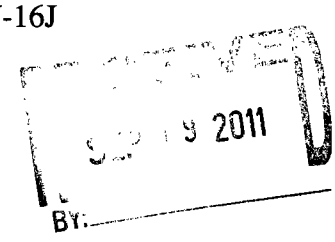
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 14 2011

REPLY TO THE ATTENTION OF:
WW-16J



Rebecca J. Flood, Assistant Commissioner
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

Dear Ms. Flood:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Loads (TMDLs) for Spring and Upper Prior Lakes, including supporting documentation and follow-up information. Spring Lake, ID 70-0055-00, and Upper Prior Lake, ID 70-0072-00 are located in the southwestern suburban Twin Cities metropolitan area. The TMDLs were calculated for phosphorus. The TMDLs address the excessive nutrient impairment of Class 2B waters for Aquatic Recreation Use.

The TMDLs meets the requirements of section 303(d) of the Clean Water Act and EPA's implementing regulations at 40 C.F.R. Part 130. Therefore, EPA hereby approves Minnesota's phosphorus TMDLs, addressing excess nutrients. The statutory and regulatory requirements, and EPA's review of Minnesota's compliance with each requirement, are described in the enclosed decision document. We wish to acknowledge Minnesota's effort in submitting these TMDLs and look forward to future TMDL submissions by the State of Minnesota. If you have any questions, please contact Mr. Peter Swenson, Chief of the Watersheds and Wetlands Branch, at 312-886-0236.

Sincerely,

Tinka G. Hyde
Director, Water Division

Enclosure

cc: Dave L. Johnson, MPCA
Chris Zadak, MPCA

TMDL: Spring and Upper Prior Lakes, Minnesota
Date:

DECISION DOCUMENT
SPRING AND UPPER PRIOR LAKES, MN PHOSPHORUS TMDLS

Section 303(d) of the Clean Water Act (CWA) and U.S. EPA's implementing regulations at 40 C.F.R. Part 130 describe the statutory and regulatory requirements for approvable TMDLs. Additional information is generally necessary for U.S. EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and U.S. 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. Use of the term "should" below denotes information that is generally necessary for U.S. EPA to determine if a submitted TMDL is approvable. These TMDL review guidelines are not themselves regulations. They are an attempt to summarize and provide guidance regarding currently effective statutory and regulatory requirements relating to TMDLs. Any differences between these guidelines and U.S. EPA's TMDL regulations should be resolved in favor of the regulations themselves.

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

The TMDL submittal should identify the waterbody as it appears on the State's/Tribe's 303(d) list. The waterbody should be identified/georeferenced using the National Hydrography Dataset (NHD), and the TMDL should clearly identify the pollutant for which the TMDL is being established. In addition, the TMDL should identify the priority ranking of the waterbody and specify the link between the pollutant of concern and the water quality standard (see section 2 below).

The TMDL submittal should include an identification of the point and non-point sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the NPDES permits within the waterbody. Where it is possible to separate natural background from non-point sources, the TMDL should include a description of the natural background. This information is necessary for U.S. 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 spatial extent of the watershed in which the impaired waterbody is located;
(2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;
(4) present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and
(5) an 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; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comments:

Location Description: Spring Lake (Segment ID# 70-0055-00) and Upper Prior Lake (Segment ID# 70-0072-00) were initially listed on the Minnesota Pollution Control Agency (MPCA) 2002 Section 303(d) list for impaired aquatic recreation use due to excessive nutrients. Spring Lake and Upper Prior Lake are located in the southwestern suburban Twin Cities metropolitan area. The lakes are located in the City of Prior Lake and Spring Lake Township. However, the drainage area also includes portions of Sand Creek Township. Both lakes are located in the North Central Hardwood Forest (NCHF) ecoregion. Most of the watershed drains into Spring Lake, which then flows into Upper Prior Lake. Figure 3.3 of the TMDL submittal identifies the watershed flows.

Spring Lake is centrally located within the Prior Lake-Spring Lake Watershed District. The watershed for Spring Lake includes wetlands and several smaller lakes (Sutton, Fish and Buck Lakes). Spring Lake has a surface area of 642 acres and the average depth of 16 feet. The lake is classified as a deep lake with a maximum depth of 35 feet and 47% littoral. The watershed area for Spring Lake is approximately 12,670 acres.

Upper Prior Lake is located in the Prior Lake-Spring Lake Watershed District. The watershed for Upper Prior Lake includes drainage from Spring Lake as well as several smaller lakes (Rice Lake, Crystal Lake, and Crystal Bay). Upper Prior Lake has a surface area of 337 acres and is defined as a shallow lake, with an average depth of 11 feet, a maximum depth of 45 feet, and 81% of the lake is littoral. The total watershed draining to Upper Prior Lake is about 16, 116 acres, of which 3400 acres do not drain through Spring Lake (Table 3.2 of the TMDL).

Land Use: Land use in the Spring Lake Upper Prior Lake watershed is discussed in Section 3.2 of the TMDL submittal. The watershed is land coverage is approximately 30% wetlands, 40% agriculture, and 30% urban. MPCA identified several different types of wetlands within the watershed, as well as different types of agriculture and urban land uses. Table 3.2 of the TMDL submittal breaks out in more detail the land use for each watershed.

Pollutant of Concern: The pollutant of concern for these TMDLs is phosphorus. Levels of phosphorus are above water quality targets, limiting all types of aquatic recreation, including fishing and swimming. Excess phosphorus stimulates excessive plant growth (algae and nuisance plants/weeds). This enhanced plant growth reduces dissolved oxygen in the water when dead plant material decomposes and can cause other organisms to die. Chlorophyll-a is a primary pigment in aquatic algae. Chlorophyll-a levels correlate well with algal production. Secchi depth is an indicator for water clarity and quality and is measured by lowering a probe into the water until it can no longer be seen from the surface.

The lakes have been sampled periodically for total phosphorus and Secchi depth since 1982, and for chlorophyll-a since 1998. Results of the sampling efforts show that nutrient levels have been consistently high, in some cases as high as 200 µg/l total phosphorus (Section 3 of the TMDL).

For the TMDL, monitoring data from 1982-2006 and modeling were used to estimate current phosphorus loadings to the lakes.

Pollutant sources: Point sources contributing to the nutrient impairment in the Spring Lake Upper Prior Lake watershed include Municipal Separate Storm Sewer System (MS4) permits, construction stormwater and industrial stormwater. Table 5-1 in Section 5.1.1 in the TMDL submittal identifies specific permits in the watershed. The nonpoint source contributions were determined to be from upstream lakes (identified earlier in this document), nonpoint source run-off, septic systems, atmospheric deposition, and internal loads (Section 4 of the TMDL). Much of the load in Prior Lake is from Spring Lake (Section 3 of the TMDL).

Urban/Residential sources: Nutrients may be added via runoff from urbanized areas in the watershed. Runoff from residential properties can include phosphorus derived from fertilizers, leaf and grass litter, pet wastes, and other sources of anthropogenic derived nutrients.

Internal loading: The release of phosphorus from sediment, the release of phosphorus via physical disturbance from benthic fish (rough fish, ex. carp), the release of phosphorus from wind mixing the water column, and the release of phosphorus from decaying pondweeds, can all contribute internal phosphorus loading to Spring and Upper Prior Lakes. Phosphorus can build up in the bottom waters of the lake and can be resuspended or mixed into the water column.

Agricultural sources (Pasture and Row Crops): Phosphorus may be added via surface runoff from upland areas used for pasture of livestock. Manure can be washed off the pastureland and into streams and then in the lakes. Stormwater runoff from croplands can mobilize nutrients to surface waters from sources such as livestock manure, fertilizers, vegetation and erodible soils, which may be already phosphorus–rich.

Inadequate Subsurface Sewage Treatment Systems (SSTS): Phosphorus may be added to the surface waters in the subwatershed from failing septic systems. Age, construction and use of SSTS can vary throughout a watershed and influence the nutrient contribution from these systems.

Atmospheric deposition: Phosphorus may be added via particulate deposition. Particles from the atmosphere may fall onto lake surfaces or other surfaces within the Spring Lake Upper Prior Lake watershed. Phosphorus can be bound to these particles which can add to the phosphorus inputs to surface water environments. MPCA considers this to be a very small source.

Priority Ranking: Minnesota's 2008 303(d) list includes a projected schedule for TMDL completions. This schedule reflects the state's priority ranking of impaired waters. The TMDL schedule for Spring and Upper Prior Lakes was prioritized to start in 2004 and be completed in 2010.

Future Growth: The TMDL did not set aside an allocation for future growth. However, MPCA determined the allocations based upon the anticipated land use in the watershed (Section 5.1.1 of the TMDL). This was based upon the 2030 Land Use Plan for the City of Prior Lake, and included anticipated expansion of the MS4 permit area.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this first element.

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

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. (40 C.F.R. §130.7(c)(1)). U.S. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

The TMDL submittal must identify a numeric water quality target(s) – a quantitative value used to measure whether or not the applicable water quality standard is attained. Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. The TMDL expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. Occasionally, the pollutant of concern is different from the pollutant that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as Dissolved Oxygen (DO) criteria). In such cases, the TMDL submittal should explain the linkage between the pollutant of concern and the chosen numeric water quality target.

Comments:

Use Designation: Both of the lakes are classified as Class 2B waters (MN. R. 7050.0430). The designated uses addressed by this TMDL are aquatic recreation for 2B waters. Class 2 waters include waters which "do or may support fish, other aquatic life, bathing, boating, or other recreational purposes..." (MN R. 7050.0150(3)).

Numeric Standards: Minnesota has numeric criteria for nutrients that limit the quantity of nutrients entering waters (Table 1 below). MN R. 7050.0222(4) defines the numeric criteria, based upon ecoregions. Both lakes are in the North Central Hardwood Forest ecoregion. Upper Prior Lake is classified by MPCA as a shallow lake and Spring Lake is classified as a deep lake (Section 1.3 of the TMDL). Lakes are to meet the applicable criteria:

Table 1. Applicable numeric criteria for Spring and Upper Prior Lakes

Parameter	**Criteria** (shallow) **Upper Prior Lake**	**Criteria** (deep) Spring Lake
Phosphorus concentration (µg/L)	60	40
Chlorophyll-a concentration (µg/L)	20	14
Secchi Disk transparency (meters)	>1.0	>1.4

Targets:
To achieve the designated use and the applicable eutrophication criteria, MPCA selected the total phosphorus number as the primary target of the TMDL (Section 2.0 of the TMDL).

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this second element.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a waterbody for the applicable pollutant. U.S. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

The pollutant loadings may be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. §130.2(i)). If the TMDL is expressed in terms other than a daily load, e.g., an annual load, the submittal should explain why it is appropriate to express the TMDL in the unit of measurement chosen. The TMDL submittal should describe the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

The TMDL submittal should contain documentation supporting the TMDL analysis, including the basis for any assumptions; a discussion of strengths and weaknesses in the analytical process; and results from any water quality modeling. U.S. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

TMDLs must take into account *critical conditions* for steam flow, loading, and water quality parameters as part of the analysis of loading capacity. (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable *critical conditions* and describe their approach to estimating both point and non-point source loadings under such *critical conditions*. In particular, the TMDL should discuss the approach used to compute and allocate non-point source loadings, e.g., meteorological conditions and land use distribution.

Comments:

MPCA determine that the total loading capacity, i.e., total maximum daily load, of total phosphorus for the Spring Lake (Segment ID# 70-0055-00) is **5.0** lbs/day. The loading for Upper Prior Lake (Segment ID # 70-0072-00) was determined to be **8.34** lbs/day. See Section 5 and Tables 5.3 and 5.4 of the final TMDL submittal reprinted below.

Modeling summary: The loading capacity determinations used for Spring and Upper Prior Lakes are based on three models, the SWMM model, the ArcSWAT GIS interface, and BATHTUB.

- SWMM (Storm Water Management Model) – a dynamic rainfall run-off simulation model used to determine the amount of run-off in the watershed
- SWAT (Soil Water Interface Tool) - a continuous time model that determines unit area loads of pollutants based upon precipitation, land use, and soil types.
- BATHTUB – a water quality model that uses the data from the above models in combination with lake water quality data to predict nutrient loads and concentrations.

To calculate the loadings needed to meet standards, several equations used within the BATHTUB model were incorporated into a spreadsheet model and used to estimate the

phosphorus, chlorophyll-a, and Secchi depth response in Spring and Upper Prior Lakes. Calibration factors were not used to adjust the model equations. Detailed results of the lake response modeling can be found in Appendix B of the TMDL submittal. To validate the model, model results were compared to available phosphorus, chlorophyll-a, and Secchi depth data collected from 1998 through 2006.

The Canfield-Bachmann natural lakes model is a model developed specifically for reservoirs, that simulates in-lake phosphorus concentrations based on phosphorus loading rates, lake geometry and water residence time in the lakes. The equations area used from the Canfield-Bachmann model is a subset of the BATHTUB model. The BATHTUB model was used to estimate the total phosphorus load needed to explain the observed water quality, as well as the amount of phosphorus load reduction needed to achieve the TMDL target in-lake phosphorus concentration of 40 µ/L and 60 µ/L respectively for Spring and Upper Prior Lakes.

The water quality models were applied to in-lake total phosphorus (TP) data (summer surface averages) for the nine-year period from 1998 through 2006 and were first used to simulate the observed conditions for each year (Section 4.4 of the TMDL). The lakes' overall water and phosphorus budgets for each year were estimated as part of the simulations. Without changing the water budgets, the models were then applied with the overall phosphorus load reduced by 5% increments over a range of 0% to 95% reductions. The allowable load for each lake and year can then be interpolated from the tabulated results (Appendix B of the TMDL). Figures 5.2 and 5.3 of the TMDL show the results of modeling effort and the allowable loads calculated for the model period.

Spring Lake was modeled using the Canfield-Bachmann natural lakes model. The State indicated that the model adequately predicted monitored phosphorus concentrations for most years (Figure 4.9 for the TMDL for model calibration results). Based on these results the model was considered reasonable for Spring Lake.

The Canfield-Bachmann model was applied to Upper Prior Lake; however the State indicated that the model performed poorly for most years (Figure 4.10 of the TMDL). To improve the model performance, a second order decay model was selected for Upper Prior Lake. According to the State, using this model, water quality predictions had a better correlation. Therefore the State determined that the water quality response model is considered reasonable for Upper Prior Lake.

Minnesota lakes typically demonstrate impacts from excessive nutrients during the summer growing season (June 1 through September 30) including excessive algal blooms and fish kills. Consequently, the critical condition for these lakes is the summer growing season. Lake goals have focused on summer-mean total phosphorus, Secchi transparency and chlorophyll-a concentrations. Consequently, the lake response models have focused on the summer growing season as the critical condition.

MPCA determined that Spring Lake has approximately 49% of the load coming from internal sources, with approximately 47% coming from the watershed and the remaining 4% coming from atmospheric deposition and septic systems. For Upper Prior Lake, approximately 50 % of the load was determined to be coming from internal sources, with 42% coming from upstream

lakes (38% from Spring Lake), and 8% from direct watershed discharge, atmospheric deposition and septic systems (Section 4.5 of the TMDL).

The load calculations for Spring Lake resulted in meeting the summer average TP criteria of 40 µg/L, and the load calculations for Upper Prior Lake resulted in meeting the summer average TP criteria of 60 µg/L. In developing the lake nutrient standards for Minnesota lakes (Minn. Rule 7050), MPCA evaluated data from a large cross-section of lakes within each of the state's ecoregions. Clear relationships were established between the causal factor total phosphorus and the response variables chlorophyll-a and Secchi depth. Based on these relationships MPCA believes by meeting the phosphorus targets for Spring and Upper Prior Lakes the chlorophyll-a standards (14 µg/L and 20 µg/L, respectively) and Secchi standards (1.4 m and 1.0 m, respectively) will also be met. The EPA agrees with this analysis. (Figures 5.3 and 5.4 of the TMDL copied below.)

Table 5.3. TMDL total phosphorus allocations expressed as annual and daily loads for Spring Lake.

Allocation	Source	Existing TP Load[1,2]		TP Allocations[2]		Reduction
		lbs/year	lbs/day	lbs/year	lbs/day	lbs/year
Wasteload Allocation	MS4 - Mn/DOT	43.8	0.12	15.9	0.04	28
	MS4 - Other Municipal; see Table 5.1	1308.2	3.6	472.1	1.3	836
	Construction Stormwater					
	Industrial Stormwater					
Load Allocation	Upstream Lake	63	0.2	63	0.2	0
	Watershed Load[3]	3,595	9.8	636	1.7	2,959
	Septic	263	0.7	0	0	263
	Atmospheric	30	0.1	30	0.10	0
	Internal	5,161	14.1	607	1.7	4,554
	TOTAL LOAD	**10,464**	**28.62**	**1,824**	**5.04**	**8,640**

[1] Existing load is based on calibrated areal unit loads; water budget is the average for the years 1998-2006.
[2] Annual loads converted to daily by dividing by 365.25 days per year accounting for leap years
[3] The watershed load is the load from the watershed that is not regulated under an MS4 permit.

Table 5.4. TMDL total phosphorus allocations expressed as annual and daily loads for Upper Prior Lake.

Allocation	Source	Existing TP Load [1,2]		TP Allocations [2]		Reduction
		lbs/year	lbs/day	lbs/year	lbs/day	lbs/year
Wasteload Allocation	MS4 - Mn/DOT	36.4	0.10	36.4	0.10	0
	MS4 - Other Municipal; see Table 5.1	382.6	1.0	382.6	1.0	0
	Construction Stormwater					
	Industrial Stormwater					
Load Allocation	Upstream Lakes	2,179	6.0	611	1.7	1,568
	Septic	4	0.01	0	0	4
	Atmospheric	16	0.04	16	0.04	0
	Internal	2,598	7.1	2,027	5.5	571
	TOTAL LOAD	**5,216**	**14.25**	**3,073**	**8.34**	**2,143**

[1] Existing load is based on calibrated areal unit loads; water budget is the average for the years 1998-2006.
[2] Annual loads converted to daily by dividing by 365.25 days per year accounting for leap year

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this third element.

4. Load Allocations (LAs)

U.S. EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future non-point sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Where possible, load allocations should be described separately for natural background and non-point sources.

Comments:

The TMDL report submitted by MPCA identified the LA of total phosphorus for Spring Lake to be 3.7 lbs/day to meet standards (Section 5.1.4 and Table 5.3 of the final TMDL submittal and reprinted above). This LA (3.7 lbs/day) corresponds to an approximately 85% reduction from the estimated existing phosphorus load by nonpoint sources. The existing nonpoint sources contributing to the LA include upstream lakes, watershed load (load not regulated by MS4 permits), septic systems, atmospheric deposition and internal loads.

The TMDL report submitted by MPCA identified the LA of total phosphorus for Upper Prior Lake to be 7.24 lbs/day (Section 5.1.4 and Table 5.4 of the final TMDL and reprinted above) to meet standards. This LA corresponds to an approximately 45% reduction from the estimated existing phosphorus load by nonpoint sources. The existing nonpoint sources contributing to the LA include upstream lakes, septic systems, atmospheric deposition and internal loads.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this fourth element.

5. Wasteload Allocations (WLAs)

U.S. EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit.

The individual WLAs may take the form of uniform percentage reductions or individual mass based limitations for dischargers where it can be shown that this solution meets WQSs and does not result in localized impairments. These individual WLAs may be adjusted during the NPDES permitting process. If the WLAs are adjusted, the individual effluent limits for each permit issued to a discharger on the impaired water must be consistent with the assumptions and requirements of the adjusted WLAs in the TMDL. If the WLAs are not adjusted, effluent limits contained in the permit must be consistent with the individual WLAs specified in the TMDL. If a draft permit provides for a higher load for a discharger than the corresponding individual WLA in the TMDL, the State/Tribe must demonstrate that the total WLA in the TMDL will be achieved through reductions in the remaining individual WLAs and that localized impairments will not result. All permittees should be notified of any deviations from the initial individual WLAs contained in the TMDL. U.S. EPA does not require the establishment of a new TMDL to reflect these revised allocations as long as the total WLA, as expressed in the TMDL, remains the same or decreases, and there is no reallocation between the total WLA and the total LA.

Comments:

The only point sources identified by MPCA were regulated stormwater, either as MS4 or construction/industrial in nature (Section 5 of the TMDL). The WLAs for both lakes' watersheds were aggregated together for all stormwater sources in each watershed, except for the Minnesota Department of Transportation (Mn/DOT). The individual WLAs for Mn/DOT's right-of-way (ROW) areas were calculated using the same percentage reductions as the average for the other MS4s within each watershed. These percentage reductions are 64% for Spring Lake and 0% for Upper Prior Lake (when Spring Lake meets its water quality standards, the reduction in its outflow load will be sufficient to bring Upper Prior Lake into compliance with its standards as well). For current conditions, Mn/DOT's loads were calculated using the areal export rate of 0.9 lb/ac-yr from Table 4.1 of the TMDL. Under the TMDL, Mn/DOT's WLA for Spring Lake corresponds to an areal export rate of 0.327 lb/ac-yr. Mn/DOT's ROW areas are 48.70 acres in Spring Lake's watershed, and 40.46 acres in Upper Prior Lake's watershed. Although parts of these areas are not yet in the Census Bureau-defined Urban Area, the total ROW areas were included in the WLAs in anticipation of the Urban Area expansion. The WLAs are expected to reduce the amount of phosphorus export associated with development of high loading land uses under current stormwater rules. The remaining reductions required to meet the standards are expected to come from Best Management Practices (BMP) implementation in the non-permitted areas. In the future it may be necessary to account for additional regulated discharges. For example, as development occurs within the watershed, the Census Bureau-defined Urban Area

may expand or new regulated conveyances not considered in this TMDL may be established. To account for additional regulated discharges, it may be necessary to transfer load, either from the LA to the WLA or from one MS4 to another. In the event that additional stormwater discharges come under permit coverage within the watershed, load will be transferred based on the process used to set wasteload allocations in the TMDL. MS4s will be notified and will have an opportunity to comment on the reallocation.

Wasteload allocations were set based on annexation plans for the City of Prior Lake for the year 2030 (Section 5.1.3 of the TMDL). A WLA based on these annexation plans account for future growth in the watershed. Therefore, no reserve capacity is included in this TMDL.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this fifth element.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety (MOS) 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)). U.S. EPA's 1991 TMDL 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.

Comments:

An implicit MOS has been incorporated into this TMDL by using a conservative modeling approach. The lake response model for total phosphorus used for this TMDL uses the rate of lake sedimentation, or the loss of phosphorus from the water column as a result of settling, to predict total phosphorus concentration. Sedimentation can occur as algae die and settle, as organic material settles, or as algae are grazed by zooplankton. Sedimentation rates in shallow lakes such as Upper Prior Lake can be higher than rates for deep lakes. Shallow lakes also differ from deep lakes in that they tend to exist in one of two stable states: turbid water and clear water. Lake response models assume that even when the total phosphorus concentration in a lake is at or better than the state water quality standard the lake will continue to be in the turbid state. As nutrient load is reduced, and other internal load management activities, such as fish community management, occur to provide a more balanced lake system, shallow lakes will tend to "flip" to a clear water condition. In that balanced, clear water condition, light penetration allows rooted aquatic vegetation to grow and stabilize the sediments thus allowing zooplankton to thrive and graze on algae at a much higher rate than is experienced in turbid waters. Hence, in a clear water state more phosphorus will be removed from the water column through settling than the model would predict. (See Section 5.3 of the TMDL)

In effect the TMDL is set to achieve water quality standards while still in a turbid water state. To achieve the designated use, the lake must change to a clear water state which can support the

response variables at higher total phosphorus concentrations due to increased zooplankton grazing and reduced sediment re-suspension.

Spring Lake is classified as a deep lake; however, its littoral area represents 47% of its total area. For this reason it shares some shallow-lake characteristics with Upper Prior Lake. The implicit MOS discussion above thus applies to both lakes.

U.S. EPA finds that the TMDL document submitted by MPCA contains an appropriate MOS satisfying all requirements concerning this sixth element.

7. Seasonal Variation

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

Comments:

Seasonal variation is accounted for through the use of annual loads and developing targets for the summer period where the frequency and severity of nuisance algal growth will be the greatest. Although the critical period is the summer, lakes are not sensitive to short term changes in water quality, rather lakes respond to long-term changes such as changes in the annual load. Therefore, seasonal variation is accounted for in the annual loads. Additionally, by setting the TMDL to meet targets established for the most critical period (summer), the TMDL will inherently be protective of water quality during all the other seasons.

The TMDL equations represent loads for the critical conditions in the lakes. Minnesota lakes typically demonstrate impacts from excessive nutrients during the summer growing season (June 1 through September 30) including excessive algal blooms and fish kills. Consequently, the critical condition for these lakes is the summer growing season. Lake goals have focused on summer-mean total phosphorus, Secchi transparency and chlorophyll-a concentrations. These parameters have been linked to user perception. Consequently, MPCA agrees that the lake response models focused on the summer growing season to represent the critical condition.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this seventh element.

8. Reasonable Assurances

When a TMDL is developed for waters impaired by point sources only, the issuance of a National Pollutant Discharge Elimination System (NPDES) permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with "the assumptions and requirements of any available wasteload allocation" in an approved TMDL.

When a TMDL is developed for waters impaired by both point and non-point sources, and the WLA is based on an assumption that non-point source load reductions will occur, U.S. EPA's 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that non-point source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for U.S. EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

U.S. EPA's August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by non-point sources. However, U.S. EPA cannot disapprove a TMDL for non-point source-only impaired waters, which do not have a demonstration of reasonable assurance that LAs will be achieved, because such a showing is not required by current regulations.

Comments:

Section 8 of the TMDL presents reasonable assurances alternatives for resolving the water quality problems associated with phosphorus in both Spring and Prior Lakes

An overall reduction of approximately 82% (23.58 lbs/day) for Spring Lake and approximately 41% (5.91 lbs/day) for Upper Prior in the current nutrient loading to the lake is necessary to achieve the water quality goals of 40 µ/l and 60 µ/l respectively for the lakes. Table 5.3 of the TMDL identified the load allocations for the watershed load (8.1 lbs/day reduction needed from the watershed loads excluding MS4 areas) from phosphorus sources to Spring Lake that could be directly achieved through the implementation of BMPs.

Prior Lake and Spring Lake Watershed District (PLSLWD) was formed in 1970. The PLSLWD developed its first management plan in 1971. The TMDL indicates that PLSLWD has prepared its "Third Generation Plan" watershed management plan. The TMDL stated this Plan focuses on stormwater volume and water quality improvement, and includes a revised Capital Improvement Plan. Rules amended by the District will incorporate more stringent stormwater volume management requirements for new development. After adoption of The Third Generation Plan, each of the local governments with land in the watershed must within two years revise their local Water Management Plans to be consistent with the revised PLSLWD plan.

The PLSLWD will continue to work the City of Prior Lake and Scott County Soil and Water Conservation District to incorporate new BMPs to treat stormwater before it carries nutrients into the lake (Section 8.2 of the TMDL). The PLSLWD will continue to work on issues to address both carp and curlyleaf pondweed in the lakes.

City of Prior Lake, Scott County and Mn/DOT all have MS4 discharge permits allowing discharge to the lakes. Sand Creek Township is not required to have an MS4 permit. The City of Savage has land in the watershed but discharges stormwater downstream of Spring and Prior Lakes. Under the NPDES stormwater program, permit holders are required to develop and

implement a Stormwater Pollution Prevention Program (SWPPP). The SWPPP must cover six minimum control measures:

- Public Education
- Public participation/involvement
- Illicit discharge detection and elimination
- Construction site runoff control
- Post-construction site runoff control
- Pollution prevention/good housekeeping

The permit holder must identify BMPs and measurable goals associated with each minimum control measure.

The Clean Water Legacy Act (CWLA) is a statute passed in Minnesota in 2006 for the purposes of protecting, restoring, and preserving Minnesota water. The CWLA provides the process to be used in Minnesota to develop TMDL implementation plans, which detail the restoration activities needed to achieve the allocations in the TMDL. The TMDL implementation plans are required by the State to obtain funding from the Clean Water Fund. The Act discusses how MPCA and the involved public agencies and private entities will coordinate efforts regarding land use, land management, water management, etc. Cooperation is also expected between agencies and other entities regarding planning efforts, and various local authorities and responsibilities. This would also include informal and formal agreements and to jointly utilize technical educational, and financial resources. MPCA expects the implementation plans to be developed within a year of TMDL approval.

The CWLA also provides details on public and stakeholder participation, and how the funding will be used. The implementation plans are required to contain ranges of cost estimates for both point and nonpoint source load reductions, as well as monitoring efforts to determine effectiveness. MPCA has developed guidance on what is required in the implementation plans (Implementation Plan Review Combined Checklist and Comment, MPCA), which includes cost estimates, general timelines for implementation, and interim milestones and measures. The Minnesota Board of Soil and Water Resources administers the Clean Water Fund as well, and has developed a detailed grants policy explaining what is required to be eligible to receive Clean Water Fund money (FY '11 Clean Water Fund Competitive Grants Policy; Minnesota Board of Soil and Water Resources, 2011)

U.S. EPA finds that the TMDL document submitted by MPCA adequately addresses this eighth element.

9. Monitoring Plan to Track TMDL Effectiveness

U.S. EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (U.S. EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and non-point sources, and the WLA is based on an assumption that non-point source load reductions will occur. Such a TMDL should provide assurances that non-point source controls will achieve expected load reductions and, such TMDL should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring and leading to

attainment of water quality standards.

Comments:

Monitoring is necessary to determine whether sufficient progress is being made toward attaining WQS. The PLSLWD is in the process of developing a monitoring plan that focuses on the adaptive management approach outlined in the TMDL submittal report. The monitoring plan will focus on collecting data to reduce the uncertainty in the modeling approach as well as track improvements in water quality associated with The PLSLWD activities.

The monitoring will track the effectiveness of the BMPs and will continue to determine if additional action or BMPs will need to take place for the Lakes to meet the standards. Section 7.3 of the TMDL submittal discusses further details of the monitoring plan.

U.S. EPA reviews, but does not approve, monitoring plans. EPA finds that this criterion has been adequately addressed.

10. Implementation

U.S. EPA policy encourages Regions to work in partnership with States/Tribes to achieve non-point source load allocations established for 303(d)-listed waters impaired by non-point sources. Regions may assist States/Tribes in developing implementation plans that include reasonable assurances that non-point source LAs established in TMDLs for waters impaired solely or primarily by non-point sources will in fact be achieved. In addition, U.S. EPA policy recognizes that other relevant watershed management processes may be used in the TMDL process. U.S. EPA is not required to and does not approve TMDL implementation plans.

Comments:

Section 7 of the final TMDL submitted report presents some implementation alternatives for resolving the water quality problems associated with phosphorus in Spring and Prior Lakes by focusing on reducing the movement of phosphorus from the watershed area into the Lakes.

Implementation alternatives for nonpoint sources include:

- Internal- rough fish management and curlyleaf pondweed control
    - Sediment phosphorus inactivation- binding sediment with a chemical agent such as alum or iron
    - Manage fish population- work with the Minnesota Department of Natural Resources to monitor and maintain a beneficial fish population community
    - Vegetation management - chemical treatment to reduce the curlyleaf pondweed to a non-nuisance levels
    - The PLSLWD has prepared a whole lake macrophyte management plan for both Lakes.

- External-
  - Increase infiltration and filtration in the watershed
  - Target street sweeping
  - Retrofit BMPs
  - Encourage shoreline restoration
  - Conduct education and outreach awareness programs
  - Encourage agricultural conservation projects
  - Protect high-value wetlands to prevent phosphorus export

Although a formal implementation plan is not required as a condition for TMDL approval under the current U.S. EPA regulations, U.S. EPA finds that the TMDL document submitted by MPCA adequately addresses this tenth element.

11. Public Participation

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

Provision of inadequate public participation may be a basis for disapproving a TMDL. If U.S. EPA determines that a State/Tribe has not provided adequate public participation, U.S. EPA

may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by U.S. EPA.

Comments:

A technical advisory committee was established to allow interested stakeholders to be involved in key decisions involved in developing the TMDL. Stakeholders invited to the Technical Advisory Committee include local cities and counties, Minnesota DNR, the Metropolitan Council, the United States Geological Service and the Minnesota Pollution Control Agency. All meetings were open to interested individuals and organizations. Technical Advisory Committee meetings to review this and other lake TMDLs in the watershed were held on October 11, 2007 and January 11, 2008. Additionally, interested parties were asked to comment on the draft TMDL.

Stakeholder meetings were held on November 20, 2007, December 15, 2008, and March 4, 2009. The draft TMDL was made available for a 30-day public comment period from August 2, 2010 through September 1, 2010. The draft TMDL can be found at:
http://www.pca.state.mn.us/index.php/water/water-types-and-programs/minnesotas-impaired-waters-and-tmdls/tmdl-projects/minnesota-river-basin-tmdl-projects/project-upper-prior-spring-

lakes-excess-nutrients.html?menuid=&redirect=1. As part of the final TMDL submittal, the state provided to U.S. EPA copies of the press releases of public notice, the mailing list of interested parties, and copies of the written public comment letters received the during public comment period and the state responses to these comments. MPCA received six written public comments during the Spring Lake and Upper Prior Lake TMDL public comment period, and all of these comments were adequately addressed by MPCA.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this eleventh element.

12. Submittal Letter

A submittal letter should be included with the TMDL submittal, and should specify whether the TMDL is being submitted for a *technical review* or *final review and approval.* Each final TMDL submitted to U.S. EPA should 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 U.S. EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and U.S. EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final review and approval, should contain such identifying information as the name and location of the waterbody, and the pollutant(s) of concern.

Comments:

A transmittal letter submitting the final TMDL to USEPA was dated May 26, 2010 and received by the Watersheds & Wetlands Branch, Water Division, USEPA, R5 on June 3, 2011. The transmittal letter explicitly states that the final Total Maximum Daily Load for Spring and Upper Prior Lakes for excess nutrients is being submitted to USEPA for final review and approval. The letter clearly stated that this was a final TMDL.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this twelfth element.

13. Conclusion

After a full and complete review, U.S. EPA finds that the TMDLs for Spring Lake (Segment ID# 70-0055-00) and Upper Prior Lake (Segment ID# 70-0072-00) satisfy the elements of an approvable TMDL. This approval addresses two segments for one pollutant each for a total of two TMDLs addressing two impairments (see table below).

Impaired Reach Name	Assessment Unit ID	Pollutant	Impairment (s) Addressed by TMDL
Spring Lake	70-0055-00	Total phosphorus	Nutrients/Eutrophication Biological Indicators
Upper Prior Lake	70-0072-00	Total phosphorus	Nutrients/Eutrophication Biological Indicators

U.S. EPA's approval of the Spring Lake and Upper Prior Lake TMDLs extends to the waterbodies which are identified in this decision document and the TMDL study with the

exception of any portions of the waterbodies that are within Indian Country, as defined in 18 U.S.C. Section 1151. U.S. EPA is taking no action to approve or disapprove the State's TMDL with respect to those portions of the waters at this time. U.S. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under Section 303(d) for those waters.