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

JUN 14 2012

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BY:

REPLY TO THE ATTENTION OF:

WW-16J

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

Dear Ms. Flood:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Loads (TMDLs) for Big Elk Lake (ID#71-0141-00), Mayhew Lake (ID#05-0007-00), and the Elk River (ID# 07010203-579), including supporting documentation and follow up information. The waterbodies are located in eastern central Minnesota in Benton and Sherburne Counties. The TMDLs were calculated for Phosphorus, Total Suspended Solids, and E. coli, to address excess nutrients, turbidity, and bacteria, respectively. The designated use impairment in the lakes is aquatic recreational use, and the Elk River is classified as a Class 2B water and is defined as and protected for aquatic life (warm and cool water fisheries and associated biota) and recreation (all water recreation activities including bathing).

These TMDLs meet 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 four TMDLs in Big Elk Lake, Mayhew Lake, and the Elk River. The statutory and regulatory requirements, and EPA's review of Minnesota's compliance with each requirement, are described in the enclosed decision document.

We wish to acknowledge Minnesota's effort in submitting these TMDLs, and look forward to future TMDL submissions by the State of Minnesota. If you have any questions, please contact Mr. Peter Swenson, Chief of the Watersheds and Wetlands Branch, at 312-886-0236.

Sincerely,

Tinka G. Hyde
Director, Water Division

Enclosure

cc: Dave L. Johnson, MPCA
Phil Votruba, MPCA

TMDL: Elk River, Big Elk Lake, Mayhew Lake, Minnesota
Date:

DECISION DOCUMENT FOR THE APPROVAL OF THE ELK RIVER, BIG ELK LAKE, AND MAYHEW LAKE, MINNESOTA, TMDL

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: Section 1.2 of the TMDL states that the Elk River (ID# 07010203-579), Big Elk Lake (ID#71-0141-00), and Mayhew Lake (ID#05-0007-00) are located northwest of Minneapolis/St. Paul in east central Minnesota. The majority of the watershed is located in Benton and Sherburne Counties, with some portions of the watershed located in Mille Lacs and Morrison Counties. The study area is located within the North Central Hardwood Forests Ecoregion.

Mayhew Lake is in the northwest portion of the watershed and has an areal extent of 130 acres. The lake is categorized as a deep lake which stratifies in the summer, with a mean depth of 13 feet and a maximum depth of 20 feet. Further to the southeast, several lakes and tributaries drain into Big Elk Lake, which covers 360 acres. Big Elk Lake is categorized as a shallow lake with a mean depth of 5 feet, a maximum depth of 9 feet, and does not experience stratification in the summer. It is a "flow through" or flowage lake on the Elk River. The lake has an outlet at its downstream end and continues its course into the Elk River. The Elk River then flows southeastward and joins the St. Francis River, which then flows into the Mississippi River at the City of Elk River. The impaired segment of the Elk River is the 23.2 mile reach from the outflow of Big Elk Lake to the St. Francis River. The TMDL submittal is for phosphorus TMDLs for each of the two lakes, and for two TMDLs in the Elk River, one for Total Suspended Solids (TSS) to address turbidity and one for *E. coli* to address bacteria, for a total of four TMDLs.

Land use: Section 3.1.1 of the TMDL lists land use percentages in the TMDL study area. There is 34.27% pasture/hay, 20.07% deciduous forest, 15.26% corn, 8.97% soy, 6.30% herbaceous wetlands, 5.87% developed/open space, 1.69% open water, 1.16% evergreen forest, 1.05% grass pasture, and trace percentages of other land uses.

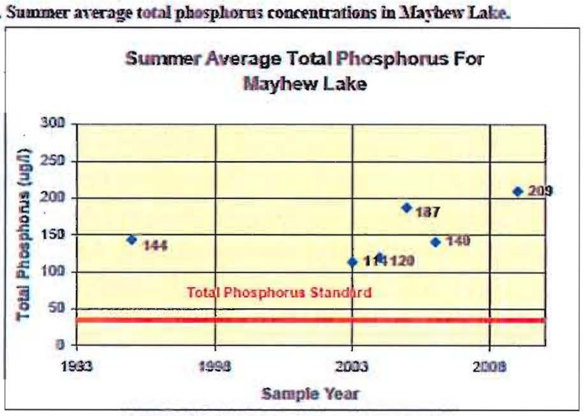
Problem Identification in Lakes: The lakes are impaired for aquatic recreation by excess nutrients. Section 1.2 of the TMDL states that Big Elk Lake and Mayhew Lake were listed for nutrients in 2006 and 2008, respectively. Though turbidity is often associated with TSS and sedimentation, the problem in the lakes is primarily algal turbidity from algal growth resulting from excess phosphorus. Section 3.2.5 of the TMDL describes that fish and plant communities in the lakes do not exhibit typical assemblages due to the high algal turbidity. Bank erosion measurements confirm that the erosional impact on lake impairment is less significant than algal turbidity. Excess nutrient concentration in the lakes will be addressed by developing a TMDL for total phosphorus (TP).

Problem Identification in the River: The river is impaired for aquatic life and aquatic recreation by turbidity and pathogens. A significant source of excess turbidity (algal) in the Elk River is from Big Elk Lake and is discussed in detail later in this document. Section 3.2.7 of the TMDL confirms that the non-algal turbidity is from sediment generated from the landscape and streambank erosion, but is not a large contributor to the total turbidity load. The amount of sediment from the landscape depends on soil erodibility, land cover, slope, and conveyances to the stream. The thickness of the soil eroded from a streambank face in a year is the lateral recession rate. Though the impaired reach scored from a moderate to severe lateral recession rate, this score resulted in a lateral recession rate of 0.1 – 0.3 feet/year. The conditions measured for risk of streambank erosion are bank stability, bank condition, vegetation/cover on banks, bank/channel slope, channel bottom, and deposition. Scores given to these conditions determine the severity of risk. Active streambank erosion contributes ~1.0% - 2.4% to the total TSS load.

Lakes Nutrients - Section 3.2.1.1 of the TMDL states that data were collected by MPCA in Mayhew Lake for all three trophic indicator parameters, phosphorus, Secchi depth, and chlorophyll *a*. Data were collected for many years, and more recently for TMDL development. Though Secchi depth data are believed to have some errors due to unit conversion, data still indicate a decline in clarity from 2003 through 2009, with increases in both phosphorus and chlorophyll *a* during the same time interval. The highest phosphorus measurements were recorded in 2009, and many exceedences of the standard occur, as shown below, and in Figure 3.5 of the TMDL. In 2006 and 2009, chlorophyll *a* measurements had the highest readings on record. There was a corresponding increase in precipitation during those same years. For lakes with a long residence time, the runoff from precipitation may increase the phosphorus loading to the lake.

The sources of nutrients to Big Elk Lake are derived from external tributaries and internal lake dynamics. Excess nutrients in the lake result in excess algal growth, and resultant turbidity is caused by the suspension of sediment, organic matter, or algae.

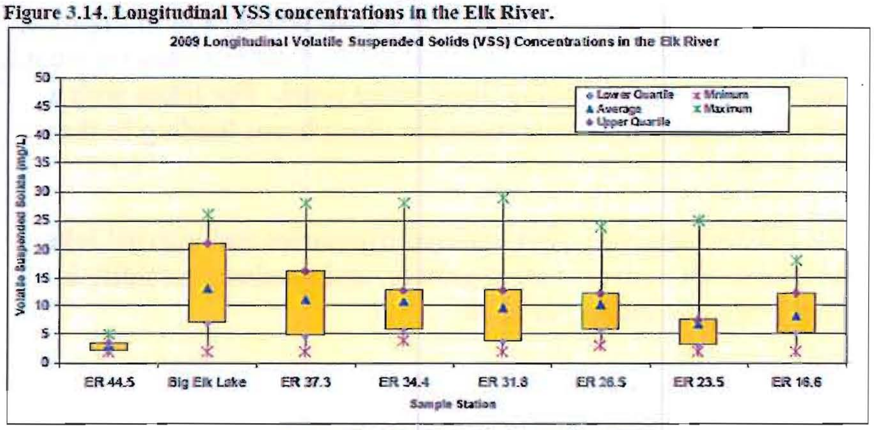
Figure 3.5. Summer average total phosphorus concentrations in Mayhew Lake.



River Turbidity - The Elk River is impaired for aquatic recreation and aquatic life use by turbidity and bacteria. The TMDL for turbidity in the Elk River, from below the outlet of the lake to the confluence with the St. Francis River, was developed using two components: TSS with non-algal constituents (sediments), and Volatile Suspended Solids (VSS), which are the algal components of turbidity. Details of TSS and VSS will be discussed below in the Surrogate Section of this document.

Big Elk Lake is classified as hyper-eutrophic because all three parameters, phosphorus, chlorophyll *a*, and Secchi depth measured well above the standards; the lake then discharges directly to the Elk River. Figure 3.14 below, taken from the TMDL, shows that the smallest amount of VSS upstream of Elk Lake, followed by a large amount of VSS measured downstream is found in Elk Lake, located between sampling stations ER 44.5 and ER 37.3. This figure illustrates the strong support for VSS algal turbidity originating in Big Elk Lake and being transported from Big Elk Lake to the Elk River. Section 5.2.3.1 of the TMDL states that turbidity tube readings contrast greatly when comparing station readings upstream and downstream of the lake (a 4% violation of the turbidity standard versus a 40% violation, respectively), further indicating the influence of the lake on turbidity. As indicated in Section 5.1.1 of the TMDL, MPCA believes that meeting the phosphorus standard in Big Elk Lake will result in Elk River achieving the TMDL for turbidity because the excess nutrients contribute to excess algal growth; EPA concurs with this assessment.

Figure 3.14. Longitudinal VSS concentrations in the Elk River.



T:\12378_ERWSA\Elk River\[2009 WQ data.xls]VSS Chart

River Bacteria - The Elk River impairment by *E. coli* (and historic fecal coliform), indicators for bacteria, exceeded both chronic and maximum water quality standards. Sampling results are recorded above *E. coli* monthly geomean standards during the recreational season (April 1 through October 31) collected in 2009, with exceedences occurring mostly during August and September. In samples collected from 1974 – 1976 and 2002 – 2007, approximately 20% exceeded the previous chronic fecal coliform standards.

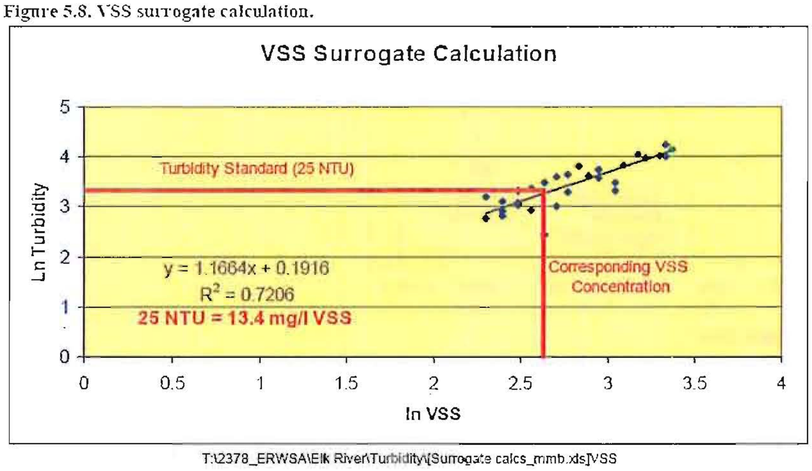
Pollutants of Concern: Pollutants of concern are excessive nutrients, turbidity and bacteria. TMDLs are developed for TP, TSS, and *E. coli*, respectively. Table 1.1 below lists the waterbodies and pollutants.

Table 1.1. Impaired waters in the Elk River watershed.

Water Body	HUC	DNR Lake ID # or stream reach #	Listing Year	Affected Use	Pollutant or Stressor	Target Start Date	Target Completion Date
Mayhew Lake	07010203	05-0007-00	2008	Aquatic Recreation	Excessive nutrients	2008	2011
Big Elk Lake	07010203	71-0141-00	2008	Aquatic Recreation	Excessive nutrients	2010	2014
Elk River	07010203	579	2006 & 2008 respectively	Aquatic Life and Aquatic Recreation	Turbidity and pathogens (fecal coliform)	2008	2016

Surrogates: The Elk River TMDL uses TSS as a surrogate for both nutrients and turbidity; no surrogates are used for the lakes. Section 2.2.1 of the TMDL states that the turbidity standard is 25 Nephelometric Turbidity Units (NTUs) based on the Class 2B stream use classification of the Elk River segment. MPCA has determined that the surrogate values of transparency tube < 20 centimeters and TSS > 100 mg/L correspond to violation of the 25 NTU turbidity standard. This TSS value represents the "non-algal" turbidity, caused by erosion and lateral recession, and has been well-established in past projects and TMDLs. The TSS "algal" turbidity component will be addressed by VSS measurements. Calculations in Figure 5.8 below were conducted in accordance with MPCA turbidity protocols. VSS was compared to the turbidity standard in NTU, using log normal calculations, resulting in an R^2 of 0.7206. VSS, which measures the algal turbidity concentration caused by excess phosphorus in the lake, is chosen as the surrogate because it has the highest correlation to turbidity in NTU; 13.4mg/l VSS = 25 NTU.

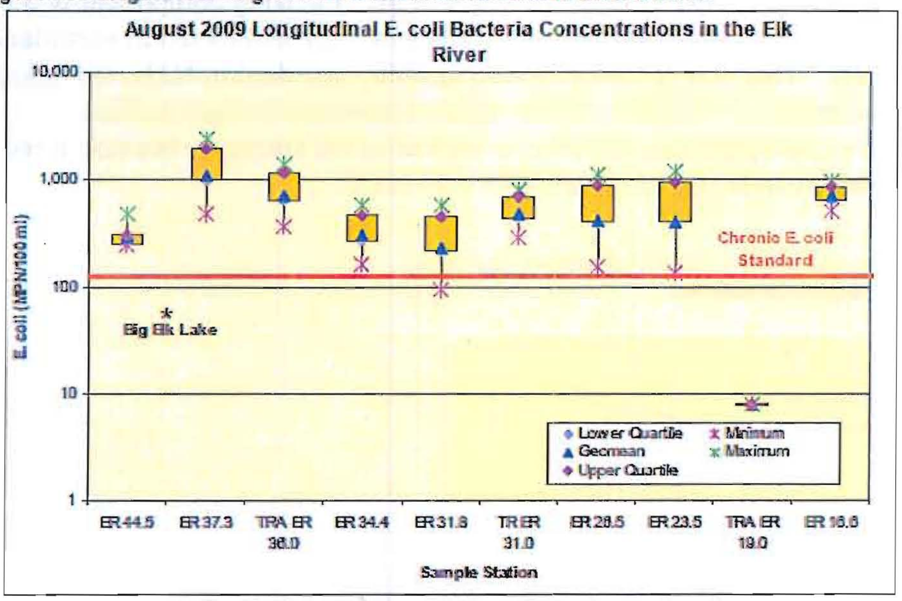
Figure 5.8. VSS surrogate calculation.



Source Identification: Section 3.1 of the TMDL states that sources of the elevated levels of phosphorus, and associated chlorophyll *a* and Secchi disk readings in the lakes are primarily agricultural. Feedlot density is high, especially in the northern portion of the watershed. The high percentage of agricultural land use introduces phosphorus, sediment, and bacteria to surface waters. Numerous feedlots and pastures add to the potential for manure to enter surface water directly. The southern portion of the watershed has mostly irrigated agriculture and more urban/residential development than the northern reaches of the watershed. Section 3.2.1.3.1 of the TMDL states that the algal components are the primary contributors to the Elk River turbidity impairment.

The sources of bacteria are agricultural runoff and other watershed sources. Unlike VSS, the bacteria measurements do not change greatly when comparing upstream or downstream measurements, as shown in Figure 3.21 below for August 2009, found in Section 3.2.1.3.2 of the TMDL. Other months also show little magnitude change upstream to downstream. MPCA states that the data show the bacteria cannot be attributed to a specific land use or location. The bacteria most likely are introduced to the waterbodies through land use throughout the entire watershed, especially in riparian zones. Some sources may include concentrated animal feeding operations (CAFOs), Wastewater Treatment Facilities (WWTFs), Municipal Separate Storm Sewer Systems (MS4s), Subsurface Sewage Treatment Systems (SSTS), straight pipe septic systems, runoff (from residential and urban riparian, lakeshores, grazed pasture, cropland, and feedlots), non-permitted CAFOs (small to medium size), agricultural lands, and wildlife.

Figure 3.21. August 2009 longitudinal *E. coli* concentrations in the Elk River.



T:\2378_ERWSA\Elk River\[2009 WQ data.xls]Long. E.coli by exceed. months

Sources of contaminants are from both point and nonpoint sources. Section 4.1 of the TMDL states that the potential point sources that exist in the watershed include WWTFs, MS4s, general permits (construction, industrial, sand and gravel) and CAFOs, as seen below in tables 4.1, 4.2, and 4.3.

Table 4.1. List of NPDES permitted WWTFs in the study area.

NPDES Permit Holder Name	NPDES Permit Number	Population[1] Served	MPCA Limits	Watershed Location
Foley WWTF	MN0023451-SD-1, -2, -3	2624	FC, TSS	Elk River Reach 579, Big Elk Lake
Gilman WWTF	MN6580021-SD-2	228	FC, TSS	Elk RRiver Reach 579, Big Elk Lake
Becker WWTF	MN0025666-SD-1	4105	P,TSS	Elk River Reach 579
Eagle View Commons WWTF	MN0063983	102[2]	NA	Elk River Reach 579, Big Elk Lake
Appert's Inc.	MN0052728	NA	NA	Elk RRiver Reach 579, Big Elk Lake

FC= fecal coliform; TSS= total suspended solids; P= phosphorus

ER 579= Elk River reach 579 watershed

1 League of MN Cities 2003

2 40 homes are served by the system, calculated from 2000 census average persons per household for Benton County

Table 4.2. List of NPDES Phase II stormwater permit holders in the TMDL study area.

NPDES Phase II Permit Holder Name	NPDES Phase II Permit Number	Watershed Location (ER 579= Elk River Reach 579, BEL= Big Elk Lake)
Sherburne County	MS4400155	ER 579, BEL
Big lake Township	MS4400234	ER 579
City of Big Lake	MS4400249	ER 579
Benton County	MS4400067	ER 579, BEL
Sauk Rapids City	MS4400118	ER 579, BEL
Sauk Rapids Township	MS4400153	ER 579, BEL
St. Cloud City	MS4400052	ER 579, BEL
MNDOT Outstate District	MS4400180	ER 579, BEL
Haven Township	MS4400136	ER 579, BEL
Minden Township	MS400147	ER 579, BEL
Minnesota Correctional-St Cloud MS4	MS400179	ER 579, BEL
Watab Township MS4	MS400161	ER 579, BEL

Table 4.3: List of CAFO NPDES permit holders in the TMDL study area

CAFO NPDES Permit Holder	Permit Number	AU's	Watershed Location
Goenner Poultry LLC	MNG441109	396	ER 579
Eiler Bros.	MNG440909	1060	ER 579

Potential nonpoint sources include atmospheric deposition, internal lake loading, groundwater, SSTS, straight pipe septic systems, rural and urban residential runoff, non-permitted small to medium sized livestock facilities and riparian pastures, agricultural lands, wildlife, and instream erosion of streambed and banks. The tables below summarize the point and nonpoint contaminants and sources (Table 5a and 5b below).

Table 5a. Point Sources and Contaminants

Point Source	Nutrients	Turbidity	*E. coli*
CAFO permits	x	x	x
WWTF	x	x	x
MS4	x	x	x
Construction, general, industrial	x	x	

Table 5b. Nonpoint Sources and Contaminants

Nonpoint Source	Nutrients	Turbidity	*E. coli*
Atmospheric	x	x	
Internal lake	x	x	
Groundwater	x	x	
SSTS	x	x	x
Straight pipe septic systems	x	x	x
Runoff (residential and urban riparian, lakeshores, grazed pasture, cropland, feedlots)	x	x	x
Non-permitted small-medium Animal feeding operations	x	x	x
Agricultural lands	x	x	x
Wildlife			x
Instream bank erosion		x	

Priority Ranking: Section 1.1 of the TMDL states that the priority ranking is implicit in the TMDL schedule included in Minnesota's 303(d) list. This TMDL project was scheduled to begin in 2008 and targeted to be completed in 2010. Ranking criteria include: impairment impacts on public health and aquatic life; public value of the impaired water; likelihood of completing the TMDL and restoring the water; local interest and assistance with the TMDL; and sequencing of TMDLs within a watershed. The local interest has been high for several decades, and will be discussed later in the Reasonable Assurance Section of this document.

Future growth: Section 6.3 of the TMDL states that the population of Sherburne County is expected to double by the year 2030. The population of Benton County experienced an increase of 29% from 1990-2005 with a projected growth of another 32% by 2020. Section 6.1.1 states that the nutrient WLA was adjusted by 2% to account for future growth.

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

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

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. (40 C.F.R. §130.7(c)(1)). 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.

<u>Comment:</u>
Designated Use: Section 2.1 of the TMDL submittal states that the protected beneficial use for all lakes in Minnesota is aquatic recreation. The Elk River is classified as a Class 2B water and is defined as, and protected for, aquatic life (warm and cool water fisheries and associated biota) and recreation (all water recreation activities including bathing).

Lakes Phosphorus Standards - Section 2.1 of the TMDL states that standards for the lakes in Minnesota were revised in 2008 and are shown below in Table 2.2. The lakes in Minnesota have two different standards depending on the depth of the lake and ecoregion. There are three different parameters in the standard, phosphorus, chlorophyll *a* and Secchi depth, using summer averages from June 1 through September 30.

Table 2.2. New MPCA goals and standards for protecting Class 2B waters. Values are summer averages (June 1 through September 30) (MPCA 2008).

Ecoregion	TP (µg/L)	Chl-a (µg/L)	Secchi (m)	Applicable Lake Goals
CHF- Aquatic Rec. Use (class 2b) Deep Lakes	<40	<14	>1.4	**Mayhew Lake**
CHF- Aquatic Rec. Use (Class 2b) Shallow lakes[1]	<60	<20	>1.0	**Big Elk Lake**

[1]Shallow lakes are defined as lakes with a maximum depth of 15 feet or less, or with 80% or more of the lake area shallow enough to support emergent and submerged rooted aquatic plants (littoral zone).

River Turbidity Standards - Section 2.2.1 of the TMDL states that the numeric criterion for turbidity is based on stream use classification. The impaired reach covered in this TMDL is classified a Class 2B water and has a turbidity standard of 25 NTU (equal to 13.4 mg/l VSS in

Figure 5.8 above). Minn. R. 7050.0220. The standards are violated for the surrogates when the transparency tube < 20 centimeters and **TSS > 100 mg/L.**

River Bacteria Standards - The standard for bacteria in Class 2B waters is: Minn. R. ch. 7050.0222 subp. 4, *E. coli* water quality standard for class 2B and 2C waters. This standard states that *E. coli* shall not exceed **126 organisms per 100 milliliters** as a geometric mean of not less than five samples in any calendar month, **nor shall more than ten percent** of all samples taken during any calendar month individually **exceed 1,260 organisms per 100 milliliters**. The standard applies between April 1 and October 31. The river segment was originally listed for impairment by fecal coliform but in 2008 the standards were changed to the *E. coli* indicator used for development of this TMDL.

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

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a waterbody for the applicable pollutant. 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 stream 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.

<u>Comment:</u>
The Loading Capacities for each contaminant are discussed in Section 6 of the TMDL submittal, and are shown below in Tables 6.1, 6.5, and 6.6. The methodology varies for each contaminant and is discussed with each TMDL table presented.

Lakes Phosphorus Methodology - Phosphorus allocation in the lakes was determined by using BATHTUB. Section 5.1.1 of the TMDL states that BATHTUB is a eutrophication model for nutrients that predicts the lake response to phosphorus inputs, developed by the US Army Corps of Engineers. There are also subroutines within the BATHTUB model, such as Canfield-Bachman, which was developed using data from 704 lakes in Minnesota to predict the relationship between in-lake phosphorus concentrations and phosphorus load inputs. Internal phosphorus release is a large component of the phosphorus loading, and can also occur as a result of fish and boats stirring bottom sediment, plants growing and dying in the summer months, and internal lake cycling. As stated earlier in this document, achieving the total phosphorus goals for Big Elk Lake will result in the lake meeting the chlorophyll *a* and Secchi depth goals, which are components of the phosphorus standard.

Data used in the BATHTUB modeling effort included: measured in-lake water quality, measured hydrology, measured watershed phosphorus runoff and loadings, watershed specific land use, lake morphometry, and measured internal lake nutrient cycling. Three years of measured in-lake water quality data were used for calibration and validation in Big Elk Lake, and five years of water quality data for the Mayhew Lake model.

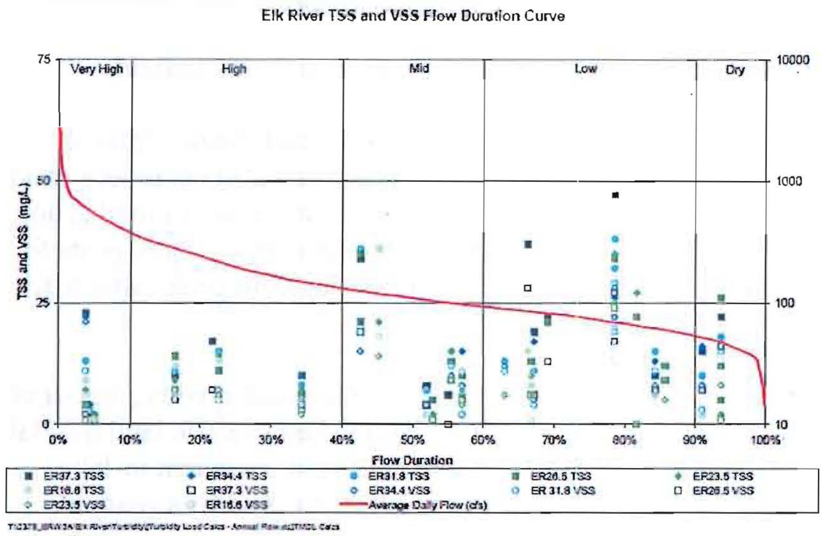
Table 6.1. Total phosphorus TMDL expressed as daily loads (from lake response models and source watershed data).

Lake	Total Phosphorus TMDL (lbs/day)	Waste Load Allocation (lbs/day)	Load Allocation (lbs/day)	MOS
Mayhew	4.67	0	4.67	Implicit
Big Elk	25.1	7.96	17.15	Implicit

Big Elk Lake is located between ER 44.5 and ER 37.3

River Turbidity Methodology – The load duration curve approach was used for developing this TMDL. First, continuous flow data is required and reflect a range of natural occurrences from extremely high flows to extremely low flows. The flow duration curve is derived from USGS flow records from 1990-2009 at station 05275000, approximately 5 miles below the Elk River reach. Figure 3.16 from the TMDL shown below shows the TSS and VSS water quality data from the Elk River combined with the flow duration curve. The various sampling locations are added to the curve and it can be determined which sites contribute loads above or below the average daily flow curve (cfs). The highest turbidity readings generally occur in the midflow, low flow, and dry conditions. Using the appropriate conversion factors to get a TSS load-based allocation, the resultant turbidity TMDL will result in water quality standards being attained. The final step is to determine where reductions need to occur, to achieve values that all occur below the curve.

Figure 3.16. Flow Duration Curve with TSS and VSS Concentrations.



The TMDL approach is based upon the premise that all discharges (point and non-point) must meet the WQS when entering the waterbody. If all sources are meeting the WQS at discharge, then the waterbody will by definition meet the WQS and the designated use. The plots show under what flow conditions the water quality exceedences occur. Those exceedences at the right side of the graph occur during low flow conditions, such as SSTS and straight-pipe septic systems; exceedences on the left side of the graphs occur during higher flow events, such as runoff.

Sources are attributed to both wet-weather (nonpoint) and dry-weather (point) events. Using the load duration curve approach allows MPCA to determine which implementation practices are most effective for reducing TSS and VSS loads based on flow regime. For example, if loads are significant during storm events, implementation efforts can target those BMPs that will most effectively reduce storm water run-off. This allows for a more efficient implementation effort.

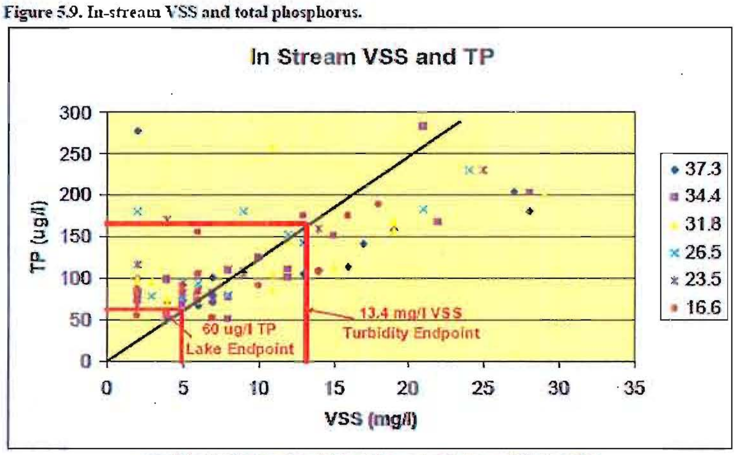
The load duration curve is a cost-effective TMDL approach, while still addressing the reductions necessary to meet WQS for turbidity. The approach also aids in sharing the responsibility among various sources in the TMDL watershed, which encourages collective implementation efforts.

Weaknesses of the TMDL analysis are that Non-Point Source (NPS) load allocations were not assigned to specific sources within the watershed. However, EPA believes the weaknesses are outweighed by the strengths of the TMDL approach and is appropriate based upon the information available. In the event that TSS levels do not meet WQS in response to implementation efforts, the TMDL strategy may be amended as new information on the watershed is developed, to better account for contributing sources of the impairment and to determine where reductions in the Elk River watershed are most appropriate.

One of the enhancements of the approach taken by MPCA is described in Section 5.1.2 of the TMDL. The turbidity calculation methodology partitions the TSS into algal and non-algal TSS. The algal TSS uses linear regression to establish and support relationships between algal TSS (VSS) and phosphorus (nutrients).

MPCA has established the VSS standard as 13.4 mg/l in Class B streams (equivalent to 25 NTU turbidity standard). MPCA has established the Big Elk Lake standard for TP is 60 µg/l (shallow lakes). Figure 5.9 below, taken from the TMDL, shows in a linear regression that achieving the Big Elk Lake standard of 60 µg/l TP corresponds with a VSS concentration of only 5 mg/l (smaller value red lines), which is well below the 13.4 mg/l VSS standard and TP equivalent (larger value red lines). Therefore, EPA concurs with the approach that achieving lake standards will inherently achieve in stream standards.

Figure 5.9. In-stream VSS and total phosphorus.



T:\2378_ERWSA\Elk River\Turbidity\[turbidity_rmb.xls]In Stream TSS, VSS, CHla

Note: The black solid line is a linear regression of the relationship between VSS and TP.

The non-algal turbidity in tons per day is shown below in Table 6.5 taken from Section 6.1.2 of the TMDL. It is derived by: non-algal TSS = TSS – algal TSS. The non-algal partition is the watershed-based loading to the river, rather than the lake contribution to the turbidity impairment. The river turbidity loadings are outputs of the models and equations used in the lake and the river.

Table 6.5. Partitioned non-algal turbidity TMDL (Daily loads).

		Daily (Tons per day)							
246876	Critical Condition	Total Wasteload Allocation (Tons)	WWTF Allocation (tons)	MS4 Allocation (Tons)	Industrial Stormwater Allocation (Tons)	Construction Stormwater Allocation (Tons)	Load Allocation (tons)	Margin of Safety (tons)	TMDL (tons)
Elk River 579	High Flow	0.56	0.27	0.13	0.08	0.08	6.84	0.82	8.23
	Wet	0.37	0.27	0.05	0.03	0.03	2.31	0.30	2.98
	Mid-Range	0.33	0.27	0.03	0.02	0.02	1.17	0.17	1.66
	Dry	0.31	0.27	0.02	0.01	0.01	0.71	0.11	1.13
	Low Flow	0.29	0.27	0.01	0.01	0.01	0.31	0.07	0.67

All calculations are based on a TSS-VSS average of 5.65 mg/L (Results of 2009 monitoring data)

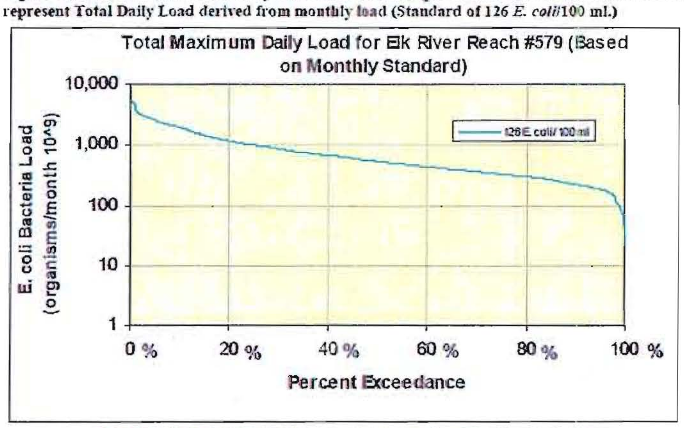
T:\2378_ERWSA\Elk River\Turbidity\[Turbidity Load Calcs - Annual Flow.xls]TMDL Calcs

River Bacteria Methodology - Section 6.1.3 of the TMDL states that the load duration curve methodology was used for the *E. coli* TMDL. The seasonal mean discharge is calculated for each of five flow conditions (high, wet, mid-range, dry, and low), and these data are then multiplied by the *E. coli* standard of 126 cfu /100 ml. For the Becker WWTF individual WLA, the same method is used, with calculation based on the design flow rate of the facility multiplied by the standard. Where monthly mean flow data were used to calculate the load duration curve, daily loads were then derived from these calculated monthly loads. LA is calculated by subtracting MOS and WLA from the TMDL. TMDLs for MS4s are categorical, allowing for aggregating loads for stormwater municipalities (Table 4.2 above).

Table 6.6. The TMDL expressed as daily loading capacity of *E. coli* in the Elk River Reach # 579.

Daily						
Reach	Critical Condition	WWTF Wasteload Allocation (10^9 org) (Becker WWTF)	MS4 Wasteload Allocation (10^9 org)	Load Allocation (10^9 org)	Margin of Safety (10^9 org)	TMDL (10^9 org)
Elk River 579	High Flow	10.30	539.43	1816.17	450.65	2816.55
	Wet	10.30	203.99	686.78	171.63	1072.70
	Mid-Range	10.30	101.84	342.87	86.67	541.67
	Dry	10.30	61.01	205.41	52.71	329.43
	Low Flow	10.30	29.95	100.85	26.88	167.98

Figure 6.2. The Total Maximum Daily Load for the listed segment of the Elk River. Concentrations represent Total Daily Load derived from monthly load (Standard of 126 *E. coli*/100 ml.)



T:\2378_ERWSA\Elk River\Bacteria\[Bacteria Load Calcs - Annual Flow.xls]Load Duration (Method 3)

Critical Conditions for Nutrients and Turbidity: Section 5.2.3.1 of the TMDL states that the critical condition for nutrients and turbidity is July and August. This is a portion of the growing season when low flow conditions result in higher concentration of contaminants in water due to nutrient runoff. Nutrients also contribute to increased growth of algae and plants in the aquatic environment, resulting in increased algal turbidity.

Critical Conditions for Bacteria: For watershed contributions to the bacteria impairment in the river, Section 5.1.3.1 states that the critical condition is wet weather for surface applied manure. Delivery potential from this source is high where tiling exists. Bacteria input to the river during dry weather conditions from manure spreading is very low. During dry conditions, there is more bacterial input from septic systems, livestock with direct access to riparian streams, and wildlife. EPA finds MPCA's approach to be reasonable and consistent with EPA guidance.
EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this third element.

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.

Comment:
The Load Allocations are as shown in the previous Tables 6.1 (phosphorus), 6.5 (turbidity), and 6.6 (*E. coli*). The phosphorus LA for Mayhew Lake and Big Elk Lake are shown below in Table 6.2, partitioned into separate load allocations by source. MPCA did not further partition the LA for other contaminants. EPA finds MPCA's approach for calculating the LA to be reasonable and consistent with EPA guidance.

Table 6.2. Partitioned total phosphorus Load Allocations expressed as daily loads.

Lake	Load Allocation	Direct Watershed	Tributary Inflows	Septic Systems	Atmospheric + Groundwater	Internal
Mayhew	4.67	0.32	2.02	0.00	0.59	1.74
Big Elk	17.62	0.02	2.72	0.00	3.74	11.15

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

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 permitees 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 identifies three point sources discharging the pollutants of concern in the Big Elk Lake/Elk River watershed. Table A below is a summary of the WLA and facilities. There are no point sources in the Mayhew Lake watershed.

The other permitees shown in Table 4.1 above are the Eagle View Commons WWTF and Appert's, Inc. The WWTF periodically discharges from a Class C gravity system that splits flow into flow-forced aeration wetland treatment cells and a wetland that serves as an infiltration bed. The system is designed for no industrial or commercial development so has no wasteload component. Appert's is hydrologically isolated from the watershed, so has no wasteload. The Goenner Poultry LLC and Eiler Bros. in Table 4.3 above are CAFOs so have zero WLA.

Table A. Summary of individual WLA in Big Elk Lake and Elk River watershed area.

Facility	**TP WLA**	**TSS WLA**	***E. coli* WLA**
Becker WWTF		0.27 tons/day	10.30 X 10^9cfu/day
Foley WWTF	6.2 lbs./day		
Gilman WWTF	0.75 lbs./day		

Phosphorus – WLA are calculated for Big Elk Lake and the Elk River watersheds. The Foley and Gilman WWTFs individual WLAs are shown above, from the Executive Summary Table in the TMDL. Table 6.1a below is for phosphorus.

Table 6.1a. Big Elk Lake Waste Load Equation (all values in lbs/day)

WLA	**=**	**WWTF WLA (Foley + Gilman)**	**+**	**MS4 WLA**	**+**	**Reserve Capacity**	**+**	**Construction Stormwater WLA**
7.96	=	6.95	+	0.94	+	0.07	+	0.0007

TSS - no WLA reductions are required in the non-algal TSS; the phosphorus TMDL for Elk Lake addresses the algal TSS in the stream. Further, no WLA reductions in TSS from downstream sources are required (Table 6.5).

- Permits included the Becker WWTF (WLA 0.27 tons/day).
- MS4 aggregate WLAs range from 0.13 to 0.01 tons/day (high to low flow, respectively)
- Industrial Stormwater WLAs range from 0.08 to 0.01 tons/day (high to low flow, respectively)
- Construction stormwater WLAs range from 0.08 to 0.01 tons/day (high to low flow, respectively)

Bacteria – MPCA calculated the Elk River WLAs for *E. coli* only for the Becker WWTF and the aggregate MS4s in the stream reach (Table 6.6).

- WWTF: 10.30 x 10^9 *E. coli* cfu /100ml /day
- MS4s: ranges from 539.43 to 29.95 x 10^9 *E. coli* cfu /100ml /day (high to low flow, respectively)

EPA finds MPCA's approach for calculating the WLA to be reasonable and consistent with EPA guidance. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this fifth element.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)). 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:
Phosphorus MOS for Lakes – The TMDLs for the two lakes use an implicit MOS, based on conservative modeling assumptions (e-mail from Phi Votruba, MPCA, 5/09/12). The main assumption was the use of a sedimentation rate in the Canfield-Bachman model that is lower than that expected for the lakes addressed by the TMDL. The sedimentation rate used by the Canfield-Bachman method is based on observed data from 704 lakes across the country and is conservative compared to the actual sedimentation rate for Minnesota lakes. As a result, MPCA believes that the loss of phosphorus from the water column as a result of settling is modeled at a lower rate than is found in most Minnesota lakes. This process removes phosphorus from the system, making it unavailable for use by algae. The model, therefore overestimates the phosphorus concentration in the lake, and correspondingly overestimates the reductions needed to achieve the WQS.

Turbidity MOS for River - Section 6.2 of the TMDL further supports the implicit MOS used in calculating the TMDL for turbidity. The reduction needed for the lake nutrient TMDL to achieve the water quality goal is approximately 57%. Correlative reductions in chlorophyll *a* (a component of the phosphorus standard) of 25% to 49% are needed to meet the standard. Therefore, as phosphorus is reduced the turbidity goal will be reached in advance of the phosphorus goal. The MOS for the turbidity TMDL is a valid method because the contaminants phosphorus and TSS are so closely linked, as previously discussed, that the TP reduction in the lake will result in the turbidity reduction in the river. Table 6.5 shows an explicit 10% non-algal turbidity MOS. This MOS is considered adequate because the non-algal turbidity is a small portion of the total turbidity exceedance.

Bacteria MOS for River - For the bacteria TMDL, the explicit MOS of 16% was calculated and assessed to be protective based on the statistical distribution of available data. This MOS accounts for the variation and distribution of *E. coli* concentrations in each flow regime.

EPA finds MPCA's approach for calculating the WLA to be reasonable and consistent with EPA guidance. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this fifth element.

7. Seasonal Variation

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

Comment:
Lakes - Seasonal variation for the lakes is described in Section 6.5 of the TMDL. The data from annual loading in Mayhew Lake and seasonal loading in Big Elk Lake included many flow conditions. Annual lake loading was used for the development of the TMDL. Daily loads were then calculated from the annual loading.

Lakes are not as sensitive to fluctuations in a shorter timeframe when compared to the overall annual loading budget. However, the lakes have varied temporal and spatial sensitivity that impact the prioritization of BMPs. Section 8.3.1.2 of the TMDL states that Mayhew Lake is highly sensitive to spring nutrient loads from riparian areas in the watershed. Section 8.3.2.1 of the TMDL states that Elk Lake is highly sensitive in mid to late summer from agricultural runoff to surface tributaries to the lake.

River - For the river TMDL, bacteria sources varied seasonally based on manure application and handling. Allocations also varied seasonally to reflect changes from stream loads and concentrations under different flow and loading conditions.

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

8. Reasonable Assurances

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

When a TMDL is developed for waters impaired by both point and 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.

<u>Comment:</u>
Section 6.4 of the TMDL submittal states that there is reasonable assurance that the TMDL will be implemented. First, the MPCA can issue and enforce permits that take the TMDL allocations into consideration. The Elk River Watershed Association can implement nonpoint source activities, including expansion of existing programs and introduction of new projects. MPCA's approach also includes interim assessment of progress and milestones.

Clean Water Legacy Act (CWLA): 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 and to jointly utilize technical educational, and financial resources. MPCA expects the implementation plans to be developed within a year of TMDL approval.

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

Section 3.1 of the TMDL states that citizen interest in Sherburne and Benton Counties has been high for many years, and stakeholders started the Elk River Watershed Association (ERWSA) Joint Powers Board in 1994 for water planning efforts in the two counties where the Elk River and the lakes are located. The two counties made this watershed a priority to better address their concerns and improve water quality in the Elk River watershed, and to avoid duplicative efforts.

The fourth version of the Sherburne County Watershed Management Plan 2007 through 2017 will be updated in 2012 and in effect for 5 years through February 28, 2017. The ERWSA has approximately $150,000 in funding for Sherburne and Benton Counties to work together to implement BMPs, shoreland restoration, stormwater treatment, manure management, and wetland creation. More details may be found at http://www.legacy.leg.mn/projects/elk-river-watershed-pollution-reduction.

Section 8.2.1 states that this TMDL will be implemented according to Minnesota's new approach in surface water assessment, monitoring and implementation planning, which includes restoration and protection of waters on a large watershed (8-digit HUC) in 10 year cycles. This approach will include local input and prioritization, and state level funding. The projects will attempt to restore impaired waters and protect unimpaired waters. The implementation section of this document shows Tables 8.2 and 8.4 below. The Tables show BMPs, annual and total costs, duration of tasks, staffing needs, and outcome of practices for both of the lakes and the river.

Section 8.2 describes the roles and responsibilities of the various entities involved in ERWSA since the time of its origin. The Sherburne and Benton County Soil and Water Conservation Districts are also currently involved in implementation efforts, and will continue to partner with the Natural Resources Conservation Service (NRCS) and the United States Department of Agriculture (USDA). The Briggs Lake Chain Association is comprised of residents living on Briggs Lake, Lake Julia and Rush Lake (the Briggs Chain) and is now involved with ERSWA; these lakes are impaired and discharge to Big Elk Lake. The US Fish and Wildlife Service provides input to the TMDL process and has resources that may be used to meet water quality goals; the Minnesota DNR Fisheries and DNR Waters (Division of Waters) assist in monitoring and in seeking grants; and other partners and local landowners are involved in various processes to improve the watershed.

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:
Section 9 of the TMDL states that the lakes and stream segment in the watershed will be closely monitored. MPCA has provided a table of parameters, locations, frequency and intervals of monitoring to clarify its approach. From this baseline, both tracking and trends can be established to determine the strength of the BMP implementation. BMP types, location, size, drainage area, cost, pollutant removal, and TMDL target will be tracked, as well as historical and total progress.

Table 9.1. Baseline water quality monitoring plan.

Resource	Parameter	Location/ Frequency	Monitoring Period
Mayhew Lake	TP	Surface/ Monthly	May- September
	Secchi Depth	Surface Monthly	April- October
	Chlorophyll-a	Surface /Monthly	May- September
Big Elk Lake	TP	Weekly	May- September
	Secchi Depth	Monthly to weekly	April- October
	Chlorophyll-a	Weekly	May- September
Elk River	E. coli	3 stations in the listed reach, twice monthly	April- October
	Transparency	3 stations, twice monthly	April- October
	VSS	3 stations, twice monthly	April- October
	TP	3 stations, twice monthly	April- October

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:
Section 8 of the TMDL includes an implementation strategy and reflects many entities working together. The Elk River Watershed Association, Soil and Water Conservation Districts, National Resource Conservation District, and the US Department of Agriculture all have programs and funding for assisting in achieving water quality goals. Lake associations, US Fish and Wildlife Service, Minnesota Department of Natural Resources Fisheries, local and state partners, and private landowners also are interested in achieving the goals. In particular, the Briggs Lake Chain Association (residents living on Briggs Lake, Lake Julia and Rush Lake, known as the Briggs Chain) will be very involved in reducing nutrients in their lakes. The entire Briggs Lake Chain is currently impaired for nutrients and these lakes discharge into Big Elk Lake.

Mayhew Lake has several options for implementation. Both internal lake reductions and external will be considered. The internal cycling of phosphorus can be greatly reduced by alum injection below the bottom of the lake. Alum causes a reaction that takes phosphorus out of the water by forming a floc and stripping phosphorus out of the water column as it settles out as sediment on the lake bottom, then forming a sediment seal preventing further cycling of phosphorus back into the lake waters. Carp and vegetation management will also reduce the effects of internal lake phosphorus. The external sources that can be addressed are increased manure management, and decreased manure runoff from feedlots and riparian grazing. Improving septic systems and adding buffers and filter strips can reduce the nutrient loading and have shown phosphorus removal to be as high as 50 – 70%.

Table 8.2. Mayhew Lake nutrient impairment implementation summary.

Mayhew Lake- Nutrient Impairment							
Priority Level	BMP	Annual Cost	Schedule	Duration (yrs)	Extended Cost	Outcome	Note
1	GIS/ Air Photo (BING) Survey Tier 1 & 2 Implementation Areas to identify opportunities for feedlot and riparian grazing management	$5,500	Year 1	1	$5,500	GIS-based prioritized database of tier 1 and 2 implementation areas	4 weeks of County staff, SWCD staff or intern time, plus 2 large computer screens, GIS and internet connection with available GIS information (Computer equipment not included). It is advisable to wait until LiDar is available. Additional time to develop criteria and evaluate function of database.
1	Outreach & grant opportunities plus inspections	$13,000	Year 1	1	$13,000	Staff to develop a plan for 20% of parcels (27 parcels)	~7 weeks of County staff, SWCD staff or intern time
1	Alum treatment of Mayhew	$20-$50k	Year 5	30	$20-$50k plus design & permitting	Target internal load reduction of 900 lbs (load reduction is only 80% of internal, this targets entire internal load	
1	Education and Outreach: Implement watershed-wide advocacy of cover crops and stopping winter spreading	$6,320	Year 0-5	5	$31,600	Literature distribution twice per year timed to target practices, plus outreach to 10% of tier 1 and 2 implementation areas	~ 3 weeks of County staff, SWCD staff or intern time plus expenses
2	Cost for per acre for grants/ loans, etc.	$72,632	Year 0-10	10	$726,319	Implement protection strategies on 5% of land in Tier 1 and 2 Implementation Areas, $250/ acre	Can the nutrient management plans be implemented effectively on site without cost share?
2	Staff time for inspections (Nutrient Management)	$3,500	Year 0-10	10	$35,000	Staff inspections (also yields farmer outreach)	2 weeks of staff time per year
				Total	$811,419		

Table 8.4. Big Elk Lake nutrient impairment/Elk River turbidity impairment implementation schedule and costs.

Big Elk Lake Nutrient Impairment/ Elk River Turbidity Impaiment							
Priority Level	Priority BMP	Annual Cost	Schedule	Duration (yrs)	Extended Cost	Outcome	Note
1	Upper Watershed Tier 1 and 2 Implementation Areas Inspection SSTS inspections	$25,000	Years 0-2	1.4	$35,000	at a rate of 300 Inspections/ yr of Tier 1 and 2 Implementation Areas (413 parcels), at 25% failure rates yields 103 replacements	Inspections conducted May to November.
1	Tier 1 and 2- Implementation Areas SSTS Inspections (Big Elk Lake tributary watershed)	$25,000	Years 0-2	1.7	$42,500	at a rate of 300 Inspections/ yr of Tier 1 and 2 Implementation Areas (504 parcels), at 25% failure rates yields 126 replacements	Inspections conducted May to November.
1	Tier 1 and 2 Implementation Areas SSTS Inspections, (Briggs-Julia chain tributary watershed)	$25,000	Years 0-2	1.5	$37,500	at a rate of 300 Inspections/ yr of Tier 1 and 2 Implementation Areas (453 tier 1 and 2 parcels), at 25% failure rates yields 113 replacements	Inspections conducted May to November.
1	GIS/ Air Photo (BING) Survey Tier 1 & 2 Implementation Areas to identify opportunities for feedlot and riparian grazing management	$37,170	Years 0-1	1	$37,170	GIS-based prioritized database of tier 1 and tier 2 implementation areas	12 weeks of County staff, SWCD staff or intern time, plus 2 large computer screens, GIS and internet connection with available GIS information (Computer equipment not included). It is advisable to wait until LiDar is available. Additional time to develop criteria and evaluate function of database. QA/QC.
1	Outreach & grant opportunities plus inspections	$37,350	Years 0-1	1	$37,350	Staff to develop a plan for 20% of parcels (83 parcels)	~ 21 weeks of County staff, SWCD staff or intern time
1	Education and Outreach: Implement watershed-wide advocacy of cover crops and stopping winter spreading	$7,478	Years 0-5	5	$37,390	Literature distribution twice per year timed to target practices, plus outreach to 10% of tier 1 and 2 parcels	~ 3 weeks of County staff, SWCD staff or intern time plus expenses
2	Cost for per acre for grants/ loans, etc.	$169,680	Years 0-10	10	$1,696,801	Implement protection strategies on 5% of land in tier 1 and 2 parcels, $250/ acre	Can the nutrient management plans be implemented effectively on site without cost share?
2	Staff time for inspections (Nutrient Management)	$3,735	Years 0-10	10	$37,350	Staff inspections (also yields farmer outreach)	2 weeks of staff time per year
Updated: April 27, 2011				Total	$1,961,061		

EPA finds that this criterion has been adequately addressed.

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 was extensively involved in the development process of this TMDL. Section 7 of the TMDL submittal includes details of the involvement of stakeholders in several phases of the TMDL development.

Table 7.1. Summary of public participation meetings conducted for this TMDL project.

	Meeting Date	Description	Topic
PHASE I	8/4/08	TAC Meeting	Kick-Off; Data Needs
	1/9/09	TAC Meeting	Phase I Report
	2/11/09	Public Presentation	Farm Group Presentation
	3/19/09	Stakeholder Meeting	Project Introduction
PHASE II	4/15/10	TAC Meeting	Data Analysis Results
	5/4/10	Benton County Board	Draft Results
	5/5/10	Sherburne County Board	Draft Results
	2/23/10	Sherburne County Water Plan	Draft Results
	3/23/10	Benton County Water Plan	Draft Results
	6/8/10	TAC Meeting	Implementation
	7/21/10	Stakeholder Meeting (Benton Co.)	Draft Results & Implementation
	7/22/10	Stakeholder Meeting (Sherburne Co.)	Draft Results & Implementation
PHASE III	10/21/10	TAC Meeting	Phase III- load allocations & Implementation
	12/1/10	Stakeholder Meeting (Sherburne Co.)	Load allocations & Implementation
	12/3/10	Stakeholder Meeting (Benton County)	Load allocations & Implementation

The TMDL was public noticed from February 6, 2012 to March 7, 2012. Copies of the draft TMDL were made available upon request and on the Internet web site: http://www.pca.state.mn.us/water/tmdl/tmdl-draft.html.
Several entities or individuals provided comments to the MPCA during the public comment period. The comments were adequately addressed by MPCA and are included with the final TMDL submittal. MPCA also adequately addressed US EPA comments.

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

12. Submittal Letter

A submittal letter should be included with the TMDL submittal, and should specify whether the TMDL is being submitted for a *technical review* or *final review and approval*. Each final TMDL submitted to 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 Elk Lake TMDL on April 25, 2012, accompanied by a submittal letter dated April 16, 2012. In the submittal letter, MPCA stated that the submission includes the final TMDL for Big Elk Lake and Mayhew Lake nutrients, and Elk River bacteria and turbidity in the Elk River watershed.

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

13. Conclusion

After a full and complete review, EPA finds that the phosphorus TMDLs for Big Elk Lake (ID#71-0141-00) and Mayhew Lake (ID#05-0007-00), and TSS and *E. coli* TMDLs for the Elk River (ID# 07010203-579), satisfy all of the elements of an approvable TMDL. This approval addresses three waterbodies for excess nutrients, turbidity and bacteria, for a total of four TMDLs.

EPA's approval of this TMDL does not extend to those waters that are 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.