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

MAY 07 2012

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 Load (TMDL) for Rice Lake (DNR ID 73-0196-00), including support documentation and follow up information. Rice Lake is located in central Minnesota in Stearns County. The TMDL addresses an aquatic use impairment due to excessive phosphorus.

EPA has determined that the Rice Lake TMDL meets the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations set forth at 40 C.F.R. Part 130. Therefore, EPA approves Minnesota's phosphorus TMDL, 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 efforts in submitting this TMDL 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
Maggie Leach, MPCA

wq-iw8-35g

TMDL: Rice Lake Nutrient TMDL, Stearns County, MN
Date: May 7, 2012

DECISION DOCUMENT FOR THE RICE LAKE NUTRIENT TMDL, STEARNS COUNTY, MN

Section 303(d) of the Clean Water Act (CWA) and 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 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. Use of the term "should" below denotes information that is generally necessary for 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 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 nonpoint 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 nonpoint sources, the TMDL should include a description of the natural background. This 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 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.

Comment:

Location Description/Spatial Extent:

Rice Lake (DNR ID 73-0196-00) is located in the North Fork of the Crow River (NFCR) watershed in Stearns County, Minnesota. Rice Lake is approximately 10-miles southeast of Paynesville, Minnesota, within the boundaries of the North Central Hardwood Forest (NCHF) ecoregion. The Rice Lake direct watershed is approximately 10,730 acres (16.76 square miles (mi^2)) in size. Rice Lake is located at the southern terminus of the NFCR headwaters watershed (Figure 2-1 of the final TMDL document). The area of the NFCR headwaters watershed, which lies above Rice Lake, is approximately 162,122 acres (253.32 mi^2). The NFCR flows through the southwestern corner of Rice Lake (Figure 2-2 of the final TMDL document) and the flow and loading from the NFCR influence the hydrology and water quality in the Rice Lake southwestern basin.

Rice Lake has a large drainage area, which includes the NFCR headwaters watershed. The lake's watershed to surface water area ratio is 107:1, which indicates that Rice Lake is significantly influenced by watershed loading inputs. Rice Lake has a surface area of 1,509 acres (2.36 mi^2), a maximum depth of 41 feet (12.49 meters (m)), and an average depth greater than 15 feet (4.57 m). The MPCA classified Rice Lake as a deep lake based upon the average depth of the lake being greater than 15 feet.

Land Use:

Land use in the Rice Lake direct watershed is comprised of pastures for growing hay, row crops (corn or soybeans), open water, forested lands, areas covered by roads, wetlands, alfalfa fields, other agricultural purposes, and medium and low intensity developed lands (Table 1 of this Decision Document). Figure 2-4 in the final TMDL document presents land use classifications within the Rice Lake watershed (Rice Lake direct watershed and the NFCR headwaters watershed). Land use within the NFCR headwaters watershed is similar to land use in the Rice Lake direct watershed. The Minnesota Pollution Control Agency (MPCA) estimated that land use within the Rice Lake watershed is primarily agricultural (60% in Rice Lake direct watershed and 80% in the NFCR headwaters watershed) and is expected to remain as agricultural for the foreseeable future. Lakefront development exists along the shores of Rice Lake. The MPCA does not anticipate significant development in the Rice Lake watershed. The amount of land in agricultural use in the Rice Lake watershed is likely to remain fairly constant over the next several decades. There may be a shift in crop usage within the watershed (i.e. pasture/hay land uses to row crop land uses) but the MPCA does not believe that this will have a significant impact on nutrient loading to Rice Lake.

Table 1: Land Use in the Rice Lake watershed (direct watershed)

Land Use*	Acres	Percent
Pasture/Hay	3,304	31%
Corn/Soybean	2,697	25%
Open Water	1,673	16%
Forest	1,577	15%
Roads/Transportation	692	6%
Wetland	529	5%
Alfalfa	206	2%
Other Agriculture	40	<1%
Low Intensity Development	11	<1%
Medium Intensity Development	1	<1%
TOTAL	10,730	100%

* From the 2009 National Agricultural Statistics Services (NASS)

Table 1a: Land Use in the North Fork Crow River Headwaters watershed

Land Use*	Acres	Percent
Corn/Soybean	62,447	39%
Pasture/Hay	61,701	38%
Roads/Transportation	9,333	6%
Forest	8,984	6%
Other Agriculture	7,206	4%
Wetland	6,385	4%
Alfalfa	2,981	2%
Open Water	2,010	1%
Low Intensity Development	857	<1%
Medium Intensity Development	150	<1%
High Intensity Development	68	<1%
TOTAL	162,122	100%

* From the 2009 National Agricultural Statistics Services (NASS)

Problem Identification:

Rice Lake was originally listed on the 2008 Minnesota 303(d) list for excessive nutrients (phosphorus). Rice Lake is currently on the draft 2012 Minnesota 303(d) list for impaired aquatic recreation due to excessive nutrients. MPCA assessment of in-lake water quality data from 2009-2010 indicated that Rice Lake was impaired by excess nutrients (total phosphorus) and was not attaining its designated uses. During this monitoring period, summer total phosphorus (TP) average values (June 1 through September 30) were in the range of 32 µg/L to 78 µg/L and averaged 59 µg/L. Chlorophyll-a (chl-a) concentrations ranged from 11 µg/L to 54 µg/L and averaged 31 µg/L. Secchi disk (SD) depth transparencies averaged approximately 1.5 m with a range of 0.8 m to 2.3 m. The NCHF ecoregion water quality standards (WQS) for deep lakes are 40 µg/L for total phosphorus, 14 µg/L for chl-a, and not less than 1.4 m for Secchi disk depth.

While TP is an essential nutrient for aquatic life, elevated phosphorus levels can lead to nuisance algal blooms that negatively impact aquatic life and recreation (swimming, boating, fishing, etc.). Algal decomposition depletes oxygen levels which stresses benthic macroinvertebrates and fish. Excess algae can shade the water column which limits the distribution of aquatic vegetation. Aquatic vegetation stabilizes bottom sediments, and also is an important habitat for macroinvertebrates and fish.

Furthermore, depletion of oxygen can cause phosphorus release from bottom sediments (i.e. internal loading).

Priority Ranking:
The Rice Lake watershed was given a priority ranking for TMDL development due to: the impairment impacts on public health and aquatic life, the public value of the impaired water resource, the likelihood of completing the TMDL in an expedient manner, the inclusion of a strong base of existing data and the restorability of the water body, the technical capability and the willingness of local partners to assist with the TMDL, and the appropriate sequencing of TMDLs within a watershed or basin. Areas within the Rice Lake watershed are popular locations for aquatic recreation. Water quality degradation has led to efforts to improve the overall water quality within the Rice Lake watershed, and to the development of a TMDL.

Pollutant of Concern:
The pollutant of concern is phosphorus.

Source Identification (point and nonpoint sources):
Point Source Identification: The potential point sources to the Rice Lake watershed are:

National Pollutant Discharge Elimination Systems (NPDES) permitted facilities: NPDES permitted facilities may contribute phosphorus loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge treated wastewater according to their National Pollutant Discharge Elimination System (NPDES) permit. There are no NPDES permitted facilities within the Rice Lake direct watershed but there are three NPDES permitted facilities within the NFCR headwaters watershed. Two of these facilities are wastewater treatment plants (WWTP) and the other NPDES permitted facility is related to agricultural uses.

- Brooten WWTP (MN0025909-SD-1)
- Paynesville WWTP (MN0020168-SD-1)
- Associated Milk Producers Inc. (AMPI) of Paynesville (MN0044326-SD-1)

Municipal Separate Storm Sewer System (MS4) communities: There are no MS4 communities within the direct Rice Lake watershed and the NFCR headwaters watershed.

Stormwater from construction activities: Phosphorus input via stormwater from construction activities may contribute phosphorus loading to the Rice Lake watershed. The Rice Lake TMDL assumes that there will be phosphorus inputs from construction activities and therefore a wasteload allocation (WLA) was assigned to construction stormwater. Construction sites may contribute phosphorus via sediment runoff during stormwater events.

Stormwater from industrial activities: Phosphorus input via stormwater from industrial activities may contribute phosphorus loading to the Rice Lake watershed. The Rice Lake TMDL assumes that there will be phosphorus inputs from industrial activities and therefore a WLA was assigned to industrial stormwater.

Concentrated Animal Feedlot Operations (CAFOs): There are approximately 365 animal feedlot operations within the Rice Lake watershed (the Rice Lake direct watershed and the NFCR headwaters

watershed). The MPCA estimates that the 365 facilities have approximately 55,000 total animal units. Of those 365, seven facilities (Table 6 of this Decision Document) have greater than 1,000 animal units and are classified as concentrated animal feeding operations (CAFOs). By rule, CAFOs and other feedlots are generally not allowed to discharge to waters of the State (Minnesota Rule 7020.2003). Manure from these lots is spread on nearby fields and can be a source of phosphorus found in nonpoint derived watershed runoff. However, runoff from manure spread onto fields in accordance with federal and state requirements is unregulated, and included in the watershed runoff portion of the load allocation (LA).

Nonpoint Source Identification: The potential nonpoint sources to the Rice Lake watershed are:

Internal loading: The release of phosphorus from lake sediments, 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 curly-leaf pondweeds, may all contribute internal phosphorus loading to Rice Lake. Phosphorus may build up in the bottom waters of the lake and may be resuspended or mixed into the water column when the thermocline decreases and the lake water mixes.

Atmospheric deposition: Phosphorus may be added via particulate deposition. Particles from the atmosphere may fall onto lake surfaces or other surfaces within the Rice Lake watershed. Phosphorus can be bound to these particles which may add to the phosphorus inputs to surface water environments.

Agricultural sources (pasture and open lands): Phosphorus may be added via surface runoff from upland areas which are being used for Conservation Reserve Program (CRP) lands, grasslands, and agricultural lands used for growing hay. Stormwater runoff may contribute nutrients to surface waters from livestock manure, fertilizers, vegetation and erodible soils.

Livestock sources(animal feeding operations): Animal feeding operations (AFOs), which fall beneath the animal threshold limits to be given an NPDES permit, may nevertheless transport phosphorus to surface waters during storm events (via stormwater runoff). AFOs may transport phosphorus laden materials from feeding, holding and manure storage areas to surface waters.

Urban/residential sources: Nutrients may be added via runoff from homes near Rice Lake. Runoff from residential properties can include phosphorus derived from fertilizers, leaf and grass litter, pet wastes, and other sources of anthropogenic derived nutrients.

Inadequate Subsurface Sewage Treatment Systems (SSTS): Phosphorus may be added to the surface waters in the Rice Lake watershed from failing septic systems. Age, construction and use of SSTS can vary throughout a watershed and influence the nutrient contribution from these systems. It is likely that those systems sited closer to the lake shore are more likely to contribute nutrients than those systems sited further away from the lake. Failing SSTS can discharge nutrients directly into surface waters by straight pipe connections (considered point sources) or by effluents leaching into groundwater or ponding at the surface where they can be washed into surface waters via stormwater runoff.

Wetland Sources: Phosphorus may be added to surface waters by stormwater flows through wetland areas in the Rice Lake watershed. Storm events may mobilize phosphorus through the transport of suspended solids and other organic debris.

Shoreline Erosion: Phosphorus may be added to Rice Lake by erosional processes impacting lake shoreline areas. Phosphorus may be attached to eroded shoreline materials and may be mobilized through the transport of sediment and suspended solids.

Forest Sources: Phosphorus may be added to surface waters via runoff from forested areas within the watershed. Runoff for forested areas may include debris from decomposing vegetation and organic soil particles.

Future Growth:
Significant development is not expected in the Rice Lake watershed. The land use within the watershed is primarily agricultural and according to the MPCA is expected to remain as agricultural for the foreseeable future. The WLA and load allocations for the Rice Lake TMDL were calculated for all current and future sources. Any expansion of point or nonpoint sources will need to comply with the respective WLA and LA values calculated in the Rice Lake TMDL.

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the first criterion.

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)). 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.

Comment:

Designated Uses:

Minnesota Rule Chapter 7050 designates uses for waters of the state. Rice Lake is designated as Class 2B water for aquatic recreation use (boating, swimming, fishing etc.). The Class 2 aquatic recreation designated use is described in Minnesota Rule 7050.0140 (3):

> *"Aquatic life and recreation includes all waters of the state that support or may support fish, other aquatic life, bathing, boating, or other recreational purposes and for which quality control is or may be necessary to protect aquatic or terrestrial life or their habitats or the public health, safety, or welfare."*

Standards:

Narrative Criteria: Minnesota Rule 7050.0150 (3) set forth narrative criteria for Class 2 waters of the State:

> *"For all Class 2 waters, the aquatic habitat, which includes the waters of the state and stream bed, shall not be degraded in any material manner, there shall be no material increase in undesirable slime growths or aquatic plants, including algae, nor shall there be any significant increase in harmful pesticide or other residues in the waters, sediments, and aquatic flora and fauna; the normal fishery and lower aquatic biota upon which it is dependent and the use thereof shall not be seriously impaired or endangered, the species composition shall not be altered materially, and the propagation or migration of the fish and other biota normally present shall not be prevented or hindered by the discharge of any sewage, industrial waste, or other wastes to the waters."*

Numeric criteria: Numeric criteria for total phosphorus, chl-a, and SD depth are set forth in Minnesota Rules 7050.0222. These three parameters are the eutrophication standards that must be achieved to attain aquatic recreation designated use. The numeric eutrophication standards that are applicable to Rice Lake are those set forth for Class 2B deep lakes in the NCHF Ecoregion (Table 2 of this Decision Document). In developing the lake nutrient standards for Minnesota lakes, the 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, TP, and the response variables, chl-a and SD depth. Regression relationships were established between the causal factor TP and the response variables chl-a and SD depth at Rice Lake (Figures 4-2, 4-3, and 4-4 in the final TMDL document). Based on these relationships, TP loadings designed to meet the TP WQS of 40 µg/L were estimated to also result in attainment of chl-a and SD depth standards.

Table 2: Minnesota Eutrophication Standards for deep lakes within the North Central Hardwood Forest ecoregion

Parameter	Eutrophication Standard
Total Phosphorus (µg/L)	TP < 40
Chlorophyll-a (µg/L)	chl-a < 14
Secchi Depth (m)	SD > 1.4

Target: MPCA selected a target of 40 µg/L of TP to develop the TMDL.

MPCA selected total phosphorus as the appropriate parameter to address eutrophication problems at Rice Lake because of the interrelationships between TP and chl-a, as well as SD depth. Algal abundance is measured by chl-a, which is a pigment found in algal cells. As more phosphorus becomes available,

algae growth can increase. Increased algae in the water column will decrease water clarity that is measured by SD depth.

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the second criterion.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a waterbody for the applicable pollutant. 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. 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 nonpoint source loadings under such *critical conditions*. In particular, the TMDL should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

Comment:

The approach utilized by the MPCA to calculate the loading capacity for Rice Lake is described in Section 3.2 of the final TMDL document. The MPCA first determined appropriate phosphorus budgets for each source contributor and then utilized the BATHTUB model to examine how different lake response variables (chl-a and SD depth) respond to changes in nutrient loads.

To estimate nutrient loading within the Rice Lake direct watershed, the MPCA calculated a hydrologic budget for the direct lake watershed and then assigned nutrient inputs to different land use types within the Rice Lake direct watershed via the Unit Area Load (UAL) model. Nutrient loading was investigated on a subwatershed by subwatershed basis within the Rice Lake direct watershed. The MPCA focused on creating phosphorus and water budgets for 2009 and 2010.

A hydrologic budget for the Fishers Resort subwatershed (subwatershed #8 in Figure 2-2 of the final TMDL document) was determined from annual water yield data recorded at the Fishers Resort flow gage (S002-734). TP loading measurements were also gathered from water quality measurements

collected at the same location. A water budget for this subwatershed was calculated using the Rational Method and calibrated to monitored monthly water yields. The Rational Method employs the following equation to estimate water yields:

$Q = C * I * A$

Where:

- Q = peak runoff rate (measured in cubic feet per second (cfs))
- C = runoff coefficient (typical runoff rates based on land cover)
- I = rainfall (measure in inches per hour (in/hr))
- A = area (measured in acres)

The Rational Method was eventually applied to other subwatersheds within the Rice Lake direct watershed. Rainfall data was gathered from a National Weather Service weather station in New London, Minnesota. Watershed land use categories were defined and assigned typical runoff coefficients based on literature values. Runoff coefficients had to be adjusted so that average runoff values agreed with the monitored water yield at the Fishers Resort flow gage. The adjustments, based off of the Fishers Resort flow gage data, were applied to the other subwatersheds within the Rice Lake direct watershed.

The Hydrologic Response Unit (HRU) approach was used to develop the nutrient loading estimates, via the UAL. HRUs incorporated watershed soil types (from the Soil Survey Geographic (SSURGO) database), slope (from 30-meter Digital Elevation Models), land use (from 2008 National Agricultural Statistics Service Land Cover (NASS)), and soil erodibility and saturated infiltration values. Loading rates for each land use category were calculated and then applied to each subwatershed within the Rice Lake direct watershed. These calculations made up the bulk of the Rice Lake direct watershed TP loading estimate.

The MPCA communicated that manure is a primary contributor of dissolved phosphorus to the Rice Lake direct watershed and the NFCR headwaters watershed. There are approximately 365 animal feedlot operations with roughly 55,000 animal units in the Rice Lake direct and NFCR headwaters watersheds. The UAL implicitly accounted for animal contributions through the use of the Fishers Resort water quality data (2009 – 2010). The Fishers Resort subwatershed has 10 animal feedlot operations with approximately 590 total animal units, and the MPCA deemed that the animal feedlot and agricultural activities within this subwatershed were representative of practices utilized in other subwatersheds within the Rice Lake direct watershed.

TP loading estimates were also necessary for the NFCR headwaters subwatershed, the internal load, and atmospheric load. The NFCR headwaters watershed TP loading estimate was calculated from flow and water quality data collected at the NFCR inlet station (S001-510). Continuous average daily flow data was examined at this station to calculate annual flow-weighted mean phosphorus concentrations. Internal loading was determined from phosphorus release rates from sediment cores and anoxic observations developed from dissolved oxygen profiles. The sediment cores and dissolved oxygen profiles were developed in each basin (L1, L2, L3 & L4) and normalized to determine the internal loading estimate. Atmospheric deposition TP loading was based on annual precipitation measurements and atmospheric TP loading rates. The atmospheric load was calculated by multiplying the lake area by the atmospheric deposition rate.

The BATHTUB model was utilized to link phosphorus loads with in-lake water quality and to calculate a loading capacity value for Rice Lake. BATHTUB has previously been used successfully in many lake studies in Minnesota. BATHTUB is a steady-state annual or seasonal model that predicts a lake's growing season (June 1 – September 30) average surface water quality. BATHTUB utilizes annual or seasonal time-scales which are appropriate because watershed TP loads are normally impacted by seasonal conditions.

BATHTUB has built-in statistical calculations which account for data variability and provide a means for estimating confidence in model predictions. BATHTUB employs a mass-balance TP model that accounts for water and TP inputs from tributaries, direct watershed runoff, the atmosphere, and sources internal to the lake; and outputs through the lake outlet, water loss via evaporation, and TP sedimentation and retention in the lake sediments. BATHTUB provides flexibility to tailor model inputs to specific lake morphometry, watershed characteristics and watershed inputs. The BATHTUB model also allows the MPCA to assess different impacts of changes in nutrient loading. BATHTUB allows choice among several different mass-balance TP models. For deep lakes in Minnesota, the Canfield-Bachmann lake formulation has proven to be appropriate in most cases. The Canfield-Bachmann lake formulation subroutine was utilized in the Rice Lake TMDL.

The pollutant sources were identified and estimated based on water quality monitoring data, flow data and modeling efforts (UAL). The loading capacity of the lake was determined through the use of BATHTUB and the Canfield-Bachmann subroutine and then allocated to the WLA, LA and Margin of Safety (MOS). To simulate the load reductions needed to achieve the WQS, a series of model simulations were performed. Each simulation reduced the total amount of TP entering Rice Lake during the growing season (or summer season, June 1 through September 30) and computed the anticipated water quality response within the lake. The goal of the modeling simulations was to identify the loading capacity of Rice Lake (i.e., the maximum allowable load to the system, while allowing it to meet WQS) from June 1 to September 30. The modeling simulations focused on reducing the TP to the system. The chl-a and SD depth were predicted external from the BATHTUB model simulations using regression equations established by the MPCA. These regression equations were originally developed to determine relationships between TP, chl-a and SD depth in Minnesota lakes as part of the State's development of ecoregion eutrophication WQS.

Within the modeling simulations, the MPCA targeted reductions to internal sources first and then reductions to direct lake and the NFCR watershed headwaters sources. BATHTUB modeling simulations calculated that in order to meet the WQS, the NFCR headwaters watershed average TP concentration must be lowered from 173 µg/L to 100 µg/L and TP contributions from the Rice Lake direct watershed must be lowered from 278 µg/L to 150 µg/L. The MPCA decided to lower the BATHTUB calculated target concentration for the Rice Lake direct watershed further, from 150 µg/L to 100 µg/L. This further decrease was justified so TP concentrations from tributaries within the Rice Lake direct watershed could attain the proposed MPCA river and stream phosphorus target of 100 µg/L. This decision provides a margin of safety to the TMDL calculation and also provides consistency with the target concentration requirements of the NFCR inputs.

The BATHTUB modeling efforts were used to calculate the loading capacity for the Rice Lake TMDL. The loading capacity is the maximum phosphorus load which Rice Lake can receive over an annual

period and still meet the NCHF WQS. The residence time for Rice Lake is relatively short, 0.24 years. The MPCA explained that even with a relatively short residence time, Rice Lake responds to water quality changes on a longer time scale. The MPCA used annual load calculations to determine loading capacity values for Rice Lake. Loading capacities on the annual scale (lbs/year) were calculated to meet the WQS during the growing season (June 1 through September 30). The time period of June to September was chosen by MPCA as the growing season because it corresponds to the eutrophication criteria, contains the months that the general public typically uses Rice Lake for aquatic recreation, and is the time of the year when water quality is likely to be impaired by excessive nutrient loading. Loading capacities were divided by 365.25 to calculate the daily loading capacities.

MPCA estimated the current phosphorus load to Rice Lake to be 52,656 lbs TP/year (144.16 lbs TP/day). The loading capacity was calculated to be 29,684 lbs TP/year (81.27 lbs TP/day). The loading capacity was determined based on the BATHTUB modeling efforts, while the chl-a and SD depth were predicted using regression equations established by the MPCA. These regression equations demonstrated that the summer growing season mean chl-a WQS of 14 µg/L would be met at the designated loading capacity of 29,684 lbs TP/year (Figure 4-3 of the final TMDL document). Also, the regression equation (Figure 4-4 of the final TMDL document) for SD depth showed that the summer growing season mean SD depth WQS of greater than 1.4 meters of visibility would be achieved with a annual TP load of 29,684 lbs/year.

MPCA subdivided the loading capacity among the WLA, LA and MOS components of the TMDL (Table 3 of this Decision Document). The LA accounted for a majority of the loading capacity. These calculations were based on the critical condition, the summer growing season, which is typically when the water quality in the lake is degraded and phosphorus loading inputs are the greatest. TMDL allocations assigned during the summer growing season will protect Rice Lake during the worst water quality conditions of the year. The MPCA assumed that the loading capacities established by the TMDL will be protective of water quality during the remainder of the calendar year (October through May).

EPA supports the data analysis and modeling approach utilized by MPCA in their calculation of wasteload allocations, load allocations and the margin of safety for the Rice Lake TMDL. Additionally, EPA concurs with the loading capacities calculated by the MPCA in the Rice Lake TMDL.

Table 3: TMDL load for Rice Lake (inclusive of Rice Lake direct watershed and the NFCR headwaters watershed)

Allocation	Source	Existing TP Load[1]		TMDL	
		(lbs/yr)	*(lbs/day)*[2]	*(lbs/yr)*	*(lbs/day)*[2]
Wasteload	Construction Stormwater	--	--	297	0.81
	Industrial Stormwater	--	--	148	0.41
	CAFOs	--	--	0	0.00
	NPDES permitted sources				
	AMPI Paynesville (MN0044326)			35	0.10
	Brooten WWTP (MN0025909)			406	1.11
	Paynesville WWTP (MN0020168)			2,703	7.40
	NPDES Total	509	1.39	3,144	8.61
	WLA Totals	***509***	***1.39***	***3,589***	***9.83***
Load	Atmospheric Deposition	392	1.07	392	1.07
	Rice Lake Direct watershed	1,010	2.77	381	1.04
	North Fork Crow River headwaters watershed	49,212	134.74	23,393	64.05
	Rice Lake Internal Load	2,042	5.59	445	1.22
	LA Totals	***52,656***	***144.16***	***24,611***	***67.38***
Margin Of Safety (5 %)		--	--	1,484	4.06
Total		**53,165**	**145.56**	**29,684**	**81.27**

1 = Existing load was calculated from average loading values for 2009 - 2010

2 = Annual loads converted to daily loads by dividing by 365.25 days per year (accounting for leap year)

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the third criterion.

4. Load Allocations (LA)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future nonpoint 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 nonpoint sources.

Comment:

Load allocations are addressed in Section 4.1.2 of the final TMDL document. MPCA recognized the LA for the Rice Lake TMDL as originating from a variety of nonpoint sources including; atmospheric deposition, nonpoint source inputs from the Rice Lake direct watershed, nonpoint source inputs from the NFCR headwaters watershed, and internal loading sources (ex. lake sediments, curly-leaf pondweed). The direct and headwater watershed nonpoint sources include TP inputs from; agricultural nonpoint source runoff, urban nonpoint source runoff, septic inputs and wetland nonpoint source contributions. The LA assigned to the Rice Lake direct watershed also includes phosphorus inputs from Rice Lake shoreline erosional processes. MPCA calculated estimated percent reductions for different LA sources. These reductions represent the estimated decreases necessary to meet the NCHF WQS (Table 7 of this

Decision Document). The reductions necessary from nonpoint sources ranged from 52% to 78%. EPA finds the MPCA's approach for calculating the LA to be reasonable.

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the fourth criterion.

5. Wasteload Allocations (WLAs)

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. 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.

Comment:
MPCA assigned WLAs to three NPDES permitted facilities within the NFCR headwaters watershed, and to general NPDES construction and industrial stormwater permits. All three NPDES permitted facilities have a 1,000 µg/L phosphorus concentration limit and currently discharge below their permitted TP load (Table 4 of this Decision Document). The MPCA estimated a combined existing TP load from these facilities at 509 lbs TP/year (1.4 lbs TP /day), while their NPDES permits allowed them to discharge at 3,144 lbs TP/year (8.6 lbs TP/day). The WLA assigned to these three facilities was set at their effluent permit limits, 3,144 lbs TP/year (8.6 lbs/day).

Table 4: North Fork Crow River headwaters watershed NPDES permitted sources

Facility	Permit ID	Total Phosphorus Concentration Limit	Average TP concentration from DMR[1]	TMDL Allocated Load	TMDL Allocated Load
		TP (µg/L)	TP (µg/L)	TP (lbs/year)	TP (lbs/day)
AMPI Paynesville	MN0044326-SD-1	1,000	100	35	0.10
Brooten WWTP	MN0025909-SD-1	1,000	704	406	1.11
Paynesville WWTP	MN0020168-SD-1	1,000	115	2,703	7.40
			Total =	**3,144**	**8.61**

1 = Discharge Monitoring Report

WLA assigned to construction stormwater was 297 lbs TP/year (0.81 lbs TP/day). This estimate was calculated based on the percentage of land under construction within the Rice Lake watershed. MPCA reviewed active construction stormwater permits within the Rice Lake watershed and determined that less than 1% of the watershed area was land which was covered under a construction stormwater permit. To generate the WLA assigned to construction stormwater, the MPCA rounded the construction stormwater estimate up to 1% of the land area and applied this 1% estimate to the loading capacity (29,684 lbs TP/year), which was approximately 297 lbs TP/year (0.8 lbs TP/day). The rounding up to 1% also provided a small amount of reserve capacity for potential additional future development activities within the Rice Lake watershed. The list of Rice Lake construction stormwater permits are found in Table 5 of this Decision Document.

The MPCA found one industrial stormwater permit within the Rice Lake watershed (Table 5 of this Decision Document). The WLA for this facility was set at 0.5 % of the loading capacity (29,684 lbs TP/year), which was approximately 148 lbs TP/year (0.4 lbs TP/day) allocated for industrial stormwater permits.

Table 5: Construction and Industrial stormwater permits within the Rice Lake direct watershed and the North Fork Creek River headwaters watershed

Name	Permit ID	Type	Watershed	Date Established
2010 Street & Utility Improvements CSW	C00029777	Construction Stormwater Permit	NFCR headwaters watershed	5/6/2010
Industrial Drive (000193-08002-0) Redwood Falls	C00027958	Construction Stormwater Permit	NFCR headwaters watershed	6/23/2009
SP 3408-15 (TH 23) Paynesville - CSW	C00029336	Construction Stormwater Permit	NFCR headwaters watershed	3/18/2010
SP 7318-36 (TH 71) Bridge 73045 Belgrade - CSW	C00027819	Construction Stormwater Permit	NFCR headwaters watershed	6/4/2009
Voss Plumbing - Paynesville - CSW	C00029006	Construction Stormwater Permit	NFCR headwaters watershed	11/5/2009
Holly Estates CSW	C00028080	Construction Stormwater Permit	Rice Lake direct watershed	7/6/2009
Paynesville Auto Parts & Services - SW	A00002281	Industrial Stormwater Permit	NFCR headwaters watershed	7/13/1998

MPCA found no MS4 permits within the Rice Lake direct watershed or NFCR headwaters watersheds. MPCA identified 365 permitted animal feedlot operations within the Rice Lake watershed. Seven of the 365 were classified as CAFOs. CAFOs and other feedlots are generally not allowed to discharge to waters of the State (Minnesota Rule 7020.2003). CAFOs were assigned a WLA of zero (WLA = 0).

Table 6: Permitted CAFO facilities in the Rice Lake direct watershed and the North Fork Creek River headwaters watershed

Type	Permit ID	Watershed	Total Animal Units
CAFO	145-75594	Rice Lake direct watershed	2540
CAFO	067-50005	NFCR headwaters watershed	1260
CAFO	067-50006	NFCR headwaters watershed	1290
CAFO	067-50007	NFCR headwaters watershed	1620

CAFO	067-61243	NFCR headwaters watershed	1215
CAFO	145-75190	NFCR headwaters watershed	1595
CAFO	145-75199	NFCR headwaters watershed	1065

EPA finds the MPCA's approach for calculating the WLA to be reasonable.

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the fifth criterion.

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)). 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.

Comment:
Section 4.1.4 of the final TMDL submittal outlines the Margin of Safety used in the Rice Lake TMDL. An explicit MOS of 5.0% of the loading capacity (29,684 lbs TP/year) was utilized in the Rice Lake TMDL to account for annual variability and uncertainty in the model outputs. The MOS for the Rice Lake TMDL was calculated to be 1,484 lbs TP/year (4.1 lbs TP/day). The MPCA believes that using a MOS of 1,484 lbs TP/year (4.1 lbs TP/day) will aid to offset the environmental variability in phosphorus loading to Rice Lake and will allow Rice Lake to meet the NCHF eutrophication WQS.

In addition, MCPA incorporated the following conservative assumptions into the BATHTUB modeling and analysis:

- The Canfield-Bachmann model utilizes a database of TP loading values which were collected in reference lakes within the NCHF. Loading values used in the BATHTUB modeling efforts were predicted values, specifically internal loading predicted loads and direct watershed predicted loads (i.e. those loads which contributes TP to Rice Lake and impact water quality). The MPCA explained that the predicted loads from the Canfield-Bachmann model overestimated the actual loads for Rice Lake. This overestimate provided an additional element of MOS to the loading estimate resulting in a load estimate which was greater than the actual load necessary to attain WQS.
- To attain the NCHF WQS, the Rice Lake TMDL required the Rice Lake direct watershed tributaries to attain an average TP concentration of 100 µg/L. The 100 µg/L TP concentration was set as the target concentration for tributary inputs because the MPCA anticipated the eventual passing of the its proposed river and stream nutrient TP concentration criterion of 100 µg/L. The MPCA expects this new standard to be passed in the near future. The BATHTUB modeling efforts indicated that direct watershed tributary concentrations could be as high as 150 µg/L, and Rice Lake would still meet WQS. Thus, using the river and stream TP concentration of 100 µg/L provided an addition element of MOS for the Rice Lake TMDL.

- The MPCA asserted that achieving the necessary runoff reductions from Rice Lake direct watershed tributaries would result in a relatively higher reduction of soluble phosphorus inputs to Rice Lake. Soluble phosphorus is added via animal wastes, fertilizers and septic discharges, and has a significant impact on lake algal productivity. Eliminating this phosphorus source will aid in eliminating algal productivity in Rice Lake.
- The calibration and validation processes of the BATHTUB model also functioned to reduce error from erroneous assumptions made in the modeling process.

The EPA finds that the TMDL document submitted by the MPCA contains an appropriate MOS satisfying the requirements of the sixth criterion.

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)).

Comment:
Seasonal variation was considered in this TMDL as described in Section 4.4 of the final TMDL document. The nutrient targets employed in the Rice Lake TMDL were based on the average nutrient values collected during the growing season (June 1 to September 30). The water quality targets were designed to meet the NCHF eutrophication WQS during the period of the year where the frequency and severity of algal growth is the greatest.

The Minnesota eutrophication standards state that total phosphorus WQS are defined as the mean concentration of phosphorus values measured during the growing season. In the Rice Lake phosphorus TMDL, the LA and WLA estimates were calculated from modeling efforts which incorporated mean growing season total phosphorus values. Nutrient loading capacities were set in the TMDL development process to meet the WQS during the most critical period. The mid-late summer time period is typically when eutrophication standards are exceeded and water quality in Rice Lake is deficient. By calibrating the modeling efforts to protect these waterbodies during the worst water quality conditions of the year, it is assumed that the loading capacities established by the TMDLs will be protective of water quality during the remainder of the calendar year (October through May).

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the seventh criterion.

8. Reasonable Assurance

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

EPA's August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by nonpoint sources. However, EPA cannot disapprove a TMDL for nonpoint 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.

Comment:
The Rice Lake phosphorus TMDL outlines reasonable assurance activities in Section 7.0 of the final TMDL document. There are several groups which will have a role in ensuring that phosphorus reductions in the Rice Lake watershed move forward in the coming years. The following groups will work closely with one another to ensure that TP reduction efforts are being implemented within the Rice Lake watershed; the North Fork Crow River Watershed District (NFCRWD), the Crow River Organization of Water (CROW), the Stearns County Soil and Water Conservation District (SWCD), the Kandiyohi County SWCD, the Pope County SWCD, and the Rice Lake Association (RLA).

The implementation strategies and nutrient reduction goals discussed in the Rice Lake TMDL are consistent with the objectives outlined in the Stearns County and NFCRWD watershed management plans. The reasonable assurance practices discussed in the final TMDL document will be implemented over the next several years. Best Management Practices (BMPs) will be employed within the Rice Lake direct watershed and the NFCR headwaters watershed, to target nutrient reductions efforts.

Various funding mechanisms will be utilized to execute the recommendations made in the implementation section of this TMDL. An implementation plan based on the recommendations from the Rice Lake TMDL will be finalized within one year of the approval of the Rice Lake TMDL. Funding for these efforts will be a mixture of local, state and federal funding vehicles. Local funding may be through SWCD cost-share funds, Natural Resources Conservation Service (NRCS) cost-share funds, and NFCRWD and CROW cost-share funds.

Federal funding, via the Section 319 grants program, may provide money to implement voluntary nonpoint source programs within the Rice Lake watershed. State efforts may be via Clean Water Legacy Act (CWLA) grant money and the Minnesota Clean Water Partnership program.

Clean Water Legacy Act: The 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 to jointly use 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 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).

Reasonable assurance that the WLA set forth will be implemented is provided by regulatory actions. According to 40 CFR 122.44(d)(1)(vii)(B), NPDES permit effluent limits must be consistent with assumptions and requirements of all WLAs in an approved TMDL. MPCA's stormwater program and the NPDES permit program are some of the implementing programs for ensuring effluent limits are consistent with the TMDL. The NPDES program requires construction and industrial sites to create a Stormwater Pollution Prevention Plan (SWPPP) that summarizes how stormwater will be minimized from the site.

Under the MPCA's Stormwater General Permit, managers of sites under construction or industrial stormwater permits, must review the adequacy of local SWPPPs to ensure that each plan meets WLA set in the Rice Lake TMDL. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified within 18-months of the approval of the TMDL by the U.S. EPA. This applies to sites under the MPCA's general industrial stormwater permit (*General Permit for Construction Sand and Gravel (MNG49000)*). Additionally, the NFCRWD, under Minnesota Statue 103D, maintains a set of rules meant to govern land development and redevelopment for urban use. These rules require developers and municipalities to provide water quality treatment for any new impervious surfaces, and in some cases, for alterations to existing impervious surfaces.

Table 7 of this Decision Document shows the current estimated TP load allocated to nonpoint sources, the TMDL allocated load (due to inputs from nonpoint sources) and the reduction required to meet WQS.

Table 7: TMDL load for Rice Lake

Allocation	Source	Existing TP Load[1]		TMDL		Load Reduction	
		(lbs/yr)	*(lbs/day)[2]*	*(lbs/yr)*	*(lbs/day)[2]*	*(lbs/yr)*	*Percent*
Wasteload	Construction Stormwater	--	--	297	0.81	--	--
	Industrial Stormwater	--	--	148	0.41	--	--
	CAFOs	--	--	0	0.00	--	--
	NPDES point sources	509	1.39	3,144	8.61	--	--
	WLA Totals	***509***	***1.39***	***3,589***	***9.83***	***0***	***0***
Load	Atmospheric	392	1.07	392	1.07	0	***0%***
	Direct watershed	1,010	2.77	381	1.04	629	***62%***
	North Fork Crow River watershed	49,212	134.74	23,393	64.05	25,819	***52%***
	Internal Load	2,042	5.59	445	1.22	1,597	***78%***
	LA Totals	***52,656***	***144.16***	***24,611***	***67.38***	***28,045***	***53%***
Margin Of Safety		--	--	1,484	4.06	--	--
Total		**53,165**	**145.56**	**29,684**	**81.27**	**28,045**	**53%**

1 = Existing load was calculated from average loading values for 2009 - 2010

2 = Annual loads converted to daily loads by dividing by 365.25 days per year (accounting for leap year)

The EPA finds that this criterion has been adequately addressed.

9. Monitoring Plan to Track TMDL Effectiveness

EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur. Such a TMDL should provide assurances that nonpoint 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.

Comment:

The final TMDL document outlines the water monitoring efforts in the Rice Lake watershed. Water quality monitoring is a critical component of the adaptive management strategy employed as part of the Rice Lake implementation plan. Water quality information will aid watershed managers in understanding how BMP phosphorus removal efforts are impacting water quality within the direct Rice Lake watershed and the NFCR headwaters watershed. Water quality monitoring combined with an annual review of BMP efficiency will provide information on the success or failure of BMP systems designed to reduce nutrient loading into Rice Lake. Watershed managers will have the opportunity to reflect on the progress or lack of progress, and will have the opportunity to change course if progress is unsatisfactory.

Annual water quality monitoring is expected to continue on Rice Lake. Annual measurements of; dissolved oxygen, temperature, total phosphorus, chlorophyll-a, Secchi depth, and total Kjeldhal nitrogen, will be completed within Rice Lake. The MPCA also expects to continue to collect data from their NFCR inflow monitoring station (S001-510). Data from both of these efforts will inform local

watershed managers on the success of nutrient reduction efforts within the direct watershed and NFCR watershed above Rice Lake.

The EPA finds that this criterion has been adequately addressed.

10. Implementation

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

Comment:
Implementation strategies are outlined in Section 6.0 of the final TMDL document. The MPCA presented a variety of possible implementation activities which could be undertaken within the Rice Lake watershed. The Rice Lake TMDL estimated that nonpoint source inputs from the Rice Lake direct watershed necessitated a 62% phosphorus reduction in order for Rice Lake to meet WQS. Additionally, nonpoint source inputs from the NFCR watershed necessitated a 52% phosphorus reduction in order for Rice Lake to attain WQS. These reduction goals will be met via components of the following strategies:

Protection and restoration of high-value wetlands: The MPCA explained that there are numerous high-value wetlands within the NFCR headwaters watershed. MPCA recommends protecting these high-value wetlands from unnecessary stormwater introductions, which could potentially turn wetland areas from nutrient sinks to nutrient sources. Additionally, addressing those wetlands which are discharging phosphorus into Rice Lake will aid in the reduction of nonpoint source loads.

Increased infiltration and filtration within the direct and NFCR watersheds: Reducing nutrient loading to Rice Lake can involve increasing infiltration and filtration of precipitation and precipitation derived stormwater. This can be accomplished through creating infiltration areas (rain gardens, bioretention swales, etc.), removing tile lines from agricultural fields, and incorporating lake shore buffer areas and vegetated swales.

Manure management (feedlot and manure stockpile runoff controls): Manure has been identified as a potential source of nutrients. Nutrients derived from manure can be transported to surface waterbodies via stormwater runoff. Nutrient laden water can also leach into groundwater resources. Improved strategies in the collection, storage and management of manure can minimize impacts of nutrients entering the surface and groundwater system. Repairing manure storage facilities or building roofs over manure storage areas may decrease the amount of nutrients in stormwater runoff.

Pasture management and agricultural reduction strategies: These strategies involve reducing nutrient transport from fields and minimizing soil loss. Specific practices would include; erosion control through conservation tillage, reduction of winter spreading of fertilizers, elimination of fertilizer spreading near

open inlets and sensitive areas, installation of stream and lake shore buffer strips, streambank stabilization practices (gully stabilization and installation of fencing near streams), and nutrient management planning.

Septic Field Maintenance: Septic systems are not believed to be a major source of nutrients to Rice Lake, but failing systems should be addressed within the watershed. Local septic management programs and educational opportunities can aid in the reduction of septic pollution. Educating the public on proper septic maintenance, finding and eliminating illicit discharges, and repairing failing systems could lessen the impacts of septic derived nutrients inputs into the Rice Lake watershed.

Urban/Residential Nutrient Reduction Strategies: These strategies involve reducing stormwater runoff from lakeshore homes and other residences within the Rice Lake watershed. These practices would include; rain gardens, lawn fertilizer reduction, lake shore buffer strips, vegetation management and replacement of failing septic systems. Water quality educational programs could also be utilized to inform the general public on nutrient reduction efforts and their impact on water quality.

Shoreline restoration activities: Property owners with yards extending to the shoreline should be encouraged to restore the immediate shoreline with native plants and create buffer areas to capture runoff and prevent erosion. The NFCRWD is expected to work with landowners to naturalize shoreline through their Water Quality Cost-Share program.

Internal Loading Reduction Strategies: Internal nutrient loads will also need to be addressed to meet the TMDL allocations outlined in the Rice Lake TMDL. MPCA recommends that before any strategy is put into action, an intensive technical review, to evaluate the costs and feasibility of internal load reduction options should be completed. Several options should be considered to manage internal load inputs from Rice Lake.

- *Alum Treatment:* The addition of aluminum sulfate to permanently bind phosphorus into the lake bottom sediments. This would decrease phosphorus releases from sediments in Rice Lake, brought on by anoxic conditions in the water column.
- *Hypolimnetic Withdrawal:* The removal of the phosphorus rich bottom waters (hypolimnion). This water could potentially be treated and returned to Rice Lake.
- *Hypolimnetic Aeration:* Aeration of the hypolimnion to prevent the formation of anoxic conditions within the bottom waters of Rice Lake. Aerators could be placed near the bottom of the lake to maintain oxygenated conditions within the bottom waters.
- *Redesigning boating traffic patterns:* To limit boat operation in shallow or vegetated areas which may resuspend phosphorus from lake bottom sediments.
- *Management of fish populations:* Monitor and manage fish populations to maintain healthy game fish populations and reduce rough fish (i.e. carp, bullheads, fathead minnows) populations.
- *Vegetation management:* Improved management of in-lake vegetation in order to limit phosphorus loading and to increase water clarity. Controlling the vitality of curly-leaf pondweeds via chemical treatments (herbicide applications) will reduce one of the significant sources of internal loading, the senescence of curly-leaf plants in the summer months.

Public Education Efforts: Public programs will be developed to provide guidance to the general public on nutrient reduction efforts and their impact on water quality. These educational efforts could also be used to inform the general public on what they can do to protect the overall health of Rice Lake. The

NFCRWD could mail annual newsletters to local property owners encouraging them to visit the NFCRWD website or to consult information within the newsletter which would outline nutrient reduction strategies.

The EPA finds that this criterion has been adequately addressed. The EPA reviews but does not approve implementation plans.

11. Public Participation

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, EPA has explained that final TMDLs submitted to 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 EPA establishes a TMDL, EPA regulations require 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 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.

Comment:
The public participation section of the TMDL submittal is found in Section 5.0 of the final TMDL document. Through the development of the Rice Lake TMDL the public was given various opportunities to participate in the TMDL process. The MPCA encouraged public participation through public meetings and small group discussions. The MPCA worked with members of the RLA and NFCRWD board to solicit their input for potential implementation strategies. Members from these two stakeholder groups will ultimately be responsible for the implementation efforts within the Rice Lake watershed. The MPCA met with these two stakeholder groups from 2009 to 2011 in order to share information about the TMDL development efforts, to share Rice Lake monitoring data, and to present the public notice draft of the Rice Lake TMDL.

The draft TMDL was posted online by the MPCA at (http://www.pca.state.mn.us/water/tmdl). The 30-day public comment period was started on January 9, 2012 and ended on February 8, 2012. The MPCA received 5 public comments and adequately addressed these comments. The MPCA submitted all of the public comments and responses in the final TMDL submittal packet received by the EPA on March 26, 2012.

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of 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 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 EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final review and approval, should contain such identifying information as the name and location of the waterbody, and the pollutant(s) of concern.

Comment:
The EPA received the final Rice Lake phosphorus TMDL document, submittal letter and accompanying documentation from the MPCA on March 26, 2012. The transmittal letter explicitly stated that the final Rice Lake (DNR ID 73-0196-00) TMDL for excess nutrients was being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval. The letter clearly stated that this was a final TMDL submittal under Section 303(d) of CWA. The letter also contained the name of the watershed as it appears on Minnesota's 303(d) list, and the causes/pollutants of concern. This TMDL was submitted per the requirements under Section 303(d) of the Clean Water Act and 40 CFR 130.

The EPA finds that the TMDL transmittal letter submitted for Rice Lake by the MPCA satisfies the requirements of this twelfth element.

13. Conclusion

After a full and complete review, the EPA finds that the TMDL for Rice Lake satisfies all of the elements of an approvable TMDL. This approval is for one TMDL, addressing one waterbody for aquatic recreational use impairments, for Rice Lake (DNR ID 73-0196-00).

The EPA's approval of this TMDL extends to the water bodies which are identified as Rice Lake (DNR ID 73-0196-00), with the exception of any portions of the water bodies that are within Indian Country, as defined in 18 U.S.C. Section 1151. The EPA is taking no action to approve or disapprove TMDLs for those waters at this time. The EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.