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

REPLY TO ATTENTION OF
WW-16J

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

Subject: Approval of the Mississippi River-Sartell Final TMDL

Dear Mr. Skuta:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Loads (TMDLs) for the Mississippi River-Sartell River Watershed, including supporting documentation and follow up information. The Mississippi River-Sartell Watershed is located in central Minnesota. The TMDLs were calculated for *E. coli* and phosphorus to address the impaired Aquatic Recreation Use.

EPA has determined that 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 15 TMDLs for *E. coli* and 2 TMDLs for phosphorus for a total of 17 TMDLs for the Mississippi River-Sartell Watershed. 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 submissions by the State of Minnesota. If you have any questions, please contact Christine Urban of the Watersheds and Wetlands Branch at urban.christine@epa.gov or 312-886-3493.

Sincerely,

Digitally signed by
Tera L. Fong
Date: 2020.12.22
12:44:12 -06'00'

Tera L. Fong
Division Director, Water Division

Enclosure

cc: Celine Lyman, MPCA

wq-iw8-61g

TMDL: Mississippi River – Sartell Watershed TMDL, Minnesota
Date: 12/22/2020

DECISION DOCUMENT FOR THE APPROVAL OF THE MISSISSIPPI RIVER - SARTELL WATERSHED TMDLS, MN

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.P.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 (chl-a) and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comments:

Waterbody and Pollutant of Concern

The Mississippi River-Sartell (MRS) TMDL addresses fifteen streams that are impaired due to *E. coli* bacteria and two impaired lakes that are impaired due to phosphorus. Table 1 of the TMDL lists the assessment unit IDs and their impacted designated uses. In most of the assessment units (AUs), the impacted waterbody use is Aquatic Recreation. Although, one waterbody is designated for Domestic Consumption Use with moderate treatment (Class 1B), the *E. coli* criteria are the same as Aquatic Recreation Use.
The remaining AU failed to meet its Limited Resource Value use. The aquatic recreation use impairments in the river are caused by elevated levels of *E. coli* and in the lakes by elevated levels of phosphorus (See Table 1 of this Decision Document).

Location Description/Spatial Extent

The Minnesota Pollution Control Agency (MPCA) has submitted TMDLs for the MRS watershed, located in central Minnesota. The TMDL document describes the watershed in Sections 1.2 of the TMDL. Table 1 of this Decision Document lists the waterbodies addressed in the TMDL document. Figure 1 of the TMDL shows the location of the MRS watershed within the Mississippi River Watershed and Figures 1 and 2 of the TMDL show the impaired assessment units' locations and subwatersheds within the MRS watershed.

Table 1: Mississippi River-Sartell Watershed TMDL waterbodies

TMDLs Identified in the MRS Watershed TMDL					
Reach Name	**Assessment Unit ID or MN DNR Lake #**	**Year Listed**	**Affected Designated Use**	**Use Class**	**Pollutant**
Hay Creek	630	2020	Aquatic Recreation	2Bg	*E. coli*
North Two River	524	2020	Aquatic Recreation	2Bg	*E. coli*
South Two River	542	2020	Limited Resource Use	7	*E. coli*
Unnamed Creek	628	2020	Aquatic Recreation	2Bg	*E. coli*
Unnamed Creek	612	2020	Aquatic Recreation	2Bg	*E. coli*
Unnamed Creek	580	2020	Aquatic Recreation	2Bg	*E. coli*
Krain Creek	613	2020	Aquatic Recreation	2Bg	*E. coli*
Spunk Branch	561	2020	Aquatic Recreation	2Bg	*E. coli*
Hillman Creek	639	2020	Aquatic Recreation	2Bg	*E. coli*
Skunk River	521	2008	Aquatic Recreation	2Bg	*E. coli*
Big Mink Creek	646	2020	Aquatic Recreation	2Bg	*E. coli*
Platte River	507	2020	Aquatic Recreation	2Bg	*E. coli*
Stony Creek	649	2020	Aquatic Recreation	2Bg	*E. coli*
Little Rock Creek	653	2020	Aquatic Recreation	1B, 2Ag	*E. coli*
County Ditch 16	616	2020	Aquatic Recreation	2Bg	*E. coli*
Two Rivers Lake	73-0138-00	2010	Aquatic Recreation	2B	phosphorus
Platte Lake	18-0088-00	2010	Aquatic Recreation	2B	phosphorus

* - All streams are part of the same HUC ID 07010201
Use Class categories are discussed in Section 2 of the Decision Document.

Land Use

The MRS TMDL watershed spans approximately 1,020 square miles overall and is in the North Central Hardwood Forest and Northern Lakes and Forests ecoregions (Section 3 of the TMDL). The land uses in the MRS subwatersheds are mainly cropland, with some subwatersheds having significant amounts of forest and wetlands. One watershed, County Ditch 16, (616) is located near Sartell, Minnesota, and has a significant amount of developed land (Table 6 of the TMDL). MPCA discussed the potential future growth and land use changes in the TMDL subwatersheds in Section 6 of the TMDL. Future growth was accounted for in the development of the allocations for urban stormwater, as discussed further in Section 5 of this Decision Document. MPCA noted that there are no Native American Reservation lands within the MRS watershed.

Problem Identification
Most of the TMDL waterbodies in this study will be placed on the MPCA 2020 303(d) list of impaired waters. The two lakes were originally listed as impaired on the 2010 303(d) list, and one waterbody (Skunk River) was originally listed on the 2008 303(d) list. The waterbodies that are the topic of this study are placed on the 303(d) list due to exceedances of the bacteria or eutrophication criteria. Section 3.5 and Table 8 of the TMDL summarize the data used to assess the waterbodies. As noted in Table 1 of the TMDL, several other waterbody segments are to be listed as impaired for Aquatic Life Use, but MPCA explained that there is either insufficient data to develop a TMDL at this time, or the cause of impairment is not a pollutant and therefore a TMDL cannot be developed (Appendix A of the TMDL).

Pollutants of Concern
MPCA developed seventeen TMDLs to address aquatic recreation and limited resource waters impaired designated uses. MPCA developed fifteen *E. coli* TMDLs to address bacteria-impaired streams and two phosphorus TMDLs to address eutrophication-impaired lakes.

E. coli
E. coli bacteria is an indicator organism usually associated with fecal matter contamination. These organisms can be found in the intestines of warm-blooded animals (humans and livestock). The presence of *E. coli* bacteria in water suggests the presence of fecal matter and associated bacteria, viruses, and protozoa that are pathogenic to humans when ingested. *E. coli* samples were collected from the waterbodies of the MRS watershed from April through October from 2008-2017 to determine the waters' impairment status. Exceedances of both the geometric mean portion of the criteria as well as the single sample maximum were recorded. Tables 8 and 9 in the TMDL summarize *E. coli* sampling data. In Section 5.1 of the TMDL, MPCA presents results of MPCA's TMDL analysis for the *E. coli* analysis in Rivers.

Total Phosphorus
Phosphorus is an essential nutrient for aquatic life, but elevated concentrations of phosphorus can lead to nuisance algal blooms that negatively impact aquatic life and recreation (swimming, boating, fishing, etc.). Excess algae increase turbidity which degrades aesthetics and causes adverse ecological impacts. Algal decomposition depletes oxygen levels stressing aquatic biota (fish and macroinvertebrate species). Oxygen depletion can cause phosphorus release from bottom sediments (i.e. internal loading), which contributes to increased nutrient levels in the water column. Excess phosphorus can alter biological communities by shifting species composition toward organisms better suited to excess levels of phosphorus. Measurements were collected for phosphorus, chlorophyll α, and secchi disk transparency from June through September for the years 2008 through 2017. Data results are summarized in Table 10 of the TMDL. In Section 5.2, MPCA presents results of MPCA's TMDL analysis figures and a table for each lake, as well as a TMDL summary table for each lake. See Section 5.2.1 of the TMDL for Two Rivers Lake information and Section 5.2.2 of the TMDL for Platte Lake information.

Pollutant Sources

The pollutant loads in the MRS are primarily attributed to nonpoint sources with some loading coming from wastewater treatment plants, and a minimal amount from construction and industrial stormwater sources. There are also permitted CAFOs and AFOs which have been assigned a zero waste load allocation. MPCA also indicates that there are some "natural" sources of *E. coli* loading in the TMDL area. The pollutants and their corresponding sources are broken out below. Pollutant-specific information on pollutant sources are provided in Section 3.6.2 of the TMDL for *E. coli* and Section 3.6.3 of the TMDL for phosphorus.

E. coli

MPCA identified several potential sources of *E. coli* impairing streams within the watershed (see Section 3.6.2 of the TMDL). Tables 11, 13 and 14 in of the TMDL identify permitted sources of *E. coli* in the various subwatersheds, including permitted wastewater and permitted stormwater. Table 15 of the TMDL summarizes MPCA's analysis and estimates of the relative potential contributions of permitted livestock sources. The evaluation of unpermitted livestock contributions is presented in Table 16 of the TMDL. MPCA noted that industrial wastewater permits for facilities in the watershed do not include provisions for *E.coli*.

Point sources-E.coli

Wastewater Treatment Facilities (WWTFs) – NPDES permitted facilities may contribute bacteria loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge treated wastewater according to their NPDES permit. MPCA determined that there are two WWTFs in the MRS watershed which contribute bacteria from treated wastewater releases (Table 14 of this Decision Document) to segments impaired by bacteria. MPCA assigned each of these facilities a portion of the bacteria wasteload allocation (WLA).

Concentrated Animal Feedlot Operations (CAFOs) - CAFOs are generally defined as having over 1000 animal units confined for more than 45 days in a year. MPCA identified in Table 15 of the TMDL subwatershed AUIDs which contain either permitted CAFOs (or NPDES/SDS) or have feedlots present in the subwatershed. Table 15 presents the estimated percent contribution to each *E.coli* impaired AUID. Under MPCA NPDES permit requirements, discharges of pollutants from CAFOs are not allowed except under extreme circumstances (24-hour storm duration exceeding the 25-year recurrence interval), and therefore MPCA assigned no portion of the WLA to the manure-handling facilities (WLA = 0). Runoff from the spreading of manure in agronomic rates is not regulated as a point source discharge and is therefore considered in the nonpoint source load discussed below.

Municipal Separate Storm Sewer System (MS4) communities MS4 discharges can contain bacteria due to stormwater runoff containing pet and wildlife waste. Figure 6 and Table 13 of the TMDL denotes the four MS4 entities and the MS4 boundaries in the watershed.

Combined Sewer Overflows (CSOs) and Sanitary Sewer Overflows (SSOs) – There are no CSOs or known occurances of SSOs in MRS watershed.

Nonpoint sources - E. coli

Non-permitted Medium and Small Animal Feeding Operations (AFOs) – Animal operations in close proximity to surface waters can be a source of bacteria to waterbodies in the MRS watershed. These areas may contribute bacteria via the mobilization and transportation of pollutant laden waters from feeding, holding and manure storage sites. These sites are not regulated under the NPDES CAFO permit program. Runoff from agricultural lands may contain significant amounts of bacteria which could lead to impairments in the MRS watershed. Feedlots generate manure which may be spread onto fields as fertilizer. Manure runoff from fields can be exacerbated by tile drainage lines that channelize the stormwater flows and reduce bacteria die-off potential. Additionally, unrestricted livestock access to streams in pasture areas can add bacteria directly to the surface waters or resuspend bacteria laden sediment that had settled on the stream bottom. Direct deposition of animal wastes can result in very high localized bacteria counts and may contribute to downstream impairments. Smaller animal facilities may add bacteria to surface waters via wastewater from these facilities or stormwater runoff from near-stream pastures. In Table 16 of the TMDL, MPCA estimates the *E. coli* bacteria generated by these unpermitted sources.

State permitted AFO facilities must be designed to contain all surface water runoff from the production facilities (i.e., have zero discharge from their facilities) and have a current manure management plan. MPCA explained that these facilities do not discharge effluent and therefore were not assigned a portion of the LA (LA = 0).

SSTS or Unsewered Communities – Failing septic systems are a potential source of bacteria within the MRS watershed. Septic systems generally do not discharge directly into a waterbody, but effluents from SSTS may leach into groundwater or pond at the surface where they can be washed into surface waters via stormwater runoff events. Age, construction, and use of SSTS can vary throughout a watershed and influence the bacteria contribution from these systems. Furthermore, systems which discharge partially treated sewage to the ground surface, road ditches, tile lines, and directly into streams, rivers and lakes are considered an imminent threat to public health and safety (ITPHS). ITPHS systems also include illicit discharges from unsewered communities. MPCA indicated that there are relatively few SSTSs in the MRS.

Wildlife and Pets – Wildlife is a known source of bacteria in waterbodies as many animals spend time in or around waterbodies. Deer, geese, ducks, raccoons, and other animals all create potential sources of bacteria. Wildlife contributes to the potential impact of contaminated runoff from animal habitats, such as urban park areas, forest, and rural areas. Animal impact can be exacerbated in urban areas with high pet populations and a lack of sanitary disposal of pet waste.

Total Phosphorus

MPCA identified several sources as contributing phosphorus loading to the nutrient impairments for the two impaired lakes within this MRS study area, including: agricultural areas; internal loading; and atmospheric deposition. Industrial and construction stormwater runoff is the only potential point source in the lake subwatershed; MPCA determined there are no MS4s and one WWTF and one CAFO in the lake subwatersheds.

Point sources- Phosphorus
Wastewater Treatment Facilities (WWTFs) – NPDES permitted facilities may contribute phosphorus loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge treated wastewater according to their NPDES permit. MPCA determined that there one WWTF in the MRS (Section 3.6.3 of the TMDL). The Albany WWTF is in the Two Rivers Lake subwatershed. WWTFs contribute a permitted amount of phosphorus from treated wastewater discharges. MPCA assigned this facility a portion of the phosphorus wasteload allocation (WLA).

Concentrated Animal Feedlot Operations (CAFOs) – MPCA identified one CAFO in the MRS Two Rivers Lake subwatershed (Section 3.6.3 of the TMDL). CAFOs are generally defined as having over 1000 animal units confined for more than 45 days in a year. Under MPCA NPDES permit requirements, discharges of pollutants from CAFOs are not allowed except under extreme circumstances (24-hour storm duration exceeding the 25-year recurrence interval), and therefore no allocations were developed by MPCA for the manure-handling facilities (WLA = 0). Runoff from the spreading of manure in agronomic rates is not regulated as a point source discharge and is therefore considered in the nonpoint source load discussed below.

Municipal Separate Storm Sewer System (MS4) communities – No MS4 dischargers were identified by MPCA in either lake subwatershed.

Combined Sewer Overflows (CSOs) and Sanitary Sewer Overflows (SSOs) – There are no CSOs or know occurances of SSOs in MRS watershed.

Stormwater from Construction and Industry – Stormwater from construction and industrial sites may contribute sediment containing phosphorus to a waterway if the stormwater is untreated. This sediment may have phosphorus sorbed to the sediment particles and in turn be a source of phosphorus in the MRS lake subwatersheds. However, MPCA does not consider these to be significant sources on phosphorus (Section 3.6.3 of the TMDL).

Nonpoint sources - Phosphorus
Watershed runoff - Runoff from agricultural lands may contain significant amounts of nutrients, organic material and organic-rich sediment which may contribute to impairments in the MRS watershed. Manure spread onto fields is often a source of phosphorus, and can be exacerbated by tile drainage lines, which channelize the stormwater. Tile lined fields and channelized ditches enable particles to move more efficiently into surface waters. Stormwater field runoff may contribute nutrients and organic-rich sediment to surface waters from livestock manure, fertilizers, vegetation and erodible soils. Additionally, stormwater from AFO feedlots can be high in nutrients. Furthermore, livestock with direct access to a waterway can directly deposit nutrients via animal wastes into a waterbody, which may result in very high localized nutrient concentrations.

Internal Loading – When phosphorus inputs are greater than the in-lake biological needs and phosphorus input is greater than export, phosphorus can build up in lake sediment. This phosphorus then can be directly leached from sediments, released though physical disturbance from benthic fish (rough fish, ex. carp), and/or released by mixing of the water column. Table 20 in the TMDL indicates that internal loading of phosphorus was a small contributor for Platte Lake (4%). Two Rivers Lake internal loading was unquantified, but was limited to the BATHTUB model default value. (Sections 3.6.3 and 4.8.1 of the TMDL).

Atmospheric Deposition – Phosphorus and organic material may be added via particulate deposition. Particles from the atmosphere may fall onto lake surfaces or other surfaces within the MRS lake subwatersheds. Phosphorus can be bound to these particles which may add to the phosphorus inputs to surface water environments.

SSTS or Unsewered Communities– Septic systems generally do not discharge directly into a waterbody, but effluents from SSTS may leach into groundwater or pond at the surface where they can be washed into surface waters via stormwater runoff events. Age, construction and use of SSTS can vary throughout a watershed and influence the nutrient contribution from these systems. MPCA indicated that these are relatively few SSTSs in the MRS lake subwatersheds.

Priority Ranking

As discussed in Section 1.3 of the TMDL, MPCA's schedule for TMDL completions, as indicated on the 303(d) impaired waters list, reflects Minnesota's priority ranking of this TMDL. The MPCA has aligned TMDL priorities with the watershed approach and Watershed Restoration and Protection Strategy (WRAPS) cycle. The schedule for TMDL completion corresponds to the WRAPS report completion on the 10-year cycle. Mainstem river TMDLs, which are not contained in major watersheds and thus not addressed in WRAPS, must also be completed. The MPCA developed a state plan, Minnesota's TMDL Priority Framework Report, to meet the needs of EPA's national measure (WQ-27) under EPA's Long-Term Vision for Assessment, Restoration and Protection under the CWA section 303(d) program. As part of these efforts, the MPCA identified water quality-impaired segments that will be addressed by TMDLs by 2022. The waters of the MRS watershed addressed by this TMDL are part of the MPCA prioritization plan to meet EPA's national measure.

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

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

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

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

Comments:

The MRS Watershed TMDL addresses seventeen impaired waterbodies with TMDLs. Sixteen impaired segments are not meeting the Aquatic Recreation Use designations and one TMDL addresses a segment not meeting the Limited Resource Value use (Table 1 of this Decision Document). Section 2 of the TMDL describes the applicable water quality standards (WQS) for the impaired waterbodies. The impaired assessment units are shown in Figure 2 of the TMDL. Table 1 of this Decision Document also lists these impairments and their associated pollutant and Table 2 of the Decision Document summarizes the criteria for *E. coli* and phosphorus.

Designated Use

WQS are the fundamental benchmarks by which the quality of surface waters is measured. Within the State of Minnesota, WQS are developed pursuant to the Minnesota Statutes Chapter 115, Sections 03 and 44. Authority to adopt rules, regulations, and standards as are necessary and feasible to protect the environment and health of the citizens of the State is vested with the MPCA. Through adoption of WQS into Minnesota's administrative rules (principally Chapters 7050 and 7052), MPCA has identified designated uses to be protected in each of its drainage basins and the criteria necessary to protect these uses.

The TMDL report addresses the waterbodies that do not meet the standards for Class 1, 2, and 7 waters. The impaired streams in this report are classified as Class 1B, 2Ag, 2Bg, and/or 7 waters and the lakes addressed in this report are classified as Class 2B waters (Table 1 of this Decision Document; Section 2 of the TMDL). Class 1B waters are protected for domestic consumption (requires moderate treatment). Class 2Ag waters are protected for aquatic life and recreation—general cold water habitat (lakes and streams). Class 2B waters are protected for aquatic life and recreation. Class 2Bg waters are protected for aquatic life and recreation—general warm water habitat. Class 7 waters are limited resource value waters and are protected for aesthetic qualities, secondary body contact use, and groundwater for use as a potable water supply. Minnesota Rule Chapter 7050 designates uses for waters of the state. Sixteen of the assessment units addressed by the MRS TMDL are designated as Class 2 waters for aquatic recreation use (fishing, swimming, boating, etc.) and aquatic life use. The Class 2 designated use is as follows:

> "*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.*"

South Two River is designated as a Class 7 water or waters of limited resource value by Minnesota. The Class 7 designated use is as follows (in part):

> "*Limited resource value waters include surface waters of the state that have been subject to a use attainability analysis and have been found to have limited value as a water resource. Water quantities in these waters are intermittent or less than one cubic foot per*

second at the 7Q10 flow as defined in part 7050.0130, subpart 3. These waters shall be protected so as to allow secondary body contact use, to preserve the groundwater for use as a potable water supply, and to protect aesthetic qualities of the water. It is the intent of the agency that very few waters be classified as limited resource value waters. The use attainability analysis must take into consideration those factors listed in Minnesota Statutes, section 115.44, subdivisions 2 and 3."

Little Rock Creek is designated by Minnesota as Class 1 water or water for domestic consumption. The Class 1 designated use is as follows (in part):

> *Domestic consumption includes all waters of the state that are or may be used as a source of supply for drinking, culinary or food processing use, or other domestic purposes and for which quality control is or may be necessary to protect the public health, safety, or welfare.*

The lakes are listed as impaired for aquatic recreation use. The lakes are in the North Central Hardwood Forest and Northern Lakes and Forest Ecoregions and meet the class 2B designation. The applicable narrative criteria states:

> *"The quality of class 2B surface waters shall be such as to permit the propagation and maintenance of a healthy community of cool or warm water sport or commercial fish and associated aquatic life and their habitats. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable. This class of surface waters is also protected as a source of drinking water. The applicable standards are given below. Abbreviations, acronyms, and symbols are explained in subpart 1."*

Table 2: Minnesota Water Quality Standards - Numeric Criterion

<table>
<tr><th colspan="5">Applicable Water Quality Standards</th></tr>
<tr><th>Parameter</th><th>Water Quality Standard</th><th>Units</th><th>Criteria</th><th>Applicable Time Period</th></tr>
<tr><td rowspan="2">E. coli
Class 1 & 2 streams</td><td>Not to exceed 126</td><td>org/100 mL</td><td>Monthly geometric mean of a least 5 samples within one calendar year</td><td rowspan="2">April 1st – October 31st</td></tr>
<tr><td>Not to exceed 1,260</td><td>org/100 mL</td><td>Monthly upper 10th percentile</td></tr>
<tr><td rowspan="2">E. coli
Class 7 streams</td><td>Not to exceed 630</td><td>org/100 mL</td><td>Monthly geometric mean of a least 5 samples within one calendar year</td><td rowspan="2">May 1st – October 31st</td></tr>
<tr><td>Not to exceed 1,260</td><td>org/100 mL</td><td>No more than 10% of total samples</td></tr>
<tr><td rowspan="3">Phosphorus – North Central Hardwood Forest Ecoregion 2B Lakes
(Two Rivers Lake)</td><td>≤ 40</td><td>P µg/L</td><td>Concentration should not exceed</td><td rowspan="3">June 1st – September 30ith</td></tr>
<tr><td>≤ 30</td><td>chl-α µg/L</td><td>Concentration should not exceed</td></tr>
<tr><td>≥ 0.7</td><td>meters</td><td>Secchi depth measurement should exceed</td></tr>
<tr><td rowspan="3">Phosphorus – Northern Lakes and Forest Ecoregion 2B Lakes
(Platte Lake)</td><td>≤30</td><td>P µg/L</td><td>Concentration should not exceed</td><td rowspan="3">June 1st – September 30ith</td></tr>
<tr><td>≤ 9</td><td>chl-α µg/L</td><td>Concentration should not exceed</td></tr>
<tr><td>≥ 2.0</td><td>meters</td><td>Secchi depth measurement should exceed</td></tr>
</table>

E. coli

The applicable numeric criteria for the waters of the MRS watershed are in Table 2 of this Decision Document. MPCA determined that the focus of these TMDLs is on the **126** organisms (orgs) per 100 mL (126 orgs/100 mL) geometric mean portion of the standard for the Class 1 and 2 waters and the **630** organisms per 100 mL portion of the Class 7 standard. Additionally, MPCA determined that using the geometric mean portions of the standards will result in the greatest bacteria reductions within the MRS and will also result in the attainment the maximum portion of the standard. While the bacteria TMDLs will focus on the geometric mean portion of the water quality standard, attainment of both criteria of the water quality standard is required.

Phosphorus

Numeric criteria for phosphorus, chl-*a*, and Secchi Disk (SD) depth in lakes are set forth in Minnesota Rules 7050.0222. These three parameters form the MPCA eutrophication standard that must be achieved to attain the Aquatic Recreation Use. The numeric eutrophication criteria which are applicable to the MRS lake TMDLs are found in Table 2 of this Decision Document.

By evaluating multiple lakes in multiple ecoregions, MPCA has determined that achieving these phosphorus targets will also achieve the targets for SD depth and chlorophyll-*a*.

MPCA indicated that there is a clear causal relationship between phosphorus, and the response variables, chl-*a* and Secchi depth. Therefore, MPCA anticipates that by meeting the phosphorus concentration of less than **30** or **40** µg/L will sufficiently address all other parameters, achieving their designated beneficial uses. For lakes to achieve their designated beneficial use, the lake 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 experiencing minimal nuisance algal blooms and exhibiting desirable water clarity.

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)(l)). TMDLs should define applicable critical conditions and describe their approach to estimating both point and nonpoint source loadings under such critical conditions. In particular, the TMDL should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

Comment:

Functionally a TMDL is represented by the equation:

$$TMDL = LC = \Sigma WLA + \Sigma LA + MOS + RC,$$

where: LC is the loading capacity; WLA is the wasteload allocation; LA is the load allocation; MOS is the margin of safety; and (pursuant to MPCA rules) RC is any reserve capacity set aside for future growth. In the MRS TMDL, MPCA did not set aside any RC. However, MPCA did account for future growth as the MS4 entities expand over time. All of the stream TMDLs use the load duration curve (LDC) methods and the lake TMDLs use the BATHTUB model for their underlying calculations. Details on these models, the LDC process, and specifics related to pollutants of concern (including the TMDL tables) can be found in the sections below and in Sections 3.6 and 4 of the TMDL.

HSPF

HSPF is a comprehensive modeling package used to simulate watershed hydrology and water quality on a basin scale. The package includes both an Agricultural Runoff Model and a more general nonpoint source model. HSPF parametrizes numerous hydrologic and hydrodynamic processes to determine flow rate, sediment, and nutrient loads. HSPF uses continuous meteorological records to create hydrographs, and to estimate time series pollution concentrations. The output of the HSPF process is a model of multiple Hydrologic Response Units (HRUs), or subwatershed areas of the overall MRS. The MRS HSPF model validation used data from several nearby MPCA/MDNR flow gages in the watershed (Section 3.5.1 of the TMDL). The flows generated from the model were used to develop a flow duration curve. The HSPF model was also used to determine watershed runoff for the lake TMDLs, based upon the land cover (Section 3.6.3 of the TMD).

BATHTUB

MPCA used the U.S. Army Corps of Engineers (USACE) BATHTUB model to calculate the loading capacities for the lake TMDLs. BATHTUB is a model used to calculate steady-state water volume and nutrient mass balances for lakes and reservoirs (surficial depressions with retention times greater than two weeks) in a “spatially segmented hydraulic network”. BATHTUB uses empirical relationships to determine “eutrophication-related water quality conditions”. These TMDLs use the BATHTUB model to link observed phosphorus water quality conditions and modeled phosphorus loading to in-lake water quality values. BATHTUB can be a steady-state annual or seasonal model that predicts a lake’s water quality. BATHTUB utilizes annual or seasonal timescales which are appropriate because watershed phosphorus loads are normally impacted by seasonal conditions. To estimate loading capacity the model is rerun, reducing current loading to the lake until the modeled result shows that in-lake total phosphorus would meet the applicable WQS.

LDC

Flow Duration Curve (FDC) graphs have flow duration interval (percentage of time flow exceeded) on the X-axis and discharge (flow per unit time) on the Y-axis. For the MRS TMDLs FDCs were generated from the spatially relevant flow generated by their HSPF Hydrological Response Units (HRUs). The FDC were transformed into LDC by multiplying individual flow values by the WQS and then multiplying that value by a conversion factor. The resulting points are plotted onto a LDC graph. LDC graphs, have flow duration interval (percentage of time flow exceeded) on the X-axis and the pollutant load (count of colonies for *E. coli*) on the Y-axis. The curved line on a LDC graph represents the TMDL of the respective flow conditions observed at that location. Water quality monitoring was completed in the MRS subwatersheds and measured pollutant concentrations were converted to individual sampling loads by multiplying the sample concentration by the instantaneous flow measurement observed/estimated at the time of sample collection. The individual sampling loads were plotted on the same figure with the created LDC.

Individual LDCs representing each TMDL are found in Section 5 of the TMDL document and in Appendix B of this Decision Document

The LDC plots were subdivided into five flow regimes; very high flow conditions (exceeded 0–10% of the time), high flow conditions (exceeded 10–40% of the time), mid-range flow conditions (exceeded 40–60% of the time), low flow conditions (exceeded 60–90% of the time), and very low flow conditions (exceeded 90–100% of the time). LDC plots can be organized to display individual sampling loads with the calculated LDC. Watershed managers can interpret LDC graphs with individual sampling points plotted alongside the LDC to understand the relationship between flow conditions and water quality exceedances within the watershed. Individual sampling loads that plot above the LDC represent violations of the WQS for those flow conditions. The difference between individual sampling loads plotted above the LDC and the LDC, measured at the same flow, is the amount of reduction necessary to meet WQS.

The LDC TMDL tables in this Decision Document report five points (the midpoints of the designated flow regime) on the loading capacity curve. However, it should be understood that the components of the TMDL equation could be illustrated for any point on the entire loading capacity curve. The LDC method can be used to display pollutant monitoring data and allows for the estimation of load reductions necessary for attainment of the appropriate WQS. Using this method, daily loads were developed based upon the flow in the waterbody. Loading capacities were determined for the segment from multiple flow regimes. This creates a TMDL that represents the allowable daily load across all flow conditions. The TMDL tables identify the loading capacity for the waterbody at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved as a TMDL.

The strengths of using the LDC method are that critical conditions and seasonal variation are considered in the creation of the FDC by plotting hydrologic conditions over the flows measured during the recreation season. Additionally, the LDC methodology is relatively easy to use and cost-effective. The weaknesses of the LDC method are that nonpoint source allocations cannot be assigned to specific sources, and specific source reductions are not quantified.
Overall, MPCA believes and EPA concurs that the strengths outweigh the weaknesses for the LDC method. The LDC approach is useful in determining loading capacities, wasteload allocations, load allocations and the margin of safety for *E. coli* and TSS TMDLs. The methods used are consistent with U.S. EPA technical memos.[1]

E. coli

Typically loading capacities are expressed as a mass per time (e.g. pounds per day). However, for *E. coli* loading capacity calculations, mass is not always an appropriate measure. Instead, *E. coli* is expressed in terms of organism counts. This approach is consistent with the EPA's regulations which define "load" as "an amount of matter that is introduced into a receiving water". To establish the loading capacities for the MRS *E. coli* TMDLs, MPCA used Minnesota's WQS for *E. coli* (in orgs/mL). A loading capacity is, "the greatest amount of loading that a water can receive without violating water quality standards." Therefore, a loading

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[1] An Approach for Using Load Duration Curves in the Development of TMDLs
https://www.epa.gov/sites/production/files/2015-07/documents/2007_08_23_tmdl_duration_curve_guide_aug2007.pdf

capacity set at the WQS will assure that the water does not violate WQS. MPCA's *E. coli* TMDL approach is based upon the premise that all discharges (point and nonpoint) must meet the WQS when entering the waterbody. If all sources meet the WQS at discharge, then the waterbody should meet the WQS and the designated use.

MPCA uses the geometric mean for *E.coli* counts to calculate loading capacity values for the *E. coli* TMDLs (126 orgs/100 mL or 630 orgs/100 mL). MPCA believes the geometric mean portion of the WQS provides the best overall characterization of the status of the watershed. EPA agrees with this assertion, as stated in the preamble of, "The WQS for Coastal and Great Lakes Recreation Waters Final Rule", "…the geometric mean is the more relevant value for ensuring that appropriate actions are taken to protect and improve water quality because it is a more reliable measure, being less subject to random variation, and more directly linked to the underlying studies on which the 1986 bacteria criteria were based."[2] MPCA stated that the *E. coli* TMDLs will focus on the geometric mean portion of the WQS (126 orgs/100 mL or 630 orgs/100 mL) and that it expects that by attaining the geometric mean portion of the *E. coli* WQS the single sample portion of the *E. coli* WQS will also be attained. EPA finds these assumptions to be reasonable.

In addition, to using the geometric mean MPCA structures its WQS to reflect when the highest potential for contact occurs (spring though summer). By targeting this critical exposure period MPCA can achieve the greatest overall protection. A review of historical data indicates that *E. coli* loading is a problem for the entire flow regime for most of the stream TMDLs. Some LDCs indicate more of a problem under higher flows, but there is often limited data for the lower flow regimes.

EPA supports the data analysis and modeling approach used by MPCA in its calculation of wasteload allocations, load allocations, and the margin of safety for the MRS *E. coli* TMDLs. Additionally, EPA concurs with the loading capacities calculated by MPCA in the *E. coli* TMDLs. EPA finds MPCA's approach for calculating the loading capacity to be reasonable and consistent with EPA guidance.

The summary tables for all of the *E. coli* TMDLs are in Tables 3-17 of Appendix A of this Decision Document.

Phosphorus

MPCA modeled phosphorus loading capacity with the BATHTUB model. These calculations were done for the lake's critical conditions, the summer growing season, when water quality in each lake is most likely to be degraded and phosphorus loading inputs are the greatest. Therefore, the resulting allocations will protect the MRS lakes during the time of the year with the highest potential for degraded water quality. MPCA also assumes that the loading capacities established by the TMDL will be protective of water quality during the remainder of the calendar year (October through May). Minnesota reflects this assumption with its targeted WQS approach for the months of June through September. In addition to the allocations being set for the summer months and Minnesota's WQS reflecting this period, the BATHTUB model is calibrated to the summer growing season.

[2] 69 FR 67218-67243 (November 16, 2004) – https://www.gpo.gov/fdsys/pkg/FR-2004-11-16/html/04-25303.htm

MPCA calibrated the BATHTUB models with lake data from 2008 through 2017 (Section 4.8.1 of the TMDL). MPCA used these calibrated models to determine the proportional loading for the MRS phosphorus TMDLs. This data was provided in the form of tributary inflow (watershed loading), precipitation (atmospheric loading), and internal load. The watershed and internal loading portions were reduced until the modeled results obtained the phosphorus criterion for each lake (Table 2 of this Decision Document). MPCA then used these values to develop the TMDL. MPCA then modeled reductions in loading until the phosphorus criterion was met. WLAs were then calculated, the MOS calculated and then the LA was determined (Section 4.8 of the TMDL).

The TMDL tables for the phosphorus TMDLs are found in Tables 18-19 of this Decision Document and in Section 5.2 of the TMDL.

Table 18: Phosphorus TMDL summary, Two Rivers Lake (73-0138-00)

TMDL Parameter	TMDL Allocations	
	TP Load (lb/yr)	TP Load (lb/day)
WLA for Construction Stormwater	4.75	0.0130
WLA for Industrial Stormwater	4.75	0.0130
WLA for Albany WWTF (MN0020575)	840	2.30
Load Allocation	5,689	15.6
Margin of Safety	726	1.99
Loading Capacity	**7,264**	**19.9**
	Other	
Existing Load	21,956	60.2
Percent Load Reduction	67%	67%

Table 19: Phosphorus TMDL summary, Platte Lake (18-0088-00)

TMDL Parameter	TMDL Allocations	
	TP Load (lb/yr)	TP Load (lb/day)
WLA for Construction Stormwater	0.623	0.00171
WLA for Industrial Stormwater	0.623	0.00171
Load Allocation	2,077	5.69
Margin of Safety	231	0.633
Loading Capacity	**2,309**	**6.33**
	Other	
Existing Load	4,833	13.2
Percent Load Reduction	52%	52%

EPA finds that the TMDL document submitted by 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.

Comment:

***E. coli* Load Allocation**

Once the Loading Capacities, which are based upon the applicable WQS, were determined and the WLAs were established, MPCA develops the LA for each *E. coli* TMDLs. Starting with the loading capacity Minnesota subtracted the MOS and the WLAs. The remaining assimilative capacity represents the portion of the loading capacity that is allocated to pollutant loads that are not permitted through an NPDES permit; for example, non-permitted watershed runoff, ITPHS, and natural background (Section 4.7.3 of the TMDL).

MPCA's approach to establishing LAs for each of the individual TMDL in the MRS Watershed study area was to develop the nonpoint source allocations by pollutant of concern, and not by individual sources or source categories. Although the individual nonpoint sources are part of an aggregated load allocation and not assigned individual allocations, additional calculations to identify relative loadings and to appropriately prioritize and address priority pollutant sources to each watershed are described throughout the TMDL and this Decision Document.

MPCA estimated the relative contributions for some but not all potential *E. coli* sources. MPCA noted where additional information was available allow for source assessment exercises to establish relative loading contributions from cropland, livestock, failing SSTSs, and other anthropogenic sources. Section 3.6.2 and Table 18 of the TMDL summarize the actual or potential sources of bacteria loadings in the subwatersheds.

Total Phosphorus

Non-permitted sources of phosphorus are summarized in Section 3.6.3 of the TMDL. Although MPCA did not further subdivide the LA by source type, MPCA did document estimated loadings from several source types, as noted in Table 20 and Figures 10-11 of the TMDL.

Models within BATHTUB inherently include an internal load that is typical of lakes. For Platte Lake, the internal load was added during model calibration (see Internal Loading discussion in Section 3.6.3 in the TMDL that a larger amount of internal loading was suggested by the data that than the average rates used in BATHTUB). The BATHTUB models were calibrated to the long-term average phosphorus concentration, consisting of all data from 2008 through 2017 (Section 3.5.2 of the TMDL).

Estimated percentage reductions for loadings to Two Rivers Lake and Platte Lake were developed by MPCA to guide activities to address the sources of water quality standards impairment identified by the State (Tables 70 and 73 of the TMDL).

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

5. Wasteload Allocations (WLAs)

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

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

Comment:
The MPCA states that WLAs were determined for applicable point sources in each subwatershed (Sections 4.7.2 and 4.8.2 of the TMDL). MPCA indicated that the MRS impairments are primarily due to contributions from nonregulated sources.

E. coli
MPCA's approach sets *E. coli* WLA equal to flow contribution from a given source multiplied by 126 org *E. coli*/100 mL (Section 4.7.2. of the TMDL).

WWTFs – MPCA identified NPDES permitted facilities (Table 20 of this Decision Document) within the MRS watershed and assigned those facilities a portion of the WLA. WLAs for each of these individual facilities were calculated based on the facility's maximum daily volume (in millions of gallons per day) and the *E. coli* WQS (126 orgs /100 mL) (Section 4.7.2 of the TMDL). MPCA explained that the WLA for each individual WWTF was calculated based on the *E. coli* WQS but WWTF permits are regulated for the fecal coliform (200 orgs /100 mL as a geometric mean) and that if a facility is meeting its fecal coliform limits, which are set in the facility's discharge permit, MPCA assumes the facility is also meeting the calculated *E. coli* WLA from the MRS watershed TMDLs. The WLA was therefore calculated using the assumption that the *E. coli* standard of 126 orgs/100 mL provides equivalent protection from illness due to primary contact recreation as the fecal coliform WQS of 200 orgs/100 mL.

MS4– MPCA described how *E. coli* WLAs for permitted MS4 areas within each TMDL subwatershed were determined in Section 4.7.2 of the TMDL. Two subwatersheds contain permitted MS4 areas (Stony Creek and County Ditch 16) and the MS4 systems received WLAs (Table 22, Figure 12 in the TMDL). The estimated permitted area of each permitted MS4 within an impaired subwatershed was divided by the total area of the subwatershed to represent the percent coverage of each permitted MS4 within the impaired subwatershed. The WLAs for permitted MS4s were calculated as the percent coverage of each permitted MS4 multiplied by the loading capacity minus the MOS.

MPCA noted that the City of Sartell has an annexation agreement with Le Sauk Township, and in the near future will be responsible for the MS4 loads. The WLA for Sartell was calculated to include the future annexation of Le Sauk Township. Section 4.7.2 of the TMDL discusses the specific details on the calculation of are addressed by each MS4.

CAFOs – MPCA noted the presence of 20 CAFOs in the MRS watershed in Section 4.7 of the final TMDL document. CAFOs and other feedlots are generally not allowed to discharge to waters of the State (Minnesota Rule 7020.2003). CAFOs were assigned a WLA of zero (WLA = 0) by MPCA for the MRS bacteria TMDLs. CAFOs are generally defined as having over 1,000 animal units confined for more than 45 days in a year. Under MPCA NPDES permit requirements, discharges of pollutants from CAFOs are not allowed except under extreme circumstances (24-hour storm duration exceeding the 25-year recurrence interval), and therefore no allocations were developed for the manure-handling facilities. If there is a discharge, MPCA noted that it must be consistent with the applicable permit. Runoff from the spreading of manure in agronomic rates is not regulated as a point source discharge and is therefore considered in the nonpoint source load.

General Industrial and Construction Stormwater permits – Industrial and construction stormwater sources are not expected by MPCA to be sources of *E. coli*. MPCA did not assigned a WLA to these sources.

The *E. coli* WLAs described are presented in Tables 21 and 22 in the TMDL and in this decision document. MRS River *E. coli* TMDL Summary Tables and Load Duration Curves also present WLAs in Appendix 1 and 2 respectively of this Decision Document.

Table 21: Individual *E. coli* WLAs for the MRS watershed TMDLs

Facility	Permit Number	Design Flow (Mgd)[a]	*E. coli* WLA (b-organisms/day)	Impaired waterbody	AUID
Albany WWTF	MN020575	5	23.85[b]	South Two River	542
Bowlus WWTF	MN0020923	0.277	1.32	North Two River	524
Richland Prairie Sewer Treatment Facility	MNG580211	2.167	10.34	Skunk River	521

a – Maximum daily pond flow in millions of gallons/day
b – WLAs noted with footnote apply May-October; all others apply April-October

Table 22: MS4 WLAs for *E. coli* for the MRS watershed TMDLs

MS4 Name	Permit Number	Regulated area (ac)	*E. coli* WLA (b-organisms/day)[a]	Impaired waterbody	AUID
Brockway Township	MS400068	497	4.3-0.090	Stony Creek	649
City of Sartell[b]	MS400048	1873	16-0.60	County Ditch 116	616
Stearns County	MS400159	13	0.11-0.0040	County Ditch 16	616

a – Range of *E. coli* WLAs from very high to very low
b – The WLA for the City of Sartell includes 587 acres of regulated area that is currently part of Le Sauk Township (MS400143) but is expected to be annexed to the City of Sartell as a result of future growth. The Le Sauk Township annexation are represents approximately 31% of the 1873 acres that are accounted for in the City of Sartell's WLA.

EPA finds the MPCA's approach for calculating the WLAs for the MRS watershed bacteria TMDLs to be reasonable and consistent with EPA guidance.

Phosphorus

In the phosphorus-impaired lakes, WLAs are provided for municipal wastewater and for permitted construction and industrial stormwater. There are no permitted MS4s in the impaired lake subwatersheds. CAFOs are required to completely contain runoff.

WTPs– The Albany WWTF, which discharges in the Two Rivers Lake Subwatershed, is the only permitted wastewater source in the phosphorus-impaired lakes subwatersheds (Table 18 of this Decision Document and Section 4.8.2 of the TMDL). MPCA noted that the WLA of 2.30 lb/day is not intended to be a permit limit, as the New Albany facility is not a continuous discharger (Section 4.8.2 of the TMDL). The EPA is approving the 2.30 lb/day WLA only; how the WLA is implemented in any NPDES permit will be addressed in the NPDES permit process.

Construction and industrial stormwater – A categorical WLA for phosphorus is provided for construction stormwater and industrial stormwater. See Section 4.5 of the TMDL for details. Construction and Industrial Multi-Sector stormwater sources are permitted through General Permits MNR100001 and MNR050000 respectively.

Construction stormwater is permitted through the Construction Stormwater General Permit MNR100001, and a single categorical phosphorus WLA for construction stormwater is provided for each of the impaired lakes. Permitted industrial activities make up a small portion of the impaired lake watershed areas, and the industrial stormwater WLA for each impaired lake was set equal to the construction stormwater WLA. To determine the construction and industrial stormwater WLAs the average annual percent area of each county that is permitted through the construction stormwater permit and the industrial stormwater permit was determined and area-weighted for each impairment watershed (Section 4.5 of the TMDL).

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)(l)(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.

Comments:

MPCA applied an explicit 10% MOS to their MRS TMDLs (Tables 3-19 of this Decision Document; Section 4.2 of the TMDL). MPCA determined that this MOS should account for any environmental variability in pollutant loading, limitations in water quality data, errors in the calibration and validation of the HSPF model, and limitations associated with the drainage area-ratio method for extrapolating flows. Minnesota noted that the datasets and the quality of the modeling for the TMDL were robust and therefore the quality of results are a valid representation of results, as described below.

Calibration results indicate that the HSPF model is a valid representation of hydrologic and water quality conditions in the watershed (RESPEC, 2015). Flow data used to develop the stream TMDLs are derived from HSPF-simulated daily flow data. The HSPF model was also used to estimate watershed phosphorus loading to the impaired lakes. The BATHTUB models used to develop the lake TMDLs for Total Phosphorus show agreement between the observed lake water quality and the water quality predicted by the lake response models (Appendix B of the TMDL).

MPCA explained that 10% was considered an appropriate MOS for the bacteria TMDLs because the LDC approach minimizes the uncertainty associated with developing TMDLs. For the bacteria TMDLs, MPCA also consider the fact that they did not include a rate of decay or die-off rate of pathogen species when calculating the TMDL or creating LDCs. As stated in the EPA’s Protocol for Developing Pathogen TMDLs (EPA 841-R-00-002), many different factors affect the survival of pathogens, including the physical condition of the water.

EPA agrees that this MOS accounts for any uncertainty attributed to the modeling efforts and finds that the TMDL document submitted by the MPCA satisfies 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)(l)(C), 40 C.F.R. §130.7(c)(l)).

Comment:

MPCA addresses seasonal variation and critical conditions for in the *E. coli* TMDLs through the application of load duration curves. Load duration curves evaluate water quality conditions across all flow regimes including high flow, which is the runoff condition where pollutant transport and loading from upland sources tend to be greatest, and low flow, when loading from wastewater and other direct sources to the waterbodies has the greatest impact. Seasonality is accounted for by addressing all flow conditions in a given reach.

The Minnesota eutrophication standards state that total phosphorus WQS are defined as the mean concentration of phosphorus values measured during the growing season. Seasonal variations are addressed in the lake phosphorus TMDLs by assessing conditions during the summer growing season, which is when the water quality standards apply (June 1 through September 30). The frequency and severity of nuisance algal growth in Minnesota lakes is typically highest during the growing season. By setting the TMDL to meet targets by setting the TMDL to meet targets established for the most critical period (summer), the TMDL will inherently be protective of water quality during all other seasons. Established for the most critical period (summer), the TMDL will inherently be protective of water quality during all other seasons if the standards are met for the critical summer months. Seasonal variation is also addressed by the water quality standards' application during the period when high pollutant concentrations are expected via storm event runoff.

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

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 NPDES permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with "the assumptions and requirements of any available wasteload allocation" in an approved TMDL.

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

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

Comment:
The Clean Water Legacy Act (CWLA) was passed in Minnesota in 2006 for the purposes of 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 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 MRS watershed WRAPS was approved by MPCA on November 20, 2020.

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).

One Watershed One Plan (1W1P)

The Minnesota Legislature adopted legislation (Minn. Stat. §103B.101, subd. 14) referred to as One Watershed One Plan (1W1P) which authorizes BWSR to adopt methods to allow comprehensive plans, local water management plans, or watershed management plans to serve as substitutes for one another or to be replaced with one comprehensive watershed management plan. Further legislation defining purposes and outlining additional structure for 1W1P, officially known as the Comprehensive Watershed Management Planning Program (Minn. Stat. § 103B.801), was passed in May 2015.

Minnesota states in the TMDL that the 1W1P is an "important component of the reasonable assurance framework." The 1W1P for the MRS watershed has not yet been completed. The eventual MRS 1W1P will follow the completion of the WRAPs for the TMDL project focus area.

Water planning continues on a county basis, per the Comprehensive Local Water Management Act (Minn. Stat. § 103B.301). The following is a list of local county water plans for major counties in the MRS watershed. MPCA provides examples in Section 7.3 of the TMDL of local Soil and Water Conservation District (SWCD) non-point source reduction plans and various partners that will implement the plans. MPCA also provided examples of projects undertaken with partners to improve water quality in the area of the MRS Watershed TMDL study area:

- Benton County Comprehensive Local Water Management Plan;
- Crow Wing County Local Comprehensive Water Plan - 2013 through 2023;
- Mille Lacs County Local Water Resource Management Plan 2006 through 2016 and 2012 Amendments;
- Morrison County Five Year Focus Plan, Comprehensive Local Water Plan - 2017 through 2022;
- Stearns County Local Water Management Plan Amendment - 2013 through 2017.

Local water plans incorporate implementation strategies aligned with or called for in TMDLs and WRAPS and are implemented by SWCDs, counties, state and federal agencies, and other partners. These local plans and the eventual 1W1Ps evaluate the effectiveness of the previous plan, determine current local priorities, set goals and objectives for those priorities, and set timelines for specific BMPs to achieve the goals and objectives.

Reasonable assurance that WLAs will be implemented is provided by regulatory actions. According to 40 CFR 122.44(d)(1)(vii)(B), NPDES permit effluent limits must be consistent with assumptions and requirements of all WLAs in an approved TMDL. MPCA implements its storm water and NPDES permit programs and is responsible for making the effluent limits consistent with the WLAs in this TMDL.

In order to address pollutant loading in the MRSW, required point source controls will be effective in improving water quality if accompanied by considerable reductions in nonpoint source loading. Reasonable assurance for permitted sources such as stormwater, CAFOs, and wastewater is provided primarily via compliance with their respective NPDES/SDS permit programs, as described in Section 3.6 of the TMDL.

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

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 assess if load reductions provided for in the TMDL are occurring and leading to attainment of water quality standards.

Comment:

MPCA has a comprehensive water quality monitoring program, Minnesota's Water Quality Monitoring Strategy. This program is comprised of three monitoring programs: Intensive Watershed Monitoring, Watershed Pollutant Load Monitoring Network, and the Citizen Stream and Lake Monitoring Program (Section 8 of the TMDL). MPCA's statewide monitoring program assesses the states waters on a ten-year rotating timeframe. This historical monitoring created a robust dataset that was used for the model development of the MRS TMDL and will be used as a baseline to evaluate overall improvements in the watershed. Furthermore, continued water quality monitoring within the basin will provide insight into the success or failure of BMP systems designed to reduce *E. coli* and nutrient loading into the surface waters of the watershed. Local watershed managers will be able to reflect on the progress of the various pollutant removal strategies and would have the opportunity to change course if observed progress is unsatisfactory.

EPA finds that the ninth 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:

As was stated in the Reasonable Assurance section of this Decision Document, MPCA outlines various BMPs to be implemented providing a roadmap towards achieving WQS. A description of these practices can be found in Table 74 of the TMDL.

The findings from the MRS TMDLs, WRAPS, and other existing plans will be used to support local working groups and jointly develop scientifically supported restoration and protection strategies. Some of this work will culminate in the development of the proposed 1W1P mentioned in the Reasonable Assurance section of this Decision Document. These goals will be accomplished through education and outreach, local ordinances, and BMPs. Various locally specific BMPs and restorations strategies outlined in the existing plans and in Section 9 of the MRS TMDL can be found in the subsections below broken down by pollutant.

E. coli

MPCA's main approach to address bacteria contamination is to increase understanding of the main sources and provide that knowledge to the residents of the watershed. Increased education and outreach to the general public bring greater awareness to the issues surrounding bacteria contamination and strategies to reduce loading and transport of bacteria. Education efforts targeted to the general public are commonly used to provide information on the status of impacted waterways as well as to address pet waste and wildlife issues. Education efforts may emphasize aspects such as cleaning up pet waste or managing the landscape to discourage nuisance congregations of wildlife and waterfowl. Education can also be targeted to municipalities, land managers and other groups who play a key role in the management of bacteria sources.

Pasture Management/Livestock Exclusion Plans – Reducing livestock access to stream environments will lower the opportunity for direct transport of bacteria to surface waters. The installation of exclusion fencing near stream and river environments to prevent direct access for livestock, installing alternative water supplies, and installing stream crossings between pastures, would work to reduce the influxes of bacteria and improve water quality within the watershed. Additionally, introducing rotational grazing to increase grass coverage in pastures, and maintaining appropriate numbers of livestock per acre for grazing, can also aid in the reduction of bacteria inputs.

Manure Collection and Storage Practices – Manure has been identified as a source of bacteria. Bacteria can be transported to surface waterbodies via stormwater runoff. Bacteria laden water can also leach into groundwater resources. Improved strategies for the collection, storage and management of manure can minimize impacts of bacteria entering the surface and groundwater system. Repairing manure storage facilities or building roofs over manure storage areas may decrease the number of bacteria in stormwater runoff.

Manure Management Plans – Developing manure management plans can ensure that the storage and application rates of manure are appropriate for land conditions. Determining application rates that consider the crop to be grown on that particular field and soil type will ensure that the correct amount of manure is spread on a field given the conditions. Spreading the correct amount of manure will reduce the availability of bacteria to migrate to surface waters.

Feedlot Runoff Controls – Treatment of feedlot runoff via diversion structures, holding/storage areas, and stream buffering areas can all reduce the transmission of bacteria to surface water environments. Additionally, cleaner stormwater runoff can be diverted away from feedlots to prevent bacteria contamination.

SSTS – Improvements to septic management programs and educational opportunities can reduce the occurrence of septic pollution. Educating the public on proper septic maintenance, finding and eliminating illicit discharges and repairing failing systems could lessen the impacts of septic derived bacteria inputs into the MRS.

Riparian Area Management Practices – Protection of streambanks within the watershed through planting of vegetated/buffer areas with grasses, legumes, shrubs or trees will mitigate bacteria inputs into surface waters. These areas will filter stormwater runoff before the runoff enters the main stem or tributaries of the MRS.

WWTF – Adherence to the state NPDES permits though on-site control mechanisms is seen as a sufficient means of source control from WWTFs, some plants may need to be updated with newer technologies.

MS4s – While not currently a source if future areas are placed under an MS4 permit, retention basins are often used as a primary mechanism for achieving any necessary WLA reductions.

Phosphorus
As with *E. coli* a major component of addressing the phosphorus loading is to educate the watershed inhabitants. Practices that prevent phosphrous from reaching the lakes are both beneficial in the short and long-term. For these reasons the practices in this section are about both about preventing phosphorus from reaching the impaired lakes and about controlling internal loading. Many of the controls for *E. coli* discussed above also apply to the reduction of phosphorus. Additional controls to those noted above include:

Internal Loading Control Measures – MPCAs control strategies for internal loading include rough fish control, chemical binding of phosphorus, and a re-establishment of native vegetation. Additionally, MCPA has indicated that controlling lake levels may help mitigate phosphorus release from sediment. These practices in combination with watershed controls can reduce or eliminate the impact of internal loading on overall lake water quality.

EPA finds the tenth criterion has been adequately addressed. EPA reviews, but does not approve TMDL 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)(l)(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:
Meetings and/or other informal communications with county and SWCD staff, MS4 representatives, other state agency staff, and other stakeholders were held at various points during the project. Opportunities were given to provide feedback on the TMDL methodology and review draft versions of the TMDL report. As part of implementing the communication plan for the watershed, two community outreach events were held in Rice, Minnesota during development of the TMDL.

In addition, MPCA sponsored an Upper Mississippi–Brainerd/Sartell (MBS) Watersheds Civic Engagement Cohort in 2016–2017 through a training partnership with the University of Minnesota Extension. The cohort included partners from the Mississippi River–Brainerd Watershed and complements the efforts of the MRS WRAPS project through the professional training and development of interested watershed partners in becoming civic engagement leaders in their respective watersheds. The ongoing goal is to continue the communication among the cohort members to help sustain the system of civic engagement support and information for the watershed and TMDL.

The public notice period on the draft TMDL report was provided via a public notice in the State Register from September 14, 2020 through October 14, 2020. The draft TMDL was posted online by the MPCA at (http://www.pca.state.mn.us/water/tmdl). There were two comment letters received and responded to as a result of the public comment period. The first letter provided general comments on environmental protection, and encouraged the State to take more actions to protect the environment. MPCA encouraged the commenter to seek out and provide input during the development of the WRAPS and other implementation documents.

Another comment recommended implementation ideas for sediment sources such as land conservation easements and acquisition. MPCA responded by adding text to Section 7.3.4 of the TMDL describing local watershed groups that will be involved in implementing the TMDL and additional environmental controls.

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

12. Submittal Letter

A submittal letter should be included with the TMDL submittal, and should specify whether the TMDL is being submitted for a *technical review* or *final review and approval.* Each final TMDL submitted to EPA should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final review and approval, should contain such identifying information as the name and location of the waterbody, and the pollutant(s) of concern.

Comment:

The EPA received the final MRS watershed TMDL document, submittal letter and accompanying documentation from the MPCA on November 30, 2020. The transmittal letter explicitly stated that the final Mississippi River-Sartell Watershed TMDLs for *E. coli* and phosphorus were being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval. The letter also contained the name of the watershed as it appears on Minnesota's303(d) list, and the causes/pollutants of concern. This TMDL was submitted per the requirements under Section 303(d) of the Clean Water Act and 40 CFR 130.

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

13. Conclusion

After a full and complete review, the EPA finds that the TMDLs for Mississippi River-Sartell (MRS) Watershed for *E. coli* and phosphorus meet all of the required elements of approvable TMDLs. This TMDL approval is for a total of **seventeen (17) TMDLs**: fifteen (15) *E. coli* TMDLs and two (2) phosphorus TMDLs. These TMDLs address impairments for aquatic recreational use impairments.

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

Appendix A

Mississippi River – Sartell *E. coli* TMDL Summary Tables

Table 3: *E. coli* TMDL summary, Hay Creek (AUID 07010201-630).

TMDL parameter		Flow zones				
		Very high	**High**	**Midrange**	**Low**	**Very low**
Sources		***E. coli* load (B org/d)**				
Load	**Total LA**	80	31	15	6.4	2.3
MOS		8.9	3.4	1.7	0.71	0.26
Total load		**89**	**34**	**17**	**7.1**	**2.6**
Maximum monthly geomean (org/100 mL)		764				
Overall estimated percent reduction		84%				

Table 4: *E. coli* TMDL summary, North Two River (AUID 07010201-524).

TMDL parameter		Flow zones				
		Very high	**High**	**Midrange**	**Low**	**Very low**
Sources		***E. coli* load (B org/d)**				
Wasteload	**Bowlus WWTF (MN0020923)**	1.32	1.32	1.32	1.32	1.32
	Total WLA	1.3	1.3	1.3	1.3	1.3
Load	**Total LA**	226	84	43	18	6.3
MOS		25	9.5	4.9	2.2	0.85
Total load		**252**	**95**	**49**	**22**	**8.5**
Maximum monthly geomean (org/100 mL)		1,666				
Overall estimated percent reduction		92%				

Table 5: *E. coli* TMDL summary, South Two River (AUID 07010201-542

TMDL parameter		Flow zones				
		Very high	**High**	**Midrange**	**Low**	**Very low**
Sources		***E. coli* load (B org/d)**				
Wasteload	Albany WWTF (MN0020575)	23.85	23.85	23.85	23.85	– [a]
	Total WLA	24	24	24	24	– [a]
Load	**Total LA**	602	223	93	31	– [a]
MOS		70	27	13	6.1	1.7
Total load		**696**	**274**	**130**	**61**	**17**
Maximum monthly geomean (org/100 mL)		2,561				
Overall estimated percent reduction		75%				

a. The permitted wastewater design flows exceed the stream flow in the indicated flow zone(s). The allocations are expressed as an equation rather than an absolute number: allocation = (flow contribution from a given source) x (126 org per 100 mL) x conversion factors. See Section 4.7.2 of the TMDL for more detail.

Table 6: *E. coli* TMDL summary, Unnamed Creek (AUID 07010201-628).

TMDL parameter		Flow zones				
		Very high	High	Midrange	Low	Very low
Sources		***E. coli* load (B org/d)**				
Load	**Total LA**	4.9	2.0	0.99	0.41	0.13
MOS		0.54	0.22	0.11	0.046	0.015
Total load		**5.4**	**2.2**	**1.1**	**0.46**	**0.15**
Maximum monthly geomean (org/100 mL)		372				
Overall estimated percent reduction		66%				

Table 7: *E. coli* TMDL summary, Unnamed Creek (AUID 07010201-612).

TMDL parameter		Flow zones				
		Very high	High	Mid-range	Low	Very low
Sources		***E. coli* load (B org/d)**				
Load	**Total LA**	44	18	9.0	3.8	1.3
MOS		4.9	2.0	1.0	0.42	0.14
Total load		**49**	**20**	**10**	**4.2**	**1.4**
Maximum monthly geomean (org/100 mL)		2,033				
Overall estimated percent reduction		94%				

Table 8: *E. coli* TMDL summary, Unnamed Creek (AUID 07010201-580

TMDL parameter		Flow zones				
		Very high	High	Midrange	Low	Very low
Sources		***E. coli* load (B org/d)**				
Load	**Total LA**	35	14	7.6	3.1	1.1
MOS		3.9	1.6	0.84	0.35	0.12
Total load		**39**	**16**	**8.4**	**3.5**	**1.2**
Maximum monthly geomean (org/100 mL)		318				
Overall estimated percent reduction		60%				

Table 9: *E. coli* TMDL summary, Krain Creek (AUID 07010201-613

TMDL parameter		Flow zones				
		Very high	High	Midrange	Low	Very low
Sources		***E. coli* load (B org/d)**				
Load	**Total LA**	66	25	13	5.3	2.0
MOS		7.3	2.8	1.4	0.59	0.22
Total load		**73**	**28**	**14**	**5.9**	**2.2**

Maximum monthly geomean (org/100 mL)	406
Overall estimated percent reduction	69%

Table 10: *E. coli* TMDL summary, Spunk Branch (AUID 07010201-561).

TMDL parameter		**Flow zones**				
		Very high	**High**	**Midrange**	**Low**	**Very low**
Sources		***E. coli* load (B org/d)**				
Load	**Total LA**	103	42	22	13	6.2
MOS		12	4.7	2.4	1.4	0.69
Total load		**115**	**47**	**24**	**14**	**6.9**
Maximum monthly geomean (org/100 mL)		257				
Overall estimated percent reduction		51%				

Table 11: *E. coli* TMDL summary, Hillman Creek (AUID 07010201-639).

TMDL parameter		**Flow zones**				
		Very high	**High**	**Midrange**	**Low**	**Very low**
Sources		***E. coli* load (B org/d)**				
Load	**Total LA**	260	96	41	15	4.5
MOS		29	11	4.6	1.7	0.50
Total load		**289**	**107**	**46**	**17**	**5.0**
Maximum monthly geomean (org/100 mL)		1,520				
Overall estimated percent reduction		92%				

Table 12: *E. coli* TMDL summary, Skunk River (AUID 07010201-521)

TMDL parameter		**Flow zones**				
		Very high	**High**	**Midrange**	**Low**	**Very low**
Sources		***E. coli* load (B org/d)**				
Wasteload	Rich Prairie Sewer Treatment (MNG580211)	10.34	10.34	10.34	10.34	10.34
	Total WLA	10	10	10	10	10
Load	**Total LA**	772	282	114	40	4.4
MOS		87	33	14	5.6	1.6
Total load		**869**	**325**	**138**	**56**	**16**
Maximum monthly geomean (org/100 mL)		4,925				
Overall estimated percent reduction		97%				

Table 13: *E. coli* TMDL summary, Big Mink Creek (AUID 07010201-646)

TMDL parameter		Flow zones				
		Very high	High	Midrange	Low	Very low
Sources		***E. coli* load (B org/d)**				
Load	**Total LA**	130	45	20	7.8	2.5
MOS		14	5.0	2.2	0.87	0.28
Total load		144	50	22	8.7	2.8
Maximum monthly geomean (org/100 mL)		300				
Overall estimated percent reduction		58%				

Table 14: *E. coli* TMDL summary, Platte River (AUID 07010201-507).

TMDL parameter		Flow zones				
		Very high	High	Midrange	Low	Very low
Sources		***E. coli* load (B org/d)**				
Load	**Total LA**	1,020	366	164	67	19
MOS		113	41	18	7.4	2.1
Total load		**1,133**	**407**	**182**	**74**	**21**
Maximum monthly geomean (org/100 mL)		1,143				
Overall estimated percent reduction		89%				

Table 15: *E. coli* TMDL summary, Stony Creek (AUID 07010201-649)

TMDL parameter		Flow zones				
		Very high	High	Midrange	Low	Very low
Sources		***E. coli* load (B org/d)**				
Wasteload	Brockway Township MS4 (MS400068) [a]	4.3	1.7	0.70	0.32	0.090
	Total WLA	4.3	1.7	0.70	0.32	0.090
Load	**Total LA**	91	36	15	6.6	1.9
MOS		11	4.2	1.7	0.77	0.22
Total load		**106**	**42**	**17**	**7.7**	**2.2**
Maximum monthly geomean (org/100 mL)		633				
Overall estimated percent reduction		80%				

a See Table 22 for the estimated permitted MS4 areas.

Table 16: *E. coli* TMDL summary, Little Rock Creek (AUID 07010201-653)

TMDL parameter		Flow zones				
		Very high	High	Midrange	Low	Very low
Sources		***E. coli* load (B org/d)**				
Load	**Total LA**	377	143	60	24	7.2
MOS		42	16	6.7	2.7	0.80
Total load		**419**	**159**	**67**	**27**	**8.0**
Maximum monthly geomean (org/100 mL)		1,344				
Overall estimated percent reduction		91%				

Table 17: *E. coli* TMDL summary, County Ditch 16 (AUID 07010201-616)

TMDL parameter		Flow zones				
		Very high	High	Midrange	Low	Very low
Sources		***E. coli* load (B org/d)**				
Wasteload	Sartell City MS4 (MS400048) [a,b]	16	6.5	2.9	1.5	0.60
	Stearns County MS4 (MS400159) [a,b]	0.11	0.044	0.020	0.010	0.0040
	Total WLA	16	6.5	2.9	1.5	0.60
Load	**Total LA**	0.20	0.25	0.16	0.030	0.021
MOS		1.8	0.75	0.34	0.17	0.069
Total load		**18**	**7.5**	**3.4**	**1.7**	**0.69**
Maximum monthly geomean (org/100 mL)		547				
Overall estimated percent reduction		77%				

a. These permitted MS4s also have *E. coli* WLAs in the Watab River TMDL (AUID 07010201-528), which is downstream of County Ditch 16. The MS4 WLAs can be found in Tables 7-1 and 7-3 of the *Upper Mississippi River Bacteria TMDL Study & Protection Plan* (MPCA 2014a).
b. See Table 22 for the estimated permitted MS4 areas.

Appendix B
Mississippi River – Sartell TMDL
Waterbody Load Duration Curve Figures

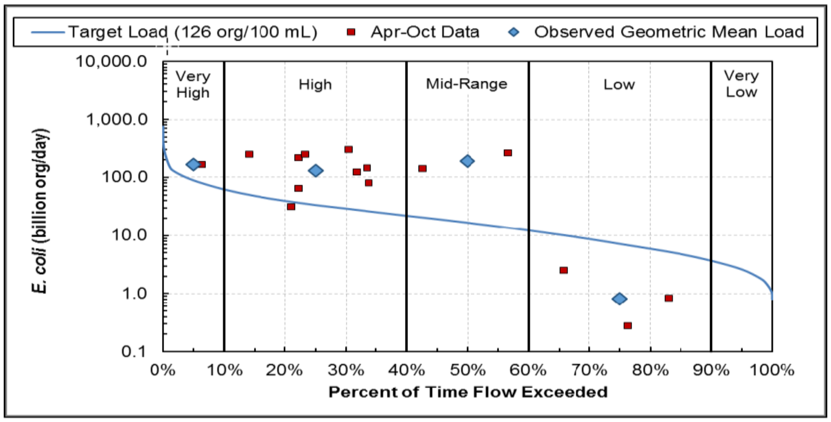

Figure 13. ***E. coli*** **load duration curve, Hay Creek (AUID 07010201-630).**

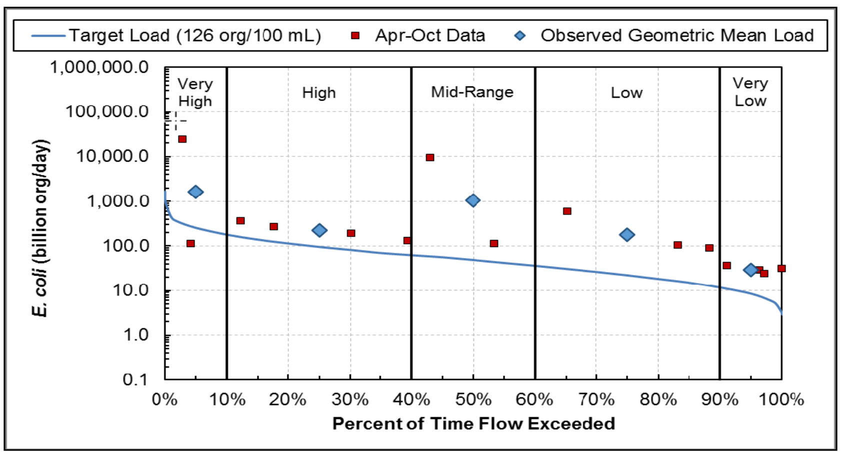

Figure 14. ***E. coli*** **load duration curve, North Two River (AUID 07010201-524).**

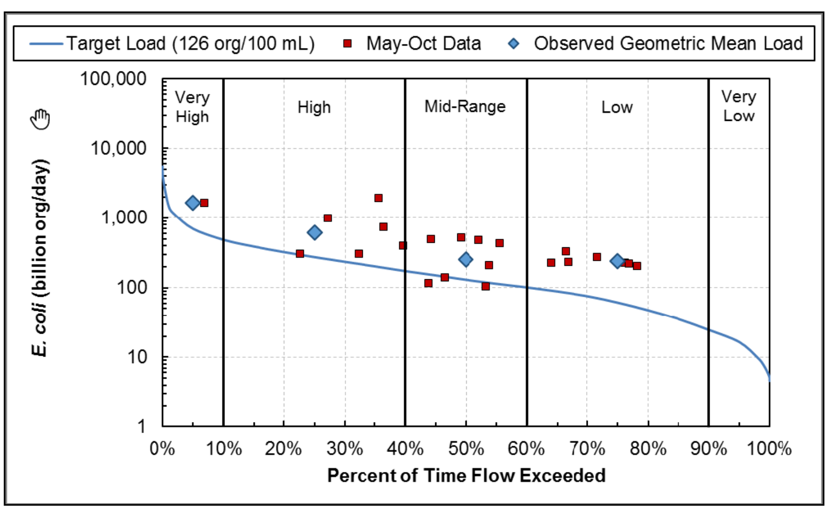

Figure 15. ***E. coli*** **load duration curve, South Two River (AUID 07010201-542).**

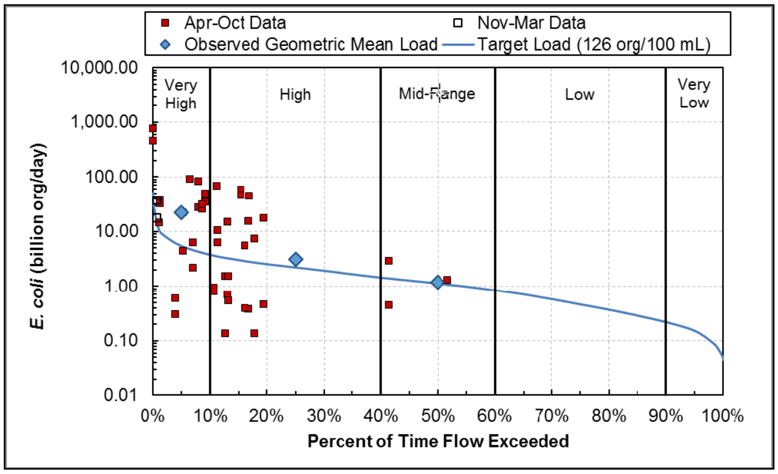

Figure 16. ***E. coli*** **load duration curve, Unnamed Creek (AUID 07010201-628).**

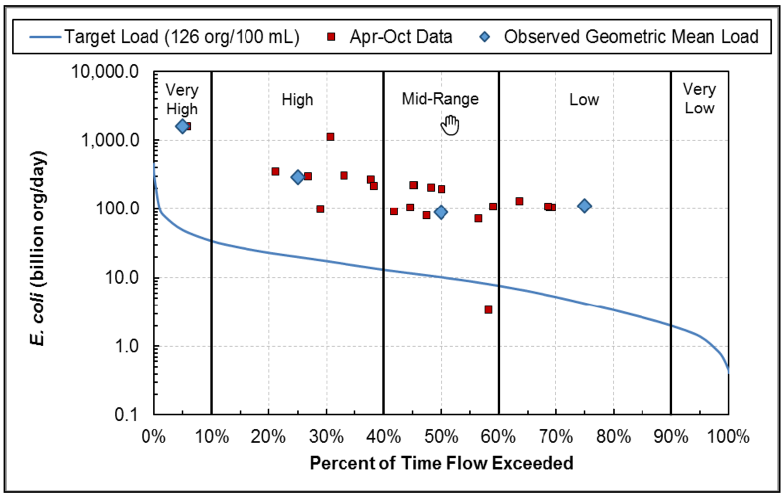

Figure 17. ***E. coli*** **load duration curve, Unnamed Creek (AUID 07010201-612).**

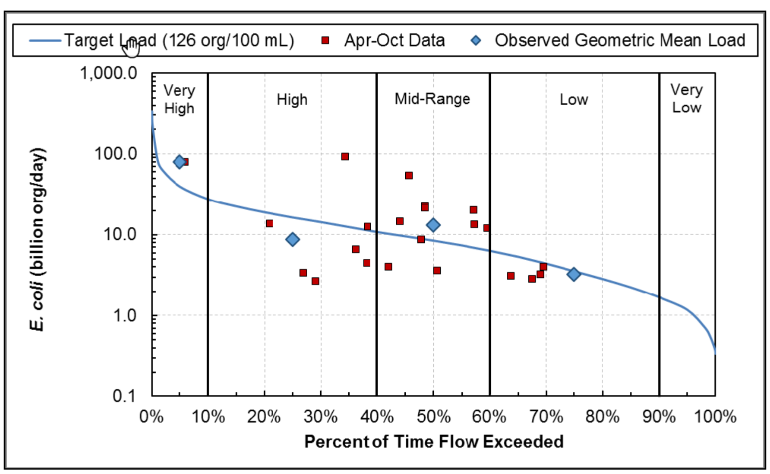

Figure 18. ***E. coli*** **load duration curve, Unnamed Creek (AUID 07010201-580).**

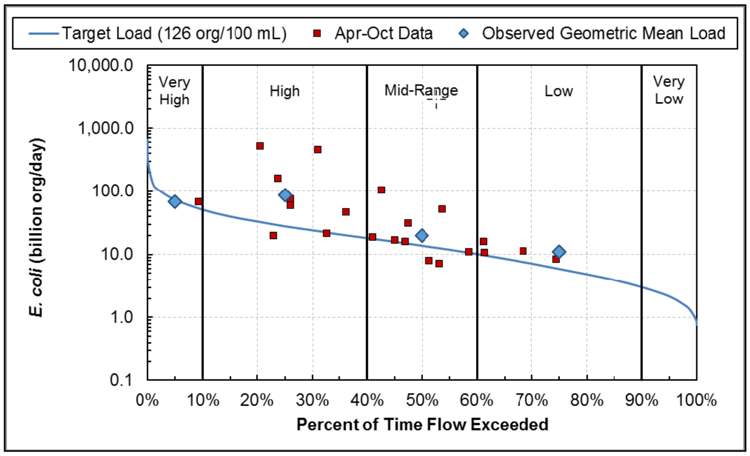

Figure 19. ***E. coli*** **load duration curve, Krain Creek (AUID 07010201-613).**

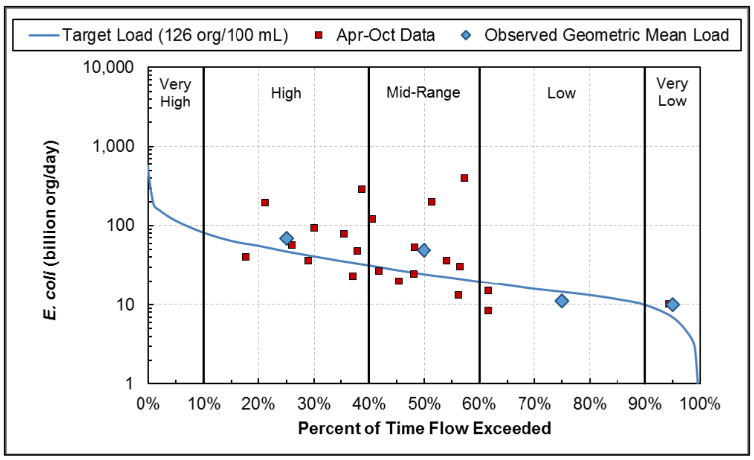

Figure 20. ***E. coli*** **load duration curve, Spunk Branch (AUID 07010201-561).**

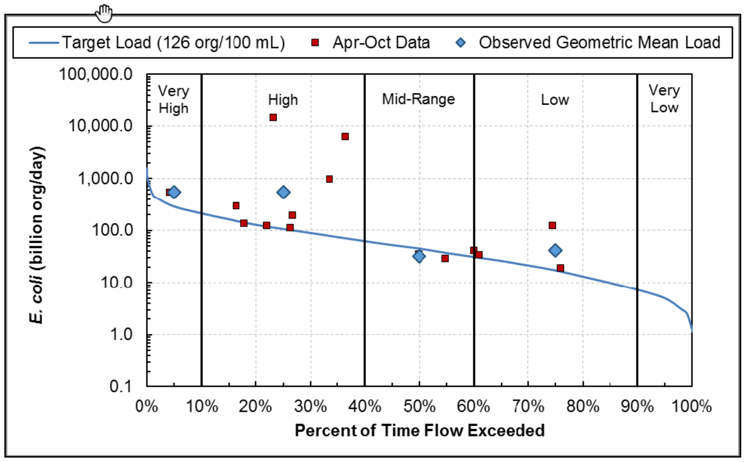

Figure 21. ***E. coli*** **load duration curve, Hillman Creek (AUID 07010201-639).**

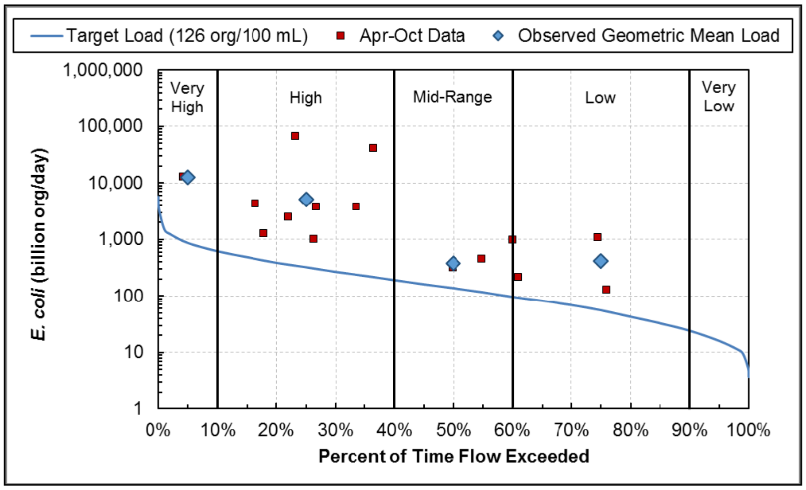

Figure 22. *E. coli* load duration curve, Skunk River (AUID 07010201-521).

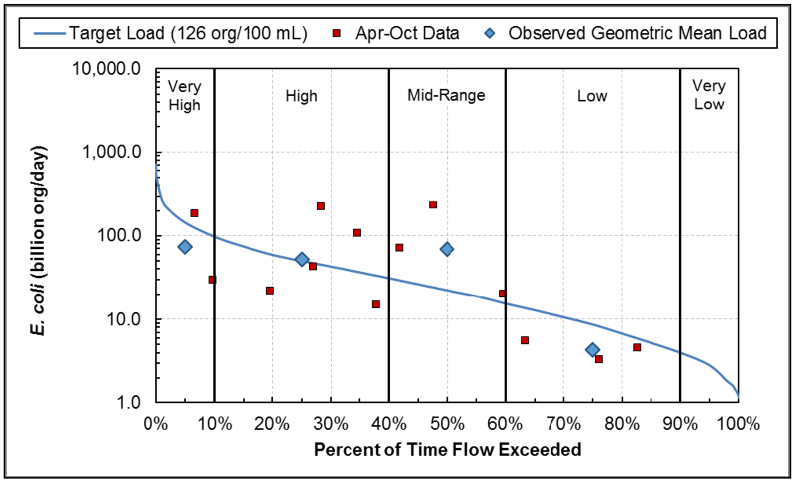

Figure 23. *E. coli* load duration curve, Big Mink Creek (AUID 07010201-646).

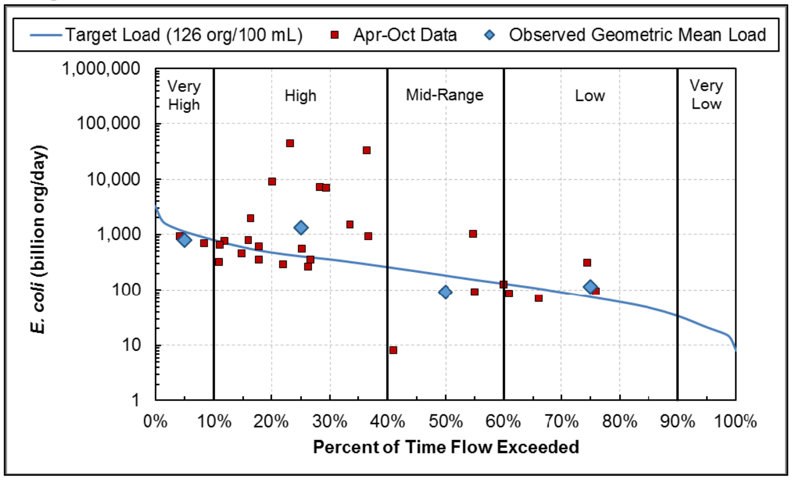

Figure 24. *E. coli* load duration curve, Platte River (AUID 07010201-507).

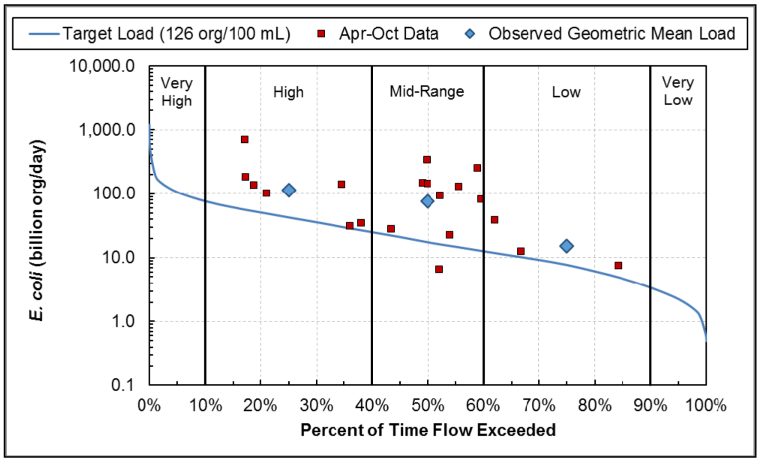

Figure 25. ***E. coli*** **load duration curve, Stony Creek (AUID 07010201-649).**

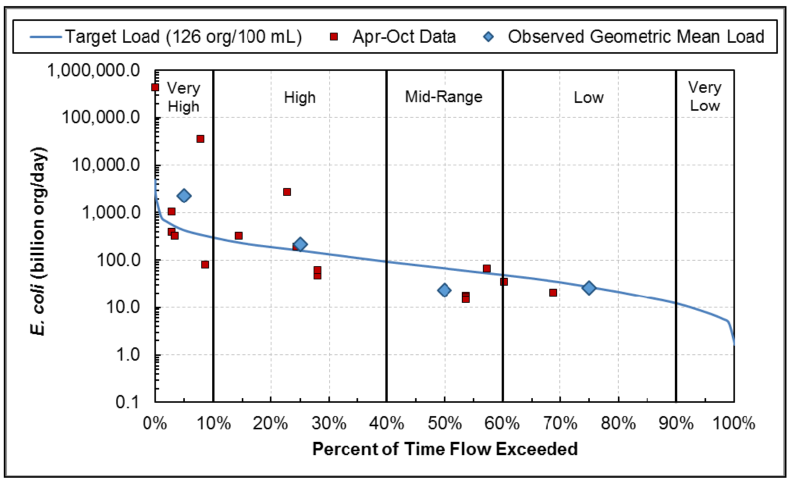

Figure 26. ***E. coli*** **load duration curve, Little Rock Creek (AUID 07010201-653).**

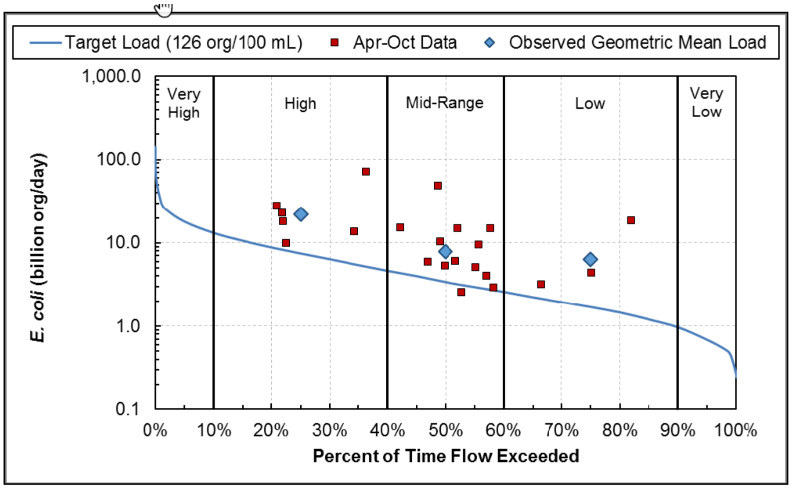

Figure 27. ***E. coli*** **load duration curve, County Ditch 16 (AUID 07010201-616).**