hereby approves Maine's August 22, 2005 Duckpuddle Pond TMDL received by EPA electronically. EPA has determined that this TMDL meets the requirements of §303(d) of the Clean Water Act (CWA), and of EPA's implementing regulations (40 CFR Part 130). Attached is a copy of our approval documentation.

We are very pleased with the quality of your TMDL submittal. Your staff, in collaboration with the Maine Association of Conservation Districts, have done an excellent job of preparing and ground-truthing a comprehensive and informative TMDL report. My staff and I look forward to continued cooperation with the ME DEP in exercising our shared responsibility of implementing the requirements under Section 303(d) of the CWA.

Sincerely,

Linda M. Murphy, Director  
Office of Ecosystem Protection

cc (electronic):  
David Courtemanch, ME DEP  
David Halliwell, ME DEP

9/1/05

## EPA NEW ENGLAND'S TMDL REVIEW

**TMDL:** **Duckpuddle Pond**, Lincoln County, Maine  
HUC: ME 0105000303; ME ID# 5702 located in Waldoboro and Nobleboro, ME  
2004 303(d) list: Primary Contact ; 2003-5 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 Duckpuddle Pond TMDL for total phosphorus (TP) with a transmittal letter dated August 22, 2005. ME DEP took into account all of EPA's July 27, 2005 comments on the July 1, 2005 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.

**REVIEWERS:** Jennie Bridge (617-918-1685) E-mail: [bridge.jennie@epa.gov](mailto:bridge.jennie@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 TMDL describes the waterbody and the cause of impairment as identified in the 2004 303(d) list (see pages 9-10 and 24 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 (6%) and from 19 subcategories of land use within the watershed which include: agricultural and forested land, shoreline development, non-shoreline development, and non-developed land (see Table 3 page 26 TMDL report). Information on population and growth characteristics is provided (page 10 TMDL report). Internal sediment recycling is evaluated (page 29 TMDL report).

ME DEP explained that it was not possible to separate natural background from nonpoint sources (page 24 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, and attempting to do so would add little value to the analysis.

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 New England concludes that the ME DEP has done an adequate job of describing the TMDL waterbody segment, pollutant of concern, and identifying and 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.*

Duckpuddle Pond TMDL describes the applicable narrative water quality standards (see page 24-25 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) (335 kg TP/yr) which ME DEP predicts will result in the attainment of water quality standards. The numeric target was selected using best professional judgment based on available late spring – early summer (pre water column stratification) water quality data (average epilimnion grab/core samples) generally corresponding to non-bloom conditions, as reflected in measures of both Secchi disk transparency (>2.0 meters) and chlorophyll-a (<8.0 ppb) levels in highly colored water (pages 24-25 TMDL report).

**Assessment:** EPA New England 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 Duckpuddle Pond is set at **335 kg TP/yr** (see page 28 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 30 TMDL report).

ME DEP links water quality to phosphorus loading using two methods:

(1) Empirical phosphorus retention model to calculate loading capacity:

- Pick a target in-lake phosphorus concentration level (expressed as ppb TP), based on historic state-wide and in-lake water quality data (page 25 TMDL report),
- Use an empirical phosphorus retention model, calibrated to in-lake phosphorus concentration data, to calculate the loading capacity (expressed as kg TP/yr) (29-30 TMDL report).

(2) In-lake concentration model to calculate current and future phosphorus reductions needed:

- Divide the annual loading capacity by the in-lake concentration target, and multiply by the difference between the measured average summertime TP concentration and the in-lake concentration target to calculate the reduction in current load needed to reach the target goal.
- Estimate the amount of increased TP-load over the past 5 years to account for anticipated future development (page 28 TMDL report).
- Add these current and future load estimates to calculate the total annual TP reductions needed to meet the target concentration.

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

ME DEP explains the justification for expressing the loading capacity as an annual load, as opposed to a daily load, lies in the lake basin's relatively low annual flushing rate (3.1 flushes per year) (page 28 TMDL report).

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

EPA New England also concurs with expressing the TMDL as an annual loading based on the reason provided by ME DEP (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 **335 kg TP/yr** for Duckpuddle Pond as the "load allocation", a gross allotment to existing and future nonpoint sources and to natural background

(page 30 TMDL report). Calculation of necessary annual reduction in TP (as described in section 3 above) is provided (page 18 TMDL report).

**Assessment:** EPA New England concludes that the load allocation is adequately specified in the TMDL at a level necessary to attain and maintain water quality standards.

## 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.*

Duckpuddle 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 explains that, as “There are no known existing point sources of pollution (including regulated stormwater sources)” in the lake watershed, “the waste load allocation for all existing and future point sources is set at 0 (zero) kg/year of total phosphorus” (page 30 TMDL report).

**Assessment:** EPA New England 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.*

Duckpuddle Pond TMDL includes an implicit margin of safety (MOS) through the 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 3) (page 31 TMDL report). Based on both historical records and ME DEP’s analysis of a state-

wide limnological database for colored (>30 SPU lakes), ME DEP believes that a target of 16 ppb is a conservative goal because “nuisance algae blooms (plankton growth of algae which causes Secchi disk transparency to be less than 2 meters) are more likely to occur at 18 ppb or above. ME DEP also mentions that the inherently conservative methods used to estimate future growth provide an additional unquantified margin of safety for attainment of state water quality (pages 28 - 29, TMDL report).

**Assessment:** EPA New England concludes that adequate MOS is provided for the following reasons: (1) EPA believes a significant 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)).*

Duckpuddle 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 (see page 31 TMDL report). The TMDL is protective of all seasons, given the lake’s flushing rate of 3.1 flushes/year, and the fact that proposed BMPs have been designed to address TP loading during all seasons.

**Assessment:** EPA New England 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 through 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 Duckpuddle Pond TMDL describes the history of volunteer monitoring (since 1990), and describes the continued cooperative water quality monitoring to be conducted bi-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 (see page 21 TMDL report).

**Assessment:** EPA New England concludes that the ongoing monitoring by the 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 Duckpuddle Pond phosphorus control action plan is described in pages 18-20 of the TMDL report, including recommendations for future work. Specific recommendations for four action items address the following sources of pollution: individual action of landowners and shoreline erosion, septic system phosphorus loading, and roadways.

**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 past and current work in the watershed which point to a local commitment to improving water quality in Duckpuddle Pond (see page 21 TMDL report). The report documents technical assistance provided to resident landowners by the Knox Lincoln Soil and Water Conservation district (KL-SWCD) since the mid-1990's, as well as collaborative approach among residents, town, state, and federal stakeholders to water quality restoration. The report flags a "recently completed 319 [Clean Water Act –funded] nonpoint source project that



estimates a reduction of 238 kg/yr of phosphorus entering Duckpuddle Pond waterways.” (page 21 TMDL report)

**Assessment:** Addressed, though not required, since this TMDL does not establish less stringent WLAs in reliance on greater load reductions from nonpoint sources.

## 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 Duckpuddle Pond TMDL is described on pages 31-32 of the TMDL report. ME DEP issued public notice of the TMDL availability on July 1, 2005 via ME DEP’s Internet web site and later in local newspapers, following a preliminary review by interested organizations/individuals representing the stakeholder group. Several local meetings, consultations, lake monitoring and survey sessions involved discussions about land use and phosphorus load reductions in the Duckpuddle Pond watershed during the summers 2004-5. The four-week public comment deadline was July 29, 2005. ME DEP received comments from Maine Departments of Agriculture, and Conservation.

**Assessment:** EPA New England concludes that ME DEP has done a full and meaningful 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*	<b>Duckpuddle Pond</b>
Number of TMDLs*	<b>1</b>
Lead State / Towns*	Maine (ME) / Waldoboro and Nobleboro
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)	2002 (until 2004 list is in the system)
Establishment Date (approval)	September 1, 2005
EPA Developed	No

\* Data needed for EPA Region 1 web page.

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