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

JUN 07 2017

REPLY TO THE ATTENTION OF

WW-16J

Glenn Skuta, Watershed Division Director
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

Dear Mr. Skuta:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Load (TMDL) for Sauk Lake (Southwest Bay), located in the Upper Mississippi River Basin in Stearns County, Minnesota. The TMDL was calculated for total phosphorus and addresses the impairment of aquatic recreational use.

EPA has determined that this TMDL 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 TMDL for Sauk Lake (Southwest Bay). 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 this TMDL addressing aquatic recreational use, and look forward to future 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,

Christopher Korleski
Director, Water Division

Enclosure

cc: Celine Lyman, MPCA
Paul Wymar, MPCA

wq-iw8-53g

TMDL: Sauk Lake (Southwest Bay TMDLs, Stearns County, MN
Date: May 23, 2017

Decision Document for the

Approval of the Sauk Lake (Southwest Bay) Total Maximum Daily Load

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.

TMDL Document Refers to the:

Sauk Lake (Southwest Bay) Excess Nutrient Total Maximum Daily Load
Prepared for Sauk River Watershed District (SRWD)
Prepared by Minnesota Pollution Control Agency
October 2016
wq-iw8-53e
Received by EPA Region 5 October 28th, 2016.

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.

Section 1 Review Comments:

Location:
Sauk Lake (Southwest Bay or SW Bay) is located in the upper part of the Sauk River watershed, in Stearns County, Minnesota. MPCA considers the lake to have two sections, Sauk Lake (North Bay), which is the upstream portion of the lake, and Sauk Lake (SW Bay), the downstream portion of the lake (Figure 1 of the TMDL). There are two tributaries to Sauk Lake (SW Bay), Ashley Creek and Hoboken Creek, as well as flow from Sauk Lake (North Bay). A dam is located at the downstream end of Sauk Lake (SW Bay), where the lake flows into the Sauk River.

Land Use:
The Sauk Lake (SW Bay) watershed is mainly agricultural in use, with over 84% of the land area in pasture/row crop, with wetlands and forest accounting for 9% and developed areas 5% (Table 5 of the TMDL document).

Table 5. Land Use in Sauk Lake (Southwest Bay) Watershed

WATERSHED	Ashley Creek		Hoboken Creek		Sauk Lake (Southwest Bay)	
	Hectares	Acres	Hectares	Acres	Hectares	Acres
OPEN_WATER	691	1,708	27	66	196	484
DEVELOPED__OPEN_SPACE	1,187	2,934	270	667	135	333
DEVELOPED__LOW_INTENSITY	158	390	46	114	130	321
DEVELOPED__MEDIUM_INTENSITY	70	172	20	48	27	66
DEVELOPED__HIGH_INTENSITY	2	4	0	0	15	37
BAREN_LAND__ROCK_SAND_CLAY_	3	7	0	0	0	0
DECIDUOUS_FOREST	1,248	3,084	210	519	111	274
EVERGREEN_FOREST	62	153	8	20	6	14
MIXED_FOREST	8	19	0	1	0	0
SHRUB_SCRUB	11	26	1	3	0	0
GRASSLAND_HERBACEOUS	698	1,725	68	169	32	79
PASTURE_HAY	5,566	13,754	1,309	3,235	230	569
CULTIVATED_CROPS	20,901	51,647	4,704	11,623	175	432
WOODY_WETLANDS	171	422	12	30	5	12
EMERGENT HERBACEOUS WETLANDS	1,700	4,201	129	320	26	64
Total Watershed area	32,476	80,248	6,805	16,814	1,087	2,686

Excerpted from the TMDL Document

Problem Identification:
The waterbody is identified on the Proposed Minnesota (MN) 2016 303d list by the MN Lake ID in Table 1 of the TMDL Document (Table 1 below) which matches the Lake ID in the MN 2014 Inventory of Impaired Waters. Water quality measurements taken from 2003 to present, demonstrate the total phosphorus (TP) values were frequently above the water quality criteria. Sampling data also indicated that the lake is exceeding the chlorophyll-a and Secchi depth criteria (Figures 3-5 of the TMDL).

https://www.pca.state.mn.us/water/minnesotas-impaired-waters-list

Pollutant:
The pollutant of concern is identified as total phosphorus in Table 1 of the TMDL document. While TP is an essential nutrient for aquatic life, elevated concentrations of TP can lead to nuisance algal blooms that negatively impact aquatic life and recreation (swimming, boating,

Table 1. Impaired waterbody

Lake/Reach	DNR Lake ID	Affected use	Pollutant or Stressor
Sauk Lake (Southwest Bay)	77-0150-01	Aquatic recreation	excessive nutrients (TP)

Excerpted from the TMDL Document

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).

Degradations in aquatic habitats or water quality (ex. low dissolved oxygen) can negatively impact aquatic life use. Increased turbidity, brought on by elevated levels of nutrients within the water column, can reduce dissolved oxygen in the water column, and cause large shifts in dissolved oxygen and pH throughout the day. Shifting chemical conditions within the water column may stress aquatic biota (fish and macroinvertebrate species). In some instances, degradations in aquatic habitats or water quality have reduced fish populations or altered fish communities from those communities supporting sport fish species to communities which support more tolerant rough fish species.

Priority Ranking:
The Sauk Lake (SW Bay) watershed was given priority for TMDL development due to the impairment impacts on aquatic life, the public value of the impaired water resource, the likelihood of completing the TMDL in an expedient manner, and the technical capability and the willingness of local partners to assist with the TMDL. Water quality degradation has led to efforts to improve the overall water quality within the watershed, and to the development of a TMDL. The priority ranking of the waterbody is represented by the 2013 TMDL target start year and the 2018 target completion year.

Source Identification:
A nutrient source assessment is included in Section 4 of the TMDL document. Sources identified and discussed in Section 4 include atmospheric deposition, internal loadings, septic systems, tributary inputs, direct runoff from the local watershed, and point sources. No National Pollutant Discharge Elimination System (NPDES) point sources were identified as a contributing source of phosphorus as part of the TMDL analysis, however a wasteload allocation (WLA) is established for potential industrial and construction stormwater inputs.

Point Sources: MPCA noted

"There are no permitted stormwater or municipal wastewater effluent sources in the

Sauk Lake (Southwest Bay) Watershed. There is one permitted industrial wastewater discharger to Hoboken Creek, a petroleum storage facility. This facility has authority to discharge tank condensate and waters used for cleaning. The discharge is not expected to contain phosphorus, therefore a WLA is not needed for this facility. For this TMDL, to comply with established TMDL protocols, 0.1% of the total watershed load will be assigned to both industrial stormwater and construction stormwater." [1]

Nonpoint sources:
The potential nonpoint sources for the Sauk Lake (SW Bay) nutrient TMDL are:

Non-regulated stormwater runoff:
Non-regulated stormwater runoff can add phosphorus to the lake. The sources of phosphorus in stormwater to Sauk Lake (SW Bay) include livestock wastes from small farms along the creeks and lake as well as runoff from row crop agriculture. Phosphorus can also run off from fields as a result of fertilizer use, both chemical as well as manure.

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

Upstream Loads:
Sauk Lake (North Bay) contributes phosphorus to Sauk Lake (SW Bay). A TMDL was approved in 2013 for the North Bay. MPCA used the modeling results from that TMDL to determine the contribution from the North Bay. Two other tributaries, Hoboken Creek and Ashley Creek, were modeled to determine TP loads.

Failing septic systems:
MPCA noted that failing septic systems, where waste material can pond at the surface and eventually flow into the creek or be washed in during precipitation events, are potential sources of phosphorus. MPCA contacted the Stearns County Environmental Services office, which provided data on septic systems in the watershed. The County noted that all septic systems on the lake have connected to a sewer system, and failing systems noted in a 1995 septic system survey have been brought into compliance. MPCA determined that septic systems are not a source of TP to the lake (page 14 of the TMDL).

Internal loading:
The release of phosphorus from lake sediments via physical disturbance from benthic fish (rough fish, ex. carp), from wind mixing the water column, and from decaying curly-leaf

[1] Excerpted from the TMDL document, Pg. 5

pondweed may all contribute internal phosphorus loading to the lakes. 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. A study was performed in 2007 where sediment cores were sampled and analyzed for TP. The study estimated that 1435 kg of TP were released annually from the sediments into Sauk Lake (SW Bay).

Natural Background:
MPCA noted that there is a natural background of TP entering the lake from non-anthropogenic sources. MPCA performed a study in 2002 on various lakes across the state to determine pre-settlement conditions based upon lake cores and associated diatom analysis. Two nearby lakes were included in the study. Based upon the study, MPCA estimated that pre-settlement in-lake concentration of TP was approximately 47 µg/L.

Future Growth: The majority of the Sauk Lake watershed is agricultural in nature. MPCA does not expect the load allocations to change in the future. The wasteload and load allocations (LA) were calculated for all current sources. Any expansion of point or nonpoint sources will need to comply with the respective WLA and LA values calculated in the Sauk Lakes (SW Bay) watershed TMDL.

Existing TP loading rates for contributing sources are discussed and quantified in Table 6 of the TMDL document.

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 (WQS), 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.

Section 2 Review Comments:

Section 2 of the TMDL document includes a description of the applicable WQS.

Designated Use:
Minnesota Rule Chapter 7050 designates uses for waters of the state. Sauk Lake (SW Bay) is designated as a 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."*

MPCA stated in the TMDL:

> *"The protected beneficial use for all lakes is aquatic recreation (swimming). Table 2 summarizes the MPCA water quality standards for lakes in the NCHF ecoregion. In 2008, these standards were used to determine that Sauk Lake (Southwest Bay) should be placed on the 303(d) list of impaired waters due to excessive nutrients."*[2]

Numerical water quality targets are identified in Table 2 of the TMDL document. Sauk Lake is in the North Central Hardwood Forest (NCHF) Ecoregion. For shallow lakes in this ecoregion, a target is set for Total Phosphorus, the pollutant of concern, at the water quality standard of 60 µg/l. Additional targets are set for the lake response variables Chlorophyll-a at 20 µg/L and Secchi Depth (SD) >1.0 meter. 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 (Section 2.3 of the TMDL).

Minnesota Water Quality Standards specify a water quality criterion for TP in the applicable NCHF ecoregion. The NCHF TP water quality standard of 60 µg/l is used as the TMDL target for the pollutant of concern. The additional lake response variables of Chlorophyll-a and Secchi Depth (SD) are also included in the TMDL document as water quality targets. Table 2 of the TMDL document gives the targeted values for the three TMDL water quality

[2] Excerpted from The TMDL document, Pg. 6

parameters.

Table 2. MPCA Goals[1] for Protecting Class 2B Waters.

	North Central Hardwood Forest Ecoregion[2]
Parameters	Shallow Lakes[3]
Total Phosphorus (µg/L)	60
Chlorophyll-a (µg/L)	20
Secchi Depth (m)	>1.0

Excerpted from the TMDL Document

Target:
MPCA selected a target of 60 µg/L of TP to develop the Sauk Lake nutrient TMDL. MPCA selected total phosphorus as the appropriate parameter to address eutrophication problems in the lake because of the interrelationships between TP and chl-a, as well as SD. 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.

In developing the lake nutrient standards for Minnesota lakes, 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. MPCA anticipates that by meeting the TP concentration the response variables chl-a and SD will be attained and the lake will achieve the designated beneficial uses. For lakes to achieve their designated beneficial uses, they must not exhibit signs of eutrophication and must allow water-related recreation, fishing, and aesthetic enjoyment. MPCA views the control of eutrophication as the lake enduring minimal nuisance algal blooms and exhibiting desirable water clarity.

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.

Section 3 Review Comments

A discussion of the relationship between the water quality targets and the pollutant of concern is provided in Section 3 of the TMDL. The models used to link the pollutant loads from the identified sources to water column concentrations of phosphorus, and the lake response variables of Chlorophyll-a and Secchi Depth are identified and discussed in the document. The specific phosphorus load reductions needed to attain the water quality targets are determined through modeling and discussed in Section 5 of the TMDL document. The corresponding relationships between phosphorus concentrations and Chlorophyll-a concentrations and Secchi Depth are shown in Figures 11 and 12 of the TMDL document.

Tributary modeling: The watershed for the lake is mainly agricultural in nature. To determine the loading from the two tributaries, MPCA used the FLUX model. The FLUX model uses existing sampling data and corresponding flow values to calculate loads and annual flow weighted mean concentrations for a tributary on an annual basis. These loads were used in the BATHTUB Model used to calculate water quality of Sauk Lake.

MPCA also accounted for loads not represented in the FLUX Model. MPCA included the runoff loads from the direct lake watershed, as well as loads from atmospheric deposition of phosphorus based upon results from studies in Minnesota and internal loading (Section 5 of the TMDL).

In-Lake modeling: Once the watershed loading calculations were developed for the lake, MPCA used BATHTUB to determine the water quality based upon the TP loading. The BATHTUB model applies a series of empirical equations derived from assessments of lake data and performs steady state water and nutrient calculations based on lake morphometry and tributary inputs. The BATHTUB model requires fairly simple inputs to predict phosphorus loading. The model accounts for pollutant transport, sedimentation, and nutrient cycling. The model was used to determine both the current load and the load needed to meet or maintain water quality standards for Sauk Lake (SW Bay) (Section 5 of the TMDL).

The Canfield-Bachmann subroutine was used in the BATHTUB model to determine how the lake responded to the TP loading. The model parameters were adjusted until the model predictions fit the sample data. Once the data were calibrated, the source loads were reduced until the in-lake concentration met the appropriate WQS (Section 5 of the TMDL).

MPCA subdivided the loading capacity among the WLA, LA and MOS components of the TMDL. 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 impacts are the greatest. TMDL allocations assigned during the summer growing season will protect the lake during the worst water quality conditions of the year. The MPCA assumed that the loading capacity established by the TMDL will be protective of water quality during the remainder of the calendar year (October through May).

Table 6 of the TMDL document identifies the loading capacity of the waterbody as 13,797 kg/year (37.8 kg/day) before subtracting a Margin of Safety of 989 kg/year (2.71kg/day) leaving 12,808 kg/year (35.1 kg/day) of remaining load to be allocated between point and nonpoint sources.

Table 6 – TMDL Summary (Excerpted from the TMDL Document)

Allocation	Source	Existing TP load		TP Allocations		Load Reductions	
		kg/yr	kg/day	kg/yr	kg/day	kg/yr	%
Wasteload	Industrial and Construction Stormwater	43	0.12	43	**0.12**	0	0
Load	Sauk Lake – North Bay	5928	16.2	3952	**10.83**	1976	33
	Ashley Cr.	9880	27.1	5200	**14.25**	4680	47
	Hoboken Cr.	3352	9.2	1140	**3.12**	2212	66
	Atmospheric	122	0.33	122	**0.33**	0	0
	Local watershed	877	2.4	877	**2.4**	0	0
	Internal load	1474	4.0	1474	**4.0**	0	0
	MOS	--	--	989	**2.71**	--	--
	Total without MOS	21676	59.4	12808	**35.1**	8868	41
	TOTAL LOAD	21676	59.4	13797	**37.8**	--	--

Figure 11. Sauk Lake (Southwest Bay) chlorophyll-a response.

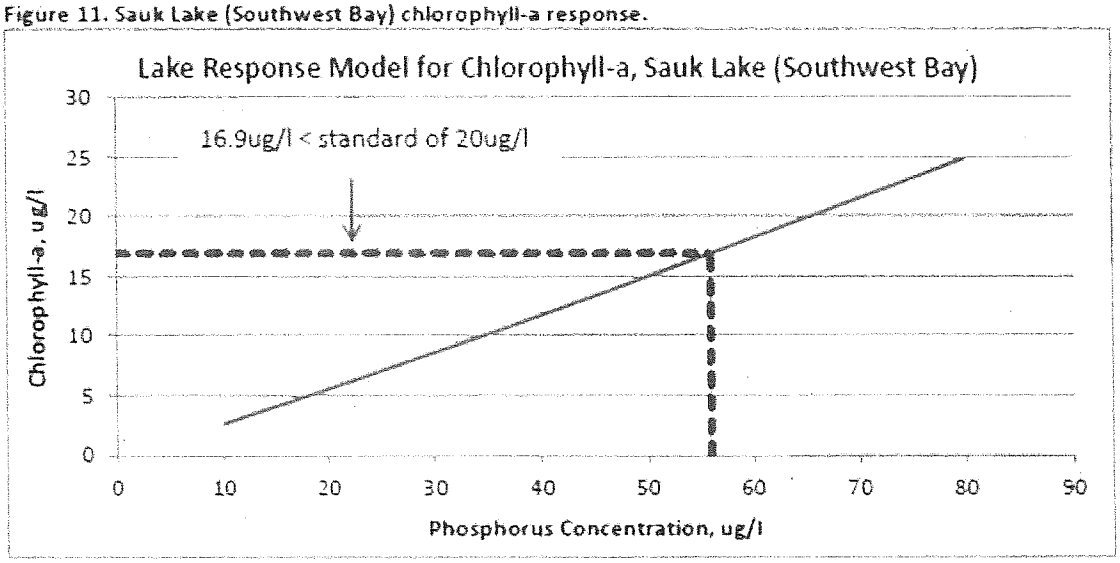
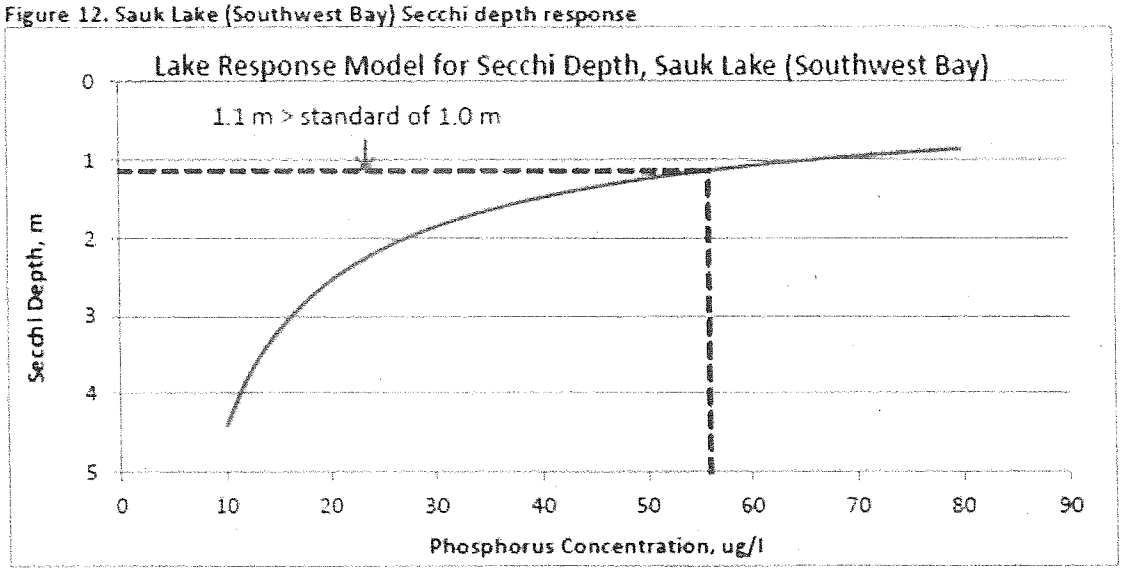


Figure 12. Sauk Lake (Southwest Bay) Secchi depth response



Excerpted from the TMDL Document

EPA supports the data analysis and modeling approach utilized by MPCA in its' calculation of wasteload allocations, load allocations and the margin of safety for the Sauk Lake (SW Bay) TMDL. Additionally, EPA concurs with the loading capacity calculated by the MPCA in the Sauk

Lake (SW Bay) TMDL. EPA finds MPCA's approach for calculating the loading capacity to be reasonable and consistent with EPA guidance.

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

4. Load Allocations (LAs)

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.

Section 4 Review Comments

Allocations for existing NPS loads are accounted for in Table 6 of the TMDL document.

Reserve capacity for future NPS loads was not allocated because increased future loads are not anticipated.

The Sauk Lake (Southwest Bay) Watershed is primarily agricultural, which is unlikely to undergo much change during the next few decades. Some shifts between hay/pasture and row crops will occur, but this will not affect the loading capacity of the lake since the analysis was based on long term records, which likely included land management changes of the same type and magnitude.[3]

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

[3] Excerpted from the TMDL document Pg. 22

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

Section 5 Review Comments

MPCA indicated that there are no NPDES permitted facilities (either municipal or industrial facilities or MS4s) present in the watershed with the potential to discharge phosphorus.

Point Sources
There are no permitted stormwater or municipal wastewater effluent sources in the Sauk Lake (Southwest Bay) Watershed. There is one permitted industrial wastewater discharger to Hoboken Creek, a petroleum storage facility. This facility has authority to discharge tank condensate and waters used for cleaning. The discharge is not expected to contain phosphorus, therefore a WLA is not needed for this facility. For this TMDL, to comply with established TMDL protocols, 0.1% of the total watershed load will be assigned to both

industrial stormwater and construction stormwater.[4]

A combined waste load allocation is provided for construction and industrial stormwater at 43 kg/yr (0.12 kg/day).

EPA finds the MPCA's approach for calculating the WLA for the Sauk Lake SWB TMDL to be reasonable and consistent with EPA guidance.

The EPA finds that the TMDL document submitted by 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.

Section 6 Review Comments:

An explicit margin of safety of 7% is identified and justified in Section 6 of the TMDL document. The margin of safety is 989 kg/yr (2.71 kg/day) of total phosphorus. MPCA noted that the 7% is reasonable due to the results of the generally good calibration of the BATHTUB model for pollutant loading (Section 6 of the TMDL). The calibration results indicate the model adequately characterizes the waterbodies, and therefore additional MOS is not needed.

> *An explicit MOS of 989 kg/yr (7%) is included in the TMDL. The data sets for the in-lake concentration and tributaries were quite robust and covered a period of five years which had a typical range of conditions. For the existing conditions model no adjustments of the calibration factors (all were left at model default values) were required, and the internal loading was within estimated ranges. Since there is good agreement between observed and predicted variables without undue model adjustments, the 7% MOS is considered to be adequate to address the uncertainties*

[4] Excerpted from the TMDL document, Pg.14

in the TMDL.[5]

The EPA finds that the TMDL document submitted by 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)).

Section 7 Review Comments:

Section 6 of the TMDL document address how the effects of seasonal and annual variation are accounted for in the development of the TMDL.

> *Seasonal variation is accounted for by developing the allocation for the summer season, which is when the nutrient levels peak and the likelihood of nuisance algae blooms is highest. By setting the TMDL to meet water quality goals during the critical summer period the allocations will be protective of the water quality during the other seasons.*[6]

EPA supports the approach utilized by MPCA in addressing the effects of seasonal variation by targeting the WQS for the critical summer season.

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

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

[5] Excerpted from the TMDL document, Pg. 14

[6] Excerpted from the TMDL document, Pg. 21

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.

Section 8 Review Comments:

Section 8 of the TMDL Document discusses how reasonable assurance is provided that the needed NPS load reductions will be achieved, including the following elements.

- The required tributary loads are set to match a proposed future State of MN WQS for Rivers in the ecoregion of 100 µg/l.[7]
- Watershed plans are in place to address NPS pollution in the basin including the Stearns County Comprehensive Local Water Management Plan and the Sauk River Watershed District Watershed Management Plan.
- An implementation plan is to be developed within one year of the approval of the TMDL.
- A mixture of funding sources is identified as appropriate for reducing NPS P pollutant loads.
- A number of technical resources are identified to assist with planning and implementing NPS pollutant control measures.
- A number of the BMPs identified as important for controlling nutrient loads are already being implemented in parts of the watershed and are therefore familiar to the landholders. Therefore, the state expects these measures to be widely adopted and implemented within the watershed.
- The natural background TP concentration of the lake is estimated to be at 47 µg/l, while the TMDL goal need only reach 60 µg/l to achieve WQS.

Clean Water Legacy Act: The CWLA was passed in Minnesota in 2006 for the purposes of

[7] The MN WQS of ≤ 100 µg/l for TP for Rivers in the Central Nutrient Region was approved by EPA on January 23, 2015. https://www.pca.state.mn.us/sites/default/files/wq-rule4-06ll.pdf

protecting, restoring, and preserving Minnesota water. The CWLA provides the protocols and practices to be followed in order to protect, enhance, and restore water quality in Minnesota.

The CWLA outlines how MPCA, public agencies and private entities should coordinate in their efforts toward improving land use management practices and water management. The CWLA anticipates that all agencies (i.e., MPCA, public agencies, local authorities and private entities, etc.) will cooperate regarding planning and restoration efforts. Cooperative efforts would likely include informal and formal agreements to jointly use technical, educational, and financial resources.

The CWLA also provides details on public and stakeholder participation, and how the funding will be used. In part to attain these goals, the CWLA requires MPCA to develop Watershed Restoration and Protection Strategies (WRAPS). The WRAPS are required to contain such elements as the identification of impaired waters, watershed modeling outputs, point and nonpoint sources, load reductions, etc. (Chapter 114D.26; CWLA). The WRAPS also contain an implementation table of strategies and actions that are capable of achieving the needed load reductions, for both point and nonpoint sources (Chapter 114D.26, Subd. 1(8); CWLA). Implementation plans developed for the TMDLs are included in the table, and are considered "priority areas" under the WRAPS process (Watershed Restoration and Protection Strategy Report Template, MPCA). This table includes not only needed actions but a timeline for achieving water quality targets, the reductions needed from both point and nonpoint sources, the governmental units responsible, and interim milestones for achieving the actions. MPCA has developed guidance on what is required in the WRAPS (Watershed Restoration and Protection Strategy Report Template, MPCA). The Sauk Lake (SW Bay) TMDL is part of the Sauk River WRAPS report, which was approved by MPCA in March, 2015.

There is an existing TMDL for Sauk Lake (North Bay), which was approved by the EPA in March, 2015, and includes an implementation plan approved by MPCA in 2014. A TMDL was also approved for Lake Osakis, upstream of Sauk Lake. This TMDL was approved by the EPA in 2013. These TMDLs identified reductions needed in phosphorus to attain WQS in the two lakes, and provide additional reasonable assurance that phosphorus reductions will occur.

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 2014 Clean Water Fund Competitive Grants Request for Proposal (RFP); Minnesota Board of Soil and Water Resources, 2014).

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.

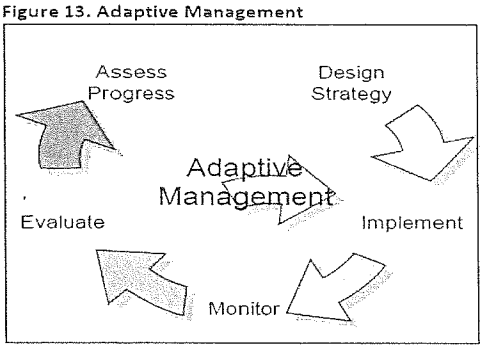
Section 9 Review Comments

Section 8 of the TMDL document includes a section on monitoring that includes a recommended strategy for effectiveness monitoring. The goals of the monitoring program are identified as assessing progress toward achieving TMDL goals, and gaining a better understanding of the lake dynamics. These two goals should provide the foundation needed to implement the TMDL through a process of adaptive management. Water quality monitoring is a critical component of the adaptive management strategy employed as part of the implementation efforts. Water quality information will aid watershed managers in understanding how BMP pollutant removal efforts are impacting water quality. Water quality monitoring combined with periodic review of BMP efficiency will provide information on the success or failure of BMP systems designed to reduce pollutant loading into Sauk Lake Southwest Bay. 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. The Sauk River Watershed District (SRWD) is expected to take the lead role in coordinating the collection of monitoring data and review of BMP effectiveness. The SRWD has been active in water resources management and protection since it was formed in 1986.

This list of implementation elements, along with the BMP's recommended in the Sauk River WRAPS report, should be considered within the framework of adaptive management (Figure 13). With continued monitoring and assessment, the linkages between nutrient sources and lake response will become better understood and strategies for improving lake water quality can be refined. Because there are no known point sources in the project area watershed, the implementation elements will

focus exclusively on non-point source controls.[8]

Figure 13. Adaptive Management



Excerpted from the TMDL document

An outline of the locations, parameters, and frequency of sampling is provided.[9]

1. *At two sampling locations in Sauk Lake (Southwest Bay), site id: 77-0150-01-203 (northern portion of lake); and 77-0150-01-206 (southern portion of lake)*
   - *10-12 times per summer (June through September) season:*
     TP (epilimnion)
     Chlorophyll-a (epilimnion)
     Secchi depth
     Temperature and dissolved oxygen profile, pH
   - *5-6 times per summer season*
     TP (hypolimnion)
     OrthoP (hypolimnion)
     Total Iron (hypolimnion)
     Total Sulfate (hypolimnion)
2. *Near the outlets of Ashley creek and Hoboken Creek*
   - *Continuous flow (gaging site with electronic logger)*
   - *18-20 times per year:*
     TP
     Temperature, pH, dissolved oxygen, conductivity (with portable sonde), t-tube

[8] Excerpted from the TMDL document, Pg. 26
[9] Excerpted from the TMDL document, Pg. 30

- *9-10 times per year*
  Total Kjeldahl nitrogen
  Nitrate/nitrite nitrogen

3. Blue-green toxicity testing if excessive algae blooms occur

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

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.

Section 10 Review Comments

Section 7 of the TMDL document includes an extensive discussion of the implementation activities needed to meet the pollutant load reduction goals of the TMDL. Implementation activities are largely to be based on a Watershed Restoration and Protection Strategy (WRAPS) Report published by MPCA in 2015. Selection of Best Management Practices (BMPs) for reducing agricultural related phosphorus inputs will be guided by the Minnesota Department of Agriculture's Agricultural BMP Handbook, published in 2012.

Potential BMPs identified in the strategy include:[10]

[10] Excerpted from the TMDL document, Pg. 23

Vegetative Management Practices

- *Contour farming*
- *Strip cropping*
- *Grassed waterways*
- *Grass filter strip for feedlot runoff*
- *Forest management practices*
- *Alternative crop in rotation*
- *Field windbreak*
- *Pasture Management (IRG)*
- *Conservation Reserve Program (CRP) or Conservation Reserve Enhancement Program (CREP)*

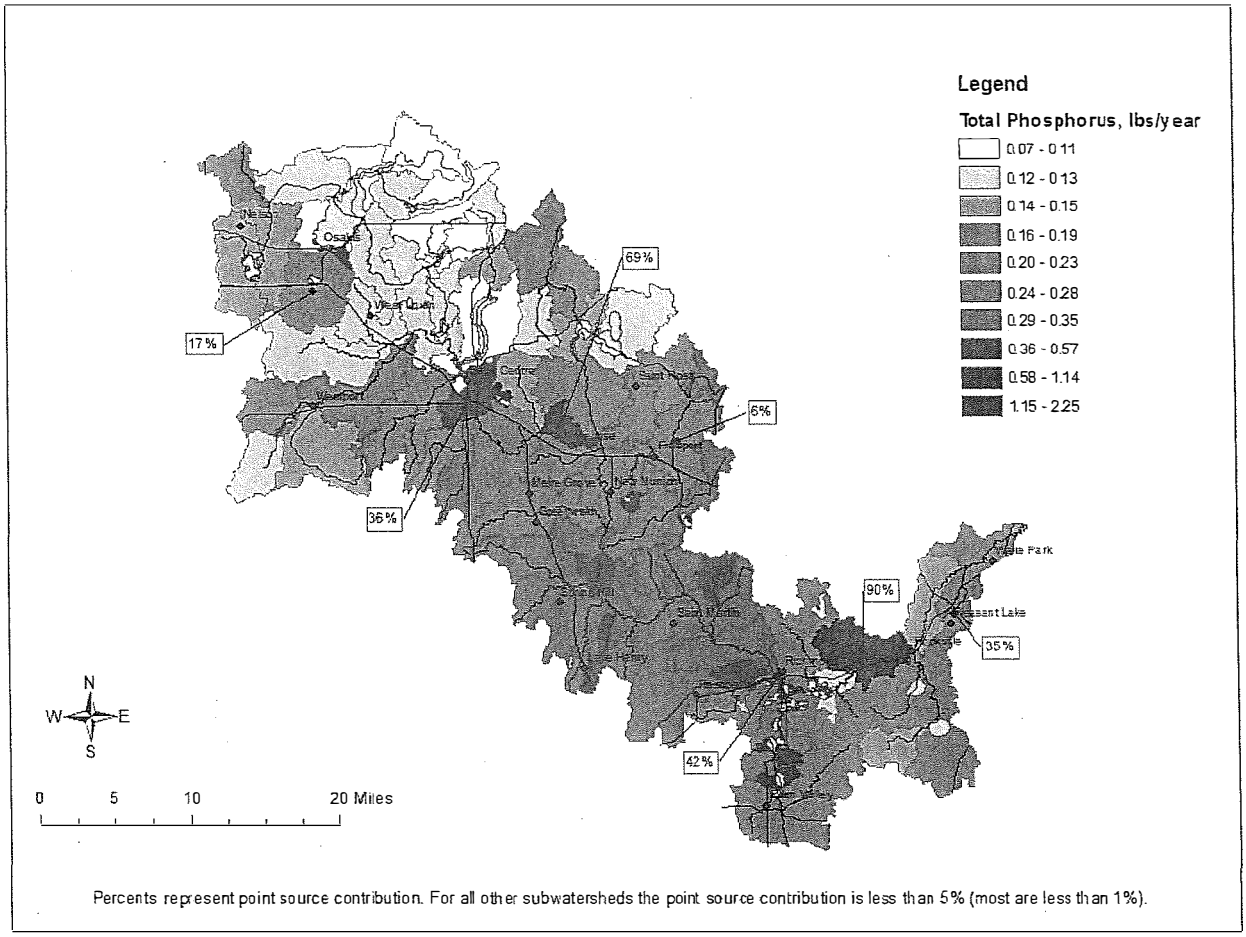
Primary Tillage Practices

- *Chisel Plow*
- *One pass tillage*
- *Ridge till*
- *Sustain surface roughness*
- *Nutrient Management Practices*
- *Amount of application*
- *Timing of application*
- *Method of application*
- *Structural Practices*
- *Wetland restoration*
- *Livestock exclusion*
- *Liquid manure waste facilities*

A detailed discussion of each category of BMP is provided in the text.

A map is provided showing the average annual total phosphorus loads by subwatershed of the Sauk River Watershed which can be used to aid in targeting BMP implementation.

Sauk River Watershed, Total Phosphorus, Average Annual Load by Subwatershed, lbs/yr, 1996-2009



Excerpted from the TMDL Document

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.

Section 11 Review Comments

Section 9 of the TMDL document discusses the opportunities provided for the public to participate in the TMDL development process.

> *As part of the strategy to achieve implementation of the necessary allocations, the SRWD held a public meeting in December, 2008. The purpose of this meeting was to inform the general public and stakeholders about the TMDL process, and preliminary results of the Sauk Lake TMDL study. Additional stakeholder meetings, following the public noticing of the TMDL, will be held to update residents and to seek additional input on implantation efforts and planning. In addition to the public meetings, the SRWD intends to publish these results and project updates in their annual newsletter, as they have done on past TMDL studies in addition to their website (www.srwdmn.org). The SRWD's Board of Managers and SWCD staff also made efforts to discuss the TMDL process and findings with their constituents and local landowners.*
> *The MPCA held a 30-day public notice review and comment period from July 18 through August 17, 2016. The MPCA received six comments regarding the TMDL, all of which were submitted by the MDA. All comments have been addressed in this final TMDL.*[11]

Although MPCA states in the TMDL that six comments were received from the Department of Agriculture, it appears that five of the comments were grouped together and responded to simultaneously in MPCA's response to the Minnesota Department of Agriculture[12]. On March 20, 2017, EPA confirmed with MPCA that it had in fact grouped the remaining five comments in "Comment #2" and responded to them in Response #2.

[11] Excerpted from the TMDL Document, Pg. 31
[12] Letter from Scott Lucus, MPCA to Ms. Heidi Peterson, MN Dept. of Agriculture, October 10th, 2016, RE: Draft Sauk Lake (Southwest Bay) Excess Nutrient TMDL comments.

The Minnesota Department of Agriculture (MDA) suggested that since a large percentage of the land use in the Sauk Lake watershed is pasture/hay, a greater focus should be given to assessing the livestock population and estimating the corresponding nutrient contribution and distribution. MPCA responded that contributions from animal units are included for modeling purposes as part of the tributary loads, and that a more detailed assessment of the nutrient contribution and distribution of feedlots and animal units will be conducted when evaluating potential BMPs.

MDA also suggested the following wording changes to the document which were subsequently adopted by MPCA.

> *Since the watershed has a nutrient impairment, it is suggested that Agricultural Nutrient Management be added to the list of BMPs recommended on page 23. More information on Nutrient Management can be found beginning on page 48 of the 2012 MDA Ag BMP Handbook. By improving nutrient use efficiency while adopting structural, vegetative, or management (such as tillage) BMPs, the watershed will have more success meeting water quality improvement or protection goals. Vegetative Management Practices (be consistent with other headings- capitalize the start of each word in the heading) are discussed on page 24. Consider inserting "When designed and managed properly," at the beginning of the second sentence which currently reads "Grassed waterways and grass filter strips increase entrainment of sediment." If waterways and filter strips are not managed properly they may actually release additional sediment. Primary Tillage Practices are discussed on page 24. Consider revising the first sentence by replacing "Certain kinds of" with " Reduced". Additionally, perhaps the second sentence could read "Conservation tillage techniques emphasize leaving at least 30% crop residue or vegetative cover on field to reduce ... . "*

EPA believes that MPCA adequately addressed the comments from the MDA and updated the final TMDL appropriately. MPCA submitted all public comments received during the public notice period and individual responses to those comments in the final TMDL submittal packet received by the EPA.

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

Section 12 Review Comments:

A cover letter accompanied the submission of the final TMDL document that included information to identify the waterbody in question, the purpose of the submittal, and the pollutants of concern.

EPA received the final Sauk Lake (SW Bay) TMDL document, submittal letter and accompanying documentation from the MPCA on October, 28th 2016. The transmittal letter explicitly stated that the final Sauk lake (SW Bay) TMDL for phosphorus 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 EPA finds that the TMDL transmittal letter submitted for the Sauk Lake SWB TMDL by MPCA satisfies the requirements of this twelfth element.

13. Conclusion

After a full and complete review, EPA finds that the TMDL study satisfies all of the elements of an approvable TMDL. This TMDL approval is for Total Phosphorus for Sauk Lake (Southwest Bay), located in the Upper Mississippi River Basin in Stearns County, Minnesota.

EPA's approval of this TMDL extends to the water body identified in Table 1 of the TMDL Document with the exception of any portions of the water body that is within Indian Country, as defined in 18 U.S.C. Section 1151. EPA is taking no action to approve or disapprove TMDLs for those waters at this time. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.